Tables of Thermal Properties of Gases

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Tables of Thermal Properties of Gases

Comprising
Tables of Thermodynamic and Transport Properties of
Air, Argon, Carbon Dioxide, Carbon Monoxide
Hydrogen, Nitrogen, Oxygen, and Steam

by
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PREFACE

Progress in all fields of science and technology rests on a knowledge of the properties of matter. This collection of tables is one of a series of compilations published by the National Bureau of Standards in furtherance of its mission to compile and disseminate data on the physical properties of substances of technical and scientific interest. The advances in high-speed flight -- both in research and engineering--are particularly dependent on precise knowledge of the behavior of materials of construction, of the theory of flight, of the physical and chemical properties of fuels and oxidizers, and of the very atmosphere through which flight is sustained.

The importance of basic thermodynamic and transport data for air and its constituent gases in the conduct of aerodynamic research has long been recognized. In 1948, Raymond J. Seeger, then Chief of the Aeroballistics Research Department, at the Naval Ordnance Laboratory, suggested to Ferdinand G. Brickwedde, Chief of the Heat and Power Division at the National Bureau of Standards, and to Hugh L. Dryden, Director of Research of the National Advisory Committee for Aeronautics, that a program of research and compilation be initiated in this field. After consultation with interested persons, F. G. Brickwedde proposed a program of research and outlined a plan for the compilation of tables of thermodynamic and transport properties of gases. This outline was circulated to a number of research laboratories and independent research workers for comment. As a result, plans for the compilation were improved, the program was formulated, and arrangements were made for a cooperative program with the National Advisory Committee for Aeronautics. The work was organized around members of the Thermodynamics Section of the Heat and Power Division who were at that time engaged in experimental research on the thermodynamic properties of gases. The responsibility for coordinating the efforts of the staff and supervising the work in general was delegated to Joseph Hilsenrath.

A decision was reached to distribute tables initially in looseleaf form in order to gain user reaction and suggestions, to stimulate the receipt of prepublication research results, and to supply research workers with the data without undue delay. The series was called the NBS-NACA Tables of Thermal Properties of Gases. In all, 43 separate tables were prepared and distributed between the inception of the project and October 1951.

The compilation of these tables was greatly facilitated by advances in the mechanization of thermodynamic calculations. From the beginning of this work, the staffs of the NBS Computation Laboratory and the Thermodynamics Section have worked together closely. Valuable assistance was rendered early in the work -- and indeed throughout -- by the hand-computing group of the Computation Laboratory. Later many of the operations involved in the calculation of the tables were performed by the IBM group which handled subtabulations, conversions, numerical integrations, and the automatic-typing, by means of a card-controlled typewriter, of the more than 300 pages of tables presented here.

In the course of the calculation of thermodynamic properties, a number of codes were devised for use on the Bureau of Standards Eastern Automatic Computer (SEAC). Codes are now available for the rapid calculation of: the harmonic-oscillator approximation to the ideal-gas thermodynamic functions; the corrections to the rigid-rotator harmonic-oscillator approximation including non-classical rotation and first-order corrections for rotational stretching, rotation-vibration interaction, and vibrational anharmonicity; and the calculation of tables of compressibility, density, and volume from virial coefficients. The advantage of the use of high-speed electronic computers for the calculation of thermodynamic functions is evidenced by the time -- about 5 minutes -- which was required to compute the some 320 entries in the table of ideal-gas thermal functions for steam (table 9-9).

The following members of the Thermodynamics Section were assigned to the project: William S. Benedict, Harold J. Hoge, Joseph F. Masi, Ralph L. Nuttall, and Harold W. Woolley. The group was joined by Charles W. Beckett in 1950, and by Lilla Fano in 1951. Yeram S. Touloukian, on leave from Purdue University, spent the summers of 1951 and 1952 on the project. The division of responsibility was approximately as follows: Benedict and Hilsenrath correlated the data on air, Beckett and Fano on argon and water, Woolley on hydrogen, nitrogen, and oxygen, Touloukian on carbon monoxide, Masi on carbon dioxide, Hoge correlated the vapor pressure, and Nuttall correlated the thermal conductivities. The viscosity tables were computed by Nuttall, Hilsenrath, and Touloukian.

Since a number of the authors have left the National Bureau of Standards, their present addresses are given below: William S. Benedict, Institute for Cooperative Research, Johns Hopkins University, Baltimore, Maryland; Harold J. Hoge, U. S. Army Quartermaster Research and Development Laboratories, Natick, Massachusetts; Joseph F. Masi, Callery Chemical Company, Callery, Pennsylvania; Ralph L. Nuttall, Argonne National Laboratories, Lemont, Illinois; and Yeram S. Touloukian, Department of Mechanical Engineering, Purdue University, Lafayette, Indiana.

The project has had a number of contributors and assistants from time to time. Among the former are: F. Charles Morey, who correlated the viscosity data for air; John Hubbell, who participated in the calculation of the steam data; Robert L. Powell, who correlated the viscosity of oxygen; and Robert Lindsay, who supervised the calculation of some of the air tables. The latter group includes Mary M. Dunlap, H. W. Flieger, F. R. Grover, G. G. King, L. C. Mihaly, J. T. Prather, P. P. Rumps, S. B. Schwartz, M. L. Snow, and Norma Young. One assistant, F. D. Queen, merits special mention. He has the distinction of having served the longest term on the project and for periods of time was indeed the only full-time worker. He was at times computer, draftsman, typist, and literature searcher. His detailed knowledge of the work and its progress was of immeasurable help to the project, and the authors are indeed in his debt.

Most valuable assistance was received from the Division of Applied Mathematics Computation Laboratory Staff under the supervision of Milton Abramowitz and Irene Stegun, and in particular from the IBM group which included L. Gordon, P. J. O'Hara, B. S. Prusch, M. Stein, and Ruth Zucker. The SEAC coding was performed by Ethel C. Marden of the Computation Laboratory. The preparation of the manuscript was expedited by the editorial assistance of Edith N. Reese, and the typescript was prepared by Hattie M. Napier.

A project of this magnitude could not be brought to fruition without the cooperation of many persons within the Bureau and outside. The authors wish particularly to acknowledge the helpful advice or data furnished by the following: N. A. Hall, University of Minnesota; J. O. Hirschfelder, University of Wisconsin; H. L. Johnston, Ohio State University; F. G. Keyes, Massachusetts Institute of Technology; E. J. LeFevre, Mechanical Engineering Research Organization, Scotland; A. Michels, University of Amsterdam; and D. D. Wagman, NBS Thermochemistry Section.

Others who contributed advice or data include J. D. Ackerman, T. F. Ball, H. C. Beaman, J. W. Beams, J. A. Beattie, E. W. Comings, S. Corrsin, C. F. Curtiss, M. C. Demler, W. S. Diehl, P. Diserens, H. W. Emmons, W. H. Evans, I. Glassman, J. A. Goff, L. Goldstein, R. P. Harrington, G. A. Hawkins, W. F. Hilton, J. N. Huff, M. Jakob, E. D. Kane, G. C. Kennedy, J. Kestin, A. M. Kuethe, J. M. Lenoir, A. S. Leonard, P. E. Liley, J. P. Longwell, R. J. Lunbeck, J. W. McBride, R. Morrison, H. T. Nagamatsu, R. L. Olinger, Donna Price, S. Reed, N. C. Rice, J. S. Rowlinson, A. E. Schmidlin, W. R. Sears, A. H. Senner, J. H. Shenk, L. E. Simon, R. Smelt, D. W. Stops, M. J. Thompson, M. Tribus, L. R. Turner, C. N. Warfield, S. Way, and P. Wegener. Helpful editorial suggestions were made by T. B. Douglas, Irwin Oppenheim, H. F. Stimson, D. D. Wagman, and W. H. Evans.

Extensive checks were incorporated in the machine codes and IBM techniques in an effort to eliminate computational errors in the tables. After the tables were typed, a systematic check was made to eliminate random typographical errors. The authors will appreciate criticism and comments and notification of any error or oversight which the reader may find.

A. V. Astin, Director

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TABLES OF THERMAL PROPERTIES OF GASES

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Tables are given at close temperature intervals for the thermodynamic and transport properties of air, argon, CO_2, CO, H_2, N_2, O_2, and steam. The thermodynamic properties - compressibility factor, density, entropy, enthalpy, specific heat, specific - heat ratio and sound velocity- are tabulated for the real gas at pressures up to 100 atmospheres and to temperatures of 600°K for hydrogen, 1500°K for carbon dioxide, 850°K for steam, and 3000°K for the remainder. The ideal - gas thermodynamic functions are tabulated uniformly to 5000°K. Also tabulated are the vapor pressures and transport properties – thermal conductivity, viscosity, and Prandtl number. These were fitted either semi-theoretically or empirically to the experimental values and are tabulated over the range of the available experimental data. Comparisons of the tabulated values with the existing experimental data are shown in deviation plots which exhibit the range and distribution of the experimental data as well as their agreement with the tabulated values.

CHAPTER 1

INTRODUCTION

The computation of sets of mutually consistent tables of thermodynamic properties of air, argon, carbon dioxide, carbon monoxide, hydrogen, nitrogen, oxygen, and steam has been accomplished through the representation of the pressure-volume-temperature (PVT) data by an equation of state, which was then used to calculate the gas imperfection corrections to the thermodynamic properties of the ideal gas. Since, usually, the experimental PVT data are abundant, cover a wide range of temperatures and pressures, and are precise, the equation of state is an effective and efficient starting point for the calculation of the values of the thermodynamic properties. In representing the PVT data for these tables, the objective was to cover adequately the limited range of pressure from zero to 100 atmospheres and of temperature from 100 to 200°K upward through the experimental range with a suitable extrapolation to higher temperatures. The properties tabulated include, with a few exceptions, the thermodynamic properties of the real gas: compressibility factor, density, entropy, enthalpy, specific heat, specific-heat ratio, and sound velocity at low frequency; the transport properties: viscosity, thermal conductivity, and Prandtl number; the vapor pressure of the liquid and the solid; and, for the ideal gas, the heat capacity, entropy, enthalpy, and free energy function. The vapor pressures and transport properties were correlated independently and are tabulated over the range of the experimental data. The ranges covered in the various tables are shown in the summary table 1-A.

Fundamental Constants

The fundamental constants used in this compilation are those given in NBS Circular 461 [1]*. In the light of more recent information [2,3], these values should be readjusted. Such a readjustment will have no significant effect upon the tables themselves, though it will affect the fifth figure of some of the conversion factors. The values of the gas constant, R, are based on the value 1.98719 cal mole^{-1} °K^{-1}, the calorie is the thermochemical calorie defined as 4.1840 absolute joules, and, unless otherwise specified, the mole is the gram-mole. The subscript 0 (except in the symbol E_0^o) is used to denote values at standard conditions (T = 273.16°K and P = 1 atmosphere).

Thermodynamic Properties of the Real Gas

The computation of the thermodynamic properties of the real gases was accomplished through the representation of the data of state (PVT data) by one of a number of equations of state. Except for the data for steam, which were fitted to an empirical equation, the virial equation of state was employed in this compilation. The virial equation expresses the compressibility factor, $Z = PV/RT$, as an infinite series either in powers of the density or the pressure.

The virial equation, derived from statistical mechanics and confirmed by experiment, can be written either as

$$PV/RT = \sum_{i=0}^{\infty} a_i \rho^i \qquad \text{or} \qquad PV/RT = \sum_{i=0}^{\infty} b_i P^i.$$

These equations represent, respectively, the density and the pressure virial expansions. The virial coefficients, a_i and b_i, can be calculated, in principle, from a knowledge of the intermolecular forces. In most cases, the representation of real-gas properties was accomplished using a three- or four-term virial expansion and the Lennard-Jones intermolecular potential energy:

$$E(r) = 4\epsilon[(r_o/r)^{12} - (r_o/r)^6],$$

where r is the intermolecular distance, ϵ is the maximum binding energy between the molecules, and r_o is the distance at which the attractive and repulsive potentials are equal. The fitting of the virial coefficients to the data of state was facilitated by the use of tabulations of second and third virial coefficient functions for nonpolar gases prepared by Hirschfelder, et al., [4, 5]. The corrections for gas imperfection to the thermodynamic properties were computed from the virial coefficients using the usual thermodynamic relationships. These corrections were combined with the values of the thermodynamic functions for the ideal gas to give the tabulated properties of the real gas over the desired pressure and temperature range.

Experimental measurements of thermodynamic properties such as the specific heat, Joule-Thomson coefficient, sound velocity, etc., were considered to varying degrees for each gas in choosing the force constants. It should be emphasized, however, that the values tabulated here for derived thermodynamic properties were obtained through the thermodynamic relationships from the equations of state. This method ensures a set of mutually consistent tables. The concordance of these derived properties with the scanty experimental data is, in general, quite good as is illustrated by the deviation plots.

*Numbers in brackets indicate references listed at the end of the chapter.

The values of sound velocity at low frequency, given in dimensionless form as a/a_0, are obtained from the usual thermodynamic relations involving the specific heat, the compressibility, and its derivatives. The tabulated sound velocities are for equilibrium conditions involving excitation of vibrational and rotational energies. Hence, the tables apply only at low frequency.

The special problems presented by the available data for each gas dictated certain modifications in the correlating and calculating procedures from gas to gas. A full account of these details is beyond the scope of this volume. Discussions of the general and particular methods used are to be found in the literature or in National Advisory Committee for Aeronautics technical reports cited later.

Thermodynamic Properties of the Ideal Gas

The values of the ideal-gas thermodynamic properties of the molecular and atomic species tabulated herein were computed from spectroscopic data using statistical mechanical formulas. The details of the computation are given in references cited here [6, 7, 8, 9] and in the succeeding chapters. The values of the functions have been tabulated in dimensionless form as follows: C_p^o/R, S^o/R, $(H^o - E_0^o)/RT_0$, and $(F^o - E_0^o)/RT$. The zero reference point of the enthalpy and free energy function is taken as the internal energy, E_0^o, of the ideal gas at absolute zero. The enthalpy function is divided here by a constant RT_0, where $T_0 = 273.16°K (491.688°R)$. The values tabulated are for the normal isotopic composition for all gases. The values of S^o/R and $(F^o - E_0^o)/RT$ are for the ideal gas at one atmosphere pressure. The effect of nuclear spin and isotopic mixing have not been included. The entropy of mixing for the constituent gases has been included in the tables for air.

The Transport Properties

The transport properties, values of which are tabulated in dimensionless form in this work, are the absolute viscosity, η/η_0, the thermal conductivity, k/k_0, and the Prandtl number, $N_{Pr} = \eta C_p/k$. The viscosities of the nonpolar gases at low pressures were calculated on the basis of the Lennard-Jones 6-12 intermolecular potential, for which Hirschfelder, Bird, and Spotz [10, 11] have calculated the collision integrals given by Chapman and Cowling [12]. The force parameters for the Lennard-Jones potential were fitted to the experimental viscosity data. The remainder of the viscosity tables were calculated from empirical formulas (see summary table 1-B) which had been fitted to the experimental data. For nitrogen and steam, where the pressure dependence of the viscosity has been investigated over a range of pressure and temperature, the tables are based on the Enskog theory [13]. The values of the thermal conductivity are tabulated at atmospheric pressure except in the case of steam. The tables were computed from empirical formulas (see summary table 1-C) fitted to the experimental data. The Prandtl numbers were computed directly from the tabulated viscosity, thermal conductivity, and specific heat.

Vapor Pressures

The tables of vapor pressures were prepared from experimental data by the use of empirical equations. In some cases, an equation of the form $\log_{10}P = A + B/T$ was adequate, but, generally, the equation contained an additional term or terms to give a closer fit. Deviations from the equation were plotted; a smooth curve was drawn through the deviations; and values read from this smooth curve were added to the equation to give the values tabulated. Mathematical smoothing procedures were used, where necessary, to avoid small irregularities in the tabulated values. Since the differences in reported values of vapor pressures seem to be more the result of uncertainties in the temperature measurement than anything else, the deviation plots for the vapor-pressure tables have been prepared in terms of temperature deviations.

The Effect of Dissociation on the Thermodynamic Properties

The effect of dissociation has been included only in the tables for air. The tables for the other gases have been extended to high temperatures without considering dissociation effects, so that these tables might serve as building-blocks from which properties of equilibrium mixtures at high temperatures can be computed by methods given in standard works [7, 14, 15]. A discussion of the effects of dissociation on the thermodynamic properties of pure diatomic gaseous substances is given by Woolley [16]. For the simple case of the diatomic gaseous elements, a graphical method of calculation is presented in reference 16 together with results of its application to H_2, O_2, and N_2. These results are presented in figures 6b, 6c, 7e, 7f, 8e, and 8f for the entropy, enthalpy, and compressibility factor.

Relaxation Phenomena in Gases

The thermodynamic properties tabulated here are based on the assumption that thermodynamic equilibrium exists in the gas. This is a valid assumption for many research and engineering applications. In hypersonic wind tunnels, however, the instantaneous equipartition of energy among the degrees of freedom in a molecule cannot be taken for granted. This delay in the redistribution of energy between the vibrational and translational degrees of freedom is a relaxation phenomenon and has been the subject of investigation by Griffiths [17], Kantrowitz [18], Huber and Kantrowitz [19], Walker [20], and others.

The Consistency and Reliability of the Tables

As indicated earlier, the internal or mutual consistency of the tables of thermodynamic properties was achieved through the application of the thermodynamic identities which relate the properties of both the real and ideal gas. Although direct measurements of Joule-Thomson coefficients, heat capacity, etc., were given weight in the course of correlation for various gases, the resulting tables depend very largely for their reliability and consistency on the accuracy of the data of state and the ideal-gas thermodynamic functions.

A precise indication of the uncertainties of the tabulated values is difficult to achieve for the data of state outside of the experimental range and for the derived properties over the entire range. The uncertainties can be ascribed to two major causes: the uncertainties in the values of the ideal-gas properties and those in the corrections for the gas imperfection. It has been found convenient to express these uncertainties separately. Approximate uncertainties for the ideal-gas properties are given in the summary table 1-D. The uncertainties in the corrections for gas imperfection are given in each chapter together with the deviation plots for the experimental range. The magnitude of the corrections for gas imperfection $(Z - 1)$, $(C_p - C_p^o)$, etc., can be found simply by subtraction of the tabulated values, except for the entropy where the effect of $\ln P$ on the tabulated entropy must be taken into account.

The specified reliabilities of the tables have been arrived at in two general ways. Where tables have been computed from empirical or semi-theoretical equations fitted directly to the experimental data, the departures of the experimental data from the tabulation form the basis for the estimate of reliability. Such tables include compressibility, density, viscosity, and thermal conductivity. The remaining tables - entropy, enthalpy, specific heat, specific-heat ratio, and sound velocity at low frequency - having been computed through the thermodynamic relationships from the equation of state, depend for their reliability on the accuracy and extent of the data of state and the validity of the numerical differentiations involved, and not solely on the agreement with the direct experimental data. The deviation plots for the derived properties serve to corroborate the verity of the tabulation.

The degree to which the adopted equations of state fit the experimental data varies with the gas. For argon, for example, the data are abundant and accurate and they are fitted to within a few hundredths of 1 percent in PV/RT; whereas the data for carbon monoxide are fitted to a few tenths of 1 percent. The reliability of the data of state tables in the extrapolated region and the reliability of the pressure corrections to the thermodynamic properties over the entire range are further dependent upon the temperature range covered by the experimental data and upon the mode of calculation. The corrections for nonideality which depend on the derivatives of the virial coefficients are less precise than the corresponding corrections for the data of state. Thus, in the case of entropy and enthalpy, where the nonideality correction depends on the first derivative of the virial coefficients, the uncertainty in this correction may be twice as large as in the case of the data of state; whereas, in the case of heat capacity, it may be three to five times as large. The above uncertainties are only rough estimates and are independent of the uncertainties of the ideal-gas values. For economy in machine tabulation, more decimal places are tabulated in some regions than is warranted by the correlation. The reader should consult the deviation plots and statements of reliability before using the tabulated values.

Conversion Factors

The compressibility factor is dimensionless. Values of the gas constant R are listed for each gas in the frequently used units in order to facilitate the use of the tables in calculating, by means of the equation $Z = PV/RT$, the pressure P, the volume V (or the density), or the temperature T, when any two of these are known. The rest of the tables also are given in dimensionless form. Conversion factors for frequently used units are given in each chapter immediately preceding the tables of thermal properties for each gas.

Interpolation

The ease with which interpolations may be made is an important factor in the practical use of a table. Seldom is it possible to avoid interpolation altogether. Since linear interpolation is relatively simple and rapid as compared with higher-order interpolation, even when tables of interpolation coefficients are at hand, the goal has been to subtabulate to the point where linear interpolation yields valid results. Although this objective was achieved in the direction of temperature, the pressure entries had to be curtailed to keep the tables within a manageable size. The tabulations in pressure were therefore arranged to permit a four-point Lagrangian interpolation formula to be used where the precision of the table justified it. It is for this reason that entries are found for the pressures 1,4,7,10,40,70,100 atmospheres, etc. In the tables for vapor pressure, with the exception of those for steam, the logarithms of the pressures have been included to facilitate interpolation. A convenient rule of thumb for determining the adequacy of linear interpolation is the following: "The maximum error introduced in linear interpolation is approximately 1/8 of the second difference." Where this error greatly exceeds the uncertainty in the table, Lagrangian or other forms of interpolation should be used. For the convenience of the user, first differences have been tabulated in smaller type in the temperature direction.

References

The references consulted in the course of the work have been listed at the end of each chapter, generally in the order cited, and numbered consecutively starting with 1 in each chapter. In some instances, references to works considered in the figures and deviation plots were not cited in the text; in such cases, they have been included in the reference lists at the end of each chapter. It is not intended, however, that these lists be considered complete bibliographies.

Table 1-A. SUMMARY OF TEMPERATURE AND PRESSURE RANGES OF THE TABLES

Property	Table Number	Tabulated Temperature Range (°K)				
		.01 atm	0.1 atm	1 atm	10 atm	100 atm
Air						
Compressibility Factor	2-1	50 - 2300	80 - 3000	100 - 3000	110 - 3000	180 - 3000
Density	2-2	50 - 2300	80 - 3000	100 - 3000	110 - 3000	180 - 3000
Specific Heat	2-3	50 - 2300	90 - 2800	100 - 3000	110 - 3000	180 - 3000
Enthalpy	2-4	50 - 2300	80 - 2800	100 - 3000	110 - 3000	180 - 3000
Entropy	2-5	50 - 2300	80 - 2800	100 - 3000	110 - 3000	180 - 3000
Specific-Heat Ratios	2-6	50 - 2100	90 - 3000	110 - 3000	110 - 3000	200 - 3000
Velocity of Sound	2-7	50 - 2100	80 - 3000	100 - 3000	110 - 3000	200 - 3000
Viscosity	2-8			100 - 1900		
Thermal Conductivity	2-9			80 - 1000		
Prandtl Number	2-10			100 - 1000		
Ideal-Gas Thermodynamic Functions*	2-11			10 - 3000		
Argon						
Compressibility Factor	3-1	70 - 5000	80 - 5000	100 - 5000	120 - 5000	180 - 5000
Density	3-2	70 - 5000	80 - 5000	100 - 5000	120 - 5000	180 - 5000
Specific Heat	3-3	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Enthalpy	3-4	100 - 3000	100 - 3000	100 - 3000	120 - 3000	250 - 3000
Entropy	3-5	100 - 3000	100 - 3000	100 - 3000	120 - 3000	180 - 3000
Specific-Heat Ratios	3-6	100 - 3000	100 - 3000	100 - 3000	180 - 3000	240 - 3000
Velocity of Sound	3-7	100 - 3000	100 - 3000	100 - 3000	180 - 3000	240 - 3000
Viscosity	3-8			50 - 1500		
Thermal Conductivity	3-9			90 - 600		
Prandtl Number	3-10			100 - 1500		
Vapor Pressure	3-11					
Ideal-Gas Thermodynamic Functions*	3-12			10 - 5000		
Carbon Dioxide						
Compressibility Factor	4-1	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Density	4-2	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Specific Heat	4-3	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Enthalpy	4-4	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Entropy	4-5	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Specific-Heat Ratios	4-6	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Velocity of Sound	4-7	200 - 1500	200 - 1500	220 - 1500	240 - 1500	320 - 1500
Viscosity	4-8			190 - 1700		
Thermal Conductivity	4-9			180 - 600		
Prandtl Number	4-10			220 - 600		
Vapor Pressure	4-11					
Ideal-Gas Thermodynamic Functions*	4-12			50 - 5000		

* Ideal-Gas Entropy, Enthalpy, Specific Heat, and Free Energy Function. (Values of the free energy function for air and argon are not tabulated.)

Table 1-A. SUMMARY OF TEMPERATURE AND PRESSURE RANGES OF THE TABLES (Cont.)

Property	Table Number	Tabulated Temperature Range (°K)				
		.01 atm	0.1 atm	1 atm	10 atm	100 atm
Carbon Monoxide						
Compressibility Factor	5-1	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Density	5-2	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Specific Heat	5-3	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Enthalpy	5-4	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Entropy	5-5	200 - 2800	200 - 2800	200 - 2800	200 - 2800	280 - 2800
Specific-Heat Ratios	5-6	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Velocity of Sound	5-7	200 - 3000	200 - 3000	200 - 3000	200 - 3000	280 - 3000
Viscosity	5-8			50 - 1500		
Thermal Conductivity	5-9			70 - 600		
Prandtl Number	5-10			200 - 600		
Vapor Pressure	5-11					
Ideal-Gas Thermodynamic Functions*	5-12			60 - 5000		
Hydrogen						
Compressibility Factor	6-1	20 - 600	20 - 600	30 - 600	40 - 600	60 - 600
Density	6-2	20 - 600	20 - 600	30 - 600	40 - 600	60 - 600
Specific Heat	6-3			30 - 600	40 - 600	60 - 600
Enthalpy	6-4	60 - 600	60 - 600	60 - 600	60 - 600	60 - 600
Entropy	6-5	60 - 600	60 - 600	60 - 600	60 - 600	60 - 600
Specific-Heat Ratios	6-6			30 - 600	40 - 600	60 - 600
Velocity of Sound	6-7			30 - 600	40 - 600	60 - 600
Viscosity	6-8			10 - 1100		
Thermal Conductivity	6-9			10 - 700		
Prandtl Number	6-10			60 - 800		
Vapor Pressure	6-11					
Ideal-Gas Thermodynamic Functions (Molecular)*	6-12			10 - 5000		
Ideal-Gas Thermodynamic Functions (Atomic)*	6-12/a			10 - 5000		
Nitrogen						
Compressibility Factor	7-1	100 - 3000	100 - 3000	100 - 3000	110 - 3000	200 - 3000
Density	7-2	100 - 3000	100 - 3000	100 - 3000	110 - 3000	200 - 3000
Specific Heat	7-3	100 - 3000	100 - 3000	100 - 3000	140 - 3000	200 - 3000
Enthalpy	7-4	100 - 3000	100 - 3000	100 - 3000	140 - 3000	200 - 3000
Entropy	7-5	100 - 3000	100 - 3000	100 - 3000	110 - 3000	200 - 3000
Specific-Heat Ratios	7-6	100 - 3000	100 - 3000	100 - 3000	140 - 3000	200 - 3000
Velocity of Sound	7-7	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Viscosity	7-8			100 - 1500	300 - 1500	300 - 1500
Thermal Conductivity	7-9			100 - 1200		
Prandtl Number	7-10			100 - 1200		
Vapor Pressure	7-11					
Ideal-Gas Thermodynamic Functions (Molecular)*	7-12			10 - 5000		
Ideal-Gas Thermodynamic Functions (Atomic)*	7-12/a			10 - 5000		

*Ideal-Gas Entropy, Enthalpy, Specific Heat, and Free Energy Function.

Table 1-A. SUMMARY OF TEMPERATURE AND PRESSURE RANGES OF THE TABLES (Cont.)

Property	Table Number	Tabulated Temperature Range (°K)				
		.01 atm	0.1 atm	1 atm	10 atm	100 atm
Oxygen						
Compressibility Factor	8-1	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Density	8-2	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Specific Heat	8-3	100 - 3000	100 - 3000	120 - 3000	150 - 3000	200 - 3000
Enthalpy	8-4	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Entropy	8-5	100 - 3000	100 - 3000	100 - 3000	150 - 3000	200 - 3000
Specific-Heat Ratios	8-6	100 - 3000	100 - 3000	120 - 3000	160 - 3000	220 - 3000
Velocity of Sound	8-7	100 - 3000	100 - 3000	120 - 3000	160 - 3000	220 - 3000
Viscosity	8-8			100 - 2000		
Thermal Conductivity	8-9			80 - 600		
Prandtl Number	8-10			100 - 600		
Vapor Pressure	8-11					
Ideal-Gas Thermodynamic Functions (Molecular)*	8-12			10 - 5000		
Ideal-Gas Thermodynamic Functions (Atomic)*	8-12/a			10 - 5000		

Property	Table Number	1 atm	10 atm	100 atm	200 atm	300 atm
Steam						
Compressibility Factor	9-1	380 - 850	460 - 850	590 - 850	650 - 850	680 - 850
Density	9-2	380 - 850	460 - 850	590 - 850	650 - 850	680 - 850
Specific Heat	9-3	380 - 850	460 - 850	590 - 850		
Enthalpy	9-4	380 - 850	460 - 850	590 - 850		
Entropy	9-5	380 - 850	460 - 850	590 - 850		
Viscosity	9-6	280 - 1500		600 - 1100	650 - 1100	700 - 1100
Thermal Conductivity	9-7	380 - 800	450 - 800	590 - 800	640 - 800	650 - 800
Free Energy Function	9-8	380 - 850	460 - 850	590 - 850		
Vapor Pressure	9-9					
Ideal-Gas Thermodynamic Functions*	9-10	50 - 5000				

*Ideal-Gas Entropy, Enthalpy, Specific Heat, and Free Energy Function.

Table 1-B. SUMMARY OF THE FORMULAS WITH WHICH THE VISCOSITY TABLES WERE COMPUTED

Gas	Table No.	Pressure (1)	Formulas (2)	Constants	$\eta_0 \times 10^7$	References to Experimental Data (3)
		atm.			poise	
Air	2-8	1	$\eta \times 10^7 = \frac{AT^{3/2}}{T+B}$	A = 145.8 B = 110.4	1716	2[43-48, 55-68]
Argon	3-8	1	(see footnote 4) $\eta \times 10^7 = \frac{266.93V\sqrt{MT}}{r_o^2 W^{(2)}(2)}$ (for Argon, CO_2, CO, N_2, O_2)	ϵ/k = 119.5°K $r_o \doteq 3.421$ Å M = 39.944 g mole^{-1}	2125	3[10 - 16]
CO_2	4-8	1		ϵ/k = 200°K r_o = 3.952 Å M = 44.010 g mole^{-1}	1370.1	4[42 - 45]
CO	5-8	1		ϵ/k = 110.3°K r_o = 3.590 Å M = 28.010 g mole^{-1}	1656.8	5[19 - 23]
N_2	7-8	1		ϵ/k = 91.46°K r_o = 3.681 Å M = 28.016 g mole^{-1}	1662.5	7[36 - 50]
O_2	8-8	1		ϵ/k = 100°K r_o = 3.499 Å M = 32 g mole^{-1}	1919.2	8[24 - 29]
H_2	6-8	1	$\eta/\eta_0 = \frac{AT^{3/2}(T+C)}{(T+B)(T+D)}$	A = 0.1017 B = 19.55 C = 650.39 D = 1175.9	841.1	6[48 - 63]
Steam	9-6	1	η = AT - B, for T ≤ 800°K $\eta = \frac{CT^{3/2}}{D-T+ET^2}$, for T ≥ 800°K ($\eta$ is in micropoise)	A = 0.361 B = 10.2 C = 39.37 D = 33.15 E = 0.001158		9[24 - 30]
N_2	7-8	10,20,30,40, 60,80,100	(see footnotes 5 and 6) $\eta/\eta' = 1 + A(b\rho) + B(b\rho)^2$, where $b \times 10^7 = 1.783\, M^{-1/4}(\sqrt{T}/\eta')^{3/2}$ (for N_2 and Steam)	A = 0.175 B = 0.8651 M = 28.016 g mole^{-1} ρ, in g cm^{-3}, from table 7-2		7[48, 51, 52, 59]
Steam	9-6/a	20,40,60,80, 100, 200, 250, 300		A = 0.175 B = 0.8651 M = 18.016 g mole^{-1} ρ, in g cm^{-3}, from table 9-2 and reference [9] 1		9[31 - 33]

(1) Pressures for which the tables are explicitly tabulated.

(2) T is the temperature in degrees Kelvin.

(3) Number outside of bracket indicates chapter number; numbers inside brackets indicate references in the particular chapter cited.

(4) V and $W^{(2)}(2)$ are functions tabulated for the Lennard-Jones 6-12 intermolecular potential by Hirschfelder, Bird, and Spotz, 1[11].

(5) η' is the viscosity in poise at T°K and 1 atmosphere.

(6) Above 600°K, values in table 7-8 were adjusted empirically to provide a better fit to the experimental data.

Table 1-C. SUMMARY OF THE FORMULAS WITH WHICH THE THERMAL CONDUCTIVITY TABLES WERE COMPUTED

Gas	Table No.	Pressure (1)	Formulas (2)	Constants	$k_0 \times 10^5$	References to Experimental Data (3)
		atm.			cal cm^{-1} sec^{-1} °K^{-1} (or °C^{-1})	
Air	2-9	1	$k/k_0 = \frac{1}{k_0}\left[\frac{a\sqrt{T}}{1+\frac{b \times 10^{-c/T}}{T}}\right]$ (Air, Argon, CO_2, CO, N_2 below 300°K, O_2)	a = 0.6325 x 10^{-5} b = 245.4 c = 12	5.77	2[49 - 54]
Argon	3-9	1		a = 0.3790 x 10^{-5} b = 179.59 c = 10	3.905	3[19 - 22]
CO_2	4-9	1		a = 4.608 x 10^{-5} b = 6212.0 c = 10	3.477	4[46 - 51]
CO	5-9	1		a = 0.5862 x 10^{-5} b = 217.6 c = 7.75	5.549	5[24 - 28]
N_2	7-9 below 300°K	1		a = 0.604 x 10^{-5} b = 224.0 c = 12	5.77	7[53 - 58]
O_2	8-9	1		a = 0.6726 x 10^{-5} b = 265.9 c = 10	5.867	8[30 - 36]
H_2	6-9	1	$k/k_0 = 1/k_0[(a+bT)(C_p - c) + d]\frac{\eta}{1+\frac{e}{T}10^{-10/T}}$	a = 0.4780 b = 0.000505 c = 4.968 d = 3.722 e = 5.9 C_p, in cal mole^{-1} °C^{-1}, from table 6-3	40.21	6[64 - 73]
N_2	7-9 above 300°K	1	$k/k_0 = 1 + at - bt^2 + ct^3$, where t = temperature in degrees Celsius	a = 3.13 x 10^{-3} b = 1.33 x 10^{-6} c = 2.63 x 10^{-10}		7[74]
Steam	9-7	0, 1, 4, 7, 10, 40, 70, 100	$k/k_0^o = \frac{1}{k_0^o}[k^o + a(10^{bP/T^4} - 1)]$ and $k^o = \frac{c\sqrt{T}}{1+\frac{d}{T}10^{-12/T}}$ (k^o = thermal conductivity at zero pressure). (k_0^o = 3.789 x 10^{-5} cal cm^{-1} sec^{-1} °K^{-1}, thermal conductivity at zero pressure and 273.16°K).	a = 1.097 x 10^{-5} b = 0.934 x 10^9 c = 1.5466 x 10^{-5} d = 1737.3		9[21 - 23]

(1) Pressures for which the tables are explicitly tabulated.

(2) T is the temperature in degrees Kelvin (unless otherwise stated).

(3) Number outside of brackets indicates chapter number; numbers inside brackets indicate references in the particular chapter cited.

Table 1-D. APPROXIMATE UNCERTAINTIES IN THE TABULATED IDEAL-GAS PROPERTIES*

C_p^o/R

	T°K			
	100 - 500	500 - 1000	1000 - 3000	3000 - 5000
	±	±	±	±
Air	.0003	.0006	.002	.05
CO_2	.001	.004	.03	.2
CO	.001	.001	.001	.01
H_2	.001	.001	.002	.06
N_2	.0003	.0006	.002	.01
O_2	.0003	.0004	.001	.2
H_2O	.002	.004	.03	.2

S^o/R

	T°K			
	100 - 500	500 - 1000	1000 - 3000	3000 - 5000
	±	±	±	±
Air	.0003	.0006	.002	.02
CO_2	.0005	.003	.02	.06
CO	.001	.001	.001	.004
H_2	.001	.001	.002	.02
N_2	.0003	.0006	.002	.005
O_2	.0003	.0004	.001	.06
H_2O	.001	.004	.02	.06

$(H^o - E_0^o)/RT$**

	T°K			
	100 - 500	500 - 1000	1000 - 3000	3000 - 5000
	±	±	±	±
Air	.0003	.0005	.001	.01
CO_2	.0003	.002	.01	.04
CO	.0001	.0002	.0005	.003
H_2	.0001	.0001	.001	.01
N_2	.0003	.0005	.001	.003
O_2	.0003	.0003	.0007	.04
H_2O	.001	.003	.01	.04

$-(F^o - E_0^o)/RT$

	T°K			
	100 - 500	500 - 1000	1000 - 3000	3000 - 5000
	±	±	±	±
Air	.0003	.0005	.001	.004
CO_2	.0002	.001	.004	.02
CO	.001	.001	.001	.001
H_2	.001	.001	.001	.004
N_2	.0003	.0005	.001	.002
O_2	.0003	.0003	.0007	.01
H_2O	.0004	.002	.006	.02

These values are suggested in cognizance of various sources of uncertainty, including rounding in earlier tables, spectroscopic constants, unknown electronic states, and effects associated with the dissociation energy region.

*The uncertainties in the ideal-gas properties of argon are of the order of the uncertainties in the atomic weight and the fundamental constants. Thus: 0.0001 in C_p^o/R and 0.001 in the other functions.

**To obtain the uncertainties for $(H^o - E_0^o)/RT_0$, multiply the tabulated uncertainties by T/T_0.

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CHAPTER 2

THE THERMODYNAMIC PROPERTIES OF AIR

In spite of the important role of air as an atmosphere and as a technical gas, there are surprisingly few direct determinations of the thermodynamic properties of air. Such charts [1-6] as have been published on air have been limited in the range of temperature or pressure or both. Although convenient tables are available for air as an ideal gas [7, 8], no published tables are available which contain a complete consistent collection of values of the thermodynamic properties of air treated as a real gas over a range of temperatures and pressures demanded in present-day research and development.

The thermodynamic properties of air are tabulated here from 100° to 3000°K in the pressure range 0.01 to 100 atmospheres. This range can be divided into two distinct regions. In the region below 1500°K, the composition of the air was considered fixed and the corrections for gas imperfection are significant. Here the experimental data of state and other pertinent data are required for an adequate representation. Above 1500°K, in this pressure range, the corrections for gas imperfection are small and the predominant influence on the thermodynamic properties is the degree to which the constituents of air have become dissociated. In this region, the properties of air are based on the contributions from each of the molecular and atomic species present in the equilibrium composition at each temperature and pressure.

Below 1500°K,the tables were computed from the virial equation of state. In this region, the composition was taken as follows: 0.7809 N_2, 0.2095 O_2, 0.0093 A, 0.0003 CO_2 moles per mole of air, yielding an average molecular weight of 28.966. In the region of dissociation, the tables for air are based on the tables of equilibrium composition for air given by Hirschfelder and Curtiss [9], who tabulated compositions and skeletal thermodynamic tables for air to 5000°K. The decision to terminate the present tables at 2300°K at pressures below 0.1 atmosphere and at 3000°K for higher pressures was dictated by the uncertainty in the energy of dissociation of nitrogen, which rendered the above-mentioned tables of compositions doubtful above 3000°K.

The Correlation of the Experimental Data

The pressure-volume-temperature relations for air were investigated in the late nineteenth century by Amagat [10] and Witkowski [11]; in the early twentieth century by Koch [12], Holborn and Schultze [13], Holborn and Otto [14], and Penning [15]; and in modern times by Michels, et al., [16, 17, 34], and Kiyama [18]. The data of Holborn and Otto [14], corrected in the manner suggested by Cragoe [19], were correlated with the existing Joule-Thomson data to form the basis for these tables. The more recent data [16, 17, 18] became available after the tables were computed and were not included in the fitting. A comparison of some of the experimental data with the present tabulation is given in figure 2a.

The data of state were represented by a virial equation in density employing second, third, and fourth virial coefficients. The second and third virials were obtained for the Lennard-Jones 6-12 potential function by a modification of a procedure outlined by Woolley [20]. The fourth virial coefficients, which were found to have only a small influence in the tabulated region, were estimated from a curve given in reference 21. The virial coefficients are given in table 2-12. Since the tables were desired in terms of a pressure rather than a density argument, an iterative process was resorted to by means of which, at each tabulated temperature and pressure, trial values of ρ and Z were used successively until the values converged upon the desired pressure with the desired accuracy.

A comparison of the Joule-Thomson data--and, in fact, of all the experimental data--for air was made by Din in connection with the preparation, for the British Mechanical Engineering Research Laboratory, of a new thermodynamic diagram for air [22]. This unpublished work, like the present correlation, uses Joule-Thomson data to compensate for the lack of PVT data at higher pressures. The data of Roebuck [23, 24] were found to be more consistent with the data of state than were the results of Hausen [25]. This fact is also illustrated in figure 2c where the specific heats derived from expansion experiments of Hausen and of Roebuck are compared with the values resulting from this correlation.

During the course of the correlation, values for the derived properties such as specific heat, sound velocity at low frequency, etc., were computed and checked against the existing experimental data for these properties. Comparisons were made with experimental specific-heat measurements of Dailey and Felsing [26], Eucken and V. Lüde [27], and Kistiakowsky and Rice [28]; the sound velocity measurements of Hodge [29] and of Van Itterbeek and Van Doninck [30]; the isothermal porous-plug experiments of Eucken, Clusius, and Berger [31]; and the calorimetric measurements of the enthalpy-pressure coefficient by Andersen [32] and the energy-pressure coefficients by Rossini and Frandsen [33].

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density, the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0, result, in general, from the correlating equations which were fitted to represent the experimental data over as wide a range as possible. Values for these quantities are given in various units in table 2-b. The values of ρ_0 and k_0 are in close agreement with the experimental data as shown in figures 2a and 2f. The value of η_0 is the average of values reported in 20 separate investigations [43-48,55-68]. The value of 331.45 m/sec for a_0 is in close agreement with the precise direct determinations of 331.41 by Hebb [69] and 331.60 ± 0.05 by Kneser [70].

The Reliability of the Tables

The effects of dissociation are included in the tables for air above 1500° where this effect becomes significant. They are applicable only when the air has been at an elevated temperature long enough to achieve chemical equilibrium. Although such equilibrium is achieved in many processes, it may not be reached in certain dynamic situations such as occur in shock waves, etc. The present tables are consistent in the low temperature region with the recent calculations of Hall and Ibele [35, 36], which did not include the effects of dissociation. If the properties for air for the fixed composition (without dissociation) are desired, the tables of Hall and Ibele should be consulted.

Above 2000°K, the tables for the compressibility factor should be reliable to 0.0003 up to 10 atmospheres and to 0.002 up to 100 atmospheres. Above 500°K, the tabulated values depend largely on theoretical calculations; it is believed that the uncertainty of any entry does not exceed 20 percent in (Z-1). The departure of the experimental data from the tables is illustrated in figure 2a. Corresponding uncertainties and corrections apply to the table of densities (table 2-2). The data of Michels and co-workers [16, 17, 34] became available after the tables had been computed. The agreement, however, is very good except at the low temperatures where the new data may be used to modify the tabulated values in accordance with the deviations shown in figure 2a. Above 200°K, the tables agree also with those calculated from the Beattie-Bridgeman equation [37] and with those of Claitor and Crawford [6].

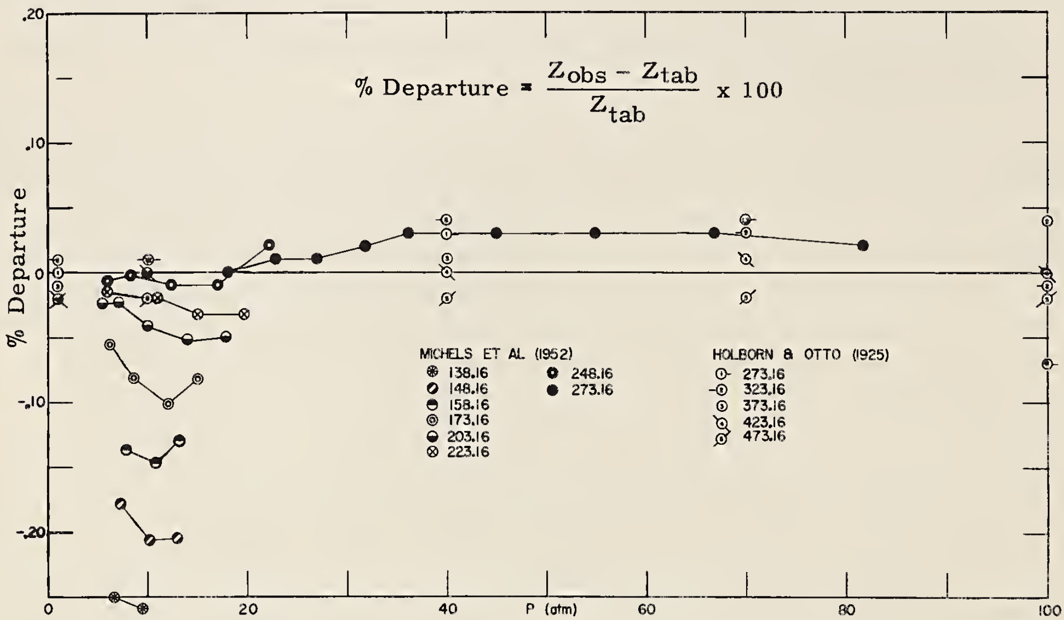

Figure 2a. Departures of experimental compressibility factors from the tabulated values for air (table 2-1)

In the case of specific heat (table 2-3) for the temperature range 100 - 300°K at all pressures except the highest entry and for the temperature range 300 - 800°K at all pressures, the uncertainty does not exceed 20 percent in $C_p - C_p^o$. For the highest pressure entries at temperatures below 300°K, the uncertainty may approach 30 percent in $C_p - C_p^o$. Direct measurements of C_p are few; figures 2b and 2c present a comparison of the tabulated values with existing data, either measured directly or derived, through assumptions for the equation of state, from the thermal measurements cited.

The values contained in the tables of enthalpy (table 2-4) and entropy (table 2-5) have been rounded so that the uncertainty probably does not exceed two or three parts in the last place tabulated, except at the extremes--low temperature and high pressure, or vice versa--where it may reach two parts in the next to last place. Similarly, the uncertainty in the specific-heat ratios (table 2-6) does not exceed two or three parts in the last place tabulated except at the extremes where it may reach two parts in the next to last place.

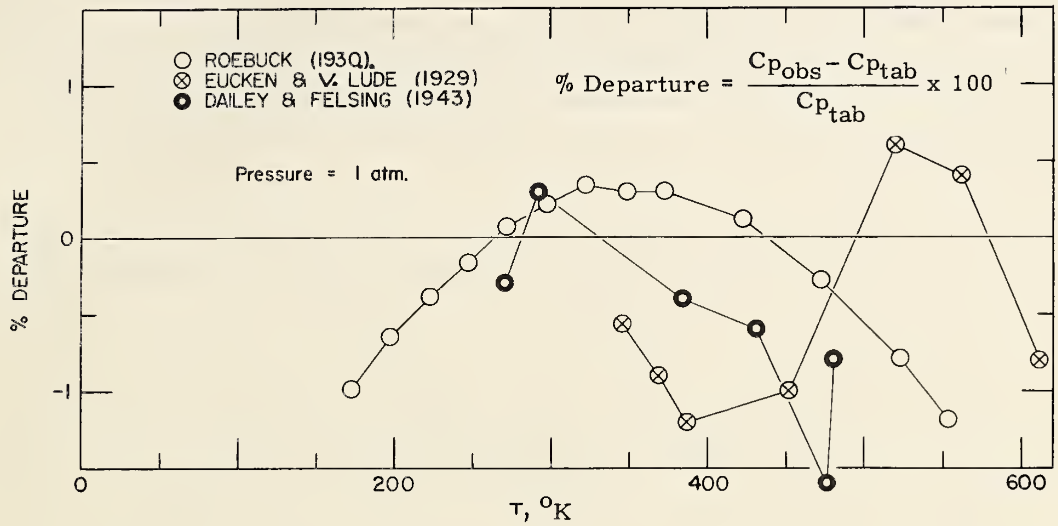

Figure 2b. Departures of low-pressure experimental specific heats from the tabulated values for air (table 2-3)

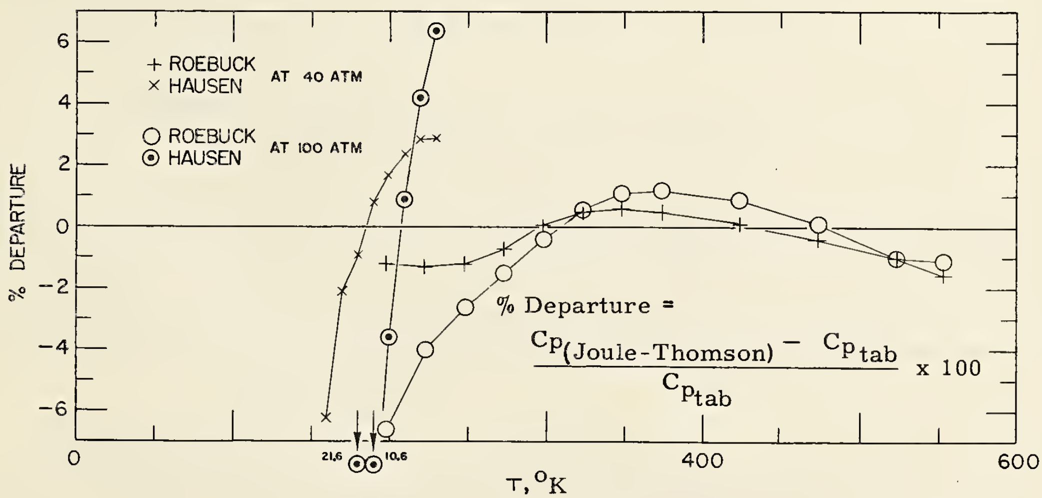

Figure 2c. Departures of specific heats (calculated from Joule-Thomson data) from the tabulated values for air (table 2-3)

The uncertainty in the sound velocity at low frequency (table 2-7) can be expressed in terms of the effect of the gas imperfection. Thus, in the temperature range from 100-270°K at all pressures except the highest entry and in the temperature range 270-800°K at all pressures, the error in $(a/a_0) - (a^o/a_0)_{.01\,atm}$ should not exceed 3 percent; the high-pressure entries below 270°K may be in error by 10 percent in that quantity. A comparison with the experimental results of Hodge [29] is given in figure 2d. The departures are within his estimated experimental uncertainty of 0.2 percent. At higher temperatures, the results are purely theoretical and should be accurate to 0.1 percent if the assumption of equilibrium composition is valid. Such accuracy, however, is unlikely since equilibrium is probably not attained and chemical dispersion effects undoubtedly occur (in the region of changing composition). Physical dispersion effects may also give rise to considerable differences between experimental and tabulated results, especially at high values of frequency/pressure. The tabulated values will, in all such cases, be a lower limit to the actual velocity.

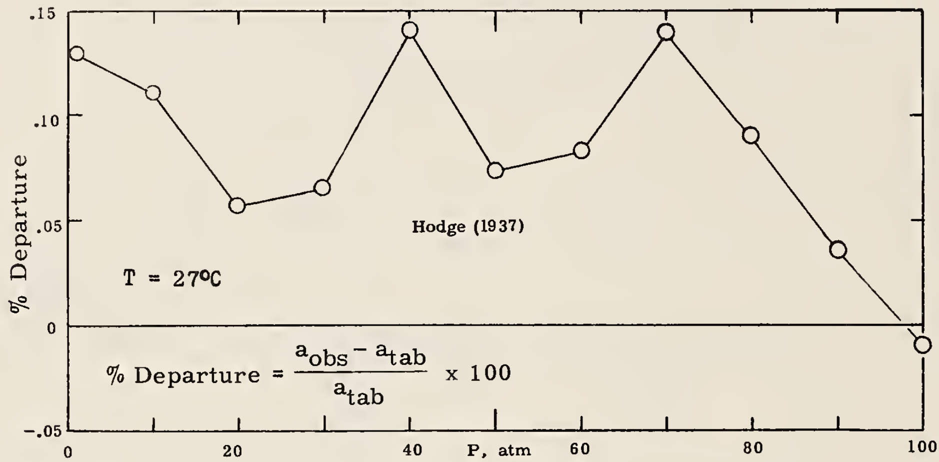

Figure 2d. Departures of experimental sound velocities at 27°C from the tabulated values for air (table 2-7)

The values of viscosity (table 2-8) and the thermal conductivity (table 2-9) were computed from the empirical equations given in summary tables 1-B and 1-C. These equations are based on the existing experimental data upon which the present tabulations depend for their reliability. The departures of the experimental data from the tabulated values are given in figures 2e and 2f from which the reliability of the viscosities can be assessed as being within 2 percent and the thermal conductivity within 4 percent.

The Prandtl number, $N_{Pr} = \eta\, C_p/k$, and certain of its fractional powers are listed (table 2-10) for dry air at 1 atmosphere. The nomogram in figure 2g will facilitate the calculations of other fractional powers not tabulated.

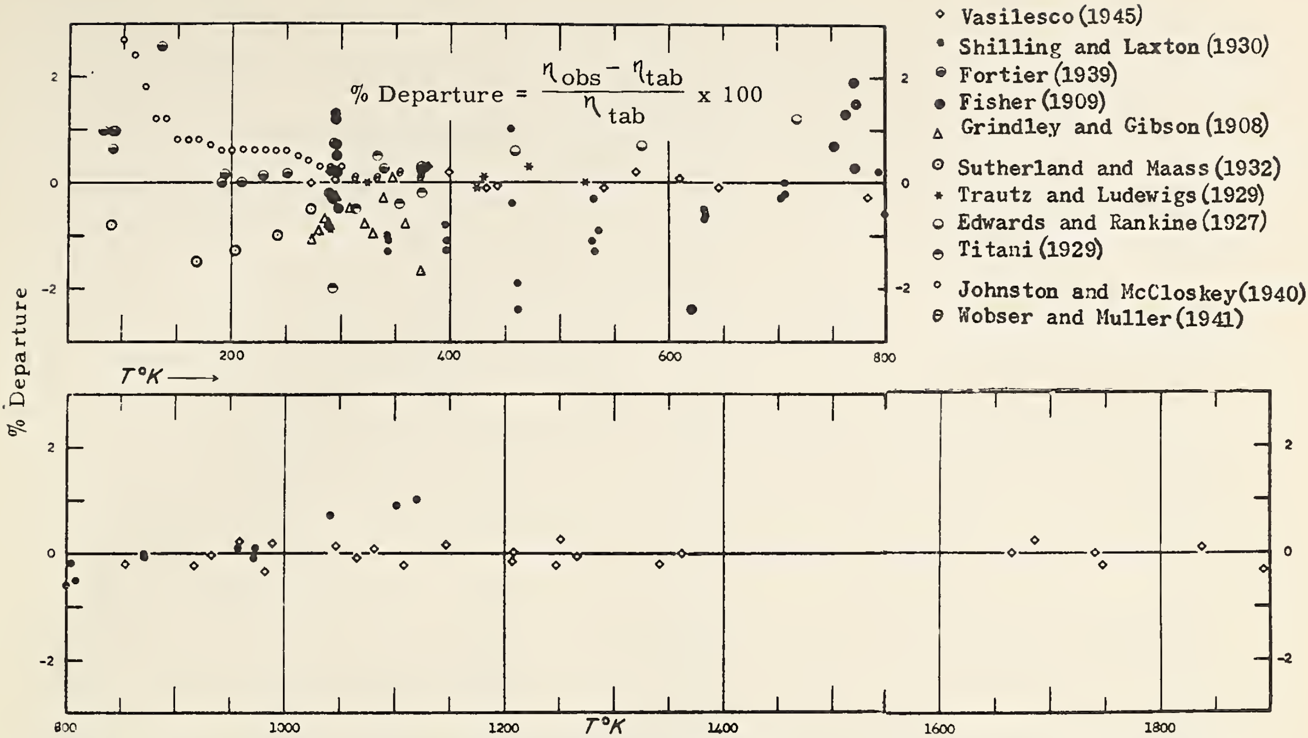

Figure 2e. Departure of experimental viscosity data from the tabulated values for air (table 2-8)

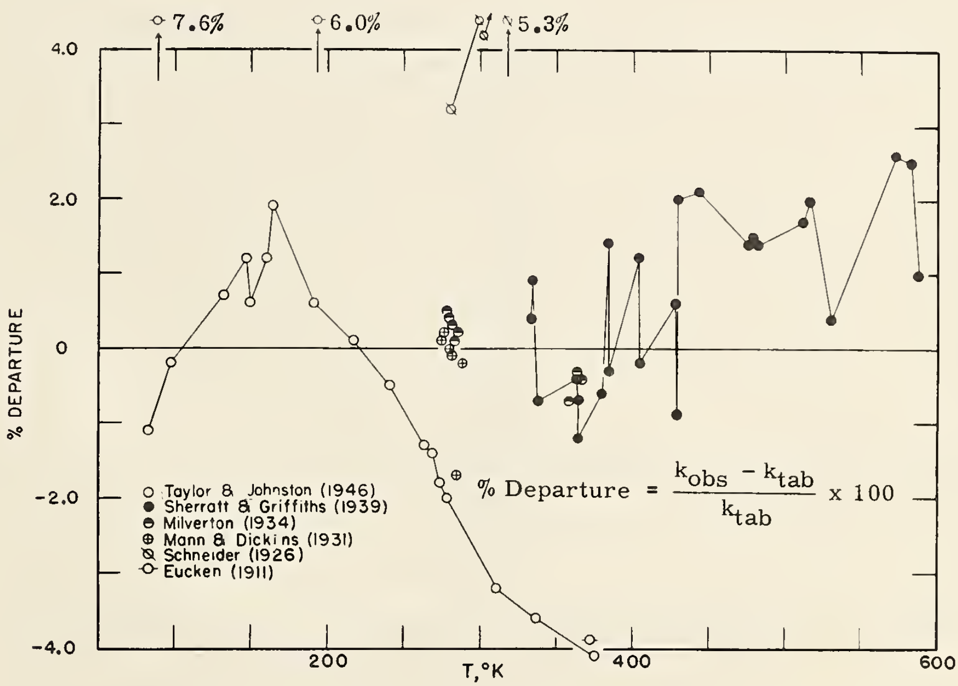

Figure 2f. Departures of low-pressure experimental thermal conductivities from the tabulated values for air (table 2-9)

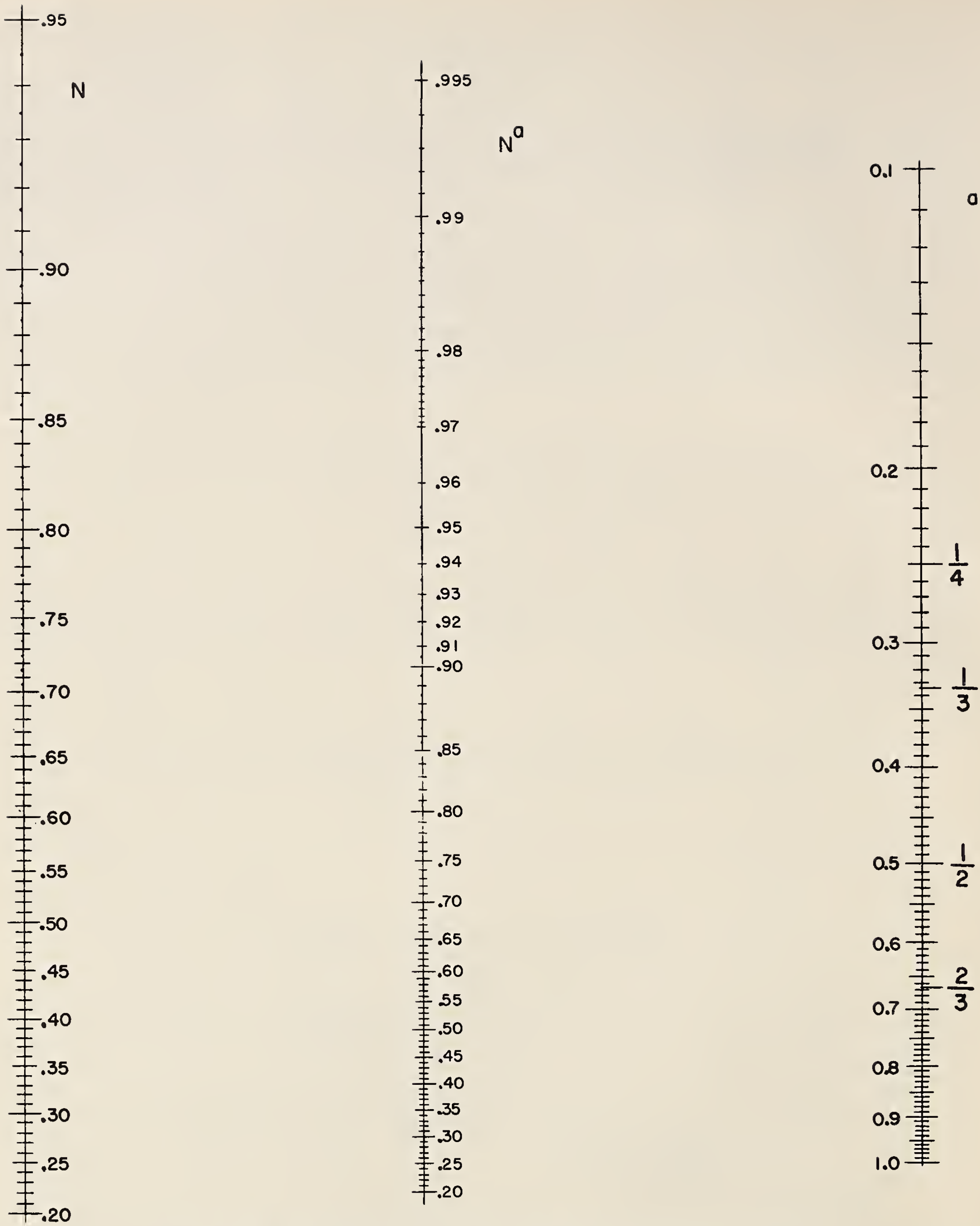

Figure 2g. Nomogram for the calculation of fractional powers of the Prandtl number

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Table 2-a. VALUES OF THE GAS CONSTANT, R, FOR AIR.

Values of R for Air for Temperatures in Degrees Kelvin

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.83286	2.92699	2152.97	41.6317
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0453777	0.0468855	34.4871	0.666871
$lb\ mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Air for Temperatures in Degrees Rankine

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.57381	1.62611	1196.09	23.1287
$mole/cm^3$	45.5871	47.1018	34646.2	669.947
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0252098	0.0260475	19.1595	0.370484
$lb\ mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 2-b. CONVERSION FACTORS FOR THE AIR TABLES

Conversion Factors for Table 2-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	1.29304×10^{-3}
		mole cm^{-3}	4.46400×10^{-5}
		g $liter^{-1}$	1.29308
		lb in^{-3}	4.67143×10^{-5}
		lb ft^{-3}	8.07223×10^{-2}

Conversion Factors for Tables 2-4 and 2-11

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	cal $mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	cal g^{-1}	18.7399
		joules g^{-1}	78.4079
		Btu (lb $mole)^{-1}$	976.437
		Btu lb^{-1}	33.7098

Conversion Factors for Tables 2-3, 2-5, and 2-11

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R	C_p, S	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.0686042
		joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.287041
		Btu (lb $mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.0685590

The molecular weight of air is 28.966 g $mole^{-1}$. Unless otherwise specified the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 2-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	331.45
		ft sec^{-1}	1087.4

Conversion Factors for Table 2-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	1.716×10^{-4}
		kg hr^{-1} m^{-1}	6.178×10^{-2}
		slug hr^{-1} ft^{-1}	1.290×10^{-3}
		lb sec^{-1} ft^{-1}	1.153×10^{-5}
		lb hr^{-1} ft^{-1}	4.151×10^{-2}

Conversion Factors for Table 2-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^oK^{-1}$	5.770×10^{-5}
		Btu ft^{-1} hr^{-1} $^oR^{-1}$	1.395×10^{-2}
		watts cm^{-1} $^oK^{-1}$	2.414×10^{-4}

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	.99871	52							90
60	.99923	27							108
70	.99950	16							126
80	.99966	9	.99657	94					144
90	.99975	6	.99751	62	.98992	256	.98220	452	162
100	.99981	5	.99813	43	.99248	175	.98672	313	180
110	.99986	3	.99856	31	.99423	125	.98985	221	198
120	.99989	2	.99887	23	.99548	92	.99206	162	216
130	.99991	2	.99910	18	.99640	69	.99368	122	234
140	.99993	1	.99928	13	.99709	54	.99490	95	252
150	.99994	1	.99941	10	.99763	42	.99585	74	270
160	.99995		.99951	9	.99805	34	.99659	59	288
170	.99995	1	.99960	7	.99839	27	.99718	48	306
180	.99996	1	.99967	5	.99866	22	.99766	39	324
190	.99997	1	.99972	5	.99888	19	.99805	32	342
200	.99998		.99977	3	.99907	15	.99837	26	360
210	.99998		.99980	4	.99922	13	.99863	23	378
220	.99998	1	.99984	2	.99935	10	.99886	19	396
230	.99999		.99986	3	.99945	9	.99905	16	414
240	.99999		.99989	2	.99954	8	.99921	13	432
250	.99999		.99991	1	.99962	7	.99934	12	450
260	.99999		.99992	2	.99969	6	.99946	10	468
270	.99999	1	.99994	1	.99975	5	.99956	9	486
280	1.00000		.99995	1	.99980	4	.99965	7	504
290	1.00000		.99996	1	.99984	4	.99972	7	522
300	1.00000		.99997	1	.99988	3	.99979	6	540
310	1.00000		.99998	1	.99991	3	.99985	5	558
320	1.00000		.99999		.99994	3	.99990	4	576
330	1.00000		.99999	1	.99997	2	.99994	4	594
340	1.00000		1.00000		.99999	2	.99998	3	612
350	1.00000		1.00000	1	1.00001	2	1.00001	3	630
360	1.00000		1.00001		1.00003	1	1.00004	3	648
370	1.00000		1.00001		1.00004	1	1.00007	3	666
380	1.00000		1.00001	1	1.00005	2	1.00010	2	684
390	1.00000		1.00002		1.00007	1	1.00012	2	702
400	1.00000		1.00002		1.00008	1	1.00014	1	720
410	1.00000		1.00002		1.00009	1	1.00015	2	738
420	1.00000		1.00002	1	1.00010		1.00017	1	756
430	1.00000		1.00003		1.00010	1	1.00018	1	774
440	1.00000		1.00003		1.00011	1	1.00019	1	792
450	1.00000		1.00003		1.00012		1.00020	1	810
460	1.00000		1.00003		1.00012	1	1.00021	1	828
470	1.00000		1.00003		1.00013		1.00022		846
480	1.00000		1.00003		1.00013		1.00022	1	864
490	1.00000		1.00003		1.00013	1	1.00023	1	882
500	1.00000		1.00003		1.00014		1.00024		900
510	1.00000		1.00003		1.00014		1.00024	1	918
520	1.00000		1.00003		1.00014		1.00025		936
530	1.00000		1.00003	1	1.00014	1	1.00025	1	954
540	1.00000		1.00004		1.00015		1.00026		972
550	1.00000		1.00004		1.00015		1.00026		990
560	1.00000		1.00004		1.00015		1.00026		1008
570	1.00000		1.00004		1.00015		1.00026	1	1026
580	1.00000		1.00004		1.00015		1.00027		1044
590	1.00000		1.00004		1.00015		1.00027		1062
600	1.00000		1.00004		1.00015		1.00027		1080
610	1.00000		1.00004		1.00015		1.00027		1098
620	1.00000		1.00004		1.00015		1.00027		1116
630	1.00000		1.00004		1.00015		1.00027		1134
640	1.00000		1.00004		1.00015		1.00027		1152
650	1.00000		1.00004		1.00015		1.00027		1170

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	1.00000		1.00004		1.00015		1.00027		1170
660	1.00000		1.00004		1.00015		1.00027		1188
670	1.00000		1.00004		1.00015		1.00027		1206
680	1.00000		1.00004		1.00015		1.00027		1224
690	1.00000		1.00004		1.00015		1.00027		1242
700	1.00000		1.00004		1.00015		1.00027		1260
710	1.00000		1.00004		1.00015		1.00027		1278
720	1.00000		1.00004		1.00015		1.00027		1296
730	1.00000		1.00004		1.00015		1.00027		1314
740	1.00000		1.00004		1.00015		1.00027	- 1	1332
750	1.00000		1.00004		1.00015		1.00026		1350
760	1.00000		1.00004		1.00015		1.00026		1368
770	1.00000		1.00004		1.00015		1.00026		1386
780	1.00000		1.00004		1.00015		1.00026		1404
790	1.00000		1.00004		1.00015		1.00026		1422
800	1.00000		1.00004		1.00015	- 1	1.00026	- 1	1440
850	1.00000		1.00004		1.00014		1.00025		1530
900	1.00000		1.00004	- 1	1.00014		1.00025	- 1	1620
950	1.00000		1.00003		1.00014	- 1	1.00024	- 1	1710
1000	1.00000		1.00003		1.00013	- 1	1.00023		1800
1050	1.00000		1.00003		1.00012		1.00023	- 1	1890
1100	1.00000		1.00003		1.00012	- 1	1.00022	- 1	1980
1150	1.00000		1.00003		1.00011		1.00021		2070
1200	1.00000		1.00003		1.00011		1.00021	- 1	2160
1250	1.00000		1.00003		1.00011		1.00020	- 1	2250
1300	1.00000		1.00003		1.00011	- 1	1.00019		2340
1350	1.00000		1.00003		1.00010		1.00019	- 1	2430
1400	1.00000		1.00003		1.00010		1.00018		2520
1450	1.00000	1	1.00003		1.00010		1.00018		2610
1500	1.00001	2	1.00003	1	1.00010		1.00018	- 1	2700
1550	1.00003	2	1.00004		1.00010		1.00017		2790
1600	1.00005	3	1.00004	1	1.00010		1.00017		2880
1650	1.00008	3	1.00005	1	1.00010	1	1.00017		2970
1700	1.00011	5	1.00006	1	1.00011		1.00017		3060
1750	1.00016	9	1.00007	3	1.00011	2	1.00017	2	3150
1800	1.00025	16	1.00010	4	1.00013	2	1.00019	1	3240
1850	1.00041	27	1.00014	9	1.00015	4	1.00020	3	3330
1900	1.00068	41	1.00023	14	1.00019	6	1.00023	4	3420
1950	1.00109	58	1.00037	17	1.00025	9	1.00027	6	3510
2000	1.00167	75	1.00054	23	1.00034	13	1.00033	11	3600
2050	1.00242	100	1.00077	34	1.00047	18	1.00044	14	3690
2100	1 00342	133	1.00111	45	1.00065	21	1.00058	14	3780
2150	1.00475	178	1.00156	59	1.00086	27	1.00072	19	3870
2200	1.00653	236	1.00215	68	1.00113	35	1.00091	28	3960
2250	1.00889	307	1.00283	88	1.00148	46	1.00119	36	4050
2300	1.01196		1.00371	123	1.00194	61	1.00155	47	4140
2350			1.00494	160	1.00255	80	1.00202	59	4230
2400			1.00654	193	1.00335	96	1.00261	72	4320
2450			1.00847	232	1.00431	117	1.00333	89	4410
2500			1.01079	278	1.00548	141	1.00422	108	4500
2550			1.01357	336	1.00689	172	1.00530	131	4590
2600			1.01693	404	1.00861	208	1.00661	160	4680
2650			1.02097	475	1.01069	244	1.00821	187	4770
2700			1.02572	546	1.01313	277	1.01008	212	4860
2750			1.03118	623	1.01590	320	1.01220	248	4950
2800			1.03741	703	1.01910	370	1.01468	288	5040
2850			1.04444	784	1.02280	422	1.01756	333	5130
2900			1.05228	858	1.02702	467	1.02089	387	5220
2950			1.06086	921	1.03169	549	1.02476	444	5310
3000			1.07007		1.03718		1.02920		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.98090	452							180
110	.98542	319	.93853	1415	.8855	281	.8234	469	198
120	.98861	234	.95268	1009	.9136	194	.8703	307	216
130	.99095	176	.96277	745	.9330	137	.9010	211	234
140	.99271	136	.97022	569	.9467	105	.9221	157	252
150	.99407	106	.97591	439	.95716	798	.9378	118	270
160	.99513	84	.98030	348	.96514	623	.9496	92	288
170	.99597	69	.98378	278	.97137	499	.95880	727	306
180	.99666	55	.98656	226	.97636	403	.96607	584	324
190	.99721	46	.98882	185	.98039	328	.97191	475	342
200	.99767	39	.99067	154	.98367	267	.97666	392	360
210	.99806	31	.99221	126	.98634	223	.98058	325	378
220	.99837	27	.99347	107	.98857	188	.98383	273	396
230	.99864	22	.99454	92	.99045	160	.98656	230	414
240	.99886	20	.99546	78	.99205	147	.98886	196	432
250	.99906	17	.99624	66	.99352	117	.99082	167	450
260	.99923	14	.99690	58	.99469	101	.99249	144	468
270	.99937	12	.99748	50	.99570	86	.99393	123	486
280	.99949	11	.99798	43	.99656	76	.99516	107	504
290	.99960	10	.99841	38	.99732	65	.99623	94	522
300	.99970	8	.99879	33	.99797	58	.99717	81	540
310	.99978	7	.99912	28	.99855	50	.99798	71	558
320	.99985	6	.99940	26	.99905	44	.99869	63	576
330	.99991	6	.99966	23	.99949	38	.99932	55	594
340	.99997	5	.99989	19	.99987	34	.99987	48	612
350	1.00002	4	1.00008	17	1.00021	30	1.00035	43	630
360	1.00006	4	1.00025	16	1.00051	27	1.00078	37	648
370	1.00010	4	1.00041	14	1.00078	24	1.00115	34	666
380	1.00014	3	1.00055	14	1.00102	20	1.00149	29	684
390	1.00017	2	1.00069	10	1.00122	19	1.00178	27	702
400	1.00019	3	1.00079	10	1.00141	16	1.00205	23	720
410	1.00022	2	1.00089	8	1.00157	15	1.00228	20	738
420	1.00024	2	1.00097	8	1.00172	13	1.00248	19	756
430	1.00026	1	1.00105	6	1.00185	11	1.00267	16	774
440	1.00027	2	1.00111	5	1.00196	11	1.00283	14	792
450	1.00029	1	1.00116	5	1.00207	9	1.00297	13	810
460	1.00030	1	1.00121	5	1.00216	8	1.00310	11	828
470	1.00031	1	1.00126	4	1.00224	7	1.00321	10	846
480	1.00032	1	1.00130	4	1.00231	6	1.00331	9	864
490	1.00033	1	1.00134	3	1.00237	5	1.00340	8	882
500	1.00034	1	1.00137	3	1.00242	5	1.00348	7	900
510	1.00035		1.00140	2	1.00247	4	1.00355	6	918
520	1.00035	1	1.00142	2	1.00251	4	1.00361	5	936
530	1.00036	1	1.00144	2	1.00255	3	1.00366	4	954
540	1.00037		1.00146	2	1.00258	3	1.00370	4	972
550	1.00037		1.00148	2	1.00261	2	1.00374	3	990
560	1.00037	1	1.00150	1	1.00263	2	1.00377	3	1008
570	1.00038		1.00151	1	1.00265	1	1.00380	2	1026
580	1.00038		1.00152		1.00266	1	1.00382	2	1044
590	1.00038		1.00152		1.00267		1.00384	1	1062
600	1.00038		1.00152	1	1.00267		1.00385	1	1080
610	1.00038		1.00153		1.00267	1	1.00386	1	1098
620	1.00038		1.00153	1	1.00268		1.00387	1	1116
630	1.00038		1.00154		1.00268	1	1.00388		1134
640	1.00038		1.00154		1.00269		1.00388		1152
650	1.00038	1	1.00154		1.00269	1	1.00388		1170
660	1.00039		1.00154		1.00270		1.00388		1188
670	1.00039	- 1	1.00154	- 1	1.00270	- 1	1.00388	- 1	1206
680	1.00038		1.00153		1.00269		1.00387	- 1	1224
690	1.00038		1.00153		1.00269	- 1	1.00386	- 1	1242
700	1.00038		1.00153		1.00268		1.00385		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	1.00038		1.00153		1.00268		1.00385	-1	1260
710	1.00038		1.00153	-1	1.00268	-1	1.00384	-1	1278
720	1.00038		1.00152		1.00267	-1	1.00383	-1	1296
730	1.00038		1.00152		1.00266	-1	1.00382	-2	1314
740	1.00038		1.00152	-1	1.00265	-1	1.00380	-1	1332
750	1.00038		1.00151		1.00264	-1	1.00379	-1	1350
760	1.00038		1.00151	-1	1.00263	-1	1.00378	-2	1368
770	1.00038		1.00150	-1	1.00262	-1	1.00376	-2	1386
780	1.00038		1.00149		1.00261	-1	1.00374	-1	1404
790	1.00038	-1	1.00149	-1	1.00260	-1	1.00373	-2	1422
800	1.00037	-1	1.00148	-4	1.00259	-7	1.00371	-10	1440
850	1.00036	-1	1.00144	-4	1.00252	-6	1.00361	-10	1530
900	1.00035	-1	1.00140	-4	1.00246	-7	1.00351	-10	1620
950	1.00034	-1	1.00136	-4	1.00239	-8	1.00341	-10	1710
1000	1.00033	-1	1.00132	-4	1.00231	-6	1.00331	-10	1800
1050	1.00032	-1	1.00128	-4	1.00225	-7	1.00321	-10	1890
1100	1.00031	-1	1.00124	-4	1.00218	-7	1.00311	-9	1980
1150	1.00030	-1	1.00120	-3	1.00211	-6	1.00302	-9	2070
1200	1.00029	-1	1.00117	-4	1.00205	-6	1.00293	-9	2160
1250	1.00028		1.00113	-3	1.00199	-6	1.00284	-9	2250
1300	1.00028	-1	1.00110	-3	1.00193	-6	1.00275	-8	2340
1350	1.00027	-1	1.00107	-3	1.00187	-5	1.00267	-8	2430
1400	1.00026	-1	1.00104	-3	1.00182	-6	1.00259	-7	2520
1450	1.00025	-1	1.00101	-3	1.00176	-5	1.00252	-7	2610
1500	1.00024		1.00098	-2	1.00171	-4	1.00245	-6	2700
1550	1.00024	-1	1.00096	-2	1.00167	-4	1.00239	-6	2790
1600	1.00023		1.00094	-2	1.00163	-3	1.00233	-5	2880
1650	1.00023		1.00092	-2	1.00160	-3	1.00228	-5	2970
1700	1.00023		1.00090	-2	1.00157	-3	1.00223	-5	3060
1750	1.00023	1	1.00088	-1	1.00154	-2	1.00218	-5	3150
1800	1.00024	1	1.00087	-1	1.00152	-3	1.00213	-5	3240
1850	1.00025	2	1.00086	-1	1.00149	-3	1.00208	-4	3330
1900	1.00027	3	1.00085		1.00146	-3	1.00204	-4	3420
1950	1.00030	5	1.00085		1.00143	-3	1.00200	-4	3510
2000	1.00035	1	1.00085		1.00140		1.00196	-1	3600
2050	1.0005	1	1.0009	1	1.0014		1.0019		3690
2100	1.0006	1	1.0010		1.0014		1.0019		3780
2150	1.0007	1	1.0010		1.0014		1.0019		3870
2200	1.0008	3	1.0010	1	1.0014	1	1.0019		3960
2250	1.0011	3	1.0011	2	1.0015	1	1.0019	1	4050
2300	1.0014	4	1.0013	2	1.0016	2	1.0020	1	4140
2350	1.0018	5	1.0015	2	1.0018	1	1.0021	1	4230
2400	1.0023	6	1.0017	3	1.0019	2	1.0022	2	4320
2450	1.0029	7	1.0020	4	1.0021	3	1.0024	2	4410
2500	1.0036	9	1.0024	4	1.0024	3	1.0026	3	4500
2550	1.0045	11	1.0028	6	1.0027	4	1.0029	3	4590
2600	1.0056	14	1.0034	7	1.0031	5	1.0032	4	4680
2650	1.0070	16	1.0041	7	1.0036	6	1.0036	5	4770
2700	1.0086	18	1.0048	10	1.0042	7	1.0041	5	4860
2750	1.0104	20	1.0058	10	1.0049	8	1.0046	7	4950
2800	1.0124	25	1.0068	13	1.0057	11	1.0053	8	5040
2850	1.0149	29	1.0081	15	1.0068	11	1.0061	10	5130
2900	1.0178	34	1.0096	17	1.0079	13	1.0071	11	5220
2950	1.0212	40	1.0113	20	1.0092	15	1.0082	13	5310
3000	1.0252		1.0133		1.0107		1.0095		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	.9378	118	.6832	857					270
160	.9496	92	.7689	529					288
170	.95880	727	.8218	371					306
180	.96607	584	.8589	277	.7550	537	.6950	650	324
190	.97191	475	.8866	214	.8087	394	.7600	505	342
200	.97666	392	.9080	169	.8481	302	.8105	389	360
210	.98058	325	.9249	137	.8783	237	.8494	307	378
220	.98383	273	.9386	111	.9020	192	.8801	247	396
230	.98656	230	.9497	93	.9212	156	.9048	202	414
240	.98886	196	.9590	78	.9368	130	.9250	167	432
250	.99082	167	.96680	654	.9498	108	.9417	140	450
260	.99249	144	.97334	560	.9606	92	.9557	118	468
270	.99393	123	.97894	477	.9698	78	.9675	100	486
280	.99516	107	.98371	411	.9776	66	.9775	85	504
290	.99623	94	.98782	353	.9842	58	.9860	73	522
300	.99717	81	.99135	308	.9900	49	.9933	63	540
310	.99798	71	.99443	267	.9949	43	.9996	55	558
320	.99869	63	.99710	233	.9992	37	1.0051	48	576
330	.99932	55	.99943	207	1.0029	33	1.0099	41	594
340	.99987	48	1.00150	176	1.0062	28	1.0140	36	612
350	1.00035	43	1.00326	157	1.0090	25	1.0176	31	630
360	1.00078	37	1.00483	139	1.0115	22	1.0207	28	648
370	1.00115	34	1.00622	122	1.0137	19	1.0235	24	666
380	1.00149	29	1.00744	107	1.0156	17	1.0259	21	684
390	1.00178	27	1.00851	95	1.0173	15	1.0280	19	702
400	1.00205	23	1.00946	84	1.0188	13	1.0299	16	720
410	1.00228	20	1.01030	75	1.0201	11	1.0315	14	738
420	1.00248	19	1.01105	65	1.0212	10	1.0329	12	756
430	1.00267	16	1.01170	58	1.0222	9	1.0341	11	774
440	1.00283	14	1.01228	51	1.0231	8	1.0352	10	792
450	1.00297	13	1.01279	45	1.0239	7	1.0362	8	810
460	1.00310	11	1.01324	39	1.0246	6	1.0370	7	828
470	1.00321	10	1.01363	35	1.0252	5	1.0377	6	846
480	1.00331	9	1.01398	30	1.0257	4	1.0383	5	864
490	1.00340	8	1.01428	26	1.0261	4	1.0388	5	882
500	1.00348	7	1.01454	23	1.0265	3	1.0393	4	900
510	1.00355	6	1.01477	20	1.0268	3	1.0397	3	918
520	1.00361	5	1.01497	18	1.0271	3	1.0400	2	936
530	1.00366	4	1.01515	14	1.0274	2	1.0402	2	954
540	1.00370	4	1.01529	12	1.0276	1	1.0404	2	972
550	1.00374	3	1.01541	10	1.0277	2	1.0406	1	990
560	1.00377	3	1.01551	8	1.0279	1	1.0407	1	1008
570	1.00380	2	1.01559	6	1.0280	1	1.0408		1026
580	1.00382	2	1.01565	5	1.0281		1.0408		1044
590	1.00384	1	1.01570	4	1.0281		1.0408		1062
600	1.00385	1	1.01574	3	1.0281		1.0408		1080
610	1.00386	1	1.01577	1	1.0281		1.0408		1098
620	1.00387	1	1.01578		1.0281		1.0408	- 1	1116
630	1.00388		1.01578	- 1	1.0281	- 1	1.0407	- 1	1134
640	1.00388		1.01577	- 1	1.0280		1.0406	- 1	1152
650	1.00388		1.01576	- 3	1.0280	- 1	1.0405	- 1	1170
660	1.00388		1.01573	- 2	1.0279	- 1	1.0404	- 2	1188
670	1.00388	- 1	1.01571	- 4	1.0278	- 1	1.0402	- 2	1206
680	1.00387	- 1	1.01567	- 4	1.0277	- 1	1.0400	- 1	1224
690	1.00386	- 1	1.01563	- 5	1.0276	- 1	1.0399	- 2	1242
700	1.00385		1.01558		1.0275		1.0397		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	1.00385	-1	1.01558	-5	1.0275	-1	1.0397	-1	1260
710	1.00384	-1	1.01553	-6	1.0274	-1	1.0396	-2	1278
720	1.00383	-1	1.01547	-6	1.0273	-1	1.0394	-2	1296
730	1.00382	-2	1.01541	-6	1.0272	-1	1.0392	-1	1314
740	1.00380	-1	1.01535	-7	1.0271	-1	1.0391	-2	1332
750	1.00379	-1	1.01528	-7	1.0270	-1	1.0389	-2	1350
760	1.00378	-2	1.01521	-6	1.0269	-2	1.0387	-2	1368
770	1.00376	-2	1.01515	-7	1.0267	-1	1.0385	-2	1386
780	1.00374	-1	1.01508	-8	1.0266	-1	1.0383	-2	1404
790	1.00373	-2	1.01500	-7	1.0265	-2	1.0381	-2	1422
800	1.00371	-10	1.01493	-40	1.0263	-7	1.0379	-12	1440
850	1.00361	-10	1.01453	-42	1.0256	-8	1.0367	-11	1530
900	1.00351	-10	1.01411	-43	1.0248	-8	1.0356	-12	1620
950	1.00341	-10	1.01368	-43	1.0240	-7	1.0344	-11	1710
1000	1.00331	-10	1.01325	-40	1.0233	-8	1.0333	-11	1800
1050	1.00321	-10	1.01285	-40	1.0225	-7	1.0322	-10	1890
1100	1.00311	-9	1.01245	-38	1.0218	-7	1.0312	-10	1980
1150	1.00302	-9	1.01207	-37	1.0211	-6	1.0302	-10	2070
1200	1.00293	-9	1.01170	-36	1.0205	-7	1.0292	-9	2160
1250	1.00284	-9	1.01134	-34	1.0198	-6	1.0283	-8	2250
1300	1.00275	-8	1.01100	-32	1.0192	-5	1.0275	-8	2340
1350	1.00267	-8	1.01068	-31	1.0187	-6	1.0267	-8	2430
1400	1.00259	-7	1.01037	-30	1.0181	-5	1.0259	-8	2520
1450	1.00252	-7	1.01007	-29	1.0176	-5	1.0251	-7	2610
1500	1.00245	-6	1.00978	-3	1.0171	-5	1.0244	-6	2700
1550	1.00239	-6	1.0095	-2	1.0166	-4	1.0238	-6	2790
1600	1.00233	-5	1.0093	-2	1.0162	-4	1.0232	-6	2880
1650	1.00228	-5	1.0091	-3	1.0158	-4	1.0226	-6	2970
1700	1.00223	-5	1.0088	-2	1.0154	-4	1.0220	-6	3060
1750	1.00218	-5	1.0086	-3	1.0150	-4	1.0214	-6	3150
1800	1.00213	-5	1.0083	-2	1.0146	-4	1.0208	-5	3240
1850	1.00208	-4	1.0081	-2	1.0142	-4	1.0203	-5	3330
1900	1.00204	-4	1.0079	-2	1.0138	-3	1.0198	-5	3420
1950	1.00200	-4	1.0077	-1	1.0135	-3	1.0193	-5	3510
2000	1.00196	-1	1.0076	-2	1.0132	-3	1.0188	-4	3600
2050	1.0019		1.0074	-1	1.0129	-3	1.0184	-4	3690
2100	1.0019		1.0073	-2	1.0126	-2	1.0180	-4	3780
2150	1.0019		1.0071	-1	1.0124	-3	1.0176	-4	3870
2200	1.0019		1.0070	-1	1.0121	-2	1.0172	-3	3960
2250	1.0019	1	1.0069	-2	1.0119	-3	1.0169	-4	4050
2300	1.0020	1	1.0067		1.0116	-1	1.0165	-2	4140
2350	1.0021	1	1.0067		1.0115	-2	1.0163	-3	4230
2400	1.0022	2	1.0067	-1	1.0113	-2	1.0160	-3	4320
2450	1.0024	2	1.0066		1.0111	-1	1.0157	-2	4410
2500	1.0026	3	1.0066		1.0110	-1	1.0155	-2	4500
2550	1.0029	3	1.0066	1	1.0109	-1	1.0153	-2	4590
2600	1.0032	4	1.0067		1.0108	-1	1.0151	-2	4680
2650	1.0036	5	1.0067	1	1.0107		1.0149	-1	4770
2700	1.0041	5	1.0068	1	1.0107		1.0148	-2	4860
2750	1.0046	7	1.0069	2	1.0107	1	1.0146	-1	4950
2800	1.0053	8	1.0071	4	1.0108	1	1.0145	1	5040
2850	1.0061	10	1.0075	4	1.0109	2	1.0146	1	5130
2900	1.0071	11	1.0079	6	1.0111	4	1.0147	2	5220
2950	1.0082	13	1.0085	7	1.0115	4	1.0149	2	5310
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80	.034135	-3795	.34241	-3833					144
90	.030340	-3036	.30408	-3057	1.22563	-12540	2.1617	-2251	162
100	.027304	-2483	.27351	-2498	1.10023	-10179	1.9366	-1816	180
110	.024821	-2069	.24853	-2078	.99844	- 8435	1.7550	-1498	198
120	.022752	-1751	.22775	-1757	.91409	- 7109	1.6052	-1259	216
130	.021001	-1500	.21018	-1505	.84300	- 6076	1.4793	-1074	234
140	.019501	-1301	.19513	-1303	.78224	- 5254	1.3719	- 926	252
150	.018200	-1137	.18210	-1140	.72970	- 4590	1.2793	- 809	270
160	.017063	-1004	.17070	-1005	.68380	- 4044	1.1984	- 711	288
170	.016059	- 892	.16065	- 894	.64336	- 3591	1.1273	- 632	306
180	.015167	- 799	.15171	- 799	.60745	- 3209	1.0641	- 564	324
190	.014368	- 718	.14372	- 719	.57536	- 2888	1.0077	- 507	342
200	.013650	- 650	.13653	- 651	.54648	- 2610	.9570	- 458	360
210	.013000	- 591	.13002	- 591	.52038	- 2372	.9112	- 416	378
220	.012409	- 540	.12411	- 540	.49666	- 2164	.8696	- 380	396
230	.011869	- 494	.11871	- 495	.47502	- 1983	.8316	- 348	414
240	.011375	- 455	.11376	- 455	.45519	- 1824	.7968	- 319	432
250	.010920	- 420	.10921	- 421	.43695	- 1684	.7649	- 295	450
260	.010500	- 389	.10500	- 389	.42011	- 1558	.7354	- 273	468
270	.010111	- 361	.10111	- 361	.40453	- 1447	.7081	- 254	486
280	.009750	- 337	.09750	- 336	.39006	- 1346	.6827	- 236	504
290	.009413	- 313	.09414	- 314	.37660	- 1257	.6591	- 220	522
300	.009100	- 294	.09100	- 294	.36403	- 1176	.6371	- 206	540
310	.008806	- 275	.08806	- 275	.35227	- 1101	.6165	- 193	558
320	.008531	- 259	.08531	- 259	.34126	- 1036	.5972	- 181	576
330	.008272	- 243	.08272	- 243	.33090	- 973	.5791	- 170	594
340	.008029	- 229	.08029	- 229	.32117	- 919	.5621	- 161	612
350	.007800	- 217	.07800	- 217	.31198	- 867	.5460	- 152	630
360	.007583	- 205	.07583	- 205	.30331	- 820	.5308	- 144	648
370	.007378	- 194	.07378	- 194	.29511	- 777	.5164	- 136	666
380	.007184	- 184	.07184	- 184	.28734	- 737	.5028	- 129	684
390	.007000	- 175	.07000	- 175	.27997	- 700	.4899	- 122	702
400	.006825	- 167	.06825	- 167	.27297	- 667	.4777	- 117	720
410	.006658	- 158	.06658	- 158	.26630	- 634	.4660	- 111	738
420	.006500	- 151	.06500	- 152	.25996	- 604	.4549	- 106	756
430	.006349	- 145	.06348	- 144	.25392	- 578	.4443	- 101	774
440	.006204	- 138	.06204	- 138	.24814	- 551	.4342	- 96	792
450	.006066	- 131	.06066	- 132	.24263	- 528	.4246	- 93	810
460	.005935	- 127	.05934	- 126	.23735	- 505	.4153	- 88	828
470	.005808	- 121	.05808	- 121	.23230	- 484	.4065	- 85	846
480	.005687	- 116	.05687	- 116	.22746	- 464	.3980	- 81	864
490	.005571	- 111	.05571	- 111	.22282	- 446	.3899	- 78	882
500	.005460	- 107	.05460	- 107	.21836	- 428	.3821	- 75	900
510	.005353	- 103	.05353	- 103	.21408	- 412	.3746	- 72	918
520	.005250	- 99	.05250	- 99	.20996	- 396	.3674	- 69	936
530	.005151	- 96	.05151	- 96	.20600	- 382	.3605	- 67	954
540	.005055	- 92	.05055	- 92	.20218	- 367	.3538	- 64	972
550	.004963	- 88	.04963	- 88	.19851	- 355	.3474	- 62	990
560	.004875	- 86	.04875	- 86	.19496	- 342	.3412	- 60	1008
570	.004789	- 82	.04789	- 83	.19154	- 330	.3352	- 58	1026
580	.004707	- 80	.04706	- 79	.18824	- 319	.3294	- 56	1044
590	.004627	- 77	.04627	- 77	.18505	- 309	.3238	- 54	1062
600	.004550	- 75	.04550	- 75	.18196	- 298	.3184	- 52	1080
610	.004475	- 72	.04475	- 72	.17898	- 289	.3132	- 51	1098
620	.004403	- 70	.04403	- 70	.17609	- 279	.3081	- 49	1116
630	.004333	- 68	.04333	- 68	.17330	- 271	.3032	- 47	1134
640	.004265	- 65	.04265	- 65	.17059	- 262	.29850	- 459	1152
650	.004200		.04200		.16797		.29391		1170

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670	.004074	- 60	.04074	- 60	.16295	- 239	.28513	- 419	1206
680	.004014	- 58	.04014	- 58	.16056	- 233	.28094	- 407	1224
690	.003956	- 56	.03956	- 56	.15823	- 226	.27687	- 396	1242
700	.003900	- 55	.03900	- 55	.15597	- 220	.27291	- 383	1260
710	.003845	- 54	.03845	- 54	.15377	- 213	.26908	- 375	1278
720	.003791	- 51	.03791	- 52	.15164	- 208	.26533	- 363	1296
730	.003740	- 51	.03739	- 50	.14956	- 202	.26170	- 354	1314
740	.003689	- 49	.03689	- 49	.14754	- 197	.25816	- 344	1332
750	.003640	- 48	.03640	- 48	.14557	- 191	.25472	- 335	1350
760	.003592	- 47	.03592	- 47	.14366	- 187	.25137	- 326	1368
770	.003545	- 45	.03545	- 45	.14179	- 182	.24811	- 318	1386
780	.003500	- 44	.03500	- 45	.13997	- 177	.24493	- 311	1404
790	.003456	- 44	.03455	- 43	.13820	- 173	.24182	- 302	1422
800	.003412	- 200	.034122	- 2007	.13647	- 802	.23880	- 1404	1440
850	.003212	- 179	.032115	- 1784	.12845	- 714	.22476	- 1249	1530
900	.003033	- 159	.030331	- 1596	.12131	- 638	.21227	- 1117	1620
950	.002874	- 144	.028735	- 1437	.11493	- 575	.20110	- 1005	1710
1000	.002730	- 130	.027298	- 1300	.10918	- 520	.19105	- 910	1800
1050	.002600	- 118	.025998	- 1182	.10398	- 472	.18195	- 827	1890
1100	.002482	- 108	.024816	- 1079	.09926	- 432	.17368	- 755	1980
1150	.002374	- 99	.023737	- 989	.09494	- 395	.16613	- 692	2070
1200	.002275	- 91	.022748	- 910	.09099	- 364	.15921	- 637	2160
1250	.002184	- 84	.021838	- 840	.08735	- 336	.15284	- 587	2250
1300	.002100	- 78	.020998	- 777	.08399	- 311	.14697	- 545	2340
1350	.002022	- 72	.020221	- 722	.08088	- 289	.14152	- 505	2430
1400	.001950	- 67	.019499	- 673	.07799	- 269	.13647	- 471	2520
1450	.001883	- 63	.018826	- 627	.07530	- 251	.13176	- 439	2610
1500	.001820	- 59	.018199	- 585	.07279	- 235	.12737	- 411	2700
1550	.001761	- 55	.017614	- 550	.07044	- 220	.12326	- 385	2790
1600	.001706	- 52	.017064	- 518	.06824	- 207	.11941	- 362	2880
1650	.001654	- 48	.016546	- 488	.06617	- 194	.11579	- 340	2970
1700	.001606	- 46	.016058	- 460	.06423	- 184	.11239	- 321	3060
1750	.001560	- 44	.015598	- 434	.06239	- 173	.10918	- 304	3150
1800	.001516	- 41	.015164	- 410	.06066	- 164	.10614	- 287	3240
1850	.001475	- 39	.014754	- 390	.05902	- 156	.10327	- 272	3330
1900	.001436	- 38	.014364	- 370	.05746	- 148	.10055	- 258	3420
1950	.001398	- 35	.013994	- 352	.05598	- 140	.09797	- 246	3510
2000	.001363	- 35	.013642	- 336	.05458	- 134	.09551	- 234	3600
2050	.001328	- 32	.013306	- 321	.05324	- 128	.09317	- 223	3690
2100	.001296	- 32	.012985	- 308	.05196	- 122	.09094	- 212	3780
2150	.001264	- 31	.012677	- 295	.05074	- 116	.08882	- 204	3870
2200	.001233	- 30	.012382	- 283	.04958	- 112	.08678	- 195	3960
2250	.001203	- 30	.012099	- 274	.04846	- 108	.08483	- 188	4050
2300	.001173		.011825	- 266	.04738	- 103	.08295	- 180	4140
2350			.011559	- 258	.04635	- 100	.08115	- 174	4230
2400			.011301	- 252	.04535	- 97	.07941	- 167	4320
2450			.011049	- 246	.04438	- 94	.07774	- 162	4410
2500			.010803	- 241	.04344	- 91	.07612	- 158	4500
2550			.010562	- 237	.04253	- 89	.07454	- 153	4590
2600			.010325	- 235	.04164	- 87	.07301	- 149	4680
2650			.010090	- 233	.04077	- 85	.07152	- 145	4770
2700			.009857	- 230	.03992	- 83	.07007	- 142	4860
2750			.009627	- 229	.03909	- 82	.06865	- 139	4950
2800			.009398	- 227	.03827	- 81	.06726	- 137	5040
2850			.009171	- 225	.03746	- 80	.06589	- 134	5130
2900			.008946	- 223	.03666	- 79	.06455	- 134	5220
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120	2.3011	-1820	9.551	- 827	17.431	-1675	26.138	-2831	216
130	2.1191	-1549	8.724	- 685	15.756	-1338	23.307	-2161	234
140	1.9642	-1334	8.039	- 580	14.418	-1108	21.146	-1740	252
150	1.8308	-1163	7.459	- 498	13.310	- 935	19.406	-1439	270
160	1.7145	-1022	6.961	- 432	12.375	- 803	17.967	-1219	288
170	1.6123	- 906	6.529	- 380	11.572	- 699	16.748	-1049	306
180	1.5217	- 809	6.149	- 337	10.873	- 614	15.699	- 916	324
190	1.4408	- 727	5.812	- 301	10.259	- 546	14.783	- 807	342
200	1.3681	- 656	5.511	- 271	9.713	- 487	13.976	- 719	360
210	1.3025	- 596	5.240	- 244	9.226	- 440	13.257	- 644	378
220	1.2429	- 544	4.996	- 223	8.786	- 398	12.613	- 582	396
230	1.1885	- 495	4.773	- 203	8.388	- 362	12.031	- 528	414
240	1.1390	- 460	4.570	- 186	8.026	- 332	11.503	- 482	432
250	1.0930	- 422	4.384	- 172	7.694	- 305	11.021	- 442	450
260	1.0508	- 391	4.212	- 158	7.389	- 281	10.579	- 407	468
270	1.0117	- 362	4.054	- 147	7.108	- 260	10.172	- 375	486
280	.9755	- 338	3.907	- 136	6.848	- 241	9.797	- 348	504
290	.9417	- 315	3.771	- 127	6.607	- 224	9.449	- 324	522
300	.9102	- 294	3.644	- 119	6.383	- 210	9.125	- 301	540
310	.8808	- 276	3.525	- 111	6.173	- 196	8.824	- 282	558
320	.8532	- 259	3.414	- 104	5.977	- 183	8.542	- 264	576
330	.8273	- 244	3.310	- 98	5.794	- 173	8.278	- 248	594
340	.8029	- 229	3.212	- 92	5.621	- 162	8.030	- 233	612
350	.7800	- 217	3.1196	- 872	5.459	- 154	7.797	- 220	630
360	.7583	- 206	3.0324	- 824	5.305	- 144	7.577	- 207	648
370	.7377	- 194	2.9500	- 781	5.161	- 137	7.370	- 197	666
380	.7183	- 184	2.8719	- 740	5.024	- 130	7.173	- 186	684
390	.6999	- 176	2.7979	- 702	4.894	- 123	6.987	- 176	702
400	.6823	- 166	2.7277	- 668	4.771	- 118	6.811	- 168	720
410	.6657	- 159	2.6609	- 636	4.653	- 111	6.643	- 159	738
420	.6498	- 151	2.5973	- 606	4.542	- 106	6.484	- 152	756
430	.6347	- 144	2.5367	- 578	4.436	- 102	6.332	- 145	774
440	.6203	- 138	2.4789	- 552	4.334	- 96	6.187	- 139	792
450	.6065	- 132	2.4237	- 528	4.238	- 93	6.048	- 132	810
460	.5933	- 126	2.3709	- 506	4.145	- 88	5.916	- 126	828
470	.5807	- 122	2.3203	- 484	4.057	- 85	5.790	- 122	846
480	.5685	- 116	2.2719	- 465	3.972	- 81	5.668	- 116	864
490	.5569	- 111	2.2254	- 445	3.891	- 78	5.552	- 111	882
500	.5458	- 107	2.1809	- 429	3.813	- 75	5.441	- 107	900
510	.5351	- 103	2.1380	- 411	3.738	- 72	5.334	- 103	918
520	.5248	- 99	2.0969	- 396	3.666	- 70	5.231	- 99	936
530	.5149	- 95	2.0573	- 382	3.596	- 66	5.132	- 95	954
540	.5054	- 92	2.0191	- 367	3.530	- 65	5.037	- 92	972
550	.4962	- 89	1.9824	- 355	3.465	- 62	4.945	- 89	990
560	.4873	- 86	1.9469	- 341	3.403	- 59	4.856	- 85	1008
570	.4787	- 82	1.9128	- 330	3.344	- 58	4.771	- 82	1026
580	.4705	- 80	1.8798	- 319	3.286	- 56	4.689	- 80	1044
590	.4625	- 77	1.8479	- 308	3.230	- 54	4.609	- 77	1062
600	.4548	- 74	1.8171	- 298	3.176	- 52	4.532	- 74	1080
610	.4474	- 73	1.7873	- 288	3.124	- 50	4.458	- 72	1098
620	.4401	- 69	1.7585	- 280	3.074	- 49	4.386	- 70	1116
630	.4332	- 68	1.7305	- 270	3.025	- 47	4.316	- 67	1134
640	.4264	- 66	1.7035	- 262	2.9778	- 458	4.249	- 65	1152
650	.4198		1.6773		2.9320		4.184		1170

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650	.4198	- 63	1.6773	- 254	2.9320	- 445	4.184	- 64	1170
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680	.4013	- 58	1.6033	- 232	2.8026	- 406	3.999	- 58	1224
690	.3955	- 57	1.5801	- 226	2.7620	- 394	3.941	- 56	1242
700	.3898	- 55	1.5575	- 219	2.7226	- 384	3.885	- 55	1260
710	.3843	- 53	1.5356	- 213	2.6842	- 372	3.830	- 53	1278
720	.3790	- 52	1.5143	- 208	2.6470	- 362	3.777	- 52	1296
730	.3738	- 50	1.4935	- 202	2.6108	- 353	3.725	- 50	1314
740	.3688	- 49	1.4733	- 196	2.5755	- 343	3.675	- 49	1332
750	.3639	- 48	1.4537	- 191	2.5412	- 334	3.626	- 48	1350
760	.3591	- 47	1.4346	- 186	2.5078	- 326	3.578	- 46	1368
770	.3544	- 45	1.4160	- 182	2.4752	- 317	3.532	- 45	1386
780	.3499	- 45	1.3978	- 177	2.4435	- 309	3.487	- 44	1404
790	.3454	- 43	1.3801	- 172	2.4126	- 301	3.443	- 43	1422
800	.3411	- 200	1.3629	- 801	2.3825	- 1400	3.400	- 200	1440
850	.3211	- 179	1.2828	- 713	2.2425	- 1245	3.200	- 177	1530
900	.3032	- 159	1.2115	- 637	2.1180	- 1113	3.023	- 159	1620
950	.28726	- 1436	1.1478	- 573	2.0067	- 1002	2.864	- 143	1710
1000	.27290	- 1299	1.0905	- 519	1.9065	- 907	2.721	- 129	1800
1050	.25991	- 1182	1.0386	- 472	1.8158	- 824	2.592	- 118	1890
1100	.24809	- 1078	.9914	- 431	1.7334	- 752	2.474	- 107	1980
1150	.23731	- 989	.9483	- 394	1.6582	- 690	2.367	- 99	2070
1200	.22742	- 909	.9089	- 364	1.5892	- 635	2.268	- 90	2160
1250	.21833	- 840	.8725	- 335	1.5257	- 586	2.178	- 84	2250
1300	.20993	- 777	.8390	- 311	1.4671	- 542	2.094	- 77	2340
1350	.20216	- 722	.8079	- 288	1.4129	- 504	2.017	- 72	2430
1400	.19494	- 672	.7791	- 268	1.3625	- 469	1.945	- 67	2520
1450	.18822	- 627	.7523	- 251	1.3156	- 438	1.878	- 63	2610
1500	.18195	- 587	.7272	- 234	1.2718	- 410	1.815	- 65	2700
1550	.17608	- 550	.7038	- 220	1.2308	- 384	1.750	- 48	2790
1600	.17058	- 517	.6818	- 207	1.1924	- 361	1.702	- 52	2880
1650	.16541	- 487	.6611	- 194	1.1563	- 340	1.650	- 48	2970
1700	.16054	- 458	.6417	- 183	1.1223	- 320	1.602	- 45	3060
1750	.15596	- 434	.6234	- 173	1.0903	- 303	1.557	- 44	3150
1800	.15162	- 410	.6061	- 164	1.0600	- 286	1.513	- 40	3240
1850	.14752	- 388	.5897	- 155	1.0314	- 271	1.473	- 39	3330
1900	.14364	- 369	.5742	- 147	1.0043	- 257	1.434	- 37	3420
1950	.13995	- 350	.5595	- 140	.9786	- 245	1.397	- 35	3510
2000	.13645	- 335	.5455	- 134	.9541	- 232	1.362	- 33	3600
2050	.13310	- 318	.5321	- 127	.9309	- 222	1.329	- 32	3690
2100	.12992	- 304	.5194	- 121	.9087	- 211	1.297	- 30	3780
2150	.12688	- 289	.5073	- 115	.8876	- 202	1.267	- 28	3870
2200	.12399	- 280	.4958	- 111	.8674	- 194	1.239	- 28	3960
2250	.12119	- 267	.4847	- 106	.8480	- 185	1.211	- 26	4050
2300	.11852	- 256	.4741	- 102	.8295	- 178	1.185	- 26	4140
2350	.11596	- 248	.4639	- 97	.8117	- 170	1.159	- 24	4230
2400	.11348	- 238	.4542	- 94	.7947	- 164	1.135	- 23	4320
2450	.11110	- 230	.4448	- 91	.7783	- 158	1.112	- 23	4410
2500	.10880	- 223	.4357	- 87	.7625	- 151	1.089	- 22	4500
2550	.10657	- 216	.4270	- 85	.7474	- 147	1.067	- 20	4590
2600	.10441	- 211	.4185	- 82	.7327	- 142	1.047	- 21	4680
2650	.10230	- 206	.4103	- 79	.7185	- 137	1.026	- 19	4770
2700	.10024	- 199	.4024	- 77	.7048	- 133	1.007	- 19	4860
2750	.09825	- 195	.3947	- 74	.6915	- 129	.988	- 18	4950
2800	.09630	- 192	.3873	- 73	.6786	- 126	.970	- 18	5040
2850	.09438	- 189	.3800	- 71	.6660	- 122	.952	- 17	5130
2900	.09249	- 187	.3729	- 69	.6538	- 119	.935	- 17	5220
2950	.09062	- 186	.3660	- 68	.6419	- 117	.918	- 17	5310
3000	.08876		.3592		.6302		.901		5400

Table 2-2. DENSITY OF AIR - Cont. ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
150	19.406	-1439	106.6	-178					270
160	17.967	-1219	88.76	-1060					288
170	16.748	-1049	78.16	- 753					306
180	15.699	- 916	70.63	- 581	140.6	-162	218.3	-293	324
190	14.783	- 807	64.82	- 469	124.37	-1171	189.0	-206	342
200	13.976	- 719	60.13	- 391	112.66	- 905	168.40	-1535	360
210	13.257	- 644	56.22	- 334	103.61	- 731	153.05	-1206	378
220	12.613	- 582	52.88	- 289	96.30	- 611	140.99	- 981	396
230	12.031	- 528	49.99	- 255	90.19	- 520	131.18	- 821	414
240	11.503	- 482	47.44	- 226	84.99	- 451	122.97	- 702	432
250	11.021	- 442	45.18	- 203	80.48	- 397	115.95	- 609	450
260	10.579	- 407	43.15	- 184	76.51	- 353	109.86	- 535	468
270	10.172	- 375	41.31	- 167	72.98	- 317	104.51	- 477	486
280	9.797	- 348	39.64	- 152	69.81	- 286	99.74	- 427	504
290	9.449	- 324	38.12	- 140	66.95	- 261	95.47	- 386	522
300	9.125	- 301	36.72	- 130	64.34	- 238	91.61	- 352	540
310	8.824	- 282	35.42	- 120	61.96	- 219	88.09	- 321	558
320	8.542	- 264	34.22	- 111	59.77	- 203	84.88	- 296	576
330	8.278	- 248	33.11	- 104	57.74	- 188	81.92	- 274	594
340	8.030	- 233	32.07	- 97	55.86	- 175	79.18	- 253	612
350	7.797	- 220	31.097	- 911	54.11	- 163	76.65	- 236	630
360	7.577	- 207	30.186	- 856	52.48	- 153	74.29	- 220	648
370	7.370	- 197	29.330	- 807	50.95	- 143	72.09	- 206	666
380	7.173	- 186	28.523	- 760	49.52	- 135	70.03	- 194	684
390	6.987	- 176	27.763	- 720	48.17	- 128	68.09	- 182	702
400	6.811	- 168	27.043	- 682	46.89	- 120	66.27	- 172	720
410	6.643	- 159	26.361	- 646	45.69	- 114	64.55	- 162	738
420	6.484	- 152	25.715	- 614	44.55	- 108	62.93	- 154	756
430	6.332	- 145	25.101	- 585	43.47	- 102	61.39	- 146	774
440	6.187	- 139	24.516	- 557	42.45	- 98	59.93	- 138	792
450	6.048	- 132	23.959	- 531	41.47	- 92	58.55	- 132	810
460	5.916	- 126	23.428	- 507	40.55	- 89	57.23	- 126	828
470	5.790	- 122	22.921	- 486	39.66	- 85	55.97	- 120	846
480	5.668	- 116	22.435	- 464	38.81	- 80	54.77	- 114	864
490	5.552	- 111	21.971	- 445	38.01	- 78	53.63	- 110	882
500	5.441	- 107	21.526	- 427	37.23	- 74	52.53	- 104	900
510	5.334	- 103	21.099	- 410	36.49	- 71	51.49	- 101	918
520	5.231	- 99	20.689	- 394	35.78	- 69	50.48	- 96	936
530	5.132	- 95	20.295	- 378	35.09	- 65	49.52	- 93	954
540	5.037	- 92	19.917	- 365	34.44	- 63	48.59	- 89	972
550	4.945	- 89	19.552	- 351	33.81	- 61	47.70	- 86	990
560	4.856	- 85	19.201	- 338	33.20	- 59	46.84	- 82	1008
570	4.771	- 82	18.863	- 326	32.61	- 56	46.02	- 80	1026
580	4.689	- 80	18.537	- 315	32.05	- 55	45.22	- 77	1044
590	4.609	- 77	18.222	- 305	31.50	- 52	44.45	- 74	1062
600	4.532	- 74	17.917	- 294	30.977	- 508	43.71	- 71	1080
610	4.458	- 72	17.623	- 284	30.469	- 490	43.00	- 69	1098
620	4.386	- 70	17.339	- 276	29.979	- 475	42.31	- 67	1116
630	4.316	- 67	17.063	- 266	29.504	- 460	41.64	- 65	1134
640	4.249	- 65	16.797	- 258	29.044	- 445	40.99	- 63	1152
650	4.184	- 64	16.539	- 250	28.599	- 432	40.36	- 60	1170
660	4.120	- 61	16.289	- 243	28.167	- 418	39.76	- 59	1188
670	4.059	- 60	16.046	- 236	27.749	- 405	39.17	- 57	1206
680	3.999	- 58	15.810	- 228	27.344	- 394	38.60	- 55	1224
690	3.941	- 56	15.582	- 222	26.950	- 383	38.05	- 54	1242
700	3.885		15.360		26.567		37.51		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	3.885	- 55	15.360	- 216	26.567	- 371	37.51	- 52	1260
710	3.830	- 53	15.144	- 209	26.196	- 362	36.99	- 51	1278
720	3.777	- 52	14.935	- 204	25.834	- 351	36.48	- 50	1296
730	3.725	- 50	14.731	- 198	25.483	- 341	35.98	- 48	1314
740	3.675	- 49	14.533	- 193	25.142	- 333	35.50	- 46	1332
750	3.626	- 48	14.340	- 187	24.809	- 323	35.04	- 46	1350
760	3.578	- 46	14.153	- 183	24.486	- 315	34.58	- 44	1368
770	3.532	- 45	13.970	- 179	24.171	- 307	34.14	- 43	1386
780	3.487	- 44	13.791	- 173	23.864	- 299	33.71	- 42	1404
790	3.443	- 43	13.618	- 169	23.565	- 291	33.29	- 41	1422
800	3.400	- 200	13.449	- 786	23.274	- 1353	32.879	- 1900	1440
850	3.200	- 177	12.663	- 699	21.921	- 1201	30.979	- 1689	1530
900	3.023	- 159	11.964	- 625	20.720	- 1077	29.290	- 1511	1620
950	2.864	- 143	11.339	- 562	19.643	- 968	27.779	- 1360	1710
1000	2.721	- 129	10.777	- 509	18.675	- 877	26.419	- 1232	1800
1050	2.592	- 118	10.268	- 463	17.798	- 797	25.187	- 1121	1890
1100	2.474	- 107	9.805	- 423	17.001	- 728	24.066	- 1024	1980
1150	2.367	- 99	9.382	- 388	16.273	- 668	23.042	- 939	2070
1200	2.268	- 90	8.994	- 356	15.605	- 615	22.103	- 866	2160
1250	2.178	- 84	8.638	- 330	14.990	- 568	21.237	- 799	2250
1300	2.094	- 77	8.308	- 305	14.422	- 527	20.438	- 742	2340
1350	2.017	- 72	8.003	- 283	13.895	- 489	19.696	- 689	2430
1400	1.945	- 67	7.720	- 264	13.406	- 455	19.007	- 642	2520
1450	1.878	- 63	7.456	- 247	12.951	- 426	18.365	- 599	2610
1500	1.815	- 65	7.209	- 230	12.525	- 398	17.766	- 563	2700
1550	1.750	- 48	6.979	- 217	12.127	- 374	17.203	- 528	2790
1600	1.702	- 52	6.762	- 204	11.753	- 352	16.675	- 496	2880
1650	1.650	- 48	6.558	- 191	11.401	- 331	16.179	- 467	2970
1700	1.602	- 45	6.367	- 180	11.070	- 312	15.712	- 440	3060
1750	1.557	- 44	6.187	- 171	10.758	- 295	15.272	- 415	3150
1800	1.513	- 40	6.016	- 161	10.463	- 278	14.857	- 394	3240
1850	1.473	- 39	5.855	- 153	10.185	- 264	14.463	- 374	3330
1900	1.434	- 37	5.702	- 145	9.921	- 252	14.089	- 355	3420
1950	1.397	- 35	5.557	- 138	9.669	- 239	13.734	- 336	3510
2000	1.362	- 33	5.419	- 132	9.430	- 227	13.398	- 322	3600
2050	1.329	- 32	5.287	- 125	9.203	- 217	13.076	- 306	3690
2100	1.297	- 30	5.162	- 119	8.986	- 207	12.770	- 292	3780
2150	1.267	- 28	5.043	- 114	8.779	- 197	12.478	- 279	3870
2200	1.239	- 28	4.929	- 109	8.582	- 189	12.199	- 268	3960
2250	1.211	- 26	4.820	- 104	8.393	- 180	11.931	- 255	4050
2300	1.185	- 26	4.716	- 100	8.213	- 174	11.676	- 246	4140
2350	1.159	- 24	4.616	- 96	8.039	- 166	11.430	- 235	4230
2400	1.135	- 23	4.520	- 92	7.873	- 159	11.195	- 225	4320
2450	1.112	- 23	4.428	- 89	7.714	- 154	10.970	- 217	4410
2500	1.089	- 22	4.339	- 85	7.560	- 147	10.753	- 209	4500
2550	1.067	- 20	4.254	- 82	7.413	- 142	10.544	- 201	4590
2600	1.047	- 21	4.172	- 79	7.271	- 136	10.343	- 193	4680
2650	1.026	- 19	4.093	- 76	7.135	- 132	10.150	- 187	4770
2700	1.007	- 19	4.017	- 73	7.003	- 128	9.963	- 179	4860
2750	.988	- 18	3.944	- 72	6.875	- 123	9.784	- 174	4950
2800	.970	- 18	3.872	- 69	6.752	- 119	9.610	- 169	5040
2850	.952	- 17	3.803	- 67	6.633	- 116	9.441	- 164	5130
2900	.935	- 17	3.736	- 66	6.517	- 113	9.277	- 159	5220
2950	.918	- 17	3.670	- 63	6.404	- 109	9.118	- 154	5310
3000	.901		3.607		6.295		8.964		5400

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	3.5001	-41							90
60	3.4960	-20							108
70	3.4940	-10							126
80	3.4930	-5							144
90	3.4925	-3	3.5030	-32	3.5398	-135	3.5787	-250	162
100	3.4922	-2	3.4998	-19	3.5263	-84	3.5537	-153	180
110	3.4920	-1	3.4979	-14	3.5179	-57	3.5384	-101	198
120	3.4919	-1	3.4965	-10	3.5122	-41	3.5283	-73	216
130	3.4918		3.4955	-7	3.5081	-30	3.5210	-53	234
140	3.4918		3.4948	-4	3.5051	-21	3.5157	-40	252
150	3.4918		3.4944	-4	3.5030	-17	3.5117	-30	270
160	3.4918		3.4940	-3	3.5013	-13	3.5087	-24	288
170	3.4918	1	3.4937	-2	3.5000	-11	3.5063	-19	306
180	3.4919	1	3.4935		3.4989	-7	3.5044	-15	324
190	3.4920	3	3.4935		3.4982	-4	3.5029	-9	342
200	3.4923	2	3.4935	1	3.4978	-4	3.3020	-9	360
210	3.4925	3	3.4936	2	3.4974	-3	3.5011	-6	378
220	3.4928	5	3.4938	4	3.4971	1	3.5005	-3	396
230	3.4933	5	3.4942	4	3.4972	1	3.5002	-2	414
240	3.4938	8	3.4946	7	3.4973	5	3.5000	3	432
250	3.4946	8	3.4953	7	3.4978	5	3.5003	2	450
260	3.4954	10	3.4960	10	3.4983	7	3.5005	6	468
270	3.4964	12	3.4970	11	3.4990	10	3.5011	8	486
280	3.4976	14	3.4981	14	3.5000	12	3.5019	11	504
290	3.4990	16	3.4995	15	3.5012	14	3.5030	13	522
300	3.5006	19	3.5010	20	3.5026	18	3.5043	16	540
310	3.5025	20	3.5030	20	3.5044	19	3.5059	17	558
320	3.5045	24	3.5050	23	3.5063	22	3.5076	22	576
330	3.5069	25	3.5073	25	3.5085	24	3.5098	23	594
340	3.5094	28	3.5098	28	3.5109	28	3.5121	27	612
350	3.5122	31	3.5126	30	3.5137	30	3.5148	30	630
360	3.5153	33	3.5156	33	3.5167	32	3.5178	31	648
370	3.5186	38	3.5189	38	3.5199	38	3.5209	37	666
380	3.5224	39	3.5227	39	3.5237	38	3.5246	38	684
390	3.5263	42	3.5266	42	3.5275	41	3.5284	41	702
400	3.5305	44	3.5308	44	3.5316	43	3.5325	42	720
410	3.5349	48	3.5352	47	3.5359	48	3.5367	47	738
420	3.5397	50	3.5399	50	3.5407	50	3.5414	50	756
430	3.5447	53	3.5449	53	3.5457	51	3.5464	51	774
440	3.5500	55	3.5502	55	3.5508	56	3.5515	55	792
450	3.5555	58	3.5557	58	3.5564	57	3.5570	57	810
460	3.5613	60	3.5615	60	3.5621	60	3.5627	60	828
470	3.5673	62	3.5675	62	3.5681	61	3.5687	61	846
480	3.5735	64	3.5737	64	3.5742	64	3.5748	63	864
490	3.5799	66	3.5801	66	3.3806	66	3.5811	66	882
500	3.5865	68	3.5867	68	3.5872	67	3.5877	67	900
510	3.5933	70	3.5935	70	3.5939	70	3.5944	70	918
520	3.6003	72	3.6005	72	3.6009	72	3.6014	71	936
530	3.6075	74	3.6077	73	3.6081	74	3.6085	74	954
540	3.6149	75	3.6150	75	3.6155	74	3.6159	75	972
550	3.6224	76	3.6225	76	3.6229	76	3.6234	75	990
560	3.6300	77	3.6301	77	3.6305	77	3.6309	77	1008
570	3.6377	79	3.6378	79	3.6382	79	3.6386	78	1026
580	3.6456	79	3.6457	79	3.6461	79	3.6464	79	1044
590	3.6535	80	3.6536	80	3.6540	79	3.6543	79	1062
600	3.6615	81	3.6616	81	3.6619	81	3.6622	81	1080
610	3.6696	82	3.6697	82	3.6700	82	3.6703	82	1098
620	3.6778	82	3.6779	82	3.6782	82	3.6785	82	1116
630	3.6860	83	3.6861	83	3.6864	83	3.6867	83	1134
640	3.6943	84	3.6944	84	3.6947	84	3.6950	83	1152
650	3.7027		3.7028		3.7031		3.7033		1170

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	3.7027	84	3.7028	84	3.7031	84	3.7033	84	1170
660	3.7111	84	3.7112	83	3.7115	83	3.7117	84	1188
670	3.7195	84	3.7195	85	3.7198	84	3.7201	84	1206
680	3.7279	84	3.7280	84	3.7282	84	3.7285	84	1224
690	3.7363	84	3.7364	84	3.7366	84	3.7369	84	1242
700	3.7447	84	3.7448	84	3.7450	84	3.7453	83	1260
710	3.7531	83	3.7532	83	3.7534	83	3.7536	83	1278
720	3.7614	84	3.7615	84	3.7617	84	3.7619	84	1296
730	3.7698	84	3.7699	84	3.7701	84	3.7703	84	1314
740	3.7782	83	3.7783	83	3.7785	83	3.7787	83	1332
750	3.7865	82	3.7866	82	3.7868	82	3.7870	82	1350
760	3.7947	83	3.7948	83	3.7950	82	3.7952	82	1368
770	3.8030	82	3.8031	82	3.8032	82	3.8034	82	1386
780	3.8112	82	3.8113	82	3.8114	82	3.8116	82	1404
790	3.8194	9	3.8195	8	3.8196	8	3.8198	8	1422
800	3.828	40	3.828	41	3.828	41	3.828	41	1440
850	3.868	38	3.869	37	3.869	37	3.869	37	1530
900	3.906	38	3.906	38	3.906	38	3.906	38	1620
950	3.944	35	3.944	35	3.944	35	3.944	35	1710
1000	3.979	34	3.979	34	3.979	34	3.979	34	1800
1050	4.013	33	4.013	33	4.013	33	4.013	33	1890
1100	4.046	32	4.046	32	4.046	32	4.046	32	1980
1150	4.078	31	4.078	31	4.078	31	4.078	31	2070
1200	4.109	31	4.109	31	4.109	31	4.109	31	2160
1250	4.140	31	4.140	31	4.140	31	4.140	31	2250
1300	4.171	30	4.171	30	4.171	30	4.171	30	2340
1350	4.201	31	4.201	29	4.201	29	4.201	29	2430
1400	4.232	33	4.230	30	4.230	30	4.230	30	2520
1450	4.265	36	4.260	29	4.260	29	4.260	29	2610
1500	4.301	38	4.289	33	4.289	32	4.289	32	2700
1550	4.339	41	4.322	34	4.321	31	4.321	31	2790
1600	4.380	47	4.356	37	4.352	35	4.352	34	2880
1650	4.427	52	4.393	38	4.387	34	4.386	33	2970
1700	4.479	67	4.431	42	4.421	36	4.419	34	3060
1750	4.546	86	4.473	48	4.457	40	4.453	37	3150
1800	4.632	111	4.521	56	4.497	42	4.490	39	3240
1850	4.743	145	4.577	67	4.539	47	4.529	44	3330
1900	4.888	188	4.644	88	4.586	57	4.753	48	3420
1950	5.076	250	4.732	107	4.643	68	4.621	55	3510
2000	5.326	34	4.839	121	4.711	73	4.676	62	3600
2050	5.67	44	4.960	136	4.784	82	4.738	68	3690
2100	6.11	51	5.096	182	4.866	107	4.806	84	3780
2150	6.62	59	5.278	217	4.973	122	4.890	103	3870
2200	7.21	66	5.495	275	5.095	155	4.993	121	3960
2250	7.87	70	5.770	326	5.250	175	5.114	142	4050
2300	8.57		6.096	360	5.425	200	5.256	163	4140
2350			6.456	436	5.625	234	5.419	185	4230
2400			6.892	528	5.859	271	5.604	212	4320
2450			7.420	595	6.130	324	5.816	248	4410
2500			8.015	58	6.454	34	6.064	26	4500
2550			8.60	81	6.79	37	6.32	28	4590
2600			9.41	81	7.16	41	6.60	31	4680
2650			10.22	89	7.57	45	6.91	35	4770
2700			11.11	96	8.02	48	7.26	37	4860
2750			12.07	101	8.50	52	7.63	39	4950
2800			13.08		9.02		8.02		5040

°K	1 atm		4 atm		7 atm		10 atm		°R
100	3.5824	- 228							180
110	3.5596	- 149	3.8166	- 832	4.163	-181	4.807	-482	198
120	3.5447	- 107	3.7334	- 544	3.982	-125	4.325	-244	216
130	3.5340	- 77	3.6790	- 372	3.857	- 79	4.081	-142	234
140	3.5263	- 58	3.6418	- 271	3.778	- 56	3.939	- 95	252
150	3.5205	- 44	3.6147	- 196	3.7219	- 403	3.8440	- 660	270
160	3.5161	- 35	3.5951	- 158	3.6816	- 302	3.7780	- 483	288
170	3.5126	- 27	3.5793	- 123	3.6514	- 235	3.7297	- 365	306
180	3.5099	- 21	3.5670	- 97	3.6279	- 183	3.6932	- 288	324
190	3.5078	- 16	3.5573	- 78	3.6096	- 146	3.6644	- 217	342
200	3.5062	- 13	3.5495	- 63	3.5950	- 119	3.6427	- 183	360
210	3.5049	- 11	3.5432	- 53	3.5831	- 100	3.6244	- 149	378
220	3.5038	- 6	3.5379	- 42	3.5731	- 80	3.6095	- 123	396
230	3.5032	- 4	3.5337	- 35	3.5651	- 67	3.5972	- 101	414
240	3.5028	- 1	3.5302	- 25	3.5584	- 53	3.5871	- 82	432
250	3.5027	1	3.5277	- 22	3.5531	- 46	3.5789	- 70	450
260	3.5028	3	3.5255	- 15	3.5485	- 35	3.5719	- 56	468
270	3.5031	7	3.5240	- 12	3.5450	- 30	3.5663	- 49	486
280	3.5038	9	3.5228	- 6	3.5420	- 22	3.5614	- 38	504
290	3.5047	12	3.5222	- 2	3.5398	- 15	3.5576	- 30	522
300	3.5059	15	3.5220	3	3.5383	- 9	3.5546	- 21	540
310	3.5074	17	3.5223	6	3.5374	- 5	3.5525	- 17	558
320	3.5091	21	3.5229	11	3.5369	2	3.5508	- 8	576
330	3.5112	22	3.5240	14	3.5371	4	3.5500	- 3	594
340	3.5134	26	3.5254	19	3.5375	11	3.5497	3	612
350	3.5160	28	3.5273	21	3.5386	15	3.5500	7	630
360	3.5188	31	3.5294	25	3.5401	18	3.5507	12	648
370	3.5219	36	3.5319	30	3.5419	24	3.5519	17	666
380	3.5255	37	3.5349	32	3.5443	26	3.5536	21	684
390	3.5292	41	3.5381	35	3.5469	31	3.5557	26	702
400	3.5333	43	3.5416	38	3.5500	33	3.5583	28	720
410	3.5376	46	3.5454	43	3.5533	39	3.5611	34	738
420	3.5422	49	3.5497	45	3.5572	40	3.5645	37	756
430	3.5471	52	3.5542	47	3.5612	44	3.5682	40	774
440	3.5523	54	3.5589	51	3.5656	48	3.5722	45	792
450	3.5577	57	3.5640	54	3.5704	51	3.5767	48	810
460	3.5634	59	3.5694	56	3.5755	54	3.5815	50	828
470	3.5693	61	3.5750	59	3.5809	55	3.5865	54	846
480	3.5754	63	3.5809	60	3.5864	58	3.5919	56	864
490	3.5817	65	3.5869	63	3.5922	61	3.5975	57	882
500	3.5882	67	3.5932	65	3.5983	63	3.6032	61	900
510	3.5949	70	3.5997	68	3.6046	65	3.6093	63	918
520	3.6019	71	3.6065	69	3.6111	68	3.6156	66	936
530	3.6090	73	3.6134	72	3.6179	69	3.6222	68	954
540	3.6163	75	3.6206	72	3.6248	71	3.6290	69	972
550	3.6238	75	3.6278	74	3.6319	71	3.6359	71	990
560	3.6313	77	3.6352	75	3.6390	75	3.6430	72	1008
570	3.6390	78	3.6427	77	3.6465	76	3.6502	74	1026
580	3.6468	79	3.6504	78	3.6541	75	3.6576	74	1044
590	3.6547	79	3.6582	78	3.6616	77	3.6650	76	1062
600	3.6626	81	3.6660	82	3.6693	79	3.6726	77	1080
610	3.6707	81	3.6742	78	3.6772	79	3.6803	77	1098
620	3.6788	82	3.6820	80	3.6851	79	3.6880	78	1116
630	3.6870	83	3.6900	82	3.6930	81	3.6958	80	1134
640	3.6953	83	3.6982	82	3.7011	82	3.7038	81	1152
650	3.7036		3.7064		3.7093		3.7119		1170

°K	1 atm		4 atm		7 atm		10 atm		°R
650	3.7036	84	3.7064	83	3.7093	81	3.7119	81	1170
660	3.7120	84	3.7147	83	3.7174	82	3.7200	81	1188
670	3.7204	84	3.7230	83	3.7256	82	3.7281	81	1206
680	3.7288	83	3.7313	83	3.7338	82	3.7362	81	1224
690	3.7371	84	3.7396	83	3.7420	82	3.7443	82	1242
700	3.7455	83	3.7479	83	3.7502	83	3.7525	81	1260
710	3.7538	83	3.7562	81	3.7585	80	3.7606	81	1278
720	3.7621	84	3.7643	84	3.7665	84	3.7687	82	1296
730	3.7705	84	3.7727	83	3.7749	82	3.7769	82	1314
740	3.7789	83	3.7810	82	3.7831	81	3.7851	81	1332
750	3.7872	82	3.7892	81	3.7912	81	3.7932	81	1350
760	3.7954	82	3.7973	82	3.7993	81	3.8013	81	1368
770	3.8036	62	3.8055	82	3.8074	81	3.8094	80	1386
780	3.8118	82	3.8137	81	3.8155	81	3.8174	80	1404
790	3.8200	8	3.8218	8	3.8236	8	3.8254	9	1422
800	3.828	39	3.830	41	3.832	40	3.834	39	1440
850	3.869	37	3.871	37	3.872	37	3.873	37	1530
900	3.906	38	3.908	38	3.909	38	3.910	38	1620
950	3.944	35	3.946	34	3.947	35	3.948	35	1710
1000	3.979	34	3.980	34	3.982	33	3.983	33	1800
1050	4.013	33	3.014	33	4.015	33	4.016	33	1890
1100	4.046	32	4.047	32	4.048	32	4.049	32	1980
1150	4.078	31	4.079	31	4.080	31	4.081	30	2070
1200	4.109	31	4.110	31	4.111	30	4.111	31	2160
1250	4.140	31	4.141	31	4.141	31	4.142	31	2250
1300	4.171	30	4.172	30	4.172	30	4.173	30	2340
1350	4.201	29	4.202	29	4.202	29	4.203	29	2430
1400	4.230	30	4.231	30	4.231	30	4.232	29	2520
1450	4.260	29	4.261	29	4.261	29	4.261	29	2610
1500	4.289	32	4.290	30	4.290	30	4.290	30	2700
1550	4.321	31	4.320	31	4.320	31	4.320	31	2790
1600	4.352	33	4.351	31	4.351	31	4.351	31	2880
1650	4.385	33	4.382	32	4.382	31	4.382	32	2970
1700	4.418	33	4.414	32	4.413	32	4.414	31	3060
1750	4.451	36	4.446	34	4.445	34	4.445	33	3150
1800	4.487	37	4.480	33	4.479	32	4.478	31	3240
1850	4.524	42	4.513	36	4.511	33	4.509	34	3330
1900	4.566	45	4.549	37	4.544	36	4.543	34	3420
1950	4.611	51	4.586	40	4.580	37	4.577	36	3510
2000	4.662	57	4.626	44	4.617	40	4.613	39	3600
2050	4.719	62	4.670	45	4.657	42	4.652	40	3690
2100	4.781	75	4.715	52	4.699	45	4.692	42	3780
2150	4.856	91	4.767	56	4.744	47	4.734	46	3870
2200	4.947	108	4.823	67	4.791	59	4.780	53	3960
2250	5.055	124	4.890	79	4.850	68	4.833	60	4050
2300	5.179	142	4.969	87	4.918	72	4.893	63	4140
2350	5.321	163	5.056	93	4.990	77	4.956	70	4230
2400	5.484	186	5.149	106	5.067	85	5.026	76	4320
2450	5.670	212	5.255	118	5.152	95	5.102	84	4410
2500	5.882	24	5.373	134	5.247	106	5.186	96	4500
2550	6.12	28	5.507	154	5.353	121	5.282	107	4590
2600	6.40	31	5.661	170	5.474	133	5.389	117	4680
2650	6.71	35	5.831	188	5.607	146	5.506	128	4770
2700	7.06	39	6.019	228	5.753	159	5.634	141	4860
2750	7.45	42	6.247	208	5.912	176	5.775	155	4950
2800	7.87	48	6.455	253	6.088	194	5.930	176	5040
2850	8.35	51	6.708	285	6.282	215	6.106	194	5130
2900	8.86	54	6.993	297	6.497	236	6.300	208	5220
2950	9.40	56	7.290	315	6.733	258	6.508	216	5310
3000	9.96		7.605		6.991		6.724		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	3.844	- 66							270
160	3.778	- 48	5.876	-784					288
170	3.730	- 37	5.092	-411					306
180	3.693	- 29	4.681	-255	6.621	-965	8.46	-148	324
190	3.664	- 21	4.426	-170	5.656	-524	6.98	- 90	342
200	3.643	- 19	4.256	-127	5.132	-342	6.079	- 601	360
210	3.624	- 14	4.129	- 93	4.790	-231	5.478	- 385	378
220	3.610	- 13	4.036	- 73	4.559	-167	5.093	- 272	396
230	3.597	- 10	3.963	- 57	4.392	-127	4.821	- 202	414
240	3.587	- 8	3.906	- 46	4.265	- 99	4.619	- 156	432
250	3.579	- 7	3.860	- 38	4.166	- 76	4.463	- 119	450
260	3.572	- 6	3.822	- 32	4.090	- 65	4.344	- 96	468
270	3.566	- 5	3.790	- 27	4.025	- 55	4.248	- 81	486
280	3.561	- 3	3.763	- 22	3.970	- 44	4.167	- 66	504
290	3.558	- 3	3.741	- 19	3.926	- 37	4.101	- 55	522
300	3.555	- 2	3.722	- 16	3.889	- 32	4.046	- 46	540
310	3.553	- 2	3.706	- 14	3.857	- 26	4.000	- 40	558
320	3.551	- 1	3.692	- 12	3.831	- 23	3.960	- 33	576
330	3.550		3.680	- 9	3.808	- 20	3.927	- 30	594
340	3.550		3.671	- 9	3.788	- 17	3.897	- 25	612
350	3.550	1	3.662	- 6	3.771	- 15	3.872	- 23	630
360	3.551	1	3.656	- 6	3.756	- 12	3.849	- 18	648
370	3.552	2	3.650	- 4	3.744	- 12	3.831	- 17	666
380	3.554	2	3.646	- 4	3.732	- 8	3.814	- 14	684
390	3.556	2	3.642	- 2	3.724	- 7	3.800	- 12	702
400	3.558	3	3.640	- 2	3.717	- 7	3.788	- 11	720
410	3.561	4	3.638	1	3.710	- 5	3.777	- 9	738
420	3.565	3	3.637		3.705	- 4	3.768	- 7	756
430	3.568	4	3.637		3.701	- 3	3.761	- 6	774
440	3.572	5	3.637	1	3.698	- 2	3.755	- 5	792
450	3.577	5	3.638	2	3.696	- 1	3.750	- 4	810
460	3.582	5	3.640	2	3.695		3.746	- 3	828
470	3.587	5	3.642	3	3.695		3.743	- 2	846
480	3.592	6	3.645	3	3.695		3.741	- 1	864
490	3.598	5	3.648	4	3.695	2	3.740	- 1	882
500	3.603	6	3.652	4	3.697	2	3.739		900
510	3.609	7	3.656	4	3.699	2	3.739	1	918
520	3.616	6	3.660	5	3.701	3	3.740	1	936
530	3.622	7	3.665	5	3.704	4	3.741	2	954
540	3.629	7	3.670	5	3.708	3	3.743	2	972
550	3.636	7	3.675	5	3.711	4	3.745	3	990
560	3.643	7	3.680	6	3.715	5	3.748	3	1008
570	3.650	8	3.686	6	3.720	4	3.751	4	1026
580	3.658	7	3.692	6	3.724	5	3.755	3	1044
590	3.665	8	3.698	7	3.729	6	3.758	5	1062
600	3.673	7	3.705	6	3.735	5	3.763	4	1080
610	3.680	8	3.711	7	3.740	6	3.767	5	1098
620	3.688	8	3.718	7	3.746	5	3.772	5	1116
630	3.696	8	3.725	7	3.751	6	3.777	5	1134
640	3.704	8	3.732	7	3.757	7	3.782	5	1152
650	3.712	8	3.739	7	3.764	6	3.787	6	1170
660	3.720	8	3.746	7	3.770	7	3.793	6	1188
670	3.728	8	3.753	7	3.777	6	3.799	5	1206
680	3.736	8	3.760	8	3.783	7	3.804	6	1224
690	3.744	9	3.768	7	3.790	7	3.810	7	1242
700	3.753		3.775		3.797		3.817		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	3.753	8	3.775	8	3.797	6	3.817	6	1260
710	3.761	8	3.783	7	3.803	7	3.823	6	1278
720	3.769	8	3.790	8	3.810	7	3.829	6	1296
730	3.777	8	3.798	7	3.817	7	3.835	7	1314
740	3.785	8	3.805	8	3.824	7	3.842	6	1332
750	3.793	8	3.813	7	3.831	7	3.848	6	1350
760	3.801	8	3.820	8	3.838	7	3.854	7	1368
770	3.809	8	3.828	7	3.845	7	3.861	7	1386
780	3.817	8	3.835	8	3.852	7	3.868	6	1404
790	3.825	9	3.843	8	3.859	8	3.874	8	1422
800	3.834	39	3.851	39	3.867	35	3.882	33	1440
850	3.873	37	3.890	34	3.902	34	3.915	32	1530
900	3.910	38	3.924	36	3.936	34	3.947	33	1620
950	3.948	35	3.960	33	3.970	33	3.980	32	1710
1000	3.983	33	3.993	32	4.003	31	4.012	30	1800
1050	4.016	33	4.025	32	4.034	31	4.042	30	1890
1100	4.049	32	4.057	31	4.065	30	4.072	31	1980
1150	4.081	30	4.088	30	4.095	30	4.103	27	2070
1200	4.111	31	4.118	30	4.125	29	4.130	29	2160
1250	4.142	31	4.148	31	4.154	30	4.159	30	2250
1300	4.173	30	4.179	29	4.184	29	4.189	28	2340
1350	4.203	29	4.208	28	4.213	28	4.217	28	2430
1400	4.232	29	4.236	30	4.241	29	4.245	28	2520
1450	4.261	29	4.266	28	4.270	28	4.273	29	2610
1500	4.290	30	4.294	30	4.298	29	4.302	29	2700
1550	4.320	31	4.324	30	4.327	30	4.331	30	2790
1600	4.351	31	4.354	31	4.357	31	4.361	30	2880
1650	4.382	32	4.385	31	4.388	31	4.391	30	2970
1700	4.414	31	4.416	31	4.419	30	4.421	30	3060
1750	4.445	33	4.447	30	4.449	30	4.451	30	3150
1800	4.478	31	4.477	31	4.479	30	4.481	30	3240
1850	4.509	34	4.508	32	4.509	31	4.511	31	3330
1900	4.543	34	4.540	31	4.540	32	4.542	31	3420
1950	4.577	36	4.571	32	4.572	32	4.573	32	3510
2000	4.613	39	4.603	35	4.604	33	4.605	33	3600
2050	4.652	40	4.638	36	4.637	33	4.638	33	3690
2100	4.692	42	4.674	35	4.670	33	4.671	31	3780
2150	4.734	46	4.709	36	4.703	35	4.702	32	3870
2200	4.780	53	4.745	40	4.738	37	4.734	35	3960
2250	4.833	60	4.785	43	4.775	39	4.769	37	4050
2300	4.893	63	4.828	46	4.814	41	4.806	39	4140
2350	4.956	70	4.874	48	4.855	42	4.845	41	4230
2400	5.026	76	4.922	51	4.897	44	4.886	42	4320
2450	5.102	84	4.973	55	4.941	46	4.928	43	4410
2500	5.186	96	5.028	59	4.987	49	4.971	45	4500
2550	5.282	107	5.087	65	5.036	52	5.016	46	4590
2600	5.389	117	5.152	68	5.088	55	5.062	53	4680
2650	5.506	128	5.220	75	5.143	60	5.115	57	4770
2700	5.634	141	5.295	82	5.203	67	5.172	61	4860
2750	5.775	155	5.377	90	5.270	71	5.233	64	4950
2800	5.930	176	5.467	96	5.341	75	5.297	66	5040
2850	6.106	194	5.563	105	5.416	80	5.363	71	5130
2900	6.300	208	5.668	114	5.496	87	5.434	78	5220
2950	6.508	216	5.782	124	5.583	95	5.512	90	5310
3000	6.724		5.906		5.678		5.602		5400

Table 2-4. ENTHALPY OF AIR* $(H-E_0^0)/RT_0$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	.6346	1279							90
60	.7625	1280							108
70	.8905	1280							126
80	1.0185	1279	1.0160	1284					144
90	1.1464	1278	1.1444	1281	1.1376	1291	1.1307	1304	162
100	1.2742	1279	1.2725	1281	1.2667	1291	1.2611	1298	180
110	1.4021	1278	1.4006	1280	1.3958	1286	1.3909	1293	198
120	1.5299	1278	1.5286	1280	1.5244	1286	1.5202	1291	216
130	1.6577	1278	1.6566	1279	1.6530	1283	1.6493	1288	234
140	1.7855	1278	1.7845	1279	1.7813	1282	1.7781	1285	252
150	1.9133	1279	1.9124	1280	1.9095	1283	1.9066	1286	270
160	2.0412	1278	2.0404	1279	2.0378	1281	2.0352	1284	288
170	2.1690	1278	2.1683	1279	2.1659	1281	2.1636	1283	306
180	2.2968	1278	2.2962	1278	2.2940	1281	2.2919	1282	324
190	2.4246	1279	2.4240	1280	2.4221	1281	2.4201	1282	342
200	2.5525	1279	2.5520	1278	2.5502	1280	2.5483	1282	360
210	2.6804	1279	2.6798	1280	2.6782	1280	2.6765	1282	378
220	2.8083	1279	2.8078	1279	2.8062	1280	2.8047	1281	396
230	2.9362	1279	2.9357	1280	2.9342	1281	2.9328	1282	414
240	3.0641	1279	3.0637	1279	3.0623	1281	3.0610	1281	432
250	3.1920	1279	3.1916	1279	3.1904	1280	3.1891	1281	450
260	3.3199	1280	3.3195	1280	3.3184	1281	3.3172	1282	468
270	3.4479	1280	3.4475	1281	3.4465	1281	3.4454	1282	486
280	3.5759	1281	3.5756	1281	3.5746	1282	3.5736	1282	504
290	3.7040	1281	3.7037	1281	3.7028	1281	3.7018	1283	522
300	3.8321	1282	3.8318	1282	3.8309	1283	3.8301	1283	540
310	3.9603	1282	3.9600	1283	3.9592	1283	3.9584	1283	558
320	4.0885	1284	4.0883	1284	4.0875	1284	4.0867	1285	576
330	4.2169	1284	4.2167	1284	4.2159	1285	4.2152	1286	594
340	4.3453	1285	4.3451	1285	4.3444	1286	4.3438	1286	612
350	4.4738	1286	4.4736	1286	4.4730	1286	4.4724	1287	630
360	4.6024	1288	4.6022	1288	4.6016	1289	4.6011	1288	648
370	4.7312	1289	4.7310	1289	4.7305	1289	4.7299	1290	666
380	4.8601	1290	4.8599	1290	4.8594	1291	4.8589	1291	684
390	4.9891	1291	4.9889	1291	4.9885	1291	4.9880	1292	702
400	5.1182	1294	5.1180	1295	5.1176	1294	5.1172	1294	720
410	5.2476	1295	5.2475	1295	5.2470	1296	5.2466	1296	738
420	5.3771	1296	5.3770	1296	5.3766	1296	5.3762	1297	756
430	5.5067	1299	5.5066	1299	5.5062	1300	5.5059	1299	774
440	5.6366	1301	5.6365	1301	5.6362	1301	5.6358	1302	792
450	5.7667	1302	5.7666	1302	5.7663	1302	5.7660	1302	810
460	5.8969	1305	5.8968	1305	5.8965	1305	5.8962	1305	828
470	6.0274	1307	6.0273	1307	6.0270	1307	6.0267	1307	846
480	6.1581	1310	6.1580	1310	6.1577	1311	6.1574	1311	864
490	6.2891	1311	6.2890	1311	6.2888	1311	6.2885	1312	882
500	6.4202	1315	6.4201	1316	6.4199	1316	6.4197	1315	900
510	6.5517	1316	6.5517	1316	6.5515	1316	6.5512	1318	918
520	6.6833	1320	6.6833	1320	6.6831	1320	6.6830	1320	936
530	6.8153	1322	6.8153	1322	6.8151	1322	6.8150	1322	954
540	6.9475	1324	6.9475	1324	6.9473	1325	6.9472	1324	972
550	7.0799	1328	7.0799	1328	7.0798	1328	7.0796	1328	990
560	7.2127	1330	7.2127	1330	7.2126	1330	7.2124	1331	1008
570	7.3457	1333	7.3457	1333	7.3456	1333	7.3455	1333	1026
580	7.4790	1336	7.4790	1336	7.4789	1336	7.4788	1337	1044
590	7.6126	1339	7.6126	1339	7.6125	1339	7.6125	1339	1062
600	7.7465	1342	7.7465	1342	7.7464	1343	7.7464	1342	1080
610	7.8807	1345	7.8807	1345	7.8807	1344	7.8806	1345	1098
620	8.0152	1348	8.0152	1348	8.0151	1349	8.0151	1348	1116
630	8.1500	1351	8.1500	1351	8.1500	1351	8.1499	1352	1134
640	8.2851	1354	8.2851	1354	8.2851	1354	8.2851	1354	1152
650	8.4205		8.4205		8.4205		8.4205		1170

* The enthalpy function is divided here by a constant RT_0 where $T_0 = 273.16^\circ K$ ($491.688\ ^\circ R$).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	8.4205	1357	8.4205	1357	8.4205	1357	8.4205	1357	1170
660	8.5562	1360	8.5562	1360	8.5562	1360	8.5562	1360	1188
670	8.6922	1363	8.6922	1363	8.6922	1363	8.6922	1363	1206
680	8.8285	1366	8.8285	1366	8.8285	1366	8.8285	1367	1224
690	8.9651	1370	8.9651	1370	8.9651	1371	8.9652	1370	1242
700	9.1021	1372	9.1021	1372	9.1022	1372	9.1022	1372	1260
710	9.2393	1375	9.2393	1375	9.2394	1375	9.2394	1375	1278
720	9.3768	1379	9.3768	1379	9.3769	1379	9.3769	1380	1296
730	9.5147	1381	9.5147	1381	9.5148	1380	9.5149	1380	1314
740	9.6528	1385	9.6528	1385	9.6528	1386	9.6529	1386	1332
750	9.7913	1388	9.7913	1388	9.7914	1388	9.7915	1389	1350
760	9.9301	1391	9.9301	1391	9.9302	1391	9.9304	1391	1368
770	10.0692	1393	10.0692	1393	10.0693	1393	10.0695	1392	1386
780	10.2085	1397	10.2085	1397	10.2086	1397	10.2087	1398	1404
790	10.3482	140	10.3482	140	10.3483	140	10.3485	140	1422
800	10.488	704	10.488	704	10.488	704	10.488	704	1440
850	11.192	712	11.192	712	11.192	712	11.192	712	1530
900	11.904	719	11.904	719	11.904	719	11.904	719	1620
950	12.623	725	12.623	725	12.623	725	12.623	725	1710
1000	13.348	731	13.348	731	13.348	731	13.348	731	1800
1050	14.079	738	14.079	738	14.079	738	14.079	738	1890
1100	14.817	744	14.817	744	14.817	744	14.817	744	1980
1150	15.561	749	15.561	749	15.561	749	15.561	749	2070
1200	16.310	755	16.310	755	16.310	755	16.310	755	2160
1250	17.065	761	17.065	761	17.065	761	17.065	761	2250
1300	17.826	766	17.826	766	17.826	766	17.826	766	2340
1350	18.592	772	18.592	771	18.592	771	18.592	771	2430
1400	19.364	778	19.363	777	19.363	777	19.363	777	2520
1450	20.142	784	20.140	782	20.140	782	20.140	782	2610
1500	20.926	791	20.922	788	20.922	788	20.922	788	2700
1550	21.717	798	21.710	794	21.710	794	21.710	794	2790
1600	22.515	806	22.504	801	22.504	800	22.504	800	2880
1650	23.321	815	23.305	808	23.304	806	23.304	806	2970
1700	24.136	826	24.113	815	24.110	812	24.110	812	3060
1750	24.962	840	24.928	823	24.922	819	24.922	818	3150
1800	25.802	858	25.751	833	25.741	827	25.740	825	3240
1850	26.660	881	26.584	844	26.568	835	26.565	833	3330
1900	27.541	911	27.428	858	27.403	845	27.398	841	3420
1950	28.452	951	28.286	876	28.248	856	28.239	851	3510
2000	29.403	1005	29.162	897	29.104	869	29.090	861	3600
2050	30.408	1077	30.059	920	29.973	883	29.951	873	3690
2100	31.485	1164	30.979	949	30.856	900	30.824	887	3780
2150	32.649	1264	31.928	985	31.756	921	31.711	904	3870
2200	33.913	1379	32.913	1030	32.677	946	32.615	925	3960
2250	35.292	1504	33.943	1085	33.623	977	33.540	949	4050
2300	36.796		35.028	1148	34.600	1011	34.489	977	4140
2350			36.176	1220	35.611	1050	35.466	1008	4230
2400			37.396	1308	36.661	1097	36.474	1045	4320
2450			38.704	1412	37.758	1151	37.519	1087	4410
2500			40.116	1520	38.909	1212	38.606	1133	4500
2550			41.636	1645	40.121	1276	39.739	1182	4590
2600			43.281	1797	41.397	1348	40.921	1236	4680
2650			45.078	1951	42.745	1426	42.157	1296	4770
2700			47.029	2120	44.171	1511	43.453	1363	4860
2750			49.149	2301	45.682	1603	44.816	1432	4950
2800			51.450		47.285		46.248		5040

*The enthalpy function is divided here by a constant RT_0 where $T_0 = 273.16^oK$ ($491.688\ ^oR$).

Table 2-4. ENTHALPY OF AIR - Cont.* $(H-E_0^o)/RT_0$

°K	1 atm		4 atm		7 atm		10 atm		°R
100	1.2552	1307							180
110	1.3859	1297	1.3331	1381	1.2731	1489	1.2013	1661	198
120	1.5156	1299	1.4712	1355	1.4220	1433	1.3674	1545	216
130	1.6455	1291	1.6067	1343	1.5653	1404	1.5219	1461	234
140	1.7746	1290	1.7410	1326	1.7057	1364	1.6680	1432	252
150	1.9036	1289	1.8736	1320	1.8421	1355	1.8112	1390	270
160	2.0325	1287	2.0056	1313	1.9776	1342	1.9502	1369	288
170	2.1612	1285	2.1369	1308	2.1118	1332	2.0871	1355	306
180	2.2897	1284	2.2677	1303	2.2450	1325	2.2226	1345	324
190	2.4181	1284	2.3980	1301	2.3775	1319	2.3571	1337	342
200	2.5465	1283	2.5281	1298	2.5094	1314	2.4908	1330	360
210	2.6748	1283	2.6579	1296	2.6408	1310	2.6238	1324	378
220	2.8031	1283	2.7875	1294	2.7718	1307	2.7562	1319	396
230	2.9314	1283	2.9169	1293	2.9025	1304	2.8881	1315	414
240	3.0597	1282	3.0462	1292	3.0329	1302	3.0196	1312	432
250	3.1879	1282	3.1754	1291	3.1631	1300	3.1508	1309	450
260	3.3161	1282	3.3045	1290	3.2931	1298	3.2817	1307	468
270	3.4443	1283	3.4335	1290	3.4229	1297	3.4124	1305	486
280	3.5726	1283	3.5625	1290	3.5526	1296	3.5429	1303	504
290	3.7009	1283	3.6915	1289	3.6822	1296	3.6732	1302	522
300	3.8292	1284	3.8204	1290	3.8118	1295	3.8034	1301	540
310	3.9576	1284	3.9494	1290	3.9413	1295	3.9335	1300	558
320	4.0860	1285	4.0784	1290	4.0708	1295	4.0635	1300	576
330	4.2145	1286	4.2074	1290	4.2003	1295	4.1935	1300	594
340	4.3431	1286	4.3364	1291	4.3298	1295	4.3235	1300	612
350	4.4717	1288	4.4655	1292	4.4593	1296	4.4535	1300	630
360	4.6005	1291	4.5947	1293	4.5889	1296	4.5835	1300	648
370	4.7296	1288	4.7240	1294	4.7185	1297	4.7135	1301	666
380	4.8584	1291	4.8534	1295	4.8482	1298	4.8436	1301	684
390	4.9875	1292	4.9829	1296	4.9780	1299	4.9737	1302	702
400	5.1167	1295	5.1125	1297	5.1079	1300	5.1039	1303	720
410	5.2462	1296	5.2422	1299	5.2379	1302	5.2342	1304	738
420	5.3758	1297	5.3721	1300	5.3681	1303	5.3646	1306	756
430	5.5055	1300	5.5021	1301	5.4984	1304	5.4952	1307	774
440	5.6355	1302	5.6322	1304	5.6288	1306	5.6259	1308	792
450	5.7657	1302	5.7626	1306	5.7594	1308	5.7567	1310	810
460	5.8959	1306	5.8932	1308	5.8902	1310	5.8877	1312	828
470	6.0265	1306	6.0240	1310	5.0212	1312	6.0189	1314	846
480	6.1571	1312	6.1550	1312	5.1524	1314	6.1503	1316	864
490	6.2883	1312	6.2862	1314	5.2838	1316	6.2819	1318	882
500	6.4195	1315	6.4176	1316	6.4154	1319	6.4137	1320	900
510	6.5510	1318	6.5492	1319	6.5473	1321	6.5457	1322	918
520	6.6828	1320	6.6811	1322	6.6794	1323	6.6779	1325	936
530	6.8148	1322	6.8133	1324	6.8117	1326	6.8104	1327	954
540	6.9470	1325	6.9457	1327	6.9443	1328	6.9431	1330	972
550	7.0795	1328	7.0784	1329	7.0771	1331	7.0761	1332	990
560	7.2123	1331	7.2113	1332	7.2102	1334	7.2093	1335	1008
570	7.3454	1333	7.3445	1335	7.3436	1337	7.3428	1338	1026
580	7.4787	1337	7.4780	1338	7.4773	1339	7.4766	1340	1044
590	7.6124	1339	7.6118	1341	7.6112	1342	7.6106	1343	1062
600	7.7463	1342	7.7459	1344	7.7454	1345	7.7449	1346	1080
610	7.8805	1345	7.8803	1347	7.8799	1348	7.8795	1349	1098
620	8.0150	1349	8.0150	1349	8.0147	1351	8.0144	1352	1116
630	8.1499	1352	8.1499	1352	8.1498	1354	8.1496	1354	1134
640	8.2851	1354	8.2851	1355	8.2852	1357	8.2850	1357	1152
650	8.4205	1357	8.4206	1358	8.4209	1360	8.4207	1360	1170
660	8.5562	1360	8.5564	1361	8.5569	1362	8.5567	1363	1188
670	8.6922	1363	8.6925	1364	8.6931	1365	8.6930	1366	1206
680	8.8285	1367	8.8289	1367	8.8296	1368	8.8296	1369	1224
690	8.9652	1371	8.9656	1371	8.9664	1371	8.9665	1372	1242
700	9.1023		9.1027		9.1035		9.1037		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688 °R).

°K	1 atm		4 atm		7 atm		10 atm		°R
700	9.1023	1372	9.1027	1374	9.1035	1374	9.1037	1375	1260
710	9.2395	1375	9.2401	1377	9.2409	1377	9.2412	1378	1278
720	9.3770	1380	9.3778	1380	9.3786	1380	9.3790	1381	1296
730	9.5150	1380	9.5158	1383	9.5166	1383	9.5171	1384	1314
740	9.6530	1386	9.6541	1386	9.6549	1386	9.6555	1387	1332
750	9.7916	1389	9.7927	1389	9.7935	1389	9.7942	1390	1350
760	9.9305	1391	9.9316	1392	9.9324	1392	9.9332	1393	1368
770	10.0696	1392	10.0708	1395	10.0716	1395	10.0725	1396	1386
780	10.2088	1398	10.2103	1398	10.2111	1398	10.2121	1399	1404
790	10.3486	140	10.3501	140	10.3509	140	10.3520	140	1422
800	10.489	703	10.490	702	10.491	705	10.492	705	1440
850	11.192	712	11.192	714	11.196	712	11.197	712	1530
900	11.904	719	11.906	719	11.908	719	11.909	719	1620
950	12.623	725	12.625	725	12.627	725	12.628	726	1710
1000	13.348	731	13.350	731	13.352	732	13.354	732	1800
1050	14.079	738	14.081	738	14.084	738	14.086	738	1890
1100	14.817	744	14.819	744	14.822	744	14.824	744	1980
1150	15.561	749	15.563	749	15.566	750	15.568	750	2070
1200	16.310	755	16.312	755	16.316	755	16.318	755	2160
1250	17.065	761	17.067	761	17.071	761	17.073	761	2250
1300	17.826	766	17.828	766	17.832	766	17.834	767	2340
1350	18.592	771	18.594	771	18.598	772	18.601	772	2430
1400	19.363	777	19.365	777	19.370	777	19.373	777	2520
1450	20.140	782	20.142	782	20.147	782	20.150	782	2610
1500	20.922	788	20.924	788	20.929	788	20.932	788	2700
1550	21.710	794	21.712	794	21.717	794	21.720	794	2790
1600	22.504	800	22.506	800	22.511	799	22.514	799	2880
1650	23.304	806	23.306	806	23.310	806	23.313	805	2970
1700	24.110	812	24.112	811	24.116	811	24.118	811	3060
1750	24.922	818	24.923	817	24.927	817	24.929	817	3150
1800	25.740	825	25.740	823	25.744	822	25.746	822	3240
1850	26.565	832	26.563	829	26.566	828	26.568	828	3330
1900	27.397	840	27.392	836	27.394	835	27.396	835	3420
1950	28.237	849	28.228	843	28.229	841	28.231	841	3510
2000	29.086	858	29.071	851	29.070	848	29.072	848	3600
2050	29.944	869	29.922	859	29.918	856	29.920	855	3690
2100	30.813	882	30.781	868	30.774	864	30.775	863	3780
2150	31.695	897	31.649	878	31.638	872	31.638	871	3870
2200	32.592	915	32.527	889	32.510	882	32.509	880	3960
2250	33.507	936	33.416	902	33.392	894	33.389	890	4050
2300	34.443	961	34.318	917	34.286	901	34.279	901	4140
2350	35.404	989	35.235	934	35.187	920	35.180	913	4230
2400	36.393	1020	36.169	952	36.107	935	36.093	927	4320
2450	37.413	1057	37.121	972	37.042	952	37.020	941	4410
2500	38.470	1098	38.093	995	37.994	970	37.961	958	4500
2550	39.568	1145	39.088	1022	38.964	991	38.919	976	4590
2600	40.713	1199	40.110	1052	39.955	1014	39.895	997	4680
2650	41.912	1260	41.162	1084	40.969	1039	40.892	1019	4770
2700	43.172	1327	42.246	1119	42.008	1067	41.911	1044	4860
2750	44.499	1402	43.365	1163	43.075	1098	42.955	1071	4950
2800	45.901	1484	44.528	1204	44.173	1132	44.026	1101	5040
2850	47.385	1575	45.732	1253	45.305	1169	45.127	1135	5130
2900	48.960	1671	46.985	1307	46.474	1211	46.262	1173	5220
2950	50.631	1772	48.292	1363	47.685	1255	47.435	1215	5310
3000	52.403		49.655		48.940		48.650		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688 °R).

°K	10 atm		40 atm		70 atm		100 atm		°R
150	1.8112	1390							270
160	1.9502	1369	1.5895	1992					288
170	2.0871	1355	1.7887	1784					306
180	2.2226	1345	1.9671	1663	1.6603	2225	1.3546	2815	324
190	2.3571	1337	2.1334	1588	1.8828	1966	1.6361	2373	342
200	2.4908	1330	2.2922	1533	2.0794	1811	1.8734	2104	360
210	2.6238	1324	2.4455	1494	2.2605	1710	2.0838	1933	378
220	2.7562	1319	2.5949	1464	2.4315	1637	2.2771	1812	396
230	2.8881	1315	2.7413	1439	2.5952	1588	2.4583	1736	414
240	3.0196	1312	2.8852	1422	2.7540	1538	2.6319	1653	432
250	3.1508	1309	3.0274	1403	2.9078	1489	2.7972	1608	450
260	3.2817	1307	3.1677	1390	3.0567	1492	2.9580	1576	468
270	3.4124	1305	3.3067	1387	3.2059	1477	3.1156	1539	486
280	3.5429	1303	3.4454	1375	3.3536	1449	3.2695	1516	504
290	3.6732	1302	3.5829	1365	3.4985	1426	3.4211	1488	522
300	3.8034	1301	3.7194	1360	3.6411	1415	3.5699	1474	540
310	3.9335	1300	3.8554	1355	3.7826	1407	3.7173	1459	558
320	4.0635	1300	3.9909	1349	3.9233	1399	3.8632	1446	576
330	4.1935	1300	4.1258	1345	4.0632	1391	4.0078	1434	594
340	4.3235	1300	4.2603	1341	4.2023	1384	4.1512	1423	612
350	4.4535	1300	4.3944	1337	4.3407	1376	4.2935	1413	630
360	4.5835	1300	4.5281	1337	4.4783	1373	4.4348	1405	648
370	4.7135	1301	4.6618	1336	4.6156	1368	4.5753	1397	666
380	4.8436	1301	4.7954	1335	4.7524	1366	4.7150	1390	684
390	4.9737	1302	4.9289	1334	4.8890	1362	4.8540	1386	702
400	5.1039	1303	5.0623	1333	5.0252	1360	4.9926	1385	720
410	5.2342	1304	5.1956	1333	5.1612	1358	5.1311	1381	738
420	5.3646	1306	5.3289	1332	5.2970	1355	5.2692	1379	756
430	5.4952	1307	5.4621	1331	5.4325	1355	5.4071	1375	774
440	5.6259	1308	5.5952	1330	5.5680	1353	5.5446	1374	792
450	5.7567	1310	5.7282	1331	5.7033	1353	5.6820	1372	810
460	5.8877	1312	5.8613	1332	5.8386	1352	5.8192	1371	828
470	6.0189	1314	5.9945	1334	5.9738	1352	5.9563	1370	846
480	6.1503	1316	6.1279	1335	6.1090	1352	6.0933	1369	864
490	6.2819	1318	6.2614	1337	6.2442	1353	6.2302	1368	882
500	6.4137	1320	6.3951	1338	6.3795	1354	6.3670	1368	900
510	6.5457	1322	6.5289	1339	6.5149	1355	6.5038	1370	918
520	6.6779	1325	6.6628	1341	6.6504	1356	6.6408	1369	936
530	6.8104	1327	6.7969	1342	6.7860	1358	6.7777	1371	954
540	6.9431	1330	6.9311	1344	6.9218	1357	6.9148	1370	972
550	7.0761	1332	7.0655	1347	7.0575	1361	7.0518	1373	990
560	7.2093	1335	7.2002	1348	7.1936	1360	7.1891	1373	1008
570	7.3428	1338	7.3350	1350	7.3296	1362	7.3264	1373	1026
580	7.4766	1340	7.4700	1353	7.4658	1364	7.4637	1376	1044
590	7.6106	1343	7.6053	1355	7.6022	1366	7.6013	1377	1062
600	7.7449	1346	7.7408	1357	7.7388	1369	7.7390	1379	1080
610	7.8795	1349	7.8765	1360	7.8757	1370	7.8769	1380	1098
620	8.0144	1352	8.0125	1363	8.0127	1372	8.0149	1382	1116
630	8.1496	1354	8.1488	1365	8.1499	1375	8.1531	1383	1134
640	8.2850	1357	8.2853	1367	8.2874	1377	8.2914	1384	1152
650	8.4207	1360	8.4220	1370	8.4251	1379	8.4298	1386	1170
660	8.5567	1363	8.5590	1373	8.5630	1381	8.5684	1389	1188
670	8.6930	1366	8.6963	1375	8.7011	1384	8.7073	1391	1206
680	8.8296	1369	8.8338	1378	8.8395	1385	8.8464	1394	1224
690	8.9665	1372	8.9716	1380	8.9780	1388	8.9858	1395	1242
700	9.1037		9.1096		9.1168		9.1253		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16 °K (491.688 °R).

°K	10 atm		40 atm		70 atm		100 atm		°R
700	9.1037	1375	9.1096	1383	9.1168	1391	9.1253	1402	1260
710	9.2412	1378	9.2479	1386	9.2559	1393	9.2655	1403	1278
720	9.3790	1381	9.3865	1389	9.3952	1397	9.4058	1405	1296
730	9.5171	1384	9.5254	1392	9.5349	1399	9.5463	1407	1314
740	9.6555	1387	9.6646	1394	9.6748	1401	9.6870	1408	1332
750	9.7942	1390	9.8040	1397	9.8149	1404	9.8278	1410	1350
760	9.9332	1393	9.9437	1400	9.9553	1406	9.9688	1411	1368
770	10.0725	1396	10.0837	1403	10.0959	1409	10.1099	1413	1386
780	10.2121	1399	10.2240	1405	10.2368	1411	10.2512	1414	1404
790	10.3520	140	10.3645	140	10.3779	141	10.3926	141	1422
800	10.492	705	10.505	708	10.519	711	10.534	714	1440
850	11.197	712	11.213	715	11.230	717	11.248	720	1530
900	11.909	719	11.928	721	11.947	723	11.968	725	1620
950	12.628	726	12.649	728	12.670	730	12.693	731	1710
1000	13.354	732	13.377	734	13.400	736	13.424	737	1800
1050	14.086	738	14.111	740	14.136	741	14.161	743	1890
1100	14.824	744	14.851	745	14.877	747	14.904	748	1980
1150	15.568	750	15.596	751	15.624	752	15.652	753	2070
1200	16.318	755	16.347	757	16.376	758	16.405	759	2160
1250	17.073	761	17.104	762	17.134	763	17.164	764	2250
1300	17.834	767	17.866	768	17.897	769	17.928	769	2340
1350	18.601	772	18.634	773	18.666	774	18.697	774	2430
1400	19.373	777	19.407	778	19.440	779	19.471	780	2520
1450	20.150	782	20.185	783	20.219	784	20.251	785	2610
1500	20.932	788	20.968	789	21.003	789	21.036	790	2700
1550	21.720	794	21.757	794	21.792	795	21.826	795	2790
1600	22.514	799	22.551	800	22.587	800	22.621	801	2880
1650	23.313	805	23.351	805	23.387	806	23.422	806	2970
1700	24.118	811	24.156	811	24.193	811	24.228	812	3060
1750	24.929	817	24.967	817	25.004	817	25.040	817	3150
1800	25.746	822	25.784	822	25.821	823	25.857	823	3240
1850	26.568	828	26.606	828	26.644	828	26.680	829	3330
1900	27.396	835	27.434	834	27.472	834	27.509	834	3420
1950	28.231	841	28.268	840	28.306	840	28.343	840	3510
2000	29.072	848	29.108	846	29.146	846	29.183	846	3600
2050	29.920	855	29.954	852	29.992	852	30.029	852	3690
2100	30.775	863	30.806	859	30.844	858	30.881	858	3780
2150	31.638	871	31.665	865	31.702	864	31.739	864	3870
2200	32.509	880	32.530	872	32.566	871	32.603	870	3960
2250	33.389	890	33.402	880	33.437	878	33.473	876	4050
2300	34.279	901	34.282	888	34.315	885	34.349	883	4140
2350	35.180	913	35.170	897	35.200	892	35.232	891	4230
2400	36.093	927	36.067	906	36.092	900	36.123	898	4320
2450	37.020	941	36.973	915	36.992	909	37.021	906	4410
2500	37.961	958	37.888	925	37.901	917	37.927	914	4500
2550	38.919	976	38.813	937	38.818	926	38.841	923	4590
2600	39.895	997	39.750	949	39.744	936	39.764	932	4680
2650	40.892	1019	40.699	962	40.680	947	40.696	942	4770
2700	41.911	1044	41.661	977	41.627	958	41.638	952	4860
2750	42.955	1071	42.638	992	42.585	971	42.590	964	4950
2800	44.026	1101	43.630	1009	43.556	984	43.554	976	5040
2850	45.127	1135	44.639	1027	44.540	999	44.530	988	5130
2900	46.262	1173	45.666	1048	45.539	1014	45.518	1002	5220
2950	47.435	1215	46.714	1070	46.553	1030	46.520	1017	5310
3000	48.650		47.784		47.583		47.537		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688 °R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	22.266	637							90
60	22.903	538							108
70	23.441	467							126
80	23.908	411	21.600	414					144
90	24.319	370	22.014	368	20.613	373	20.032	384	162
100	24.689	331	22.382	333	20.986	335	20.416	338	180
110	25.020	304	22.715	305	21.321	306	20.754	307	198
120	25.324	279	23.020	279	21.627	281	21.061	282	216
130	25.603	259	23.299	259	21.908	260	21.343	261	234
140	25.862	241	23.558	241	22.168	242	21.604	242	252
150	26.103	225	23.799	226	22.410	226	21.846	227	270
160	26.328	212	24.025	212	22.636	212	22.073	213	288
170	26.540	200	24.237	199	22.848	200	22.286	200	306
180	26.740	189	24.436	189	23.048	189	22.486	189	324
190	26.929	179	24.625	179	23.237	179	22.675	180	342
200	27.108	170	24.804	171	23.416	171	22.855	171	360
210	27.278	162	24.975	163	23.587	163	23.026	163	378
220	27.440	156	25.138	155	23.750	155	23.189	155	396
230	27.596	149	25.293	149	23.905	149	23.344	149	414
240	27.745	142	25.442	142	24.054	143	23.493	143	432
250	27.887	137	25.584	137	24.197	137	23.636	138	450
260	28.024	132	25.721	132	24.334	132	23.774	132	468
270	28.156	127	25.853	127	24.466	127	23.906	127	486
280	28.283	123	25.980	123	24.593	123	24.033	123	504
290	28.406	119	26.103	119	24.716	119	24.156	119	522
300	28.525	115	26.222	115	24.835	115	24.275	115	540
310	28.640	111	26.337	111	24.950	111	24.390	111	558
320	28.751	108	26.448	108	25.061	108	24.501	108	576
330	28.859	105	26.556	105	25.169	105	24.609	105	594
340	28.964	101	26.661	102	25.274	102	24.714	102	612
350	29.065	99	26.763	99	25.376	99	24.816	99	630
360	29.164	96	26.862	96	25.475	96	24.915	96	648
370	29.260	94	26.958	94	25.571	94	25.011	94	666
380	29.354	92	27.052	92	25.665	92	25.105	92	684
390	29.446	89	27.144	89	25.757	89	25.197	89	702
400	29.535	87	27.233	87	25.846	87	25.286	87	720
410	29.622	85	27.320	85	25.933	85	25.373	85	738
420	29.707	84	27.405	83	26.018	83	25.458	83	756
430	29.791	82	27.488	82	26.101	82	25.541	82	774
440	29.873	80	27.570	80	26.183	80	25.623	80	792
450	29.953	78	27.650	78	26.263	78	25.703	78	810
460	30.031	76	27.728	77	26.341	77	25.781	77	828
470	30.107	75	27.805	75	26.418	75	25.858	75	846
480	30.182	74	27.880	74	26.493	74	25.933	74	864
490	30.256	73	27.954	72	26.567	73	26.007	73	882
500	30.329	71	28.026	71	26.640	71	26.080	71	900
510	30.400	70	28.097	70	26.711	70	26.151	70	918
520	30.470	68	28.167	69	26.781	68	26.221	68	936
530	30.538	68	28.236	67	26.849	68	26.289	68	954
540	30.606	66	28.303	66	26.917	66	26.357	66	972
550	30.672	66	28.369	65	26.983	65	26.423	66	990
560	30.738	64	28.434	65	27.048	65	26.489	64	1008
570	30.802	63	28.499	64	27.113	63	26.553	63	1026
580	30.865	62	28.563	62	27.176	62	26.616	63	1044
590	30.927	62	28.625	61	27.238	62	26.679	61	1062
600	30.989	61	28.686	61	27.300	61	26.740	61	1080
610	31.050	60	28.747	60	27.361	59	26.801	60	1098
620	31.110	59	28.807	59	27.420	59	26.861	59	1116
630	31.169	58	28.866	58	27.479	58	26.920	58	1134
640	31.227	57	28.924	57	27.537	57	26.978	57	1152
650	31.284		28.981		27.594		27.035		1170

°K	.01 atm	Δ	.1 atm	Δ	.4 atm	Δ	.7 atm	Δ	°R
650	31.284	56	28.981	57	27.594	57	27.035	57	1170
660	31.340	56	29.038	56	27.651	56	27.092	56	1188
670	31.396	55	29.094	55	27.707	55	27.148	55	1206
680	31.451	55	29.149	54	27.762	55	27.203	54	1224
690	31.506	54	29.203	54	27.817	54	27.257	54	1242
700	31.560	53	29.257	53	27.871	53	27.311	53	1260
710	31.613	52	29.310	53	27.924	52	27.364	53	1278
720	31.665	52	29.363	52	27.976	52	27.417	52	1296
730	31.717	51	29.415	51	28.028	51	27.469	51	1314
740	31.768	51	29.466	51	28.079	51	27.520	51	1332
750	31.819	50	29.517	50	28.130	50	27.571	50	1350
760	31.869	50	29.567	50	28.180	50	27.621	50	1368
770	31.919	49	29.617	49	28.230	49	27.671	49	1386
780	31.968	49	29.666	48	28.279	49	27.720	49	1404
790	32.017	48	29.714	48	28.328	48	27.769	48	1422
800	32.065	234	29.762	234	28.376	234	27.817	233	1440
850	32.299	222	29.996	222	28.610	222	28.050	222	1530
900	32.521	212	30.218	212	28.832	212	28.272	212	1620
950	32.733	203	30.430	203	29.044	203	28.484	203	1710
1000	32.936	195	30.633	195	29.247	195	28.687	195	1800
1050	33.131	187	30.828	188	29.442	188	28.882	188	1890
1100	33.318	181	31.016	181	29.630	181	29.070	181	1980
1150	33.499	175	31.197	174	29.811	174	29.251	174	2070
1200	33.674	168	31.371	168	29.985	168	29.425	168	2160
1250	33.842	163	31.539	163	30.153	163	29.593	163	2250
1300	34.005	158	31.702	158	30.316	158	29.756	158	2340
1350	34.163	153	31.860	153	30.474	153	29.914	153	2430
1400	34.316	149	32.013	149	30.627	149	30.067	149	2520
1450	34.465	145	32.162	145	30.776	145	30.216	145	2610
1500	34.610	141	32.307	141	30.921	141	30.361	141	2700
1550	34.751	138	32.448	138	31.062	138	30.502	138	2790
1600	34.889	135	32.586	135	31.200	134	30.640	134	2880
1650	35.024	133	32.721	132	31.334	131	30.774	131	2970
1700	35.157	131	32.853	129	31.465	129	30.905	129	3060
1750	35.288	129	32.982	127	31.594	126	31.034	126	3150
1800	35.417	128	33.109	125	31.720	124	31.160	124	3240
1850	35.545	128	33.234	123	31.844	122	31.284	121	3330
1900	35.673	129	33.357	122	31.966	120	31.405	119	3420
1950	35.802	132	33.479	121	32.086	118	31.524	117	3510
2000	35.934	136	33.600	121	32.204	117	31.641	116	3600
2050	36.070	142	33.721	121	32.321	116	31.757	115	3690
2100	36.212	150	33.842	122	32.437	116	31.872	114	3780
2150	36.362	159	33.964	124	32.553	116	31.986	114	3870
2200	36.521	169	34.088	126	32.669	116	32.100	113	3960
2250	36.690	180	34.214	130	32.785	117	32.213	114	4050
2300	36.870		34.344	135	32.902	119	32.327	115	4140
2350			34.479	140	33.021	121	32.442	116	4230
2400			34.619	147	33.142	124	32.558	118	4320
2450			34.766	156	33.266	127	32.676	120	4410
2500			34.922	164	33.393	131	32.796	123	4500
2550			35.086	175	33.524	135	32.919	126	4590
2600			35.261	187	33.659	140	33.045	129	4680
2650			35.448	199	33.799	146	33.174	133	4770
2700			35.647	213	33.945	151	33.307	137	4860
2750			35.860	226	34.096	157	33.444	141	4950
2800			36.086		34.253		33.585		5040

°K	1 atm		4 atm		7 atm		10 atm		°R
100	20.049	340							180
110	20.389	309	18.903	334	18.255	355	17.786	386	198
120	20.698	283	19.237	300	18.610	314	18.172	333	216
130	20.981	262	19.537	273	18.924	282	18.505	296	234
140	21.243	243	19.810	252	19.206	259	18.801	268	252
150	21.486	227	20.062	233	19.465	239	19.069	245	270
160	21.713	213	20.295	216	19.704	222	19.314	227	288
170	21.926	201	20.511	204	19.926	208	19.541	212	306
180	22.127	190	20.715	193	20.134	195	19.753	199	324
190	22.317	180	20.908	183	20.329	184	19.952	187	342
200	22.497	171	21.091	173	20.513	175	20.139	177	360
210	22.668	163	21.264	165	20.688	166	20.316	168	378
220	22.831	155	21.429	157	20.854	158	20.484	160	396
230	22.986	149	21.586	151	21.012	151	20.644	153	414
240	23.135	143	21.737	144	21.163	145	20.797	147	432
250	23.278	138	21.881	138	21.308	140	20.944	140	450
260	23.416	132	22.019	133	21.448	135	21.084	135	468
270	23.548	127	22.152	129	21.583	130	21.219	129	486
280	23.675	123	22.281	124	21.713	125	21.348	125	504
290	23.798	119	22.405	119	21.838	120	21.473	121	522
300	23.917	115	22.524	115	21.958	116	21.594	116	540
310	24.032	112	22.639	112	22.074	112	21.710	113	558
320	24.144	108	22.751	109	22.186	109	21.823	109	576
330	24.252	105	22.860	105	22.295	105	21.932	106	594
340	24.357	102	22.965	102	22.400	102	22.038	103	612
350	24.459	99	23.067	99	22.502	100	22.141	100	630
360	24.558	96	23.166	97	22.602	97	22.241	97	648
370	24.654	94	23.263	94	22.699	95	22.338	95	666
380	24.748	92	23.357	92	22.794	92	22.433	93	684
390	24.840	89	23.449	90	22.886	90	22.526	90	702
400	24.929	87	23.539	88	22.976	87	22.616	87	720
410	25.016	85	23.627	85	23.063	86	22.703	86	738
420	25.101	84	23.712	83	23.149	84	22.789	84	756
430	25.185	82	23.795	82	23.233	82	22.873	82	774
440	25.267	80	23.877	80	23.315	80	22.955	81	792
450	25.347	77	23.957	78	23.395	78	23.036	78	810
460	25.424	77	24.035	77	23.473	77	23.114	77	828
470	25.501	75	24.112	76	23.550	76	23.191	76	846
480	25.576	74	24.188	74	23.626	74	23.267	74	864
490	25.650	73	24.262	73	23.700	73	23.341	73	882
500	25.723	71	24.335	71	23.773	71	23.414	71	900
510	25.794	70	24.406	69	23.844	70	23.485	70	918
520	25.864	69	24.475	69	23.914	68	23.555	69	936
530	25.933	67	24.544	68	23.982	68	23.624	68	954
540	26.000	67	24.612	67	24.050	67	23.692	67	972
550	26.067	65	24.679	65	24.117	66	23.759	66	990
560	26.132	64	24.744	64	24.183	64	23.825	64	1008
570	26.196	63	24.808	63	24.247	63	23.889	63	1026
580	26.259	62	24.871	62	24.310	62	23.952	63	1044
590	26.321	62	24.933	62	24.372	62	24.015	62	1062
600	26.383	61	24.995	61	24.434	61	24.077	61	1080
610	26.444	60	25.056	60	24.495	60	24.138	60	1098
620	26.504	59	25.116	59	24.555	59	24.198	59	1116
630	26.563	58	25.175	58	24.614	58	24.257	58	1134
640	26.621	57	25.233	57	24.672	58	24.315	57	1152
650	26.678		25.290		24.730		24.372		1170

°K	1 atm		4 atm		7 atm		10 atm		°R
650	26.678	57	25.290	57	24.730	57	24.372	57	1170
660	26.735	56	25.347	56	24.787	56	24.429	56	1188
670	26.791	55	25.403	55	24.843	55	24.485	55	1206
680	26.846	54	25.458	55	24.898	54	24.540	55	1224
690	26.900	54	25.513	54	24.952	54	24.595	54	1242
700	26.954	53	25.567	53	25.006	53	24.649	53	1260
710	27.007	53	25.620	53	25.059	53	24.702	53	1278
720	27.060	52	25.673	52	25.112	52	24.755	52	1296
730	27.112	51	25.725	51	25.164	51	24.807	51	1314
740	27.163	51	25.776	51	25.215	51	24.858	51	1332
750	27.214	50	25.827	50	25.266	50	24.909	50	1350
760	27.264	50	25.877	50	25.316	50	24.959	50	1368
770	27.314	49	25.927	49	25.366	49	25.009	49	1386
780	27.363	49	25.976	49	25.415	49	25.058	49	1404
790	27.412	48	26.025	48	25.464	48	25.107	48	1422
800	27.460	233	26.073	233	25.512	234	25.155	233	1440
850	27.693	222	26.306	222	25.746	222	25.388	222	1530
900	27.915	212	26.528	213	25.968	213	25.610	212	1620
950	28.127	203	26.741	203	26.181	203	25.822	203	1710
1000	28.330	195	26.944	195	26.384	195	26.025	196	1800
1050	28.525	188	27.139	188	26.579	188	26.221	187	1890
1100	28.713	181	27.327	181	26.767	180	26.408	180	1980
1150	28.894	174	27.508	174	26.947	175	26.588	175	2070
1200	29.068	168	27.682	168	27.122	168	26.763	168	2160
1250	29.236	163	27.850	163	27.290	163	26.931	162	2250
1300	29.399	158	28.013	158	27.453	158	27.093	158	2340
1350	29.557	154	28.171	153	27.611	153	27.251	153	2430
1400	29.711	149	28.324	149	27.764	149	27.404	149	2520
1450	29.860	145	28.473	145	27.913	145	27.553	145	2610
1500	30.005	141	28.618	141	28.058	141	27.698	141	2700
1550	30.146	138	28.759	138	28.199	138	27.839	138	2790
1600	30.284	134	28.897	134	28.337	134	27.977	134	2880
1650	30.418	131	29.031	131	28.471	131	28.111	131	2970
1700	30.549	129	29.162	128	28.602	128	28.242	128	3060
1750	30.678	126	29.290	126	28.730	126	28.370	126	3150
1800	30.804	123	29.416	123	28.856	123	28.496	123	3240
1850	30.927	121	29.539	121	28.979	121	28.619	121	3330
1900	31.048	119	29.660	119	29.100	119	28.740	118	3420
1950	31.167	117	29.779	117	29.219	116	28.858	116	3510
2000	31.284	116	29.896	115	29.335	115	28.974	114	3600
2050	31.400	114	30.011	113	29.450	113	29.088	113	3690
2100	31.514	113	30.124	112	29.563	111	29.201	111	3780
2150	31.627	113	30.236	110	29.674	110	29.312	109	3870
2200	31.740	112	30.346	109	29.784	108	29.421	108	3960
2250	31.852	112	30.455	108	29.892	107	29.529	107	4050
2300	31.964	113	30.563	108	29.999	107	29.636	106	4140
2350	32.077	114	30.671	107	30.106	106	29.742	105	4230
2400	32.191	115	30.778	107	30.212	105	29.847	104	4320
2450	32.306	117	30.885	107	30.317	105	29.951	104	4410
2500	32.423	119	30.992	108	30.422	105	30.055	104	4500
2550	32.542	121	31.100	108	30.527	105	30.159	104	4590
2600	32.663	125	31.208	109	30.632	106	30.263	104	4680
2650	32.788	129	31.317	111	30.738	106	30.367	104	4770
2700	32.917	133	31.428	112	30.844	107	30.471	105	4860
2750	33.050	138	31.540	114	30.951	108	30.576	105	4950
2800	33.188	143	31.654	116	31.059	109	30.681	106	5040
2850	33.331	150	31.770	119	31.168	111	30.787	108	5130
2900	33.481	156	31.889	122	31.279	113	30.895	109	5220
2950	33.637	162	32.011	125	31.392	115	31.004	110	5310
3000	33.799		32.136		31.507		31.114		5400

Table 2-5. ENTROPY OF AIR - Cont. S/R

°K	10 atm		40 atm		70 atm		100 atm		°R
150	19.069	245							270
160	19.314	227	17.475	355					288
170	19.541	212	17.830	253					306
180	19.753	199	18.083	246	17.164	328	16.441	420	324
190	19.952	187	18.329	222	17.492	275	16.861	323	342
200	20.139	177	18.551	204	17.767	242	17.184	287	360
210	20.316	168	18.755	191	18.009	218	17.471	247	378
220	20.484	160	18.946	177	18.227	199	17.718	220	396
230	20.644	153	19.123	167	18.426	184	17.938	200	414
240	20.797	147	19.290	159	18.610	172	18.138	186	432
250	20.944	140	19.449	151	18.782	163	18.324	172	450
260	21.084	135	19.600	143	18.945	153	18.496	162	468
270	21.219	129	19.743	137	19.098	144	18.658	154	486
280	21.348	125	19.880	133	19.242	140	18.812	148	504
290	21.473	121	20.013	125	19.382	131	18.960	135	522
300	21.594	116	20.138	123	19.513	128	19.095	133	540
310	21.710	113	20.261	118	19.641	123	19.228	128	558
320	21.823	109	20.379	113	19.764	118	19.356	122	576
330	21.932	106	20.492	110	19.882	112	19.478	115	594
340	22.038	103	20.602	105	19.994	108	19.593	111	612
350	22.141	100	20.707	103	20.102	107	19.704	109	630
360	22.241	97	20.810	101	20.209	103	19.813	105	648
370	22.338	95	20.911	97	20.312	100	19.918	103	666
380	22.433	93	21.008	95	20.412	96	20.021	98	684
390	22.526	90	21.103	91	20.508	94	20.119	95	702
400	22.616	87	21.194	90	20.602	92	20.214	94	720
410	22.703	86	21.284	88	20.694	89	20.308	91	738
420	22.789	84	21.372	86	20.783	87	20.399	88	756
430	22.873	82	21.458	83	20.870	85	20.487	87	774
440	22.955	81	21.541	82	20.955	83	20.574	84	792
450	23.036	78	21.623	80	21.038	81	20.658	84	810
460	23.114	77	21.703	78	21.119	80	20.742	81	828
470	23.191	76	21.781	76	21.199	78	20.823	79	846
480	23.267	74	21.857	75	21.277	76	20.902	78	864
490	23.341	73	21.932	74	21.353	75	20.980	76	882
500	23.414	71	22.006	73	21.428	73	21.056	74	900
510	23.485	70	22.079	71	21.501	72	21.130	72	918
520	23.555	69	22.150	70	21.573	70	21.202	70	936
530	23.624	68	22.220	69	21.643	69	21.272	69	954
540	23.692	67	22.289	67	21.712	68	21.341	68	972
550	23.759	66	22.356	66	21.780	67	21.409	67	990
560	23.825	64	22.422	65	21.847	66	21.476	66	1008
570	23.889	63	22.487	64	21.913	65	21.542	66	1026
580	23.952	63	22.551	63	21.978	64	21.608	65	1044
590	24.015	62	22.614	63	22.042	62	21.673	63	1062
600	24.077	61	22.677	61	22.104	62	21.736	62	1080
610	24.138	60	22.738	60	22.166	61	21.798	61	1098
620	24.198	59	22.798	60	22.227	60	21.859	60	1116
630	24.257	58	22.858	59	22.287	59	21.919	60	1134
640	24.315	57	22.917	58	22.346	58	21.979	59	1152
650	24.372	57	22.975	57	22.404	58	22.038	58	1170
660	24.429	56	23.032	56	22.462	57	22.096	57	1188
670	24.485	55	23.088	56	22.519	56	22.153	56	1206
680	24.540	55	23.144	55	22.575	55	22.209	56	1224
690	24.595	54	23.199	54	22.630	55	22.265	55	1242
700	24.649		23.253		22.685		22.320		1260

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°K	10 atm		40 atm		70 atm		100 atm		°R
700	24.649	53	23.253	54	22.685	54	22.320	54	1260
710	24.702	53	23.307	53	22.739	53	22.374	53	1278
720	24.755	52	23.360	52	22.792	52	22.427	53	1296
730	24.807	51	23.412	52	22.844	52	22.480	52	1314
740	24.858	51	23.464	51	22.896	51	22.532	52	1332
750	24.909	50	23.515	51	22.947	51	22.584	51	1350
760	24.959	50	23.566	50	22.998	50	22.635	50	1368
770	25.009	49	23.616	49	23.048	50	22.685	50	1386
780	25.058	49	23.665	49	23.098	49	22.735	49	1404
790	25.107	48	23.714	48	23.147	49	22.784	49	1422
800	25.155	233	23.762	234	23.196	236	22.833	236	1440
850	25.388	222	23.996	223	23.432	223	23.069	224	1530
900	25.610	212	24.219	212	23.655	212	23.293	212	1620
950	25.822	203	24.431	203	23.867	204	23.505	204	1710
1000	26.025	196	24.634	196	24.071	196	23.709	196	1800
1050	26.221	187	24.830	188	24.267	187	23.905	188	1890
1100	26.408	180	25.018	180	24.454	181	24.093	181	1980
1150	26.588	175	25.198	175	24.635	174	24.274	174	2070
1200	26.763	168	25.373	167	24.809	167	24.448	167	2160
1250	26.931	162	25.540	162	24.976	162	24.615	162	2250
1300	27.093	158	25.702	158	25.138	158	24.777	158	2340
1350	27.251	153	25.860	153	25.296	152	24.935	152	2430
1400	27.404	149	26.013	149	25.448	149	25.087	149	2520
1450	27.553	145	26.162	144	25.597	144	25.236	144	2610
1500	27.698	141	26.306	141	25.741	141	25.380	141	2700
1550	27.839	138	26.447	138	25.882	138	25.521	138	2790
1600	27.977	134	26.585	134	26.020	135	25.659	135	2880
1650	28.111	131	26.719	131	26.155	132	25.794	132	2970
1700	28.242	128	26.850	128	26.287	129	25.926	129	3060
1750	28.370	126	26.978	126	26.416	126	26.055	126	3150
1800	28.496	123	27.104	123	26.542	123	26.181	123	3240
1850	28.619	121	27.227	121	26.665	120	26.304	120	3330
1900	28.740	118	27.348	118	26.785	118	26.424	118	3420
1950	28.858	116	27.466	116	26.903	116	26.542	116	3510
2000	28.974	114	27.582	114	27.019	114	26.658	114	3600
2050	29.088	113	27.696	112	27.133	112	26.772	112	3690
2100	29.201	111	27.808	110	27.245	110	26.884	110	3780
2150	29.312	109	27.918	109	27.355	108	26.994	108	3870
2200	29.421	108	28.027	107	27.463	107	27.102	107	3960
2250	29.529	107	28.134	106	27.570	106	27.209	105	4050
2300	29.636	106	28.240	104	27.676	104	27.314	104	4140
2350	29.742	105	28.344	103	27.780	103	27.418	102	4230
2400	29.847	104	28.447	102	27.883	101	27.520	101	4320
2450	29.951	104	28.549	101	27.984	100	27.621	100	4410
2500	30.055	104	28.650	100	28.084	99	27.721	99	4500
2550	30.159	104	28.750	99	28.183	98	27.820	98	4590
2600	30.263	104	28.849	99	28.281	98	27.918	97	4680
2650	30.367	104	28.948	98	28.379	97	28.015	96	4770
2700	30.471	105	29.046	98	28.476	97	28.111	96	4860
2750	30.576	105	29.144	98	28.573	96	28.207	95	4950
2800	30.681	106	29.242	98	28.669	96	28.302	95	5040
2850	30.787	108	29.340	98	28.765	96	28.397	94	5130
2900	30.895	109	29.438	98	28.861	96	28.491	94	5220
2950	31.004	110	29.536	98	28.957	95	28.585	93	5310
3000	31.114		29.634		29.052		28.678		5400

Table 2-6. SPECIFIC-HEAT RATIO OF AIR $\gamma = C_p/C_v$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	1.4048	- 17							90
60	1.4031	- 8							108
70	1.4023	- 4							126
80	1.4019	- 2							144
90	1.4017	- 1	1.4046	- 8	1.4139	- 31	1.4237	- 55	162
100	1.4016	- 1	1.4038	- 6	1.4108	- 21	1.4182	- 38	180
110	1.4015		1.4032	- 3	1.4087	- 14	1.4144	- 25	198
120	1.4015		1.4029	- 3	1.4073	- 10	1.4119	- 18	216
130	1.4015		1.4026	- 2	1.4063	- 8	1.4101	- 14	234
140	1.4015	- 1	1.4024	- 2	1.4055	- 6	1.4087	- 11	252
150	1.4014		1.4022	- 1	1.4049	- 5	1.4076	- 9	270
160	1.4014		1.4021	- 1	1.4044	- 4	1.4067	- 7	288
170	1.4014		1.4020	- 1	1.4040	- 4	1.4060	- 6	306
180	1.4014	- 1	1.4019	- 1	1.4036	- 3	1.4054	- 6	324
190	1.4013		1.4018	- 1	1.4033	- 3	1.4048	- 5	342
200	1.4013		1.4017	- 1	1.4030	- 2	1.4043	- 3	360
210	1.4013	- 1	1.4016	- 1	1.4028	- 2	1.4040	- 3	378
220	1.4012	- 1	1.4015	- 1	1.4026	- 2	1.4037	- 3	396
230	1.4011		1.4014	- 1	1.4024	- 2	1.4034	- 3	414
240	1.4011	- 2	1.4013	- 2	1.4022	- 2	1.4031	- 3	432
250	1.4009	- 1	1.4011	- 1	1.4020	- 3	1.4028	- 4	450
260	1.4008	- 2	1.4010	- 2	1.4017	- 3	1.4024	- 2	468
270	1.4006	- 2	1.4008	- 2	1.4014	- 2	1.4022	- 4	486
280	1.4004	- 2	1.4006	- 2	1.4012	- 3	1.4018	- 3	504
290	1.4002	- 2	1.4004	- 3	1.4009	- 3	1.4015	- 3	522
300	1.4000	- 3	1.4001	- 3	1.4006	- 3	1.4012	- 4	540
310	1.3997	- 4	1.3998	- 3	1.4003	- 3	1.4008	- 4	558
320	1.3993	- 3	1.3995	- 4	1.4000	- 5	1.4004	- 5	576
330	1.3990	- 4	1.3991	- 4	1.3995	- 5	1.3999	- 5	594
340	1.3986	- 5	1.3987	- 5	1.3990	- 5	1.3994	- 5	612
350	1.3981	- 5	1.3982	- 5	1.3985	- 5	1.3989	- 5	630
360	1.3976	- 6	1.3977	- 5	1.3980	- 5	1.3984	- 6	648
370	1.3970	- 6	1.3972	- 6	1.3975	- 6	1.3978	- 6	666
380	1.3964	- 6	1.3966	- 6	1.3969	- 7	1.3972	- 7	684
390	1.3958	- 6	1.3960	- 7	1.3962	- 6	1.3965	- 7	702
400	1.3952	- 7	1.3953	- 7	1.3956	- 8	1.3958	- 7	720
410	1.3945	- 8	1.3946	- 8	1.3948	- 7	1.3951	- 8	738
420	1.3937	- 7	1.3938	- 7	1.3941	- 8	1.3943	- 8	756
430	1.3930	- 8	1.3931	- 8	1.3933	- 8	1.3935	- 8	774
440	1.3922	- 9	1.3923	- 9	1.3925	- 9	1.3927	- 9	792
450	1.3913	- 9	1.3914	- 9	1.3916	- 9	1.3918	- 9	810
460	1.3904	- 9	1.3905	- 9	1.3907	- 9	1.3909	- 9	828
470	1.3895	- 9	1.3896	- 9	1.3898	- 11	1.3900	- 10	846
480	1.3886	- 10	1.3887	- 10	1.3887	- 9	1.3890	- 10	864
490	1.3876	- 10	1.3877	- 10	1.3878	- 10	1.3880	- 10	882
500	1.3866	- 10	1.3867	- 10	1.3868	- 10	1.3870	- 11	900
510	1.3856	- 10	1.3857	- 11	1.3858	- 11	1.3859	- 10	918
520	1.3846	- 11	1.3846	- 10	1.3847	- 10	1.3849	- 11	936
530	1.3835	- 11	1.3836	- 11	1.3837	- 11	1.3838	- 10	954
540	1.3824	- 11	1.3825	- 11	1.3826	- 11	1.3828	- 11	972
550	1.3813	- 11	1.3814	- 11	1.3815	- 11	1.3817	- 12	990
560	1.3802	- 11	1.3803	- 11	1.3804	- 11	1.3805	- 11	1008
570	1.3791	- 11	1.3792	- 12	1.3793	- 12	1.3794	- 12	1026
580	1.3780	- 11	1.3780	- 11	1.3781	- 11	1.3782	- 11	1044
590	1.3769	- 12	1.3769	- 11	1.3770	- 12	1.3771	- 12	1062
600	1.3757	- 11	1.3758	- 12	1.3758	- 11	1.3759	- 11	1080
610	1.3746	- 12	1.3746	- 11	1.3747	- 12	1.3748	- 11	1098
620	1.3734	- 11	1.3735	- 12	1.3735	- 11	1.3737	- 12	1116
630	1.3723	- 11	1.3723	- 11	1.3724	- 11	1.3725	- 11	1134
640	1.3712	- 12	1.3712	- 12	1.3713	- 12	1.3714	- 12	1152
650	1.3700		1.3700		1.3701		1.3702		1170

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	1.3700	- 11	1.3700	- 11	1.3701	- 11	1.3702	- 12	1170
660	1.3689	- 12	1.3689	- 12	1.3690	- 12	1.3690	- 11	1188
670	1.3677	- 11	1.3677	- 11	1.3678	- 12	1.3679	- 11	1206
680	1.3666	- 11	1.3666	- 11	1.3666	- 11	1.3668	- 12	1224
690	1.3655	- 12	1.3655	- 11	1.3655	- 11	1.3656	- 11	1242
700	1.3643	- 11	1.3644	- 11	1.3644	- 11	1.3645	- 11	1260
710	1.3632	- 11	1.3633	- 11	1.3633	- 11	1.3634	- 11	1278
720	1.3621	- 11	1.3622	- 11	1.3622	- 11	1.3623	- 11	1296
730	1.3610	- 11	1.3611	- 11	1.3611	- 11	1.3612	- 11	1314
740	1.3599	- 10	1.3600	- 11	1.3600	- 11	1.3601	- 11	1332
750	1.3589	- 11	1.3589	- 10	1.3589	- 10	1.3590	- 10	1350
760	1.3578	- 10	1.3579	- 11	1.3579	- 11	1.3580	- 11	1368
770	1.3568	- 11	1.3568	- 10	1.3568	- 11	1.3569	- 11	1386
780	1.3557	- 10	1.3558	- 11	1.3557	- 9	1.3558	- 10	1404
790	1.3547	- 1	1.3547	- 1	1.3548	- 1	1.3548	- 1	1422
800	1.354	- 5	1.354	- 5	1.354	- 5	1.354	- 5	1440
850	1.349	- 5	1.349	- 5	1.349	- 5	1.349	- 5	1530
900	1.344	- 4	1.344	- 4	1.344	- 4	1.344	- 4	1620
950	1.340	- 4	1.340	- 4	1.340	- 4	1.340	- 4	1710
1000	1.336	- 7	1.336	- 7	1.336	- 7	1.336	- 7	1800
1100	1.329	- 7	1.329	- 7	1.329	- 7	1.329	- 7	1980
1200	1.322	- 6	1.322	- 6	1.322	- 6	1.322	- 6	2160
1300	1.316	- 6	1.316	- 6	1.316	- 6	1.316	- 6	2340
1400	1.310	- 6	1.310	- 6	1.310	- 6	1.310	- 6	2520
1500	1.304	- 6	1.304	- 5	1.304	- 5	1.304	- 5	2700
1600	1.298	- 8	1.299	- 7	1.299	- 6	1.299	- 6	2880
1700	1.290	-10	1.292	- 6	1.293	- 6	1.293	- 5	3060
1800	1.280	-14	1.286	- 9	1.287	- 6	1.288	- 7	3240
1900	1.266	-23	1.277	-11	1.281	- 9	1.281	- 8	3420
2000	1.243	-20	1.266	-12	1.272	- 9	1.273	- 8	3600
2100	1.223		1.254	-15	1.263	-10	1.265	- 9	3780
2200			1.239	-17	1.253	-10	1.256	- 8	3960
2300			1.222	-16	1.243	-14	1.248	-13	4140
2400			1.206	-16	1.229	-15	1.235	-12	4320
2500			1.190	-12	1.214	-13	1.223	-12	4500
2600			1.178	- 7	1.201	-10	1.211	-11	4680
2700			1.171	- 3	1.191	- 7	1.200	- 9	4860
2800			1.168	1	1.184	- 5	1.191	- 6	5040
2900			1.169	4	1.179	- 1	1.185	- 4	5220
3000			1.173		1.178		1.181		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
110	1.4202	- 36	1.4960	-230	1.6035	-522	1.7672	-1277	198
120	1.4166	- 27	1.4730	-152	1.5513	-374	1.6395	- 655	216
130	1.4139	- 20	1.4578	-105	1.5139	-238	1.5740	- 390	234
140	1.4119	- 17	1.4473	- 80	1.4901	-167	1.5350	- 266	252
150	1.4102	- 13	1.4393	- 55	1.4734	-120	1.5084	- 188	270
160	1.4089	- 10	1.4338	- 48	1.4614	- 93	1.4896	- 140	288
170	1.4079	- 8	1.4290	- 37	1.4521	- 73	1.4756	- 108	306
180	1.4071	- 7	1.4253	- 31	1.4448	- 57	1.4648	- 88	324
190	1.4064	- 7	1.4222	- 25	1.4391	- 47	1.4560	- 71	342
200	1.4057	- 4	1.4197	- 20	1.4344	- 38	1.4489	- 52	360
210	1.4053	- 5	1.4177	- 19	1.4306	- 34	1.4437	- 48	378
220	1.4048	- 4	1.4158	- 15	1.4272	- 26	1.4389	- 41	396
230	1.4044	- 4	1.4143	- 14	1.4246	- 24	1.4348	- 35	414
240	1.4040	- 4	1.4129	- 11	1.4222	- 21	1.4313	- 29	432
250	1.4036	- 4	1.4118	- 11	1.4201	- 18	1.4284	- 25	450
260	1.4032	- 3	1.4107	- 10	1.4183	- 17	1.4259	- 23	468
270	1.4029	- 5	1.4097	- 10	1.4166	- 16	1.4236	- 22	486
280	1.4024	- 4	1.4087	- 9	1.4150	- 15	1.4214	- 20	504
290	1.4020	- 3	1.4078	- 8	1.4135	- 12	1.4194	- 17	522
300	1.4017	- 4	1.4070	- 8	1.4123	- 12	1.4177	- 16	540
310	1.4013	- 5	1.4062	- 9	1.4111	- 11	1.4161	- 15	558
320	1.4008	- 4	1.4053	- 8	1.4100	- 11	1.4146	- 15	576
330	1.4004	- 5	1.4045	- 7	1.4089	- 12	1.4131	- 13	594
340	1.3999	- 6	1.4038	- 8	1.4077	- 10	1.4118	- 14	612
350	1.3993	- 6	1.4030	- 8	1.4067	- 11	1.4104	- 13	630
360	1.3987	- 6	1.4022	- 8	1.4056	- 10	1.4091	- 12	648
370	1.3981	- 6	1.4014	- 9	1.4046	- 10	1.4079	- 13	666
380	1.3975	- 7	1.4005	- 8	1.4036	- 11	1.4066	- 12	684
390	1.3968	- 7	1.3997	- 10	1.4025	- 11	1.4054	- 13	702
400	1.3961	- 8	1.3987	- 8	1.4014	- 10	1.4041	- 13	720
410	1.3953	- 7	1.3979	- 9	1.4004	- 10	1.4028	- 12	738
420	1.3946	- 8	1.3970	- 10	1.3994	- 12	1.4016	- 13	756
430	1.3938	- 9	1.3960	- 10	1.3982	- 10	1.4003	- 12	774
440	1.3929	- 9	1.3950	- 10	1.3972	- 12	1.3991	- 12	792
450	1.3920	- 9	1.3940	- 10	1.3960	- 11	1.3979	- 12	810
460	1.3911	- 10	1.3930	- 11	1.3949	- 11	1.3967	- 12	828
470	1.3901	- 9	1.3919	- 10	1.3938	- 12	1.3955	- 12	846
480	1.3892	- 11	1.3909	- 11	1.3926	- 12	1.3943	- 13	864
490	1.3881	- 10	1.3898	- 11	1.3914	- 11	1.3930	- 12	882
500	1.3871	- 10	1.3887	- 11	1.3903	- 12	1.3918	- 12	900
510	1.3861	- 10	1.3876	- 11	1.3891	- 12	1.3906	- 13	918
520	1.3851	- 11	1.3865	- 12	1.3879	- 13	1.3893	- 13	936
530	1.3840	- 11	1.3853	- 11	1.3866	- 12	1.3880	- 13	954
540	1.3829	- 11	1.3842	- 12	1.3854	- 12	1.3867	- 13	972
550	1.3818	- 12	1.3830	- 12	1.3842	- 13	1.3854	- 14	990
560	1.3806	- 11	1.3818	- 12	1.3829	- 12	1.3840	- 13	1008
570	1.3795	- 12	1.3806	- 12	1.3817	- 12	1.3827	- 13	1026
580	1.3783	- 11	1.3794	- 12	1.3805	- 13	1.3814	- 13	1044
590	1.3772	- 12	1.3782	- 12	1.3792	- 12	1.3801	- 13	1062
600	1.3760	- 11	1.3770	- 12	1.3780	- 12	1.3788	- 13	1080
610	1.3749	- 12	1.3758	- 12	1.3768	- 12	1.3775	- 12	1098
620	1.3737	- 11	1.3746	- 12	1.3756	- 13	1.3763	- 12	1116
630	1.3726	- 12	1.3734	- 12	1.3743	- 13	1.3751	- 12	1134
640	1.3714	- 12	1.3722	- 12	1.3730	- 11	1.3739	- 13	1152
650	1.3702	- 11	1.3710	- 11	1.3719	- 13	1.3726	- 12	1170
660	1.3691	- 12	1.3699	- 12	1.3706	- 12	1.3714	- 13	1188
670	1.3679	- 11	1.3687	- 12	1.3694	- 12	1.3701	- 13	1206
680	1.3668	- 11	1.3675	- 11	1.3682	- 12	1.3688	- 12	1224
690	1.3657	- 11	1.3664	- 12	1.3670	- 12	1.3676	- 12	1242
700	1.3646		1.3652		1.3658		1.3664		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	1.3646	- 12	1.3652	- 11	1.3658	- 11	1.3664	- 12	1260
710	1.3634	- 11	1.3641	- 12	1.3647	- 12	1.3652	- 11	1278
720	1.3623	- 11	1.3629	- 11	1.3635	- 11	1.3641	- 12	1296
730	1.3612	- 11	1.3618	- 11	1.3624	- 11	1.3629	- 11	1314
740	1.3601	- 10	1.3607	- 11	1.3613	- 12	1.3618	- 12	1332
750	1.3591	- 11	1.3596	- 11	1.3601	- 11	1.3606	- 11	1350
760	1.3580	- 11	1.3585	- 11	1.3590	- 11	1.3595	- 12	1368
770	1.3569	- 10	1.3574	- 10	1.3579	- 11	1.3583	- 11	1386
780	1.3559	- 10	1.3564	- 11	1.3568	- 11	1.3572	- 11	1404
790	1.3549	- 9	1.3553	- 1	1.3557	- 1	1.3561	- 1	1422
800	1.354	- 5	1.354	- 5	1.355	- 5	1.355	- 5	1440
850	1.349	- 4	1.349	- 4	1.350	- 5	1.350	- 5	1530
900	1.345	- 5	1.345	- 5	1.345	- 5	1.345	- 4	1620
950	1.340	- 4	1.340	- 4	1.340	- 4	1.341	- 5	1710
1000	1.336	- 7	1.336	- 7	1.336	- 7	1.336	- 7	1800
1100	1.329	- 7	1.329	- 7	1.329	- 7	1.329	- 7	1980
1200	1.322	- 6	1.322	- 6	1.322	- 6	1.322	- 6	2160
1300	1.316	- 6	1.316	- 6	1.316	- 6	1.316	- 6	2340
1400	1.310	- 6	1.310	- 6	1.310	- 6	1.310	- 6	2520
1500	1.304	- 5	1.304	- 5	1.304	- 5	1.304	- 5	2700
1600	1.299	- 6	1.299	- 6	1.299	- 6	1.299	- 6	2880
1700	1.293	- 5	1.293	- 5	1.293	- 5	1.293	- 5	3060
1800	1.288	- 6	1.288	- 5	1.288	- 5	1.288	- 5	3240
1900	1.282	- 8	1.283	- 6	1.283	- 5	1.283	- 5	3420
2000	1.274	- 7	1.277	- 6	1.278	- 6	1.278	- 6	3600
2100	1.267	- 8	1.271	- 6	1.272	- 5	1.272	- 5	3780
2200	1.259	-10	1.265	- 8	1.267	- 8	1.267	- 7	3960
2300	1.249	-11	1.257	- 8	1.259	- 6	1.260	- 6	4140
2400	1.238	-11	1.249	- 8	1.253	- 8	1.254	- 7	4320
2500	1.227	-12	1.241	- 9	1.245	- 8	1.247	- 7	4500
2600	1.215	-10	1.232	- 8	1.237	- 7	1.240	- 7	4680
2700	1.205	- 9	1.224	- 9	1.230	- 8	1.233	- 7	4860
2800	1.196	- 7	1.215	- 8	1.222	- 8	1.226	- 8	5040
2900	1.189	- 4	1.207	- 6	1.214	- 6	1.218	- 6	5220
3000	1.185		1.201		1.208		1.212		5400

Table 2-6. SPECIFIC-HEAT RATIO OF AIR - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
150	1.5084	- 188	2.7372	-6204					270
160	1.4896	- 140	2.1168	-2282					288
170	1.4756	- 108	1.8886	-1208					306
180	1.4648	- 88	1.7678	- 756	2.3139	-2672			324
190	1.4560	- 71	1.6922	- 504	2.0467	-1467			342
200	1.4489	- 52	1.6418	- 392	1.9000	-1005	2.1376	-1574	360
210	1.4437	- 48	1.6026	- 286	1.7995	- 677	1.9802	-1033	378
220	1.4389	- 41	1.5740	- 225	1.7318	- 500	1.8769	- 757	396
230	1.4348	- 35	1.5515	- 181	1.6818	- 384	1.8012	- 573	414
240	1.4313	- 29	1.5334	- 149	1.6434	- 304	1.7439	- 449	432
250	1.4284	- 25	1.5185	- 123	1.6130	- 245	1.6990	- 359	450
260	1.4259	- 23	1.5062	- 106	1.5885	- 202	1.6631	- 292	468
270	1.4236	- 22	1.4956	- 91	1.5683	- 172	1.6339	- 245	486
280	1.4214	- 20	1.4865	- 79	1.5511	- 146	1.6094	- 207	504
290	1.4194	- 17	1.4786	- 69	1.5365	- 125	1.5887	- 176	522
300	1.4177	- 16	1.4717	- 59	1.5240	- 108	1.5711	- 152	540
310	1.4161	- 15	1.4658	- 55	1.5132	- 97	1.5559	- 134	558
320	1.4146	- 15	1.4603	- 50	1.5035	- 87	1.5425	- 118	576
330	1.4131	- 13	1.4553	- 46	1.4948	- 77	1.5307	- 105	594
340	1.4118	- 14	1.4507	- 42	1.4871	- 67	1.5202	- 93	612
350	1.4104	- 13	1.4465	- 36	1.4804	- 62	1.5109	- 85	630
360	1.4091	- 12	1.4429	- 35	1.4742	- 57	1.5024	- 77	648
370	1.4079	- 13	1.4394	- 33	1.4685	- 53	1.4947	- 69	666
380	1.4066	- 12	1.4361	- 32	1.4632	- 49	1.4878	- 65	684
390	1.4054	- 13	1.4329	- 30	1.4583	- 46	1.4813	- 61	702
400	1.4041	- 13	1.4299	- 26	1.4537	- 45	1.4752	- 59	720
410	1.4028	- 12	1.4273	- 27	1.4492	- 43	1.4693	- 55	738
420	1.4016	- 13	1.4246	- 26	1.4449	- 37	1.4638	- 50	756
430	1.4003	- 12	1.4220	- 26	1.4412	- 36	1.4588	- 47	774
440	1.3991	- 12	1.4194	- 26	1.4376	- 34	1.4541	- 43	792
450	1.3979	- 12	1.4168	- 20	1.4342	- 30	1.4498	- 37	810
460	1.3967	- 12	1.4148	- 21	1.4312	- 29	1.4461	- 36	828
470	1.3955	- 12	1.4127	- 21	1.4283	- 31	1.4425	- 36	846
480	1.3943	- 13	1.4106	- 20	1.4252	- 28	1.4389	- 34	864
490	1.3930	- 12	1.4086	- 21	1.4224	- 25	1.4355	- 34	882
500	1.3918	- 12	1.4065	- 19	1.4199	- 27	1.4321	- 32	900
510	1.3906	- 13	1.4046	- 19	1.4172	- 24	1.4289	- 31	918
520	1.3893	- 13	1.4027	- 19	1.4148	- 26	1.4258	- 31	936
530	1.3880	- 13	1.4008	- 20	1.4122	- 24	1.4227	- 29	954
540	1.3867	- 13	1.3988	- 19	1.4098	- 25	1.4198	- 28	972
550	1.3854	- 14	1.3969	- 17	1.4073	- 22	1.4170	- 28	990
560	1.3840	- 13	1.3952	- 18	1.4051	- 22	1.4142	- 26	1008
570	1.3827	- 13	1.3934	- 17	1.4029	- 21	1.4116	- 26	1026
580	1.3814	- 13	1.3917	- 18	1.4008	- 21	1.4090	- 25	1044
590	1.3801	- 13	1.3899	- 17	1.3987	- 20	1.4065	- 24	1062
600	1.3788	- 13	1.3882	- 16	1.3967	- 20	1.4041	- 23	1080
610	1.3775	- 12	1.3866	- 16	1.3947	- 20	1.4018	- 23	1098
620	1.3763	- 12	1.3850	- 16	1.3927	- 20	1.3995	- 22	1116
630	1.3751	- 12	1.3834	- 17	1.3907	- 19	1.3973	- 22	1134
640	1.3739	- 13	1.3817	- 16	1.3888	- 19	1.3951	- 20	1152
650	1.3726	- 12	1.3801	- 16	1.3869	- 19	1.3931	- 21	1170
660	1.3714	- 13	1.3785	- 15	1.3850	- 17	1.3910	- 20	1188
670	1.3701	- 13	1.3770	- 15	1.3833	- 17	1.3890	- 20	1206
680	1.3688	- 12	1.3755	- 15	1.3816	- 16	1.3870	- 19	1224
690	1.3676	- 12	1.3740	- 15	1.3800	- 17	1.3851	- 19	1242
700	1.3664		1.3725		1.3783		1.3832		1260

Table 2-6. SPECIFIC-HEAT RATIO OF AIR - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
700	1.3664	- 12	1.3725	- 13	1.3783	- 17	1.3832	- 18	1260
710	1.3652	- 11	1.3712	- 14	1.3766	- 16	1.3814	- 18	1278
720	1.3641	- 12	1.3698	- 13	1.3750	- 16	1.3796	- 18	1296
730	1.3629	- 11	1.3685	- 14	1.3734	- 16	1.3778	- 17	1314
740	1.3618	- 12	1.3671	- 13	1.3718	- 15	1.3761	- 16	1332
750	1.3606	- 11	1.3658	- 13	1.3703	- 15	1.3745	- 16	1350
760	1.3595	- 12	1.3645	- 13	1.3688	- 15	1.3729	- 16	1368
770	1.3583	- 11	1.3632	- 13	1.3673	- 14	1.3713	- 16	1386
780	1.3572	- 11	1.3619	- 13	1.3659	- 14	1.3697	- 16	1404
790	1.3561	- 10	1.3606	- 14	1.3645	- 15	1.3681	- 16	1422
800	1.3551	- 52	1.3592	- 61	1.3630	- 64	1.3665	- 70	1440
850	1.3499	- 47	1.3531	- 51	1.3566	- 60	1.3595	- 62	1530
900	1.3452	- 46	1.3480	- 50	1.3506	- 52	1.3533	- 57	1620
950	1.3406	- 42	1.3430	- 44	1.3454	- 48	1.3476	- 53	1710
1000	1.3364	- 76	1.3386	- 83	1.3406	- 87	1.3423	- 90	1800
1100	1.3288	- 67	1.3303	- 71	1.3319	- 76	1.3333	- 79	1980
1200	1.3221	- 65	1.3232	- 67	1.3243	- 69	1.3254	- 73	2160
1300	1.3156	- 58	1.3165	- 59	1.3174	- 63	1.3181	- 64	2340
1400	1.3098	- 55	1.3106	- 59	1.3111	- 59	1.3117	- 61	2520
1500	1.3043	- 5	1.3047	- 4	1.3052	- 3	1.3056	- 3	2700
1600	1.299	- 6	1.301	- 7	1.302	- 6	1.303	- 6	2880
1700	1.293	- 5	1.294	- 5	1.296	- 6	1.297	- 6	3060
1800	1.288	- 5	1.289	- 5	1.290	- 5	1.291	- 5	3240
1900	1.283	- 5	1.284	- 5	1.285	- 5	1.286	- 5	3420
2000	1.278	- 6	1.279	- 5	1.280	- 5	1.281	- 5	3600
2100	1.272	- 5	1.274	- 5	1.275	- 5	1.276	- 6	3780
2200	1.267	- 7	1.269	- 5	1.270	- 5	1.270	- 4	3960
2300	1.260	- 6	1.264	- 5	1.265	- 5	1.266	- 5	4140
2400	1.254	- 7	1.259	- 6	1.260	- 4	1.261	- 4	4320
2500	1.247	- 7	1.253	- 5	1.256	- 5	1.257	- 5	4500
2600	1.240	- 7	1.248	- 5	1.251	- 5	1.252	- 5	4680
2700	1.233	- 7	1.243	- 6	1.246	- 5	1.247	- 4	4860
2800	1.226	- 8	1.237	- 5	1.241	- 5	1.243	- 5	5040
2900	1.218	- 6	1.232	- 6	1.236	- 5	1.238	- 4	5220
3000	1.212		1.226		1.231		1.234		5400

Table 2-7. SOUND VELOCITY AT LOW FREQUENCY IN AIR a/a_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
50	.4275	410							90
60	.4685	376							108
70	.5061	351							126
80	.5412	328	.5402	329					144
90	.5740	311	.5731	314	.5707	319	.5682	324	162
100	.6051	295	.6045	296	.6026	301	.6006	306	180
110	.6346	283	.6341	284	.6327	286	.6312	289	198
120	.6629	271	.6625	271	.6613	274	.6601	276	216
130	.6900	260	.6896	261	.6887	263	.6877	265	234
140	.7160	251	.7157	252	.7150	253	.7142	255	252
150	.7411	243	.7409	244	.7403	245	.7397	246	270
160	.7654	236	.7653	235	.7648	236	.7643	237	288
170	.7890	229	.7888	230	.7884	231	.7880	231	306
180	.8119	222	.8118	222	.8115	222	.8111	223	324
190	.8341	216	.8340	217	.8337	217	.8334	218	342
200	.8557	212	.8557	211	.8554	213	.8552	214	360
210	.8769	206	.8768	207	.8767	207	.8766	207	378
220	.8975	201	.8975	201	.8974	202	.8973	202	396
230	.9176	197	.9176	197	.9176	196	.9175	197	414
240	.9373	193	.9373	193	.9372	194	.9372	195	432
250	.9566	189	.9566	189	.9566	190	.9567	189	450
260	.9755	186	.9755	186	.9756	185	.9756	186	468
270	.9941	181	.9941	181	.9941	182	.9942	181	486
280	1.0122	178	1.0122	178	1.0123	178	1.0123	179	504
290	1.0300	176	1.0300	176	1.0301	176	1.0302	176	522
300	1.0476	172	1.0476	172	1.0477	172	1.0478	172	540
310	1.0648	170	1.0648	170	1.0649	170	1.0650	170	558
320	1.0818	166	1.0818	166	1.0819	166	1.0820	166	576
330	1.0984	164	1.0984	164	1.0985	164	1.0986	164	594
340	1.1148	160	1.1148	160	1.1149	160	1.1150	160	612
350	1.1308	158	1.1308	159	1.1309	160	1.1310	160	630
360	1.1466	156	1.1467	156	1.1469	156	1.1470	156	648
370	1.1622	153	1.1623	153	1.1625	153	1.1626	153	666
380	1.1775	152	1.1776	152	1.1778	152	1.1779	152	684
390	1.1927	149	1.1928	149	1.1930	149	1.1931	149	702
400	1.2076	147	1.2077	147	1.2079	147	1.2080	147	720
410	1.2223	144	1.2224	144	1.2226	144	1.2227	144	738
420	1.2367	144	1.2368	144	1.2370	144	1.2371	144	756
430	1.2511	141	1.2512	141	1.2514	141	1.2515	141	774
440	1.2652	139	1.2653	139	1.2655	139	1.2656	140	792
450	1.2791	137	1.2792	137	1.2794	137	1.2796	137	810
460	1.2928	135	1.2929	135	1.2931	135	1.2933	135	828
470	1.3063	134	1.3064	134	1.3066	134	1.3068	134	846
480	1.3197	132	1.3198	132	1.3200	132	1.3202	132	864
490	1.3329	131	1.3330	131	1.3332	131	1.3334	131	882
500	1.3460	129	1.3461	129	1.3463	129	1.3465	129	900
510	1.3589	127	1.3590	127	1.3592	127	1.3594	127	918
520	1.3716	126	1.3717	126	1.3719	126	1.3721	126	936
530	1.3842	125	1.3843	125	1.3845	125	1.3847	125	954
540	1.3967	123	1.3968	123	1.3970	123	1.3972	123	972
550	1.4090	122	1.4091	122	1.4093	122	1.4095	122	990
560	1.4212	120	1.4213	120	1.4215	120	1.4217	120	1008
570	1.4332	119	1.4333	119	1.4335	119	1.4337	119	1026
580	1.4451	119	1.4452	119	1.4454	119	1.4456	119	1044
590	1.4570	12	1.4571	12	1.4573	12	1.4575	11	1062
600	1.469	11	1.469	11	1.469	12	1.469	12	1080
610	1.480	12	1.480	12	1.481	11	1.481	11	1098
620	1.492	11	1.492	11	1.492	11	1.492	12	1116
630	1.503	11	1.503	11	1.503	12	1.504	11	1134
640	1.514	11	1.514	12	1.515	11	1.515	11	1152
650	1.525		1.526		1.526		1.526		1170

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	1.525	11	1.526	11	1.526	11	1.526	11	1170
660	1.536	11	1.537	10	1.537	11	1.537	11	1188
670	1.547	11	1.547	11	1.548	11	1.548	11	1206
680	1.558	11	1.558	11	1.559	10	1.559	11	1224
690	1.569	11	1.569	11	1.569	11	1.570	10	1242
700	1.580	10	1.580	10	1.580	11	1.580	11	1260
710	1.590	11	1.590	11	1.591	10	1.591	10	1278
720	1.601	10	1.601	10	1.601	10	1.601	11	1296
730	1.611	11	1.611	11	1.611	11	1.612	10	1314
740	1.622	10	1.622	10	1.622	10	1.622	10	1332
750	1.632	10	1.632	10	1.632	10	1.632	11	1350
760	1.642	10	1.642	10	1.642	10	1.643	10	1368
770	1.652	10	1.652	10	1.652	11	1.653	10	1386
780	1.662	10	1.662	10	1.663	10	1.663	10	1404
790	1.672	10	1.672	10	1.673	10	1.673	10	1422
800	1.682	49	1.682	49	1.683	48	1.683	48	1440
850	1.731	47	1.731	47	1.731	47	1.731	48	1530
900	1.778	46	1.778	46	1.778	46	1.779	45	1620
950	1.824	44	1.824	44	1.824	45	1.824	45	1710
1000	1.868	44	1.868	44	1.869	43	1.869	43	1800
1050	1.912	42	1.912	42	1.912	42	1.912	42	1890
1100	1.954	41	1.954	41	1.954	42	1.954	42	1980
1150	1.995	41	1.995	41	1.996	40	1.996	40	2070
1200	2.036	40	2.036	40	2.036	40	2.036	40	2160
1250	2.076	38	2.076	38	2.076	39	2.076	39	2250
1300	2.114	38	2.114	38	2.115	37	2.115	37	2340
1350	2.152	37	2.152	37	2.152	37	2.152	37	2430
1400	2.189	36	2.189	36	2.189	36	2.189	37	2520
1450	2.225	36	2.225	36	2.225	36	2.226	35	2610
1500	2.261	34	2.261	35	2.261	35	2.261	35	2700
1550	2.295	34	2.296	34	2.296	34	2.296	35	2790
1600	2.329	33	2.330	33	2.330	34	2.331	33	2880
1650	2.362	32	2.363	33	2.364	33	2.364	33	2970
1700	2.394	30	2.396	32	2.397	32	2.397	33	3060
1750	2.424	30	2.428	31	2.429	32	2.430	31	3150
1800	2.454	28	2.459	31	2.461	30	2.461	31	3240
1850	2.482	26	2.490	28	2.491	30	2.492	30	3330
1900	2.508	24	2.518	28	2.521	29	2.522	29	3420
1950	2.532	21	2.546	28	2.550	29	2.551	29	3510
2000	2.553	21	2.574	26	2.579	26	2.580	27	3600
2050	2.574	19	2.600	24	2.605	27	2.607	27	3690
2100	2.593		2.624	24	2.632	25	2.634	28	3780
2150			2.648	22	2.657	26	2.662	26	3870
2200			2.670	22	2.683	24	2.688	25	3960
2250			2.692	22	2.707	23	2.713	24	4050
2300			2.714	21	2.730	23	2.737	23	4140
2350			2.735	21	2.753	23	2.760	24	4230
2400			2.756	21	2.776	21	2.784	22	4320
2450			2.777	20	2.797	21	2.806	21	4410
2500			2.797	22	2.818	22	2.827	22	4500
2550			2.819	23	2.840	22	2.849	22	4590
2600			2.842	25	2.862	24	2.871	22	4680
2650			2.867	27	2.886	23	2.893	22	4770
2700			2.894	29	2.909	24	2.915	24	4860
2750			2.923	30	2.933	25	2.939	23	4950
2800			2.953	33	2.958	27	2.962	25	5040
2850			2.986	35	2.985	28	2.987	26	5130
2900			3.021	36	3.013	29	3.013	26	5220
2950			3.057	38	3.042	29	3.039	27	5310
3000			3.095		3.071		3.066		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.5987	309							180
110	.6296	293	.6136	328	.5960	373	.5762	429	198
120	.6589	279	.6464	306	.6333	335	.6191	372	216
130	.6868	266	.6770	286	.6668	309	.6563	334	234
140	.7134	257	.7056	273	.6977	290	.6897	308	252
150	.7391	247	.7329	260	.7267	273	.7205	287	270
160	.7638	237	.7589	249	.7540	260	.7492	271	288
170	.7875	233	.7838	241	.7800	250	.7763	257	306
180	.8108	224	.8079	229	.8050	236	.8020	245	324
190	.8332	218	.8308	224	.8286	229	.8265	235	342
200	.8550	214	.8532	219	.8515	225	.8500	229	360
210	.8764	208	.8751	213	.8740	217	.8729	221	378
220	.8972	203	.8964	207	.8957	210	.8950	214	396
230	.9175	196	.9171	198	.9167	202	.9164	208	414
240	.9371	196	.9369	198	.9369	201	.9372	202	432
250	.9567	190	.9567	193	.9570	194	.9574	197	450
260	.9757	186	.9760	189	.9764	190	.9771	192	468
270	.9943	181	.9949	184	.9954	186	.9963	188	486
280	1.0124	179	1.0133	180	1.0140	183	1.0151	184	504
290	1.0303	176	1.0313	177	1.0323	179	1.0335	179	522
300	1.0479	173	1.0490	174	1.0502	174	1.0514	176	540
310	1.0652	169	1.0664	170	1.0676	172	1.0690	173	558
320	1.0821	168	1.0834	169	1.0848	169	1.0863	169	576
330	1.0989	163	1.1003	164	1.1017	165	1.1032	166	594
340	1.1152	161	1.1167	162	1.1182	164	1.1198	164	612
350	1.1313	158	1.1329	159	1.1346	159	1.1362	161	630
360	1.1471	157	1.1488	157	1.1505	158	1.1523	158	648
370	1.1628	154	1.1645	155	1.1663	155	1.1681	156	666
380	1.1782	151	1.1800	151	1.1818	152	1.1837	153	684
390	1.1933	149	1.1951	150	1.1970	150	1.1990	150	702
400	1.2082	147	1.2101	147	1.2120	148	1.2140	148	720
410	1.2229	146	1.2248	146	1.2268	146	1.2288	146	738
420	1.2375	143	1.2394	144	1.2414	144	1.2434	144	756
430	1.2518	141	1.2538	141	1.2558	142	1.2578	142	774
440	1.2659	139	1.2679	139	1.2700	139	1.2720	140	792
450	1.2798	137	1.2818	138	1.2839	138	1.2860	138	810
460	1.2935	135	1.2956	135	1.2977	136	1.2998	136	828
470	1.3070	134	1.3091	135	1.3113	135	1.3134	135	846
480	1.3204	132	1.3226	132	1.3248	132	1.3269	132	864
490	1.3336	131	1.3358	131	1.3380	131	1.3401	131	882
500	1.3467	129	1.3489	129	1.3511	129	1.3532	130	900
510	1.3596	128	1.3618	128	1.3640	128	1.3662	128	918
520	1.3724	126	1.3746	126	1.3768	126	1.3790	126	936
530	1.3850	124	1.3872	124	1.3894	124	1.3916	125	954
540	1.3974	124	1.3996	124	1.4018	124	1.4041	123	972
550	1.4098	121	1.4120	121	1.4142	121	1.4164	121	990
560	1.4219	121	1.4241	121	1.4263	121	1.4285	121	1008
570	1.4340	119	1.4362	119	1.4384	119	1.4406	119	1026
580	1.4459	118	1.4481	118	1.4503	118	1.4525	118	1044
590	1.4577	11	1.4599	12	1.4621	12	1.4643	12	1062
600	1.469	12	1.472	11	1.474	12	1.476	12	1080
610	1.481	11	1.483	12	1.486	11	1.488	11	1098
620	1.492	12	1.495	11	1.497	11	1.499	12	1116
630	1.504	11	1.506	11	1.508	12	1.511	11	1134
640	1.515	11	1.517	11	1.520	11	1.522	11	1152
650	1.526		1.528		1.531		1.533		1170

°K	1 atm		4 atm		7 atm		10 atm		°R
650	1.526	11	1.528	11	1.531	11	1.533	11	1170
660	1.537	11	1.539	11	1.542	11	1.544	11	1188
670	1.548	11	1.550	11	1.553	11	1.555	11	1206
680	1.559	11	1.561	11	1.564	11	1.566	11	1224
690	1.570	10	1.572	11	1.575	11	1.577	10	1242
700	1.580	11	1.583	10	1.586	10	1.587	11	1260
710	1.591	11	1.593	11	1.596	10	1.598	10	1278
720	1.602	10	1.604	10	1.606	10	1.608	11	1296
730	1.612	10	1.614	11	1.616	11	1.619	10	1314
740	1.622	11	1.625	10	1.627	10	1.629	10	1332
750	1.633	10	1.635	10	1.637	10	1.639	10	1350
760	1.643	10	1.645	10	1.647	10	1.649	11	1368
770	1.653	10	1.655	10	1.657	10	1.660	10	1386
780	1.663	10	1.665	10	1.667	10	1.670	10	1404
790	1.673	10	1.675	10	1.677	10	1.680	10	1422
800	1.683	49	1.685	49	1.687	49	1.690	48	1440
850	1.732	47	1.734	47	1.736	47	1.738	47	1530
900	1.779	46	1.781	46	1.783	46	1.785	46	1620
950	1.825	44	1.827	44	1.829	44	1.831	44	1710
1000	1.869	43	1.871	43	1.873	43	1.875	43	1800
1050	1.912	43	1.914	43	1.916	43	1.918	43	1890
1100	1.955	41	1.957	41	1.959	41	1.961	41	1980
1150	1.996	41	1.998	40	2.000	40	2.002	40	2070
1200	2.037	39	2.038	40	2.040	40	2.042	40	2160
1250	2.076	39	2.078	39	2.080	38	2.082	38	2250
1300	2.115	38	2.117	37	2.118	38	2.120	38	2340
1350	2.153	37	2.154	37	2.156	37	2.158	37	2430
1400	2.190	36	2.191	37	2.193	36	2.195	36	2520
1450	2.226	35	2.228	35	2.229	36	2.231	36	2610
1500	2.261	35	2.263	35	2.265	35	2.267	34	2700
1550	2.296	35	2.298	34	2.300	34	2.301	34	2790
1600	2.331	33	2.332	34	2.334	34	2.335	34	2880
1650	2.364	34	2.366	33	2.368	33	2.369	33	2970
1700	2.398	32	2.399	32	2.401	32	2.402	33	3060
1750	2.430	31	2.431	33	2.433	32	2.435	32	3150
1800	2.461	31	2.464	31	2.465	32	2.467	31	3240
1850	2.492	31	2.495	31	2.497	31	2.498	31	3330
1900	2.523	29	2.526	30	2.528	30	2.529	31	3420
1950	2.552	29	2.556	29	2.558	30	2.560	30	3510
2000	2.581	27	2.585	29	2.588	29	2.590	29	3600
2050	2.608	28	2.614	28	2.617	29	2.619	29	3690
2100	2.636	28	2.642	29	2.646	28	2.648	28	3780
2150	2.664	27	2.671	28	2.674	28	2.676	28	3870
2200	2.691	26	2.699	26	2.702	28	2.704	27	3960
2250	2.717	24	2.725	27	2.730	25	2.731	26	4050
2300	2.741	24	2.752	25	2.755	26	2.757	26	4140
2350	2.765	24	2.777	25	2.781	25	2.783	25	4230
2400	2.789	22	2.802	24	2.806	24	2.808	25	4320
2450	2.811	21	2.826	23	2.830	25	2.833	25	4410
2500	2.832	22	2.849	23	2.855	24	2.858	25	4500
2550	2.854	22	2.872	23	2.879	23	2.883	24	4590
2600	2.876	22	2.895	23	2.902	24	2.907	24	4680
2650	2.898	22	2.918	22	2.926	23	2.931	24	4770
2700	2.920	23	2.940	23	2.949	23	2.955	24	4860
2750	2.943	23	2.963	22	2.972	23	2.979	23	4950
2800	2.966	24	2.985	23	2.995	22	3.002	23	5040
2850	2.990	25	3.008	22	3.017	23	3.025	22	5130
2900	3.015	25	3.030	23	3.040	23	3.047	23	5220
2950	3.040	26	3.053	23	3.063	22	3.070	22	5310
3000	3.066		3.076		3.085		3.092		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	.7205	287	.6574	486					270
160	.7492	271	.7060	402					288
170	.7763	257	.7462	351					306
180	.8020	245	.7813	317	.7988	306			324
190	.8265	235	.8130	295	.8294	299			342
200	.8500	229	.8425	271	.8593	270	.9106	185	360
210	.8729	221	.8696	257	.8863	264	.9291	219	378
220	.8950	214	.8953	245	.9127	252	.9510	222	396
230	.9164	208	.9198	233	.9379	241	.9732	219	414
240	.9372	202	.9431	224	.9620	230	.9951	215	432
250	.9574	197	.9655	216	.9850	222	1.0166	212	450
260	.9771	192	.9871	209	1.0072	215	1.0378	206	468
270	.9963	188	1.0080	202	1.0287	206	1.0584	200	486
280	1.0151	184	1.0282	194	1.0493	200	1.0784	195	504
290	1.0335	179	1.0476	192	1.0693	195	1.0979	191	522
300	1.0514	176	1.0668	187	1.0888	189	1.1170	186	540
310	1.0690	173	1.0855	181	1.1077	184	1.1356	181	558
320	1.0863	169	1.1036	177	1.1261	179	1.1537	178	576
330	1.1032	166	1.1213	172	1.1440	175	1.1715	173	594
340	1.1198	164	1.1385	169	1.1615	172	1.1888	168	612
350	1.1362	161	1.1554	166	1.1787	167	1.2056	168	630
360	1.1523	158	1.1720	163	1.1954	164	1.2224	163	648
370	1.1681	156	1.1883	159	1.2118	160	1.2387	158	666
380	1.1837	153	1.2042	156	1.2278	158	1.2545	156	684
390	1.1990	150	1.2198	153	1.2436	154	1.2701	151	702
400	1.2140	148	1.2351	152	1.2590	150	1.2852	150	720
410	1.2288	146	1.2503	148	1.2740	148	1.3002	145	738
420	1.2434	144	1.2651	146	1.2888	146	1.3147	145	756
430	1.2578	142	1.2797	143	1.3034	144	1.3292	142	774
440	1.2720	140	1.2940	140	1.3178	142	1.3434	145	792
450	1.2860	138	1.3080	140	1.3320	140	1.3579	135	810
460	1.2998	136	1.3220	138	1.3460	138	1.3714	138	828
470	1.3134	135	1.3358	136	1.3598	134	1.3852	134	846
480	1.3269	132	1.3494	134	1.3732	134	1.3986	133	864
490	1.3401	131	1.3628	131	1.3866	132	1.4119	130	882
500	1.3532	130	1.3759	130	1.3998	129	1.4249	128	900
510	1.3662	128	1.3889	129	1.4127	129	1.4377	126	918
520	1.3790	126	1.4018	126	1.4256	126	1.4503	125	936
530	1.3916	125	1.4144	124	1.4382	124	1.4628	124	954
540	1.4041	123	1.4268	124	1.4506	122	1.4752	122	972
550	1.4164	121	1.4392	122	1.4628	122	1.4874	120	990
560	1.4285	121	1.4514	121	1.4750	120	1.4994	119	1008
570	1.4406	119	1.4635	119	1.4870	119	1.5113	117	1026
580	1.4525	118	1.4754	118	1.4989	118	1.5230	116	1044
590	1.4643	12	1.4872	12	1.5107	11	1.5346	11	1062
600	1.476	12	1.499	11	1.522	11	1.546	11	1080
610	1.488	11	1.510	11	1.533	12	1.557	12	1098
620	1.499	12	1.521	12	1.545	11	1.569	11	1116
630	1.511	11	1.533	11	1.556	11	1.580	11	1134
640	1.522	11	1.544	11	1.567	11	1.591	11	1152
650	1.533	11	1.555	11	1.578	11	1.602	11	1170
660	1.544	11	1.566	11	1.589	11	1.613	10	1188
670	1.555	11	1.577	11	1.600	11	1.623	11	1206
680	1.566	11	1.588	11	1.611	11	1.634	10	1224
690	1.577	10	1.599	10	1.622	10	1.644	11	1242
700	1.587		1.609		1.632		1.655		1260

Table 2-7. SOUND VELOCITY AT LOW FREQUENCY IN AIR - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
700	1.587	11	1.609	11	1.632	10	1.655	10	1260
710	1.598	10	1.620	10	1.642	10	1.665	10	1278
720	1.608	11	1.630	10	1.652	11	1.675	11	1296
730	1.619	10	1.640	10	1.663	10	1.686	10	1314
740	1.629	10	1.650	11	1.673	10	1.696	10	1332
750	1.639	10	1.661	10	1.683	10	1.706	10	1350
760	1.649	11	1.671	10	1.693	10	1.716	10	1368
770	1.660	10	1.681	10	1.703	10	1.726	9	1386
780	1.670	10	1.691	10	1.713	10	1.735	10	1404
790	1.680	10	1.701	10	1.723	10	1.745	9	1422
800	1.690	48	1.711	49	1.733	48	1.754	48	1440
850	1.738	47	1.760	47	1.781	46	1.802	45	1530
900	1.785	46	1.807	45	1.827	45	1.847	45	1620
950	1.831	44	1.852	44	1.872	44	1.892	44	1710
1000	1.875	43	1.896	43	1.916	42	1.936	42	1800
1050	1.918	43	1.939	41	1.958	42	1.978	42	1890
1100	1.961	41	1.980	41	2.000	41	2.020	40	1980
1150	2.002	40	2.021	40	2.041	39	2.060	40	2070
1200	2.042	40	2.061	39	2.080	39	2.100	39	2160
1250	2.082	38	2.100	39	2.119	38	2.139	38	2250
1300	2.120	38	2.139	37	2.157	39	2.177	37	2340
1350	2.158	37	2.176	37	2.196	35	2.214	36	2430
1400	2.195	36	2.213	36	2.231	36	2.250	36	2520
1450	2.231	36	2.249	35	2.267	36	2.286	35	2610
1500	2.267	34	2.284	35	2.303	34	2.321	34	2700
1550	2.301	34	2.319	33	2.337	33	2.355	34	2790
1600	2.335	34	2.352	33	2.370	33	2.389	33	2880
1650	2.369	33	2.385	33	2.303	33	2.422	33	2970
1700	2.402	33	2.418	34	2.436	33	2.455	32	3060
1750	2.435	32	2.452	34	2.469	33	2.487	31	3150
1800	2.467	31	2.486	33	2.502	32	2.518	31	3240
1850	2.498	31	2.519	32	2.534	31	2.549	31	3330
1900	2.529	31	2.551	31	2.565	30	2.580	30	3420
1950	2.560	30	2.582	30	2.595	30	2.610	29	3510
2000	2.590	29	2.612	30	2.625	29	2.639	28	3600
2050	2.619	29	2.642	29	2.654	31	2.667	30	3690
2100	2.648	28	2.671	28	2.685	28	2.697	28	3780
2150	2.676	28	2.699	27	2.713	28	2.725	28	3870
2200	2.704	27	2.726	28	2.741	28	2.753	28	3960
2250	2.731	26	2.754	27	2.769	27	2.781	27	4050
2300	2.757	26	2.781	26	2.796	27	2.808	27	4140
2350	2.783	25	2.807	26	2.823	26	2.835	26	4230
2400	2.808	25	2.833	26	2.849	27	2.861	26	4320
2450	2.833	25	2.859	26	2.876	25	2.887	26	4410
2500	2.858	25	2.885	26	2.901	26	2.913	25	4500
2550	2.883	24	2.911	25	2.927	25	2.938	25	4590
2600	2.907	24	2.936	25	2.952	25	2.963	25	4680
2650	2.931	24	2.961	26	2.977	26	2.988	25	4770
2700	2.955	24	2.987	24	3.003	24	3.013	25	4860
2750	2.979	23	3.011	24	3.027	25	3.038	24	4950
2800	3.002	23	3.035	24	3.052	23	3.062	24	5040
2850	3.025	22	3.059	22	3.075	23	3.086	23	5130
2900	3.047	23	3.081	23	3.098	22	3.109	22	5220
2950	3.070	22	3.104	21	3.120	22	3.131	21	5310
3000	3.092		3.125		3.142		3.152		5400

Table 2-8. VISCOSITY OF AIR AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R
100	.4038	410	180
110	.4448	400	198
120	.4848	391	216
130	.5239	382	234
140	.5621	373	252
150	.5994	365	270
160	.6359	357	288
170	.6716	349	306
180	.7065	342	324
190	.7407	335	342
200	.7742	328	360
210	.8070	321	378
220	.8391	315	396
230	.8706	309	414
240	.9015	304	432
250	.9319	298	450
260	.9617	292	468
270	.9909	29	486
280	1.020	28	504
290	1.048	28	522
300	1.076	27	540
310	1.103	27	558
320	1.130	27	576
330	1.157	26	594
340	1.183	26	612
350	1.209	25	630
360	1.234	25	648
370	1.259	24	666
380	1.283	25	684
390	1.308	24	702
400	1.332	24	720
410	1.356	23	738
420	1.379	23	756
430	1.402	23	774
440	1.425	23	792
450	1.448	22	810
460	1.470	21	828
470	1.491	22	846
480	1.513	21	864
490	1.534	22	882
500	1.556	21	900
510	1.577	21	918
520	1.598	21	936
530	1.619	21	954
540	1.640	20	972
550	1.660	20	990
560	1.680	20	1008
570	1.700	20	1026
580	1.720	19	1044
590	1.739	19	1062
600	1.758		1080

°K	η/η_0		°R
600	1.758	19	1080
610	1.777	19	1098
620	1.796	19	1116
630	1.815	19	1134
640	1.834	18	1152
650	1.852	18	1170
660	1.870	18	1188
670	1.888	18	1206
680	1.906	18	1224
690	1.924	18	1242
700	1.942	17	1260
710	1.959	18	1278
720	1.977	17	1296
730	1.994	18	1314
740	2.012	17	1332
750	2.029	17	1350
760	2.046	17	1368
770	2.063	17	1386
780	2.080	16	1404
790	2.096	16	1422
800	2.112	16	1440
810	2.128	17	1458
820	2.145	16	1476
830	2.161	16	1494
840	2.177	16	1512
850	2.193	16	1530
860	2.209	16	1548
870	2.225	15	1566
880	2.240	16	1584
890	2.256	15	1602
900	2.271	15	1620
910	2.286	15	1638
920	2.301	15	1656
930	2.316	15	1674
940	2.331	15	1692
950	2.346	16	1710
960	2.362	15	1728
970	2.377	14	1746
980	2.391	15	1764
990	2.406	14	1782
1000	2.420	15	1800
1010	2.435	15	1818
1020	2.450	14	1836
1030	2.464	14	1854
1040	2.478	14	1872
1050	2.492	14	1890
1060	2.506	14	1908
1070	2.520	14	1926
1080	2.534	14	1944
1090	2.548	14	1962
1100	2.562		1980

°K	η/η_0		°R
1100	2.562	14	1980
1110	2.576	13	1998
1120	2.589	13	2016
1130	2.602	14	2034
1140	2.616	13	2052
1150	2.629	13	2070
1160	2.642	14	2088
1170	2.656	13	2106
1180	2.669	14	2124
1190	2.683	13	2142
1200	2.696	13	2160
1210	2.709	13	2178
1220	2.722	13	2196
1230	2.735	12	2214
1240	2.747	13	2232
1250	2.760	13	2250
1260	2.773	13	2268
1270	2.786	13	2286
1280	2.799	13	2304
1290	2.812	12	2322
1300	2.824	13	2340
1310	2.837	12	2358
1320	2.849	13	2376
1330	2.862	12	2394
1340	2.874	12	2412
1350	2.886	12	2430
1360	2.898	13	2448
1370	2.911	12	2466
1380	2.923	12	2484
1390	2.935	12	2502
1400	2.947	13	2520
1410	2.960	12	2538
1420	2.972	12	2556
1430	2.984	11	2574
1440	2.995	12	2592
1450	3.007	12	2610
1460	3.019	12	2628
1470	3.031	11	2646
1480	3.042	12	2664
1490	3.054	12	2682
1500	3.066	114	2700
1600	3.180	110	2880
1700	3.290	107	3060
1800	3.397	104	3240
1900	3.501		3420

Table 2-9. THERMAL CONDUCTIVITY OF AIR AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
80	.3092	367	144
90	.3459	372	162
100	.3831	372	180
110	.4203	373	198
120	.4576	372	216
130	.4948	370	234
140	.5318	369	252
150	.5687	365	270
160	.6052	366	288
170	.6418	362	306
180	.6780	358	324
190	.7138	356	342
200	.7494	352	360
210	.7846	350	378
220	.8196	347	396
230	.8543	342	414
240	.8885	340	432
250	.9225	336	450
260	.9561	333	468
270	.9894	33	486
280	1.022	33	504
290	1.055	32	522
300	1.087	32	540
310	1.119	32	558
320	1.151	31	576
330	1.182	31	594
340	1.213	31	612
350	1.244	31	630
360	1.275	30	648
370	1.305	30	666
380	1.335	30	684
390	1.365	29	702
400	1.394	29	720
410	1.423	29	738
420	1.452	29	756
430	1.481	28	774
440	1.509	28	792
450	1.537	28	810
460	1.565	28	828
470	1.593	27	846
480	1.620	27	864
490	1.647	27	882
500	1.674	27	900
510	1.701	26	918
520	1.727	26	936
530	1.753	26	954
540	1.779	26	972
550	1.805	26	990
560	1.831	25	1008
570	1.856	25	1026
580	1.881	25	1044
590	1.906	25	1062
600	1.931		1080

°K	k/k_0		°R
600	1.931	25	1080
610	1.956	24	1098
620	1.980	24	1116
630	2.004	24	1134
640	2.028	24	1152
650	2.052	24	1170
660	2.076	24	1188
670	2.100	23	1206
680	2.123	23	1224
690	2.146	23	1242
700	2.169	23	1260
710	2.192	22	1278
720	2.214	23	1296
730	2.237	22	1314
740	2.259	23	1332
750	2.282	22	1350
760	2.304	22	1368
770	2.326	22	1386
780	2.348	22	1404
790	2.370	22	1422
800	2.392	21	1440
810	2.413	21	1458
820	2.434	22	1476
830	2.456	21	1494
840	2.477	21	1512
850	2.498	20	1530
860	2.518	21	1548
870	2.539	20	1566
880	2.559	21	1584
890	2.580	20	1602
900	2.600	20	1620
910	2.620	20	1638
920	2.640	21	1656
930	2.661	20	1674
940	2.681	20	1692
950	2.701	19	1710
960	2.720	20	1728
970	2.740	19	1746
980	2.759	20	1764
990	2.779	19	1782
1000	2.798		1800

Table 2-10. PRANDTL NUMBER OF AIR AT ATMOSPHERIC PRESSURE $\eta C_p/k$

°K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		°R
100	.770	-4	.841	-4	.916	-1	.877	-2	180
120	.766	-5	.837	-3	.915	-2	.875	-3	216
140	.761	-7	.834	-6	.913	-3	.872	-4	252
160	.754	-8	.828	-6	.910	-3	.868	-4	288
180	.746	-7	.822	-5	.907	-3	.864	-4	324
200	.739	-7	.817	-5	.904	-3	.860	-4	360
220	.732	-7	.812	-5	.901	-3	.856	-5	396
240	.725	-6	.807	-5	.898	-2	.851	-3	432
260	.719	-6	.802	-4	.896	-3	.848	-4	468
280	.713	-5	.798	-3	.893	-2	.844	-3	504
300	.708	-5	.795	-4	.891	-2	.841	-3	540
320	.703	-4	.791	-3	.889	-2	.838	-2	576
340	.699	-4	.788	-4	.887	-1	.836	-2	612
360	.695	-4	.784	-2	.886	-2	.834	-3	648
380	.691	-2	.782	-2	.884	-1	.831	-1	684
400	.689	-3	.780	-2	.883	-1	.830	-2	720
420	.686	-2	.778	-2	.882	-1	.828	-1	756
440	.684	-1	.776	-1	.881		.827	-1	792
460	.683	-2	.775	-1	.881	-1	.826	-1	828
480	.681	-1	.774		.880	-1	.825		864
500	.680		.774		.879		.825		900
520	.680		.774		.879		.825		936
540	.680		.774		.879		.825		972
560	.680		.774		.879		.825		1008
580	.680		.774		.879		.825		1044
600	.680	1	.774		.879	1	.825		1080
620	.681	1	.774	1	.880		.825	1	1116
640	.682		.775		.880		.826		1152
660	.682	1	.775		.880	1	.826		1188
680	.683	1	.775	1	.881		.826	1	1224
700	.684	1	.776	1	.881	1	.827	1	1260
720	.685	1	.777	1	.882		.828		1296
740	.686	1	.778	1	.882		.828	1	1332
760	.687	1	.779		.882	1	.829	1	1368
780	.688	1	.779	1	.883		.830		1404
800	.689	1	.780	1	.883	1	.830	1	1440
820	.690	2	.781	2	.884		.831	1	1476
840	.692	1	.783		.884	1	.832		1512
860	.693	2	.783	1	.885	1	.832	2	1548
880	.695	1	.784	1	.886		.834		1584
900	.696	1	.785	1	.886	1	.834	1	1620
920	.697	1	.786	1	.887		.835		1656
940	.698	2	.787	1	.887	1	.835	2	1692
960	.700	1	.788	1	.888		.837		1728
980	.701	1	.789	1	.888	1	.837	1	1764
1000	.702		.790		.889		.838		1800

Table 2-11. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR AIR

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		°R
10	3.5009	− 68	.1238	1280	12.0382	24240	18
20	3.4941	− 15	.2518	1278	14.4622	14126	36
30	3.4926	− 8	.3796	1279	15.8748	10084	54
40	3.4918	− 3	.5075	1278	16.8832	7801	72
50	3.4915	− 1	.6353	1278	17.6633	6357	90
60	3.4914		.7631	1278	18.2990	5377	108
70	3.4914	− 1	.8909	1279	18.8367	4667	126
80	3.4913		1.0188	1278	19.3034	4111	144
90	3.4913		1.1466	1278	19.7145	3679	162
100	3.4913	1	1.2744	1278	20.0824	3328	180
110	3.4914		1.4022	1278	20.4152	3038	198
120	3.4914		1.5300	1278	20.7190	2794	216
130	3.4914		1.6578	1278	20.9984	2588	234
140	3.4914	1	1.7856	1278	21.2572	2408	252
150	3.4915	1	1.9134	1279	21.4980	2254	270
160	3.4916		2.0413	1278	21.7234	2117	288
170	3.4916	1	2.1691	1278	21.9351	1995	306
180	3.4917	2	2.2969	1278	22.1346	1888	324
190	3.4919	3	2.4247	1279	22.3234	1792	342
200	3.4922	2	2.5526	1278	22.5026	1703	360
210	3.4924	3	2.6804	1279	22.6729	1625	378
220	3.4927	5	2.8083	1279	22.8354	1553	396
230	3.4932	5	2.9362	1279	22.9907	1487	414
240	3.4937	8	3.0641	1279	23.1394	1426	432
250	3.4945	8	3.1920	1279	23.2820	1371	450
260	3.4953	10	3.3199	1280	23.4191	1319	468
270	3.4963	12	3.4479	1280	23.5510	1272	486
280	3.4975	14	3.5759	1281	23.6782	1227	504
290	3.4989	16	3.7040	1281	23.8009	1187	522
300	3.5005	19	3.8321	1282	23.9196	1148	540
310	3.5024	20	3.9603	1282	24.0344	1112	558
320	3.5044	24	4.0885	1284	24.1456	1079	576
330	3.5068	25	4.2169	1284	24.2535	1047	594
340	3.5093	29	4.3453	1285	24.3582	1018	612
350	3.5122	31	4.4738	1286	24.4600	990	630
360	3.5153	33	4.6024	1288	24.5590	963	648
370	3.5186	38	4.7312	1289	24.6553	939	666
380	3.5224	39	4.8601	1290	24.7492	916	684
390	3.5263	42	4.9891	1291	24.8408	893	702
400	3.5305	44	5.1182	1294	24.9301	872	720
410	3.5349	48	5.2476	1295	25.0173	853	738
420	3.5397	50	5.3771	1296	25.1026	833	756
430	3.5447	52	5.5067	1299	25.1859	816	774
440	3.5499	56	5.6366	1301	25.2675	798	792
450	3.5555	58	5.7667	1302	25.3473	782	810
460	3.5613	60	5.8969	1305	25.4255	767	828
470	3.5673	62	6.0274	1307	25.5022	751	846
480	3.5735	64	6.1581	1310	25.5773	738	864
490	3.5799	66	6.2891	1311	25.6511	724	882
500	3.5865	68	6.4202	1315	25.7235	711	900
510	3.5933	70	6.5517	1316	25.7946	698	918
520	3.6003	72	6.6833	1320	25.8644	686	936
530	3.6075	74	6.8153	1322	25.9330	675	954
540	3.6149	75	6.9475	1324	26.0005	664	972
550	3.6224	76	7.0799	1328	26.0669	654	990
560	3.6300	77	7.2127	1330	26.1323	643	1008
570	3.6377	79	7.3457	1333	26.1966	633	1026
580	3.6456	79	7.4790	1336	26.2599	624	1044
590	3.6535	80	7.6126	1339	26.3223	615	1062
600	3.6615		7.7465		26.3838		1080

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 2-11. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR AIR - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		°R
600	3.6615	81	7.7465	1342	26.3838	606	1080
610	3.6696	82	7.8807	1345	26.4444	597	1098
620	3.6778	82	8.0152	1348	26.5041	589	1116
630	3.6860	83	8.1500	1351	26.5630	581	1134
640	3.6943	84	8.2851	1354	26.6211	574	1152
650	3.7027	84	8.4205	1357	26.6785	566	1170
660	3.7111	84	8.5562	1360	26.7351	559	1188
670	3.7195	84	8.6922	1363	26.7910	551	1206
680	3.7279	84	8.8285	1366	26.8461	545	1224
690	3.7363	84	8.9651	1370	26.9006	538	1242
700	3.7447	84	9.1021	1372	26.9544	532	1260
710	3.7531	83	9.2393	1375	27.0076	525	1278
720	3.7614	84	9.3768	1379	27.0601	520	1296
730	3.7698	84	9.5147	1381	27.1121	513	1314
740	3.7782	83	9.6528	1385	27.1634	508	1332
750	3.7865	82	9.7913	1388	27.2142	502	1350
760	3.7947	83	9.9301	1391	27.2644	497	1368
770	3.8030	82	10.0692	1393	27.3141	491	1386
780	3.8112	82	10.2085	1397	27.3632	486	1404
790	3.8194	81	10.3482	1400	27.4118	481	1422
800	3.8275	395	10.4882	7042	27.4599	2332	1440
850	3.8670	379	11.1924	7113	27.6931	2221	1530
900	3.9049	360	11.9037	7181	27.9152	2121	1620
950	3.9409	341	12.6218	7245	28.1273	2030	1710
1000	3.9750	320	13.3463	7306	28.3303	1947	1800
1050	4.0070	301	14.0769	7362	28.5250	1871	1890
1100	4.0371	282	14.8131	7416	28.7121	1801	1980
1150	4.0653	264	15.5547	7466	28.8922	1736	2070
1200	4.0917	249	16.3013	7512	29.0658	1675	2160
1250	4.1166	232	17.0525	7557	29.2333	1620	2250
1300	4.1398	217	17.8082	7597	29.3953	1566	2340
1350	4.1615	205	18.5679	7636	29.5519	1517	2430
1400	4.1820	192	19.3315	7673	29.7036	1471	2520
1450	4.2012	181	20.0988	7707	29.8507	1428	2610
1500	4.2193	171	20.8695	7739	29.9935	1386	2700
1550	4.2364	161	21.6434	7769	30.1321	1348	2790
1600	4.2525	153	22.4203	7798	30.2669	1310	2880
1650	4.2678	145	23.2001	7825	30.3979	1276	2970
1700	4.2823	139	23.9826	7852	30.5255	1244	3060
1750	4.2962	131	24.7678	7875	30.6499	1212	3150
1800	4.3093	125	25.5553	7900	30.7711	1182	3240
1850	4.3218	119	26.3453	7922	30.8893	1154	3330
1900	4.3337	115	27.1375	7943	31.0047	1128	3420
1950	4.3452	109	27.9318	7963	31.1175	1101	3510
2000	4.3561	105	28.7281	7983	31.2276	1077	3600
2050	4.3666	101	29.5264	8003	31.3353	1054	3690
2100	4.3767	97	30.3267	8020	31.4407	1031	3780
2150	4.3864	94	31.1287	8037	31.5438	1009	3870
2200	4.3958	90	31.9324	8055	31.6447	989	3960
2250	4.4048	87	32.7379	8070	31.7436	969	4050
2300	4.4135	84	33.5449	8087	31.8405	950	4140
2350	4.4219	82	34.3536	8101	31.9355	932	4230
2400	4.4301	79	35.1637	8117	32.0287	914	4320
2450	4.4380	76	35.9754	8130	32.1201	898	4410
2500	4.4456	74	36.7884	8144	32.2099	881	4500
2550	4.4530		37.6028		32.2980		4590

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 2-11. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR AIR - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		°R
2550	4.4530	72	37.6028	8158	32.2980	865	4590
2600	4.4602	70	38.4186	8171	32.3845	850	4680
2650	4.4672	68	39.2357	8183	32.4695	836	4770
2700	4.4740	67	40.0540	8195	32.5531	822	4860
2750	4.4807	64	40.8735	8208	32.6353	807	4950
2800	4.4871	62	41.6943	8219	32.7160	795	5040
2850	4.4933	61	42.5162	8230	32.7955	782	5130
2900	4.4994	59	43.3392	8241	32.8737	770	5220
2950	4.5053	56	44.1633	8251	32.9507	757	5310
3000	4.5109		44.9884		33.0264		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 2-12. COEFFICIENTS FOR THE EQUATION OF STATE FOR AIR

$$Z = \frac{PV}{RT} = 1 + \frac{B}{V} + \frac{C}{V^2} + \frac{D}{V^3}$$

T	B	C	D x10^{-4}	T	B	C	D x10^{-4}
°K	cm^3/mole	cm^6/mole^2	cm^9/mole^3	°K	cm^3/mole	cm^6/mole^2	cm^9/mole^3
50	-527.60			350	+ 0.575	+ 1239.1	+ 2.75
60	-374.38			360	1.882	1230.4	2.62
70	-284.27			370	3.108	1220.7	2.49
80	-225.30			380	4.260	1211.5	2.37
90	-183.83	-6825.8		390	5.344	1202.8	2.26
100	-153.15	-3253.5	+ 9.40	400	6.367	1194.2	2.16
110	-129.56	-1377.4	8.86	410	7.332	1185.8	2.07
120	-110.87	- 314.0	8.34	420	8.243	1177.6	1.98
130	- 95.73	+ 316.3	7.85	430	9.107	1169.7	1.89
140	- 83.20	602.5	7.40	440	9.924	1162.0	1.80
150	- 72.681	944.9	7.00	450	10.701	1154.4	1.72
160	- 63.729	1099.1	6.63	460	11.438	1147.0	1.65
170	- 56.020	1197.9	6.30	470	12.139	1139.8	1.58
180	- 49.316	1260.8	6.00	480	12.806	1132.8	1.52
190	- 43.436	1300.0	5.72	490	13.442	1126.0	1.46
200	- 38.241	1323.5	5.46	500	14.048	1119.2	1.40
210	- 33.617	1336.1	5.23	550	16.691	1088.2	1.30
220	- 29.479	1341.5	5.00	600	18.826	1060.3	0.89
230	- 25.754	1341.7	4.78	650	20.573	1034.9	0.62
240	- 22.386	1338.5	4.56	700	22.024	1011.7	0.52
250	- 19.327	1332.7	4.36	750	23.241	990.4	0.4
260	- 16.537	1325.3	4.17	800	24.271	970.99	0.3
270	- 13.982	1316.9	3.98	850	25.151	952.20	
280	- 11.637	1308.0	3.80	900	25.907	935.40	
290	- 9.475	1298.3	3.63	950	26.561	919.47	
300	- 7.480	1288.5	3.46	1000	27.129	904.30	
310	- 5.629	1278.4	3.31	1100	28.061	876.91	
320	- 3.911	1268.4	3.16	1200	28.765	851.64	
330	- 2.310	1258.6	3.02	1300	29.344	829.03	
340	- 0.820	1248.8	2.88	1400	29.788	808.33	
				1500	30.138	789.45	

CHAPTER 3

THE THERMODYNAMIC PROPERTIES OF ARGON

Since the discovery of argon by Lord Rayleigh in 1890, many thermodynamic and related properties of the gas have been investigated. The density, compressibility factor, Joule-Thomson coefficient, sound velocity, thermal conductivity, viscosity, and diffusion coefficient are known with accuracies comparable to those of the common gases such as air, nitrogen, and oxygen. Probably only helium has been investigated more extensively. Interest in argon arises from its relatively high abundance (approximately 1 percent in air), its chemical inertness, and its structural simplicity. Studies of the structurally simple substances such as argon and other noble gases aid in the development of theories of atomic and molecular structure.

In spite of the scientific interest in argon, no up-to-date correlation of the thermodynamic data has been available. Such tables as have been published are limited to the experimental range covered by the individual investigators. At present technological interests focus attention on the high-temperature, high-pressure region, for which consistent tables are lacking.

The Correlation of the Experimental Data

The first extensive measurements of the data of state for argon were made at Leiden about 1910 [1]. This work, which covers the low-temperature region (123° to 293°K) at pressures from 1 to 62 atmospheres, was later shown by Cragoe [2] to require a correction to make it consistent with more recent results. The data of Holborn and others [3, 38-40] cover the temperature range -200° to +400°C at pressures from 0 to 80 meters of mercury. Other PVT measurements are reported by Tanner and Masson [4] at temperatures between 25° and 175°C and at pressures from 30 to 125 atmospheres, by Oishi [5] at temperatures between 0° and 100°C at low pressures, and most recently by Michels, et al., [6] at temperatures between 0° and 150°C and at pressures to 2900 atmospheres. This last extensive work is the most accurate.

Other data considered in this correlation include the Joule-Thomson data from Roebuck and Osterberg [7] as corrected by Roebuck [34, page 61]; sound velocity data from Van Itterbeek and Van Paemel [8] and self-diffusion data from Winn [9]. Some experimental viscosities [10 - 16] were considered also in the course of the selection of the force constants for argon.

The compressibility factor was computed from the equation

$$Z = 1 + B_1P + C_1P^2 + D_1P^3 + E_1P^4 + F_1P^5.$$

The virial coefficients B_1 and C_1 were obtained by fitting the data of state to a theoretical model having a Lennard-Jones 6-12 intermolecular potential, for which virial coefficient functions had been calculated previously by Bird, Spotz, and Hirschfelder [17]. The intermolecular force constants, $\epsilon/k = 119.5°K$ and $b_o = 50.51\ cm^3mole^{-1}$, were evaluated by correlating the available data on several different properties: PVT, Joule-Thomson, sound velocity, self-diffusion, and viscosity. The higher virial coefficients, D_1, E_1, and F_1, were obtained by a least-squares treatment of the more reliable experimental PVT data. The values of the thermodynamic properties--namely, entropy, enthalpy, specific heat, specific-heat ratio, and sound velocity at low frequency--were computed by means of the usual thermodynamic relationships from the virial coefficients given in table 3-13 and their derivatives and from the values for the ideal gas given in table 3-12. The ideal gas properties were calculated using the electronic energy levels given by Moore [35].

This semi-empirical correlation permitted the calculation of a consistent set of thermodynamic properties at pressures from 1 to 100 atmospheres and temperatures from about 100° to 5000°K. Although far superior to a separate empirical fit for each kind of experimental data, such extrapolations are not without uncertainty.

As indicated above, the second and third virial coefficients were computed from the 6-12 Lennard-Jones intermolecular potential with force constants, b_o and ϵ/k, obtained from the pertinent experimental data. Since the most accurate and abundant experiments are those on the data of state, these were given the most weight. The details of the fitting of the data are to be found in a report by Beckett and Fano [18] from which figure 3a is taken. This plot of $b_o = 2/3 \pi N r_o^3$ versus temperature was used to fix the value of b_o at 50.51 $cm^3 mole^{-1}$ after the value of ϵ/k = 119.5°K was fixed. The plot permits the simultaneous consideration of such diverse properties as viscosity, sound velocity at low frequency, Joule-Thomson coefficient, self-diffusion, and PVT data. The value of 50.51 was obtained by averaging, with appropriate weights, the values of b_o obtained from the above-mentioned experimental data.

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, the density is expressed as ρ/ρ_0, the sound velocity at low frequency as a/a_0, the thermal conductivity as k/k_0, and the viscosity as η/η_0. The reference values ρ_0, a_0, and η_0 were computed on the basis of the Lennard-Jones intermolecular potential, whose force constants were evaluated in the manner outlined above. The value k_0 was determined from an equation based on an empirical fit of the experimental data. Values for these quantities are given in various units in table 3-b. The agreement of ρ_0 and k_0 with the experimental data is shown in figures 3b and 3f. It can be seen from figure 3e that the average departure of the experimental data at standard conditions from the adopted value of η_0 is about 1 percent. The value of 307.88 m/sec for a_0 is in agreement with the value 307.8 m/sec cited in the International Critical Tables [36] and is further corroborated by the very recent determination by Greenspan of the National Bureau of Standards [37] who reports a provisional value 307.86 m/sec.

The viscosity was computed on the basis of the Lennard-Jones 6-12 intermolecular potential with the same force constants as were used for the thermodynamic properties (see summary table 1-B). The thermal conductivities were computed from an empirical fit of the experimental data [19-22] using the equation given in summary table 1-C.

The tables of vapor pressure are based on an analysis of the data in references 23 - 30, which are arranged roughly in order of the weight given to the data taken from them. The accepted triple and boiling points are those of Frank , et al., [25] whose work makes it almost certain that

Born's results [30] are in error. At other temperatures Crommelin's work [23, 24] has been given the greatest weight. In the analysis of the data, his second rather than his first measurements on the solid were accepted. The table for the liquid was partially determined from the law of corresponding states, using oxygen as the reference substance. The critical point is that given by Crommelin.

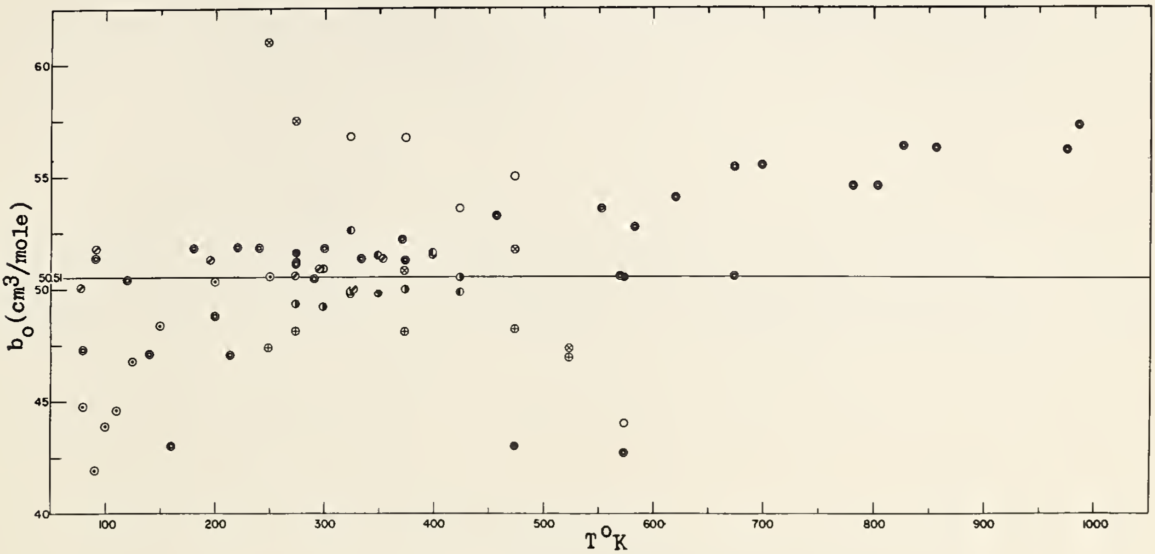

Figure 3a. $b_o = \frac{2}{3}\pi N r_o^3$ from various experimental data

From Joule-Thomson coefficient data μ_o ⊕

From Joule-Thomson coefficient data $\partial \mu / \partial p$ ⊗

From self-diffusion data ⊘

From sound-velocity data ⊙

From viscosity data ◎

From PVT data - Michels 6 power series: from B ◑ from C ◐

From PVT data - Holborn, et al.: from B ● from C ○

The Reliability of the Tables

Throughout the experimental range, the uncertainties of the tabulated values of the compressibility factor (table 3-1) are essentially the same as the uncertainties of the experimental values (see figure 3b). That is, above 200°K, they are no more than one part in one thousand and in most cases about two or three parts in ten thousand; below 200°K, the uncertainties are larger-- of the order of several parts in one thousand. The uncertainties in the table of density (table 3-2) correspond to those for the table of the compressibility factor, since the densities were computed directly from the compressibility factors.

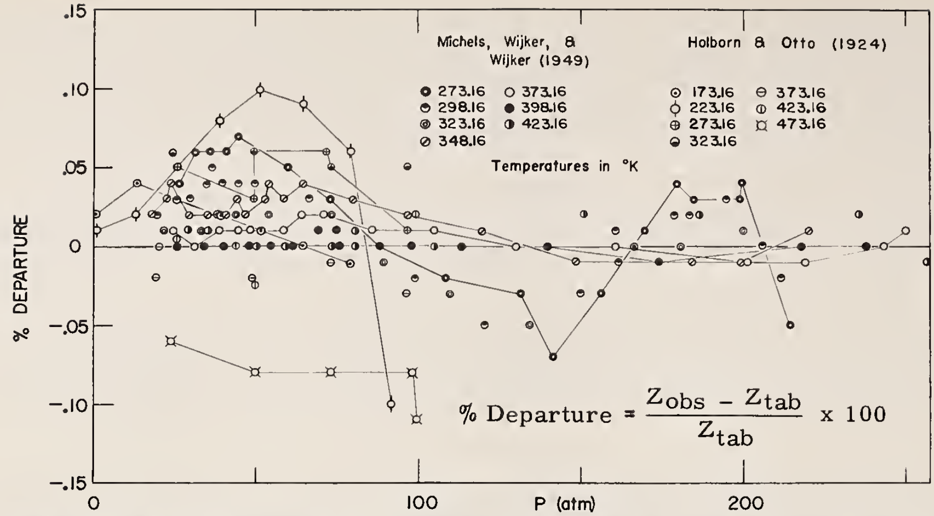

Figure 3b. Departures of experimental compressibility factors obtained from the virial equation used to calculate table 3-1

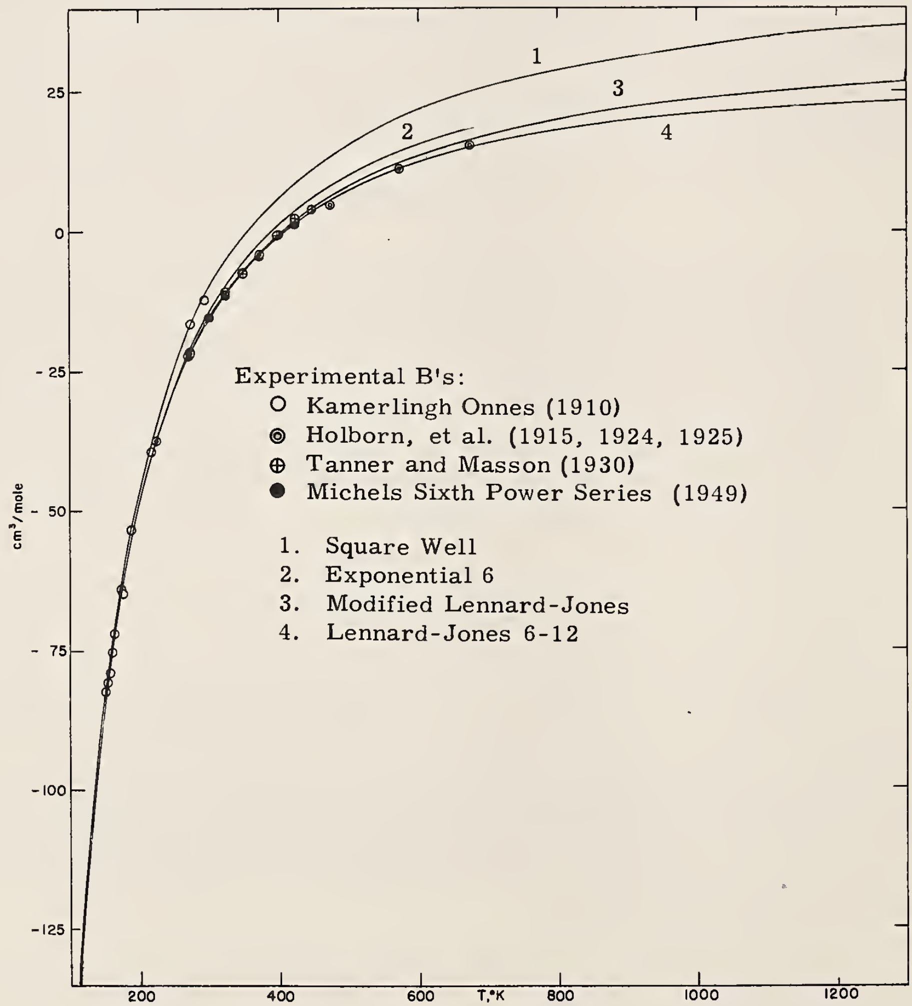

Figure 3c. Second virial coefficient, B, of argon

An indication of the probable uncertainty of the tabulated Z and ρ values at temperatures above the experimental range can be obtained from figure 3c, which shows a comparison of the second virial coefficients for various models with those derived from the experimental PVT data of various authors. The models considered were the exponential 6 function of Herzfeld [31], the modified Lennard-Jones potential (hard-sphere core) [32], and the square-well and Lennard-Jones 6-12 potentials as tabulated by Hirschfelder, et al., [17]. It will be seen that in the experimental region, the Lennard-Jones 6-12 potential is slightly favored by the experimental data. A fuller discussion of the fitting of the higher virials used here is to be found in the report of Beckett and Fano [18]. The uncertainties of the tabulated compressibility factors above the experimental temperature range are estimated to be 10 percent of (Z-1).

The ideal-gas thermodynamic properties for argon (table 3-12) are quite reliable, since the atomic weight and the fundamental constants are the only source of uncertainty. The uncertainty in the real-gas properties, is, therefore, due almost entirely to the uncertainty in the pressure correction, that is, to the uncertainty in the virial coefficients and their derivatives. At high temperatures and moderate pressures, where the gas imperfection is small, the thermodynamic properties should be reliable as tabulated. Outside this region, the pressure correction for entropy (table 3-5) and enthalpy (table 3-4) depends on the first derivative of the virial coefficients,

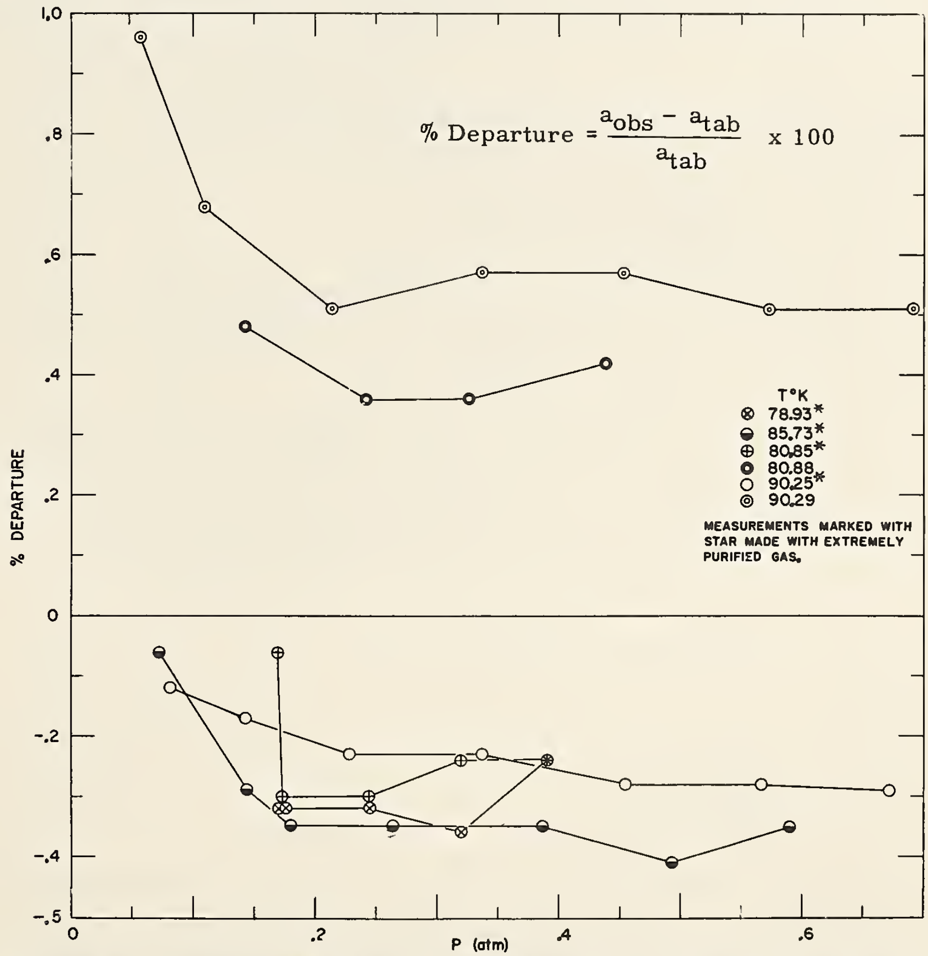

Figure 3d. Departures of experimental sound velocities from the tabulated values for argon (table 3-7)

and therefore, it is estimated that the uncertainty in the tables is in the worst cases of the order of 10 percent of the gas imperfection. For specific heat (table 3-3), the pressure correction depends on the second derivative of the virial coefficients, and therefore, the uncertainties for this property are correspondingly larger, namely, of the order of 10 percent of the pressure correction around the ice point and up to about 30 percent at 100°K. For the specific-heat ratio (table 3-6) and sound velocity at low frequency (table 3-7), the tabulated values are in good agreement with the experimental data [33 and 8] (see figure 3d). The tabulated values are thought to be accurate within a few units in the last tabulated figure above the ice point at moderate pressures. At lower temperatures and high pressures, the accuracy decreases somewhat, whereas it increases at high temperature where the gas approaches ideality.

A graphical comparison of the tabulated and experimental viscosities [10 - 16] is given in figure 3e. From this it would seem that the viscosity table is reliable to within 2 percent between 200° and 600°K and to within 3 percent at higher temperatures. Below 200°K, the uncertainties increase to 4 percent. The values of thermal conductivity are considered reliable to within 2 percent. Figure 3f shows the deviations of the tabulated values from the experimental data [19 - 22].

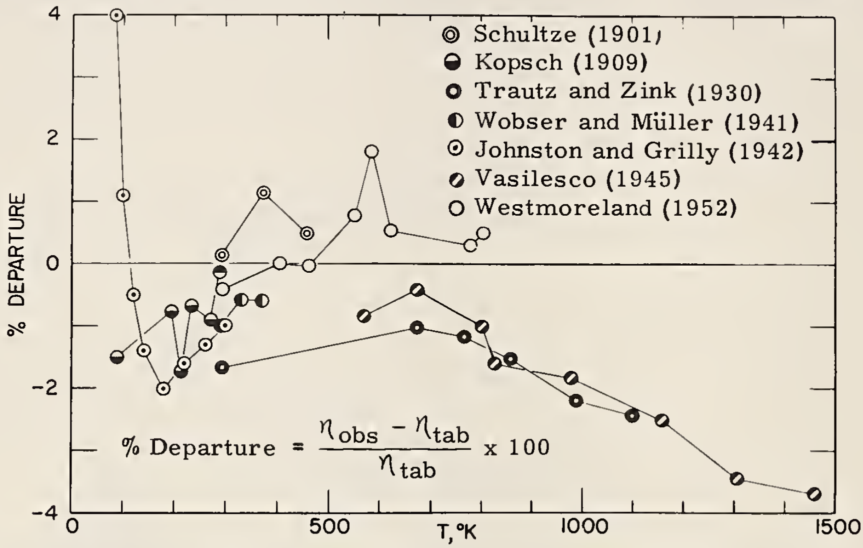

Figure 3e. Departures of experimental viscosities from the tabulated values for argon (table 3-8)

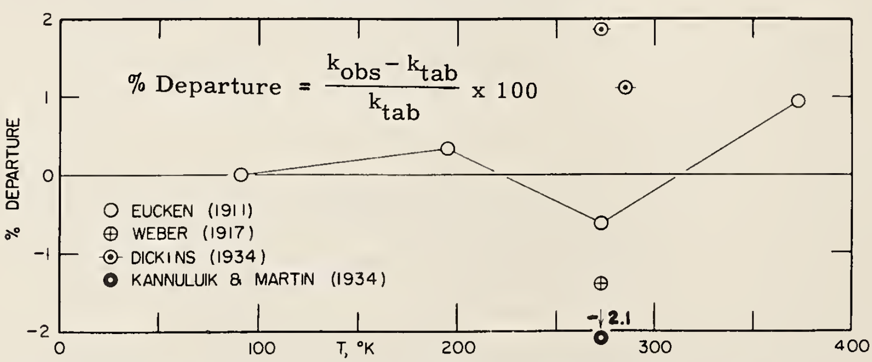

Figure 3f. Departures of experimental thermal conductivities from the tabulated values for argon (table 3-9)

For vapor pressure, the empirical equation which was used to compute the tables for the solid appears to yield results which are reliable to about ±0.1°K. This corresponds to ±0.5 mm Hg at 65°K and ±7 mm Hg at the triple point (83.78°K). Tabulated values for the liquid between the triple point and about 95°K appear to be reliable to about ±0.05°K, or roughly to ±5 mm Hg. At higher temperatures, the tables should not be considered reliable to better than ±0.2°K. This corresponds to ±40 mm Hg at 100°K, to ±120 mm Hg at 125°K, and to ±280 mm Hg at the critical point. The triple-point pressure, being independent of the temperature-scale error, is probably accurate to ±0.2 mm Hg. Figure 3g shows the deviation of the experimental data from the calculated values, except for a few experimental points outside the range of the graphs.

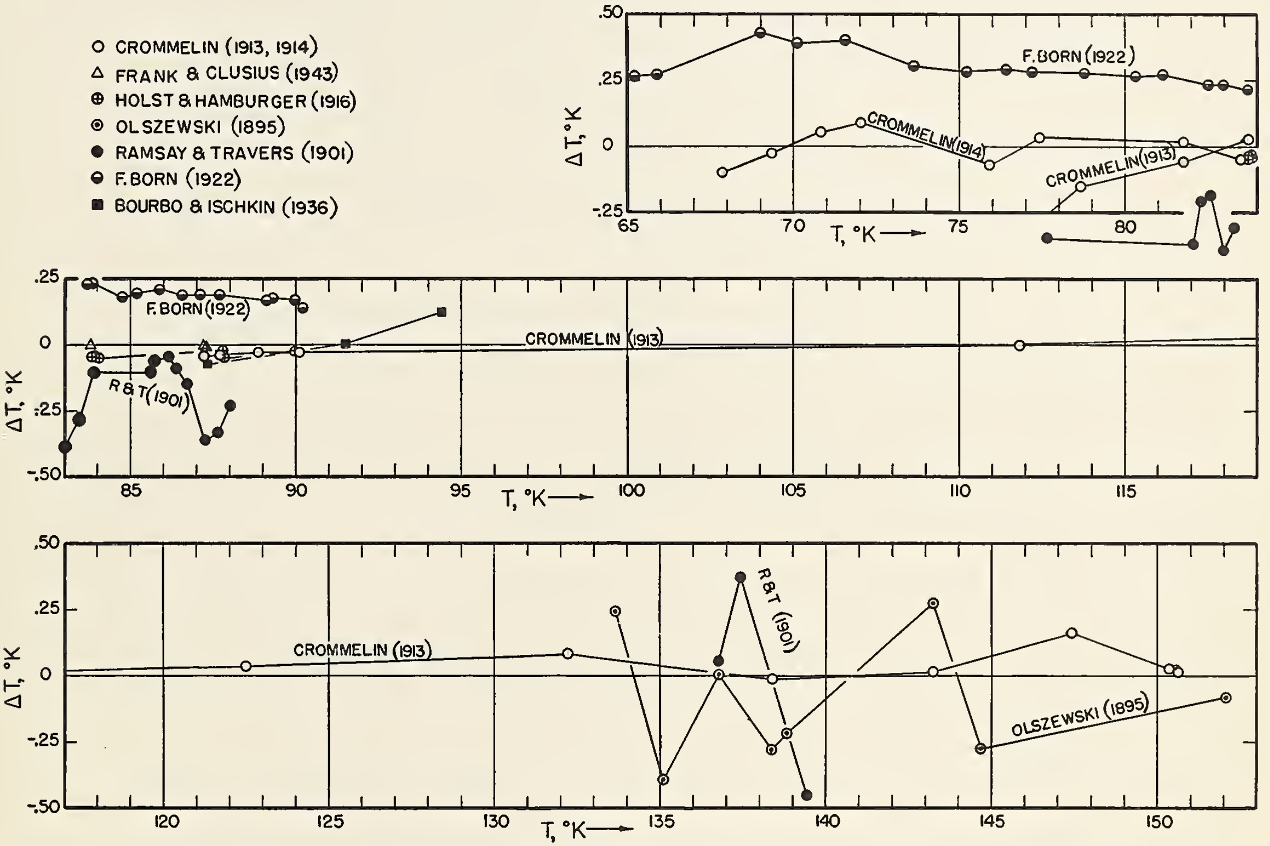

Figure 3g. Departures of the experimental vapor pressure from the tabulated values for argon (table 3-11)

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Table 3-a. VALUES OF THE GAS CONSTANT, R, FOR ARGON.

Values of R for Argon for Temperatures in Degrees Kelvin

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.05429	2.12255	1561.26	30.1899
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0329063	0.0339997	25.0088	0.483591
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Argon for Temperatures in Degrees Rankine

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.14127	1.17919	867.367	16.7722
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0182813	0.0188887	13.8938	0.268662
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 3-b. CONVERSION FACTORS FOR THE ARGON TABLES

Conversion Factors for Table 3-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	1.78377×10^{-3}
		mole cm^{-3}	4.46568×10^{-5}
		g $liter^{-1}$	1.78382
		lb in^{-3}	6.44432×10^{-5}
		lb ft^{-3}	0.111358

Conversion Factors for Tables 3-4 and 3-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	cal $mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	cal g^{-1}	13.5896
		joules g^{-1}	56.8589
		Btu (lb $mole)^{-1}$	976.437
		Btu lb^{-1}	24.4451

Conversion Factors for Tables 3-3, 3-5, and 3-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R	C_p, S	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.0497494
		joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.208152
		Btu (lb $mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.0497166

The molecular weight of argon is 39.944 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 3-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	307.88
		ft sec^{-1}	1010.10

Conversion Factors for Table 3-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	2.125×10^{-4}
		kg hr^{-1} m^{-1}	7.650×10^{-2}
		slug hr^{-1} ft^{-1}	1.598×10^{-3}
		lb sec^{-1} ft^{-1}	1.428×10^{-5}
		lb hr^{-1} ft^{-1}	5.140×10^{-2}

Conversion Factors for Table 3-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^{o}K^{-1}$	3.905×10^{-5}
		Btu ft^{-1} hr^{-1} $^{o}R^{-1}$	9.444×10^{-3}
		watts cm^{-1} $^{o}K^{-1}$	1.634×10^{-4}

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
70	.9994	2							126
80	.9996	1	.996	1					144
90	.9997	1	.9972	6	.9885	29			162
100	.99979	5	.99782	54	.99142	198	.98490	349	180
110	.99984	3	.99836	35	.99340	141	.98839	248	198
120	.99987	3	.99871	25	.99481	103	.99087	183	216
130	.99990	2	.99896	20	.99584	78	.99270	137	234
140	.99992	1	.99916	15	.99662	60	.99407	105	252
150	.99993	1	.99931	11	.99722	47	.99512	83	270
160	.99994	1	.99942	10	.99769	38	.99595	66	288
170	.99995	1	.99952	7	.99807	30	.99661	53	306
180	.99996	1	.99959	6	.99837	25	.99714	44	324
190	.99997		.99965	6	.99862	20	.99758	36	342
200	.99997	1	.99971	4	.99882	17	.99794	30	360
210	.99998		.99975	3	.99899	15	.99824	25	378
220	.99998		.99978	3	.99914	12	.99849	21	396
230	.99998		.99981	3	.99926	10	.99870	19	414
240	.99998	1	.99984	2	.99936	9	.99889	15	432
250	.99999		.99986	2	.99945	8	.99904	14	450
260	.99999		.99988	2	.99953	7	.99918	11	468
270	.99999		.99990	1	.99960	5	.99929	10	486
280	.99999		.99991	2	.99965	5	.99939	9	504
290	.99999		.99993	1	.99970	5	.99948	8	522
300	.99999	1	.99994	1	.99975	4	.99956	7	540
310	1.00000		.99995	1	.99979	3	.99963	6	558
320	1.00000		.99996		.99982	3	.99969	5	576
330	1.00000		.99996	1	.99985	3	.99974	5	594
340	1.00000		.99997	1	.99988	2	.99979	4	612
350	1.00000		.99998		.99990	2	.99983	4	630
360	1.00000		.99998	1	.99992	2	.99987	3	648
370	1.00000		.99999		.99994	2	.99990	3	666
380	1.00000		.99999		.99996	2	.99993	3	684
390	1.00000		.99999	1	.99998	1	.99996	2	702
400	1.00000		1.00000		.99999	1	.99998	2	720
410	1.00000		1.00000		1.00000	1	1.00000	2	738
420	1.00000		1.00000	1	1.00001	1	1.00002	2	756
430	1.00000		1.00001		1.00002	1	1.00004	2	774
440	1.00000		1.00001		1.00003	1	1.00006	1	792
450	1.00000		1.00001		1.00004	1	1.00007	1	810
460	1.00000		1.00001		1.00005		1.00008	2	828
470	1.00000		1.00001	1	1.00005	1	1.00010	1	846
480	1.00000		1.00002		1.00006	1	1.00011	1	864
490	1.00000		1.00002		1.00007		1.00012	1	882
500	1.00000		1.00002		1.00007	1	1.00013		900
510	1.00000		1.00002		1.00008		1.00013	1	918
520	1.00000		1.00002		1.00008		1.00014	1	936
530	1.00000		1.00002		1.00008	1	1.00015		954
540	1.00000		1.00002		1.00009		1.00015	1	972
550	1.00000		1.00002		1.00009		1.00016		990
560	1.00000		1.00002		1.00009	1	1.00016	1	1008
570	1.00000		1.00002		1.00010		1.00017		1026
580	1.00000		1.00002	1	1.00010		1.00017		1044
590	1.00000		1.00003		1.00010		1.00017	1	1062
600	1.00000		1.00003		1.00010		1.00018		1080
610	1.00000		1.00003		1.00010		1.00018		1098
620	1.00000		1.00003		1.00010	1	1.00018		1116
630	1.00000		1.00003		1.00011		1.00018	1	1134
640	1.00000		1.00003		1.00011		1.00019		1152
650	1.00000		1.00003		1.00011		1.00019		1170

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°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
650	1.00000	1.00003		1.00011		1.00019		1170
660	1.00000	1.00003		1.00011		1.00019		1188
670	1.00000	1.00003		1.00011		1.00019		1206
680	1.00000	1.00003		1.00011		1.00019		1224
690	1.00000	1.00003		1.00011		1.00019		1242
700	1.00000	1.00003		1.00011		1.00019		1260
710	1.00000	1.00003		1.00011		1.00019		1278
720	1.00000	1.00003		1.00011		1.00019	1	1296
730	1.00000	1.00003		1.00011		1.00020		1314
740	1.00000	1.00003		1.00011		1.00020		1332
750	1.00000	1.00003		1.00011		1.00020		1350
760	1.00000	1.00003		1.00011		1.00020		1368
770	1.00000	1.00003		1.00011		1.00020		1386
780	1.00000	1.00003		1.00011		1.00020		1404
790	1.00000	1.00003		1.00011		1.00020		1422
800	1.00000	1.00003		1.00011		1.00020	- 1	1440
850	1.00000	1.00003		1.00011		1.00019		1530
900	1.00000	1.00003		1.00011		1.00019		1620
950	1.00000	1.00003		1.00011	- 1	1.00019	- 1	1710
1000	1.00000	1.00003		1.00010		1.00018		1800
1050	1.00000	1.00003		1.00010		1.00018	- 1	1890
1100	1.00000	1.00003	- 1	1.00010		1.00017		1980
1150	1.00000	1.00002		1.00010		1.00017		2070
1200	1.00000	1.00002		1.00010	- 1	1.00017	- 1	2160
1250	1.00000	1.00002		1.00009		1.00016		2250
1300	1.00000	1.00002		1.00009		1.00016	- 1	2340
1350	1.00000	1.00002		1.00009		1.00015		2430
1400	1.00000	1.00002		1.00009	- 1	1.00015		2520
1450	1.00000	1.00002		1.00008		1.00015	- 1	2610
1500	1.00000	1.00002		1.00008		1.00014		2700
1550	1.00000	1.00002		1.00008		1.00014		2790
1600	1.00000	1.00002		1.00008		1.00014	- 1	2880
1650	1.00000	1.00002		1.00008	- 1	1.00013		2970
1700	1.00000	1.00002		1.00007		1.00013		3060
1750	1.00000	1.00002		1.00007		1.00013	- 1	3150
1800	1.00000	1.00002		1.00007		1.00012		3240
1850	1.00000	1.00002		1.00007		1.00012		3330
1900	1.00000	1.00002		1.00007		1.00012	- 1	3420
1950	1.00000	1.00002		1.00007	- 1	1.00011		3510
2000	1.00000	1.00002		1.00006		1.00011		3600
2050	1.00000	1.00002		1.00006		1.00011		3690
2100	1.00000	1.00002		1.00006		1.00011	- 1	3780
2150	1.00000	1.00002		1.00006		1.00010		3870
2200	1.00000	1.00002	- 1	1.00006		1.00010		3960
2250	1.00000	1.00001		1.00006		1.00010		4050
2300	1.00000	1.00001		1.00006		1.00010		4140
2350	1.00000	1.00001		1.00006	- 1	1.00010		4230
2400	1.00000	1.00001		1.00005		1.00010	- 1	4320
2450	1.00000	1.00001		1.00005		1.00009		4410
2500	1.00000	1.00001		1.00005		1.00009		4500
2550	1.00000	1.00001		1.00005		1.00009		4590
2600	1.00000	1.00001		1.00005		1.00009	- 1	4680
2650	1.00000	1.00001		1.00005		1.00009		4770
2700	1.00000	1.00001		1.00005		1.00008		4860
2750	1.00000	1.00001		1.00005		1.00008		4950
2800	1.00000	1.00001		1.00005		1.00008		5040
2850	1.00000	1.00001		1.00005		1.00008		5130
2900	1.00000	1.00001		1.00005	- 1	1.00008		5220
2950	1.00000	1.00001		1.00004		1.00008		5310
3000	1.00000	1.00001		1.00004		1.00008	- 1	5400
3100	1.00000	1.00001		1.00004		1.00007		5580

°K	.01 atm	.1 atm	.4 atm		.7 atm		°R
3100	1.00000	1.00001	1.00004		1.00007		5580
3200	1.00000	1.00001	1.00004		1.00007		5760
3300	1.00000	1.00001	1.00004		1.00007		5940
3400	1.00000	1.00001	1.00004		1.00007		6120
3500	1.00000	1.00001	1.00004		1.00007	- 1	6300
3600	1.00000	1.00001	1.00004		1.00006		6480
3700	1.00000	1.00001	1.00004	- 1	1.00006		6660
3800	1.00000	1.00001	1.00003		1.00006		6840
3900	1.00000	1.00001	1.00003		1.00006		7020
4000	1.00000	1.00001	1.00003		1.00006		7200
4100	1.00000	1.00001	1.00003		1.00006	- 1	7380
4200	1.00000	1.00001	1.00003		1.00005		7560
4300	1.00000	1.00001	1.00003		1.00005		7740
4400	1.00000	1.00001	1.00003		1.00005		7920
4500	1.00000	1.00001	1.00003		1.00005		8100
4600	1.00000	1.00001	1.00003		1.00005		8280
4700	1.00000	1.00001	1.00003		1.00005		8460
4800	1.00000	1.00001	1.00003		1.00005		8640
4900	1.00000	1.00001	1.00003		1.00005	- 1	8820
5000	1.00000	1.00001	1.00003		1.00004		9000

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.9782	53	.9079	223					180
110	.9835	34	.9302	156	.872	30			198
120	.9869	26	.9458	113	.902	21	.855	33	216
130	.9895	20	.9571	82	.923	15	.888	22	234
140	.9915	15	.9653	63	.938	12	.910	17	252
150	.9930	12	.9716	49	.950	8	.927	13	270
160	.9942	9	.9765	39	.9584	70	.940	10	288
170	.9951	8	.9804	31	.9654	56	.950	8	306
180	.99592	62	.98354	255	.97099	453	.9582	66	324
190	.99654	52	.98609	209	.97552	371	.9648	54	342
200	.99706	42	.98818	173	.97923	307	.97023	443	360
210	.99748	36	.98991	145	.98230	257	.97466	371	378
220	.99784	31	.99136	123	.98487	217	.97837	313	396
230	.99815	26	.99259	105	.98704	184	.98150	264	414
240	.99841	22	.99364	89	.98888	157	.98414	225	432
250	.99863	19	.99453	77	.99045	135	.98639	193	450
260	.99882	17	.99530	67	.99180	117	.98832	168	468
270	.99899	14	.99597	58	.99297	102	.99000	145	486
280	.99913	13	.99655	50	.99399	88	.99145	126	504
290	.99926	11	.99705	45	.99487	78	.99271	111	522
300	.99937	10	.99750	38	.99565	67	.99382	97	540
310	.99947	8	.99788	35	.99632	60	.99479	85	558
320	.99955	8	.99823	30	.99692	53	.99564	76	576
330	.99963	7	.99853	27	.99745	48	.99640	67	594
340	.99970	6	.99880	24	.99793	41	.99707	59	612
350	.99976	5	.99904	22	.99834	38	.99766	54	630
360	.99981	5	.99926	19	.99872	33	.99820	47	648
370	.99986	5	.99945	17	.99905	30	.99867	43	666
380	.99991	3	.99962	15	.99935	26	.99910	38	684
390	.99994	4	.99977	14	.99961	25	.99948	34	702
400	.99998	3	.99991	12	.99986	21	.99982	31	720
410	1.00001	2	1.00003	11	1.00007	20	1.00013	27	738
420	1.00003	3	1.00014	10	1.00027	17	1.00040	25	756
430	1.00006	2	1.00024	9	1.00044	16	1.00065	22	774
440	1.00008	2	1.00033	8	1.00060	14	1.00087	20	792
450	1.00010	2	1.00041	8	1.00074	13	1.00107	19	810
460	1.00012	2	1.00049	6	1.00087	11	1.00126	15	828
470	1.00014	1	1.00055	7	1.00098	11	1.00141	16	846
480	1.00015	2	1.00062	5	1.00109	9	1.00157	13	864
490	1.00017	1	1.00067	5	1.00118	9	1.00170	13	882
500	1.00018	1	1.00072	4	1.00127	7	1.00183	10	900
510	1.00019	1	1.00076	4	1.00134	7	1.00193	10	918
520	1.00020	1	1.00080	4	1.00141	7	1.00203	9	936
530	1.00021		1.00084	3	1.00148	6	1.00212	9	954
540	1.00021	1	1.00087	3	1.00154	5	1.00221	7	972
550	1.00022	1	1.00090	3	1.00159	4	1.00228	6	990
560	1.00023	1	1.00093	2	1.00163	4	1.00234	6	1008
570	1.00024		1.00095	2	1.00167	4	1.00240	5	1026
580	1.00024	1	1.00097	2	1.00171	3	1.00245	5	1044
590	1.00025		1.00099	2	1.00174	4	1.00250	5	1062
600	1.00025	1	1.00101	2	1.00178	2	1.00255	4	1080
610	1.00026		1.00103	1	1.00180	2	1.00259	2	1098
620	1.00026		1.00104	1	1.00182	3	1.00261	3	1116
630	1.00026	1	1.00105	1	1.00185	2	1.00264	3	1134
640	1.00027		1.00106	2	1.00187	2	1.00267	3	1152
650	1.00027		1.00108		1.00189	1	1.00270	2	1170
660	1.00027		1.00108	1	1.00190	1	1.00272	2	1188
670	1.00027		1.00109		1.00191	1	1.00274	1	1206
680	1.00027		1.00109	1	1.00192	1	1.00275	1	1224
690	1.00027		1.00110	1	1.00193	1	1.00276	2	1242
700	1.00027		1.00111		1.00194		1.00278		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	1.00027		1.00111		1.00194	1	1.00278	1	1260
710	1.00027	1	1.00111		1.00195		1.00279		1278
720	1.00028		1.00111		1.00195		1.00279		1296
730	1.00028		1.00111		1.00195		1.00279		1314
740	1.00028		1.00111	1	1.00195	1	1.00279	1	1332
750	1.00028		1.00112		1.00196		1.00280		1350
760	1.00028		1.00112		1.00196		1.00280		1368
770	1.00028		1.00112		1.00196		1.00280		1386
780	1.00028		1.00112		1.00196		1.00280		1404
790	1.00028		1.00112	-1	1.00196	-1	1.00280	-1	1422
800	1.00028		1.00111		1.00195	-1	1.00279	-2	1440
850	1.00028	-1	1.00111	-2	1.00194	-3	1.00277	-4	1530
900	1.00027		1.00109	-2	1.00191	-4	1.00273	-5	1620
950	1.00027	-1	1.00107	-3	1.00187	-4	1.00268	-7	1710
1000	1.00026		1.00104	-2	1.00183	-4	1.00261	-6	1800
1050	1.00026	-1	1.00102	-2	1.00179	-5	1.00255	-6	1890
1100	1.00025	-1	1.00100	-3	1.00174	-4	1.00249	-6	1980
1150	1.00024		1.00097	-2	1.00170	-4	1.00243	-6	2070
1200	1.00024	-1	1.00095	-3	1.00166	-5	1.00237	-7	2160
1250	1.00023		1.00092	-2	1.00161	-3	1.00230	-5	2250
1300	1.00023	-1	1.00090	-2	1.00158	-5	1.00225	-6	2340
1350	1.00022	-1	1.00088	-3	1.00153	-4	1.00219	-6	2430
1400	1.00021		1.00085	-2	1.00149	-3	1.00213	-5	2520
1450	1.00021	-1	1.00083	-2	1.00146	-4	1.00208	-5	2610
1500	1.00020		1.00081	-2	1.00142	-4	1.00203	-6	2700
1550	1.00020	-1	1.00079	-2	1.00138	-3	1.00197	-4	2790
1600	1.00019		1.00077	-2	1.00135	-3	1.00193	-5	2880
1650	1.00019	-1	1.00075	-2	1.00132	-4	1.00188	-5	2970
1700	1.00018		1.00073	-1	1.00128	-3	1.00183	-4	3060
1750	1.00018		1.00072	-2	1.00125	-2	1.00179	-4	3150
1800	1.00018	-1	1.00070	-2	1.00123	-3	1.00175	-4	3240
1850	1.00017		1.00068	-1	1.00120	-3	1.00171	-4	3330
1900	1.00017	-1	1.00067	-2	1.00117	-3	1.00167	-4	3420
1950	1.00016		1.00065	-1	1.00114	-3	1.00163	-4	3510
2000	1.00016		1.00064	-2	1.00111	-2	1.00159	-3	3600
2050	1.00016	-1	1.00062	-1	1.00109	-2	1.00156	-3	3690
2100	1.00015		1.00061	-1	1.00107	-3	1.00153	-4	3780
2150	1.00015		1.00060	-2	1.00104	-2	1.00149	-3	3870
2200	1.00015	-1	1.00058	-1	1.00102	-2	1.00146	-3	3960
2250	1.00014		1.00057	-1	1.00100	-2	1.00143	-3	4050
2300	1.00014		1.00056	-1	1.00098	-2	1.00140	-3	4140
2350	1.00014		1.00055	-1	1.00096	-1	1.00137	-2	4230
2400	1.00014	-1	1.00054	-1	1.00095	-3	1.00135	-3	4320
2450	1.00013		1.00053	-1	1.00092	-1	1.00132	-2	4410
2500	1.00013		1.00052	-1	1.00091	-2	1.00130	-5	4500
2550	1.00013		1.00051	-1	1.00089	-1	1.00127	-2	4590
2600	1.00013	-1	1.00050	-1	1.00088	-2	1.00125	-2	4680
2650	1.00012		1.00049	-1	1.00086	-2	1.00123	-3	4770
2700	1.00012		1.00048	-1	1.00084	-1	1.00120	-2	4860
2750	1.00012		1.00047	-1	1.00083	-2	1.00118	-2	4950
2800	1.00012	-1	1.00046		1.00081	-1	1.00116	-2	5040
2850	1.00011		1.00046	-1	1.00080	-2	1.00114	-2	5130
2900	1.00011		1.00045	-1	1.00078	-1	1.00112	-2	5220
2950	1.00011		1.00044	-1	1.00077	-1	1.00110	-2	5310
3000	1.00011		1.00043	-1	1.00076	-2	1.00108	-3	5400
3100	1.00011		1.00042	-1	1.00074	-2	1.00105	-3	5580
3200	1.00011	-1	1.00041	-2	1.00072	-3	1.00102	-4	5760
3300	1.00010		1.00039	-1	1.00069	-2	1.00098	-2	5940
3400	1.00010	-1	1.00038	-1	1.00067	-2	1.00096	-3	6120
3500	1.00009		1.00037	-1	1.00065	-2	1.00093	-3	6300
3600	1.00009		1.00036		1.00063		1.00090		6480

°K	1 atm		4 atm		7 atm		10 atm		°R
3600	1.00009		1.00036	– 1	1.00063	– 1	1.00090	– 2	6480
3700	1.00009		1.00035	– 1	1.00062	– 2	1.00088	– 3	6660
3800	1.00009	– 1	1.00034	– 1	1.00060	– 2	1.00085	– 2	6840
3900	1.00008		1.00033	– 1	1.00058	– 1	1.00083	– 2	7020
4000	1.00008		1.00032		1.00057	– 2	1.00081	– 2	7200
4100	1.00008		1.00032	– 1	1.00055	– 1	1.00079	– 2	7380
4200	1.00008		1.00031	– 1	1.00054	– 1	1.00077	– 2	7560
4300	1.00008	– 1	1.00030	– 1	1.00053	– 2	1.00075	– 2	7740
4400	1.00007		1.00029	– 1	1.00051	– 1	1.00073	– 2	7920
4500	1.00007		1.00028		1.00050	– 1	1.00071	– 1	8100
4600	1.00007		1.00028	– 1	1.00049	– 1	1.00070	– 2	8280
4700	1.00007		1.00027	– 1	1.00048	– 2	1.00068	– 2	8460
4800	1.00007		1.00026		1.00046	–	1.00066	– 1	8640
4900	1.00007	– 1	1.00026	– 1	1.00046	– 2	1.00065	– 2	8820
5000	1.00006		1.00025		1.00044		1.00063		9000

°K	10 atm		40 atm		70 atm		100 atm		°R
180	.9582	66	.8189	338	.6542	786	.4589	1484	324
190	.9648	54	.8527	251	.7328	510	.6073	844	342
200	.9702	45	.8778	200	.7838	392	.6917	627	360
210	.9747	37	.8978	163	.8230	313	.7544	486	378
220	.9784	31	.9141	134	.8543	245	.8030	363	396
230	.9815	26	.9275	109	.8788	194	.8393	270	414
240	.9841	23	.9384	92	.8982	159	.8663	215	432
250	.9864	19	.9476	78	.9141	133	.8878	177	450
260	.9883	17	.9554	68	.9274	114	.9055	153	468
270	.9900	15	.9622	57	.9388	98	.9208	132	486
280	.9915	12	.9679	50	.9486	84	.9340	114	504
290	.9927	11	.9729	44	.9570	73	.9454	99	522
300	.9938	10	.9773	37	.9643	63	.9553	84	540
310	.9948	8	.9810	33	.9706	55	.9637	73	558
320	.9956	8	.9843	30	.9761	48	.9710	64	576
330	.9964	7	.9873	25	.9809	41	.9774	56	594
340	.9971	6	.9898	23	.9850	38	.9830	49	612
350	.9977	5	.9921	20	.9888	33	.9879	45	630
360	.9982	5	.9941	18	.9921	30	.9924	39	648
370	.9987	4	.9959	17	.9951	27	.9963	36	666
380	.9991	4	.9976	14	.9978	23	.9999	30	684
390	.9995	3	.9990	12	1.0001	21	1.0029	28	702
400	.9998	3	1.0002	12	1.0022	19	1.0057	24	720
410	1.0001	3	1.0014	11	1.0041	17	1.0081	24	738
420	1.0004	3	1.0025	9	1.0058	16	1.0105	21	756
430	1.0007	2	1.0034	9	1.0074	14	1.0126	19	774
440	1.0009	2	1.0043	7	1.0088	13	1.0145	17	792
450	1.0011	2	1.0050	7	1.0101	11	1.0162	15	810
460	1.0013	1	1.0057	6	1.0112	10	1.0177	13	828
470	1.0014	2	1.0063	6	1.0122	9	1.0190	13	846
480	1.0016	1	1.0069	5	1.0131	9	1.0203	11	864
490	1.0017	1	1.0074	5	1.0140	7	1.0214	10	882
500	1.0018	1	1.0079	4	1.0147	6	1.0224	8	900
510	1.0019	1	1.0083	3	1.0153	6	1.0232	8	918
520	1.0020	1	1.0086	3	1.0159	6	1.0240	7	936
530	1.0021	1	1.0089	3	1.0165	5	1.0247	7	954
540	1.0022	1	1.0092	3	1.0170	4	1.0254	5	972
550	1.0023		1.0095	3	1.0174	4	1.0259	5	990
560	1.0023	1	1.0098	2	1.0178	3	1.0264	4	1008
570	1.0024	1	1.0100	2	1.0181	3	1.0268	4	1026
580	1.0025		1.0102	1	1.0184	3	1.0272	3	1044
590	1.0025	1	1.0103	2	1.0187	3	1.0275	4	1062
600	1.0026		1.0105	1	1.0190	1	1.0279	2	1080
610	1.0026		1.0106	1	1.0191	2	1.0281	2	1098
620	1.0026		1.0107	1	1.0193	2	1.0283	2	1116
630	1.0026	1	1.0108	2	1.0195	1	1.0285	2	1134
640	1.0027		1.0110	1	1.0196	2	1.0287	2	1152
650	1.0027		1.0111		1.0198	1	1.0289	1	1170
660	1.0027		1.0111	1	1.0199	1	1.0290	1	1188
670	1.0027	1	1.0112		1.0200		1.0291		1206
680	1.0028		1.0112		1.0200		1.0291		1224
690	1.0028		1.0112	1	1.0200	1	1.0291	1	1242
700	1.0028		1.0113		1.0201	1	1.0292	1	1260
710	1.0028		1.0113		1.0202	- 1	1.0293	- 1	1278
720	1.0028		1.0113		1.0201		1.0292		1296
730	1.0028		1.0113		1.0201		1.0292	- 1	1314
740	1.0028		1.0113	1	1.0201	1	1.0291	1	1332
750	1.0028		1.0114		1.0202		1.0292		1350

°K	10 atm		40 atm		70 atm		100 atm		°R
750	1.0028		1.0114		1.0202	- 1	1.0292	- 1	1350
760	1.0028		1.0114		1.0201		1.0291		1368
770	1.0028		1.0114	- 1	1.0201		1.0291	- 1	1386
780	1.0028		1.0113		1.0201		1.0290		1404
790	1.0028		1.0113		1.0201	- 2	1.0290	- 2	1422
800	1.0028		1.0113	- 1	1.0199	- 2	1.0288	- 4	1440
850	1.0028	- 1	1.0112	- 2	1.0197	- 3	1.0284	- 5	1530
900	1.0027		1.0110	- 2	1.0194	- 5	1.0279	- 7	1620
950	1.0027	- 1	1.0108	- 3	1.0189	- 4	1.0272	- 7	1710
1000	1.0026		1.0105	- 2	1.0185	- 5	1.0265	- 6	1800
1050	1.0026	- 1	1.0103	- 3	1.0180	- 4	1.0259	- 7	1890
1100	1.0025	- 1	1.0100	- 2	1.0176	- 5	1.0252	- 7	1980
1150	1.0024		1.0098	- 3	1.0171	- 4	1.0245	- 6	2070
1200	1.0024	- 1	1.0095	- 3	1.0167	- 5	1.0239	- 7	2160
1250	1.0023		1.0092	- 2	1.0162	- 4	1.0232	- 6	2250
1300	1.0023	- 1	1.0090	- 2	1.0158	- 4	1.0226	- 6	2340
1350	1.0022	- 1	1.0088	- 3	1.0154	- 5	1.0220	- 7	2430
1400	1.0021		1.0085	- 2	1.0149	- 3	1.0213	- 5	2520
1450	1.0021	- 1	1.0083	- 2	1.0146	- 4	1.0208	- 5	2610
1500	1.0020		1.0081	- 2	1.0142	- 4	1.0203	- 6	2700
1550	1.0020	- 1	1.0079	- 2	1.0138	- 3	1.0197	- 4	2790
1600	1.0019		1.0077	- 2	1.0135	- 3	1.0193	- 5	2880
1650	1.0019	- 1	1.0075	- 2	1.0132	- 4	1.0188	- 5	2970
1700	1.0018		1.0073	- 1	1.0128	- 3	1.0183	- 4	3060
1750	1.0018		1.0072	- 2	1.0125	- 2	1.0179	- 4	3150
1800	1.0018	- 1	1.0070	- 2	1.0123	- 3	1.0175	- 4	3240
1850	1.0017		1.0068	- 1	1.0120	- 3	1.0171	- 4	3330
1900	1.0017	- 1	1.0067	- 2	1.0117	- 3	1.0167	- 4	3420
1950	1.0016		1.0065	- 1	1.0114	- 3	1.0163	- 4	3510
2000	1.0016		1.0064	- 2	1.0111	- 2	1.0159	- 3	3600
2050	1.0016	- 1	1.0062	- 1	1.0109	- 2	1.0156	- 3	3690
2100	1.0015		1.0061	- 1	1.0107	- 3	1.0153	- 4	3780
2150	1.0015		1.0060	- 2	1.0104	- 2	1.0149	- 3	3870
2200	1.0015	- 1	1.0058	- 1	1.0102	- 2	1.0146	- 3	3960
2250	1.0014		1.0057	- 1	1.0100	- 2	1.0143	- 3	4050
2300	1.0014		1.0056	- 1	1.0098	- 2	1.0140	- 3	4140
2350	1.0014		1.0055	- 1	1.0096	- 1	1.0137	- 2	4230
2400	1.0014	- 1	1.0054	- 1	1.0095	- 3	1.0135	- 3	4320
2450	1.0013		1.0053	- 1	1.0092	- 1	1.0132	- 2	4410
2500	1.0013		1.0052	- 1	1.0091	- 2	1.0130	- 3	4500
2550	1.0013		1.0051	- 1	1.0089	- 1	1.0127	- 2	4590
2600	1.0013	- 1	1.0050	- 1	1.0088	- 2	1.0125	- 2	4680
2650	1.0012		1.0049	- 1	1.0086	- 2	1.0123	- 3	4770
2700	1.0012		1.0048	- 1	1.0084	- 1	1.0120	- 2	4860
2750	1.0012		1.0047	- 1	1.0083	- 2	1.0118	- 2	4950
2800	1.0012	- 1	1.0046		1.0081	- 1	1.0116	- 2	5040
2850	1.0011		1.0046	- 1	1.0080	- 2	1.0114	- 2	5130
2900	1.0011		1.0045	- 1	1.0078	- 1	1.0112	- 2	5220
2950	1.0011		1.0044	- 1	1.0077	- 1	1.0110	- 2	5310
3000	1.0011		1.0043	- 1	1.0076	- 2	1.0108	- 3	5400
3100	1.0011	- 1	1.0042	- 1	1.0074	- 2	1.0105	- 3	5580
3200	1.0010		1.0041	- 2	1.0072	- 3	1.0102	- 4	5760
3300	1.0010		1.0039	- 1	1.0069	- 2	1.0098	- 2	5940
3400	1.0010	- 1	1.0038	- 1	1.0067	- 2	1.0096	- 3	6120
3500	1.0009		1.0037	- 1	1.0065	- 2	1.0093	- 3	6300
3600	1.0009		1.0036	- 1	1.0063	- 1	1.0090	- 2	6480
3700	1.0009		1.0035	- 1	1.0062	- 2	1.0088	- 3	6660
3800	1.0009	- 1	1.0034	- 1	1.0060	- 2	1.0085	- 2	6840
3900	1.0008		1.0033	- 1	1.0058	- 1	1.0083	- 2	7020
4000	1.0008		1.0032		1.0057	- 2	1.0081	- 2	7200
4100	1.0008		1.0032		1.0055		1.0079		7380

Table 3-1. COMPRESSIBILITY FACTOR FOR ARGON - Cont. Z = PV/RT

°K	10 atm		40 atm		70 atm		100 atm		°R
4100	1.0008		1.0032	- 1	1.0055	- 1	1.0079	- 2	7380
4200	1.0008		1.0031	- 1	1.0054	- 1	1.0077	- 2	7560
4300	1.0008	- 1	1.0030	- 1	1.0053	- 2	1.0075	- 2	7740
4400	1.0007		1.0029	- 1	1.0051	- 1	1.0073	- 2	7920
4500	1.0007		1.0028		1.0050	- 1	1.0071	- 1	8100
4600	1.0007		1.0028	- 1	1.0049	- 1	1.0070	- 2	8280
4700	1.0007		1.0027	- 1	1.0048	- 2	1.0068	- 2	8460
4800	1.0007		1.0026		1.0046		1.0066	- 1	8640
4900	1.0007	- 1	1.0026	- 1	1.0046	- 2	1.0065	- 2	8820
5000	1.0006		1.0025		1.0044		1.0063		9000

Table 3-2. DENSITY OF ARGON ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
70	.03901	-488							126
80	.03413	-380	.342	-38					144
90	.03033	-304	.3041	-306	1.227	-126			162
100	.027295	-2482	.27349	-2499	1.1010	-1020	1.9396	-1826	180
110	.024813	-2069	.24850	-2079	.99895	- 8455	1.7570	-1504	198
120	.022744	-1750	.22771	-1757	.91440	- 7121	1.6066	-1263	216
130	.020994	-1500	.21014	-1505	.84319	- 6084	1.4803	-1077	234
140	.019494	-1300	.19509	-1303	.78235	- 5260	1.3726	- 928	252
150	.018194	-1137	.18206	-1140	.72975	- 4593	1.2798	- 810	270
160	.017057	-1003	.17066	-1006	.68382	- 4047	1.1988	- 713	288
170	.016054	- 892	.16060	- 893	.64335	- 3592	1.1275	- 632	306
180	.015162	- 799	.15167	- 799	.60743	- 3212	1.0643	- 565	324
190	.014363	- 718	.14368	- 719	.57531	- 2887	1.0078	- 507	342
200	.013645	- 650	.13649	- 651	.54644	- 2611	.95711	- 4585	360
210	.012995	- 590	.12998	- 591	.52033	- 2373	.91126	- 4164	378
220	.012405	- 540	.12407	- 540	.49660	- 2165	.86962	- 3798	396
230	.011865	- 494	.11867	- 494	.47495	- 1983	.83164	- 3481	414
240	.011371	- 455	.11373	- 456	.45512	- 1824	.79683	- 3199	432
250	.010916	- 420	.10917	- 420	.43688	- 1684	.76484	- 2951	450
260	.010496	- 389	.10497	- 389	.42004	- 1559	.73533	- 2732	468
270	.010107	- 361	.10108	- 361	.40445	- 1446	.70801	- 2535	486
280	.0097464	- 3361	.097472	- 3363	.38999	- 1347	.68266	- 2360	504
290	.0094103	- 3136	.094109	- 3138	.37652	- 1257	.65906	- 2202	522
300	.0090967	- 2936	.090971	- 2935	.36395	- 1175	.63704	- 2059	540
310	.0088031	- 2751	.088036	- 2752	.35220	- 1102	.61645	- 1930	558
320	.0085280	- 2584	.085284	- 2585	.34118	- 1035	.59715	- 1813	576
330	.0082696	- 2432	.082699	- 2433	.33083	- 974	.57902	- 1706	594
340	.0080264	- 2293	.080266	- 2294	.32109	- 918	.56196	- 1607	612
350	.0077971	- 2166	.077972	- 2166	.31191	- 867	.54589	- 1519	630
360	.0075805	- 2049	.075806	- 2049	.30324	- 820	.53070	- 1436	648
370	.0073756	- 1941	.073757	- 1941	.29504	- 777	.51634	- 1360	666
380	.0071815	- 1841	.071816	- 1842	.28727	- 737	.50274	- 1291	684
390	.0069974	- 1750	.069974	- 1750	.27990	- 700	.48983	- 1225	702
400	.0068224	- 1664	.068224	- 1664	.27290	- 666	.47758	- 1166	720
410	.0066560	- 1585	.066560	- 1585	.26624	- 634	.46592	- 1110	738
420	.0064975	- 1511	.064975	- 1511	.25990	- 605	.45482	- 1059	756
430	.0063464	- 1442	.063464	- 1443	.25385	- 577	.44423	- 1010	774
440	.0062022	- 1378	.062021	- 1378	.24808	- 551	.43413	- 965	792
450	.0060644	- 1319	.060643	- 1318	.24257	- 528	.42448	- 924	810
460	.0059325	- 1262	.059325	- 1262	.23729	- 505	.41524	- 884	828
470	.0058063	- 1209	.058063	- 1211	.23224	- 484	.40640	- 847	846
480	.0056854	- 1161	.056852	- 1160	.22740	- 464	.39793	- 812	864
490	.0055693	- 1114	.055692	- 1114	.22276	- 446	.38981	- 780	882
500	.0054579	- 1070	.054578	- 1070	.21830	- 428	.38201	- 749	900
510	.0053509	- 1029	.053508	- 1029	.21402	- 412	.37452	- 721	918
520	.0052480	- 990	.052479	- 990	.20990	- 396	.36731	- 693	936
530	.0051490	- 954	.051489	- 954	.20594	- 381	.36038	- 668	954
540	.0050536	- 918	.050535	- 918	.20213	- 368	.35370	- 643	972
550	.0049618	- 886	.049617	- 886	.19845	- 354	.34727	- 620	990
560	.0048732	- 855	.048731	- 855	.19491	- 342	.34107	- 599	1008
570	.0047877	- 826	.047876	- 826	.19149	- 330	.33508	- 578	1026
580	.0047051	- 797	.047050	- 798	.18819	- 319	.32930	- 558	1044
590	.0046254	- 771	.046252	- 771	.18500	- 309	.32372	- 540	1062
600	.0045483	- 746	.045481	- 745	.18191	- 298	.31832	- 522	1080
610	.0044737	- 721	.044736	- 722	.17893	- 289	.31310	- 505	1098
620	.0044016	- 699	.044014	- 698	.17604	- 279	.30805	- 489	1116
630	.0043317	- 677	.043316	- 677	.17325	- 271	.30316	- 474	1134
640	.0042640	- 656	.042639	- 656	.17054	- 262	.29842	- 459	1152
650	.0041984		.041983		.16792		.29383		1170

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
650	.0041984	- 636	.041983	- 636	.16792	- 255	.29383	- 445	1170
660	.0041348	- 617	.041347	- 617	.16537	- 246	.28938	- 432	1188
670	.0040731	- 599	.040730	- 599	.16291	- 240	.28506	- 419	1206
680	.0040132	- 582	.040131	- 582	.16051	- 233	.28087	- 407	1224
690	.0039550	- 565	.039549	- 565	.15818	- 226	.27680	- 395	1242
700	.0038985	- 549	.038984	- 549	.15592	- 219	.27285	- 385	1260
710	.0038436	- 534	.038435	- 534	.15373	- 214	.26900	- 373	1278
720	.0037902	- 519	.037901	- 519	.15159	- 207	.26527	- 364	1296
730	.0037383	- 505	.037382	- 505	.14952	- 202	.26163	- 354	1314
740	.0036878	- 492	.036877	- 492	.14750	- 197	.25809	- 344	1332
750	.0036386	- 479	.036385	- 479	.14553	- 192	.25465	- 335	1350
760	.0035907	- 466	.035906	- 466	.14361	- 186	.25130	- 326	1368
770	.0035441	- 454	.035440	- 454	.14175	- 182	.24804	- 318	1386
780	.0034987	- 443	.034986	- 443	.13993	- 177	.24486	- 310	1404
790	.0034544	- 432	.034543	- 432	.13816	- 173	.24176	- 302	1422
800	.0034112	- 2006	.034111	- 2006	.13643	- 802	.23874	- 1404	1440
850	.0032106	- 1784	.032105	- 1784	.12841	- 714	.22470	- 1249	1530
900	.0030322	- 1596	.030321	- 1596	.12127	- 638	.21221	- 1117	1620
950	.0028726	- 1436	.028725	- 1436	.11489	- 574	.20104	- 1005	1710
1000	.0027290	- 1300	.027289	- 1300	.10915	- 520	.19099	- 909	1800
1050	.0025990	- 1181	.025989	- 1181	.10395	- 473	.18190	- 827	1890
1100	.0024809	- 1079	.024808	- 1078	.099225	- 4314	.17363	- 755	1980
1150	.0023730	- 989	.023730	- 989	.094911	- 3954	.16608	- 692	2070
1200	.0022741	- 909	.022741	- 910	.090957	- 3638	.15916	- 636	2160
1250	.0021832	- 840	.021831	- 839	.087319	- 3358	.15280	- 588	2250
1300	.0020992	- 777	.020992	- 778	.083961	- 3110	.14692	- 544	2340
1350	.0020215	- 722	.020214	- 722	.080851	- 2887	.14148	- 505	2430
1400	.0019493	- 673	.019492	- 672	.077964	- 2688	.13643	- 471	2520
1450	.0018820	- 627	.018820	- 627	.075276	- 2509	.13172	- 439	2610
1500	.0018193	- 587	.018193	- 587	.072767	- 2348	.12733	- 410	2700
1550	.0017606	- 550	.017606	- 550	.070419	- 2200	.12323	- 385	2790
1600	.0017056	- 517	.017056	- 517	.068219	- 2067	.11938	- 362	2880
1650	.0016539	- 486	.016539	- 487	.066152	- 1945	.11576	- 341	2970
1700	.0016053	- 459	.016052	- 458	.064207	- 1835	.11235	- 321	3060
1750	.0015594	- 433	.015594	- 433	.062372	- 1732	.10914	- 303	3150
1800	.0015161	- 410	.015161	- 410	.060640	- 1639	.10611	- 286	3240
1850	.0014751	- 388	.014751	- 388	.059001	- 1553	.10325	- 272	3330
1900	.0014363	- 368	.014363	- 369	.057448	- 1473	.10053	- 258	3420
1950	.0013995	- 350	.013994	- 349	.055975	- 1399	.097952	- 2449	3510
2000	.0013645	- 333	.013645	- 333	.054576	- 1331	.095503	- 2329	3600
2050	.0013312	- 317	.013312	- 317	.053245	- 1268	.093174	- 2218	3690
2100	.0012995	- 302	.012995	- 302	.051977	- 1209	.090956	- 2115	3780
2150	.0012693	- 289	.012693	- 289	.050768	- 1153	.088841	- 2019	3870
2200	.0012404	- 275	.012404	- 275	.049615	- 1103	.086822	- 1929	3960
2250	.0012129	- 264	.012129	- 264	.048512	- 1055	.084893	- 1846	4050
2300	.0011865	- 252	.011865	- 252	.047457	- 1009	.083047	- 1767	4140
2350	.0011613	- 242	.011613	- 242	.046448	- 967	.081280	- 1693	4230
2400	.0011371	- 232	.011371	- 232	.045481	- 929	.079587	- 1623	4320
2450	.0011139	- 223	.011139	- 223	.044552	- 891	.077964	- 1560	4410
2500	.0010916	- 420	.010916	- 420	.043661	- 1679	.076404	- 2938	4500
2600	.0010496	- 389	.010496	- 389	.041982	- 1555	.073466	- 2721	4680
2700	.0010107	- 361	.010107	- 361	.040427	- 1444	.070745	- 2526	4860
2800	.00097463	- 3361	.0097462	- 3361	.038983	- 1344	.068219	- 2353	5040
2900	.00094102	- 3136	.0094101	- 3136	.037639	- 1254	.065866	- 2195	5220
3000	.00090966	- 2935	.0090965	- 2935	.036385	- 1174	.063671	- 2053	5400
3100	.00088031	- 2751	.0088030	- 2751	.035211	- 1100	.061618	- 1926	5580
3200	.00085280	- 2584	.0085279	- 2584	.034111	- 1034	.059692	- 1809	5760
3300	.00082696	- 2432	.0082695	- 2432	.033077	- 973	.057883	- 1702	5940
3400	.00080264	- 2293	.0080263	- 2293	.032104	- 917	.056181	- 1605	6120
3500	.00077971	- 2166	.0077970	- 2166	.031187	- 866	.054576	- 1516	6300
3600	.00075805		.0075804		.030321		.053060		6480

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
3600	.00075805	- 2049	.0075804	- 2049	.030321	- 820	.053060	- 1434	6480
3700	.00073756	- 1941	.0073755	- 1941	.029501	- 776	.051626	- 1359	6660
3800	.00071815	- 1841	.0071814	- 1841	.028725	- 736	.050267	- 1288	6840
3900	.00069974	- 1750	.0069973	- 1749	.027989	- 700	.048979	- 1225	7020
4000	.00068224	- 1664	.0068224	- 1664	.027289	- 666	.047754	- 1165	7200
4100	.00066560	- 1585	.0066560	- 1585	.026623	- 634	.046589	- 1108	7380
4200	.00064975	- 1511	.0064975	- 1511	.025989	- 604	.045481	- 1058	7560
4300	.00063464	- 1442	.0063464	- 1443	.025385	- 577	.044423	- 1010	7740
4400	.00062022	- 1378	.0062021	- 1378	.024808	- 551	.043413	- 964	7920
4500	.00060644	- 1319	.0060643	- 1318	.024257	- 528	.042449	- 923	8100
4600	.00059325	- 1262	.0059325	- 1262	.023729	- 504	.041526	- 884	8280
4700	.00058063	- 1209	.0058063	- 1210	.023225	- 484	.040642	- 847	8460
4800	.00056854	- 1161	.0056853	- 1160	.022741	- 464	.039795	- 812	8640
4900	.00055693	- 1114	.0055693	- 1114	.022277	- 446	.038983	- 779	8820
5000	.00054579		.0054579		.021831		.038204		9000

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°K	1 atm		4 atm		7 atm		10 atm		°R
100	2.790	-267	12.02	-135					180
110	2.523	-219	10.67	-105	19.9	-23			198
120	2.304	-183	9.618	-845	17.6	-17	26.6	-30	216
130	2.121	-155	8.773	-696	15.9	-14	23.6	-22	234
140	1.966	-134	8.077	-587	14.5	-11	21.4	-18	252
150	1.832	-116	7.490	-504	13.4	-9	19.6	-15	270
160	1.716	-103	6.986	-437	12.46	-82	18.1	-12	288
170	1.613	-91	6.549	-383	11.64	-71	16.9	-11	306
180	1.5223	-810	6.1659	-3397	10.930	-624	15.81	-93	324
190	1.4413	-728	5.8262	-3030	10.306	-552	14.88	-82	342
200	1.3685	-657	5.5232	-2722	9.7540	-4935	14.064	-731	360
210	1.3028	-597	5.2510	-2460	9.2605	-4440	13.333	-654	378
220	1.2431	-544	5.0050	-2235	8.8165	-4019	12.679	-590	396
230	1.1887	-498	4.7815	-2041	8.4146	-3656	12.089	-535	414
240	1.1389	-458	4.5774	-1870	8.0490	-3342	11.554	-488	432
250	1.0931	-423	4.3904	-1722	7.7148	-3068	11.066	-446	450
260	1.0508	-390	4.2182	-1589	7.4080	-2828	10.620	-411	468
270	1.0118	-363	4.0593	-1473	7.1252	-2615	10.209	-379	486
280	.97548	-3376	3.9120	-1368	6.8637	-2426	9.8304	-3511	504
290	.94172	-3149	3.7752	-1275	6.6211	-2257	9.4793	-3262	522
300	.91023	-2945	3.6477	-1190	6.3954	-2105	9.1531	-3039	540
310	.88078	-2759	3.5287	-1114	6.1849	-1968	8.8492	-2838	558
320	.85319	-2592	3.4173	-1046	5.9881	-1846	8.5654	-2659	576
330	.82727	-2439	3.3127	-983	5.8035	-1733	8.2995	-2495	594
340	.80288	-2299	3.2144	-926	5.6302	-1632	8.0500	-2347	612
350	.77989	-2170	3.1218	-874	5.4670	-1539	7.8153	-2211	630
360	.75819	-2053	3.0344	-825	5.3131	-1453	7.5942	-2088	648
370	.73766	-1944	2.9519	-782	5.1678	-1375	7.3854	-1974	666
380	.71822	-1844	2.8737	-741	5.0303	-1303	7.1880	-1870	684
390	.69978	-1752	2.7996	-704	4.9000	-1236	7.0010	-1773	702
400	.68226	-1666	2.7292	-669	4.7764	-1175	6.8237	-1685	720
410	.66560	-1586	2.6623	-636	4.6589	-1118	6.6552	-1603	738
420	.64974	-1513	2.5987	-607	4.5471	-1065	6.4949	-1526	756
430	.63461	-1444	2.5380	-579	4.4406	-1017	6.3423	-1455	774
440	.62017	-1379	2.4801	-553	4.3389	-970	6.1968	-1389	792
450	.60638	-1320	2.4248	-529	4.2419	-927	6.0579	-1328	810
460	.59318	-1263	2.3719	-507	4.1492	-888	5.9251	-1270	828
470	.58055	-1210	2.3212	-485	4.0604	-850	5.7981	-1216	846
480	.56845	-1161	2.2727	-465	3.9754	-815	5.6765	-1167	864
490	.55684	-1114	2.2262	-446	3.8939	-782	5.5598	-1118	882
500	.54570	-1071	2.1816	-429	3.8157	-751	5.4480	-1074	900
510	.53499	-1029	2.1387	-412	3.7406	-722	5.3406	-1032	918
520	.52470	-991	2.0975	-396	3.6684	-694	5.2374	-993	936
530	.51479	-953	2.0579	-382	3.5990	-669	5.1381	-956	954
540	.50526	-919	2.0197	-368	3.5321	-644	5.0425	-920	972
550	.49607	-887	1.9829	-354	3.4677	-620	4.9505	-887	990
560	.48720	-855	1.9475	-343	3.4057	-599	4.8618	-856	1008
570	.47865	-825	1.9132	-330	3.3458	-578	4.7762	-826	1026
580	.47040	-798	1.8802	-319	3.2880	-559	4.6936	-798	1044
590	.46242	-771	1.8483	-308	3.2321	-540	4.6138	-771	1062
600	.45471	-745	1.8175	-299	3.1781	-521	4.5367	-745	1080
610	.44726	-722	1.7876	-288	3.1260	-505	4.4622	-721	1098
620	.44004	-698	1.7588	-279	3.0755	-489	4.3901	-698	1116
630	.43306	-677	1.7309	-271	3.0266	-474	4.3203	-676	1134
640	.42629	-656	1.7038	-262	2.9792	-459	4.2527	-656	1152
650	.41973	-636	1.6776	-255	2.9333	-444	4.1871	-635	1170
660	.41337	-617	1.6521	-246	2.8889	-432	4.1236	-616	1188
670	.40720	-599	1.6275	-240	2.8457	-419	4.0620	-598	1206
680	.40121	-581	1.6035	-232	2.8038	-406	4.0022	-581	1224
690	.39540	-565	1.5803	-226	2.7632	-395	3.9441	-564	1242
700	.38975		1.5577		2.7237		3.8877		1260

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°K	1 atm		4 atm		7 atm		10 atm		°R
700	.38975	- 549	1.5577	- 220	2.7237	- 384	3.8877	- 548	1260
710	.38426	- 534	1.5357	- 213	2.6853	- 373	3.8329	- 532	1278
720	.37892	- 519	1.5144	- 207	2.6480	- 363	3.7797	- 518	1296
730	.37373	- 505	1.4937	- 202	2.6117	- 353	3.7279	- 504	1314
740	.36868	- 492	1.4735	- 197	2.5764	- 343	3.6775	- 490	1332
750	.36376	- 479	1.4538	- 191	2.5421	- 335	3.6285	- 478	1350
760	.35897	- 466	1.4347	- 186	2.5086	- 326	3.5807	- 465	1368
770	.35431	- 454	1.4161	- 182	2.4760	- 317	3.5342	- 453	1386
780	.34977	- 443	1.3979	- 177	2.4443	- 310	3.4889	- 442	1404
790	.34534	- 431	1.3802	- 172	2.4133	- 301	3.4447	- 430	1422
800	.34103	- 2006	1.3630	- 802	2.3832	- 1402	3.4017	- 2000	1440
850	.32097	- 1783	1.2828	- 712	2.2430	- 1245	3.2017	- 1778	1530
900	.30314	- 1596	1.2116	- 638	2.1185	- 1114	3.0239	- 1590	1620
950	.28718	- 1435	1.1478	- 573	2.0071	- 1003	2.8649	- 1430	1710
1000	.27283	- 1300	1.0905	- 520	1.9068	- 907	2.7219	- 1295	1800
1050	.25983	- 1180	1.0385	- 471	1.8161	- 825	2.5924	- 1177	1890
1100	.24803	- 1079	.99136	- 4307	1.7336	- 753	2.4747	- 1074	1980
1150	.23724	- 988	.94829	- 3950	1.6583	- 690	2.3673	- 985	2070
1200	.22736	- 909	.90879	- 3632	1.5893	- 635	2.2688	- 907	2160
1250	.21827	- 840	.87247	- 3354	1.5258	- 587	2.1781	- 836	2250
1300	.20987	- 777	.83893	- 3106	1.4671	- 542	2.0945	- 775	2340
1350	.20210	- 721	.80787	- 2883	1.4129	- 504	2.0170	- 719	2430
1400	.19489	- 672	.77904	- 2685	1.3625	- 470	1.9451	- 670	2520
1450	.18817	- 628	.75219	- 2505	1.3155	- 438	1.8781	- 625	2610
1500	.18189	- 586	.72714	- 2345	1.2717	- 410	1.8156	- 585	2700
1550	.17603	- 550	.70369	- 2197	1.2307	- 384	1.7571	- 548	2790
1600	.17053	- 517	.68172	- 2065	1.1923	- 361	1.7023	- 515	2880
1650	.16536	- 486	.66107	- 1943	1.1562	- 339	1.6508	- 485	2970
1700	.16050	- 459	.64164	- 1832	1.1223	- 321	1.6023	- 457	3060
1750	.15591	- 433	.62332	- 1731	1.0902	- 302	1.5566	- 432	3150
1800	.15158	- 409	.60601	- 1636	1.0600	- 287	1.5134	- 408	3240
1850	.14749	- 388	.58965	- 1551	1.0313	- 271	1.4726	- 387	3330
1900	.14361	- 369	.57414	- 1472	1.0042	- 257	1.4339	- 367	3420
1950	.13992	- 349	.55942	- 1398	.97851	- 2443	1.3972	- 349	3510
2000	.13643	- 333	.54544	- 1329	.95408	- 2325	1.3623	- 332	3600
2050	.13310	- 317	.53215	- 1266	.93083	- 2215	1.3291	- 316	3690
2100	.12993	- 302	.51949	- 1208	.90868	- 2110	1.2975	- 301	3780
2150	.12691	- 288	.50741	- 1152	.88758	- 2016	1.2674	- 288	3870
2200	.12403	- 276	.49589	- 1102	.86742	- 1926	1.2386	- 275	3960
2250	.12127	- 264	.48487	- 1053	.84816	- 1842	1.2111	- 263	4050
2300	.11863	- 252	.47434	- 1009	.82974	- 1764	1.1848	- 251	4140
2350	.11611	- 242	.46425	- 967	.81210	- 1690	1.1597	- 242	4230
2400	.11369	- 232	.45458	- 927	.79520	- 1621	1.1355	- 231	4320
2450	.11137	- 223	.44531	- 890	.77899	- 1557	1.1124	- 222	4410
2500	.10914	- 419	.43641	- 1678	.76342	- 2934	1.0902	- 419	4500
2600	.10495	- 389	.41963	- 1553	.73408	- 2716	1.0483	- 388	4680
2700	.10106	- 361	.40410	- 1443	.70692	- 2523	1.0095	- 360	4860
2800	.097452	- 3360	.38967	- 1343	.68169	- 2349	.97350	- 3353	5040
2900	.094092	- 3136	.37624	- 1253	.65820	- 2192	.93997	- 3129	5220
3000	.090956	- 2934	.36371	- 1173	.63628	- 2052	.90868	- 2929	5400
3100	.088022	- 2751	.35198	- 1100	.61576	- 1923	.87939	- 2746	5580
3200	.085271	- 2583	.34098	- 1032	.59653	- 1806	.85193	- 2579	5760
3300	.082688	- 2432	.33066	- 973	.57847	- 1700	.82614	- 2427	5940
3400	.080256	- 2292	.32093	- 916	.56147	- 1603	.80187	- 2289	6120
3500	.077964	- 2166	.31177	- 866	.54544	- 1514	.77898	- 2161	6300
3600	.075798	- 2049	.30311	- 819	.53030	- 1433	.75737	- 2046	6480
3700	.073749	- 1940	.29492	- 776	.51597	- 1357	.73691	- 1937	6660
3800	.071809	- 1841	.28716	- 736	.50240	- 1287	.71754	- 1838	6840
3900	.069968	- 1749	.27980	- 699	.48953	- 1223	.69916	- 1747	7020
4000	.068219	- 1664	.27281	- 665	.47730	- 1163	.68169	- 1661	7200
4100	.066555		.26616		.46567		.66508		7380

ρ/ρ_0

°K	1 atm		4 atm		7 atm		10 atm		°R
4100	.066555	- 1585	.26616	- 634	.46567	- 1109	.66508	- 1583	7380
4200	.064970	- 1511	.25982	- 604	.45458	- 1056	.64925	- 1508	7560
4300	.063459	- 1441	.25378	- 576	.44402	- 1009	.63417	- 1440	7740
4400	.062018	- 1378	.24802	- 551	.43393	- 964	.61977	- 1376	7920
4500	.060640	- 1319	.24251	- 527	.42429	- 922	.60601	- 1317	8100
4600	.059321	- 1262	.23724	- 505	.41507	- 882	.59284	- 1260	8280
4700	.058059	- 1209	.23219	- 483	.40625	- 846	.58024	- 1208	8460
4800	.056850	- 1161	.22736	- 464	.39779	- 812	.56816	- 1159	8640
4900	.055689	- 1113	.22272	- 446	.38967	- 778	.55657	- 1112	8820
5000	.054576		.21826		.38189		.54545		9000

Table 3-2. DENSITY OF ARGON - Cont.

ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
180	15.81	-93	74.06	-668	162.2	-250	330.4	-939	324
190	14.88	-82	67.38	-520	137.2	-153	236.5	-392	342
200	14.06	-73	62.18	-428	121.9	-114	197.3	-250	360
210	13.33	-65	57.90	-362	110.5	- 89	172.3	-178	378
220	12.68	-59	54.28	-310	101.6	- 71	154.5	-131	396
230	12.09	-54	51.18	-271	94.51	- 589	141.4	-101	414
240	11.55	-48	48.47	-239	88.62	- 503	131.3	- 83	432
250	11.07	-45	46.08	-214	83.59	- 437	123.0	- 71	450
260	10.62	-41	43.94	-192	79.22	- 386	115.9	- 61	468
270	10.21	-38	42.02	-174	75.36	- 344	109.8	- 54	486
280	9.830	-351	40.28	-159	71.92	- 309	104.4	- 49	504
290	9.479	-326	38.69	-146	68.83	- 280	99.54	- 432	522
300	9.153	-304	37.23	-134	66.03	- 254	95.22	- 387	540
310	8.849	-283	35.89	-123	63.49	- 233	91.35	- 352	558
320	8.566	-267	34.66	-116	61.16	- 215	87.83	- 322	576
330	8.299	-249	33.50	-107	59.01	- 198	84.61	- 296	594
340	8.050	-235	32.43	- 99	57.03	- 183	81.65	- 272	612
350	7.815	-221	31.44	- 94	55.20	- 171	78.93	- 254	630
360	7.594	-209	30.50	- 88	53.49	- 161	76.39	- 237	648
370	7.385	-197	29.62	- 82	51.88	- 150	74.02	- 220	666
380	7.188	-187	28.80	- 78	50.38	- 140	71.82	- 205	684
390	7.001	-177	28.02	- 74	48.98	- 133	69.77	- 193	702
400	6.824	-169	27.28	- 69	47.65	- 125	67.84	- 182	720
410	6.655	-160	26.59	- 66	46.40	- 118	66.02	- 172	738
420	6.495	-153	25.93	- 63	45.22	- 112	64.30	- 163	756
430	6.342	-145	25.30	- 60	44.10	- 106	62.67	- 153	774
440	6.197	-139	24.70	- 56	43.04	- 101	61.14	- 146	792
450	6.058	-133	24.14	- 54	42.03	- 96	59.68	- 139	810
460	5.925	-127	23.60	- 52	41.07	- 92	58.29	- 131	828
470	5.798	-122	23.08	- 49	40.15	- 87	56.98	- 126	846
480	5.676	-116	22.59	- 48	39.28	- 83	55.72	- 119	864
490	5.560	-112	22.11	- 45	38.45	- 80	54.53	- 115	882
500	5.448	-107	21.66	- 43	37.65	- 76	53.38	- 108	900
510	5.341	-103	21.23	- 42	36.89	- 73	52.30	- 105	918
520	5.238	-100	20.81	- 40	36.16	- 70	51.25	- 100	936
530	5.138	- 95	20.41	- 38	35.46	- 68	50.25	- 97	954
540	5.043	- 93	20.03	- 37	34.78	- 64	49.28	- 92	972
550	4.950	- 88	19.66	- 36	34.14	- 62	48.36	- 88	990
560	4.862	- 86	19.30	- 34	33.52	- 60	47.48	- 85	1008
570	4.776	- 83	18.96	- 33	32.92	- 58	46.63	- 82	1026
580	4.693	- 79	18.63	- 32	32.34	- 56	45.81	- 80	1044
590	4.614	- 78	18.31	- 31	31.78	- 53	45.01	- 76	1062
600	4.536	- 74	18.00	- 29	31.25	- 52	44.25	- 74	1080
610	4.462	- 72	17.71	- 29	30.73	- 50	43.51	- 71	1098
620	4.390	- 70	17.42	- 28	30.23	- 49	42.80	- 68	1116
630	4.320	- 67	17.14	- 27	29.74	- 47	42.12	- 67	1134
640	4.253	- 66	16.87	- 26	29.27	- 45	41.45	- 65	1152
650	4.187	- 63	16.61	- 25	28.82	- 44	40.80	- 62	1170
660	4.124	- 62	16.36	- 25	28.38	- 43	40.18	- 60	1188
670	4.062	- 60	16.11	- 24	27.95	- 41	39.58	- 58	1206
680	4.002	- 58	15.87	- 23	27.54	- 40	39.00	- 57	1224
690	3.944	- 56	15.64	- 22	27.14	- 39	38.43	- 55	1242
700	3.888	- 55	15.42	- 22	26.75	- 38	37.88	- 54	1260
710	3.833	- 53	15.20	- 21	26.37	- 36	37.34	- 51	1278
720	3.780	- 52	14.99	- 20	26.01	- 36	36.83	- 51	1296
730	3.728	- 51	14.79	- 20	25.65	- 34	36.32	- 49	1314
740	3.677	- 49	14.59	- 20	25.31	- 34	35.83	- 48	1332
750	3.628		14.39		24.97		35.35		1350

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°K	10 atm		40 atm		70 atm		100 atm		°R
750	3.628	- 47	14.39	- 19	24.97	- 33	35.35	- 46	1350
760	3.581	- 47	14.20	- 18	24.64	- 32	34.89	- 45	1368
770	3.534	- 45	14.02	- 18	24.32	- 31	34.44	- 44	1386
780	3.489	- 44	13.84	- 18	24.01	- 31	34.00	- 43	1404
790	3.445	- 43	13.66	- 17	23.70	- 29	33.57	- 41	1422
800	3.402	-200	13.49	- 79	23.41	- 137	33.16	- 194	1440
850	3.202	-178	12.70	- 70	22.04	- 122	31.22	- 172	1530
900	3.024	-159	12.00	- 63	20.82	- 108	29.50	- 153	1620
950	2.865	-143	11.37	- 57	19.74	- 98	27.97	- 138	1710
1000	2.722	-130	10.80	- 51	18.76	- 89	26.59	- 126	1800
1050	2.592	-117	10.29	- 47	17.87	- 80	25.33	- 113	1890
1100	2.475	-108	9.825	- 425	17.07	- 74	24.20	- 104	1980
1150	2.367	- 98	9.400	- 389	16.33	- 67	23.16	- 95	2070
1200	2.269	- 91	9.011	- 358	15.66	- 62	22.21	- 87	2160
1250	2.178	- 84	8.653	- 331	15.04	- 57	21.34	- 81	2250
1300	2.094	- 77	8.322	- 307	14.47	- 53	20.53	- 75	2340
1350	2.017	- 72	8.015	- 284	13.94	- 50	19.78	- 69	2430
1400	1.945	- 67	7.731	- 265	13.44	- 46	19.09	- 65	2520
1450	1.878	- 62	7.466	- 247	12.98	- 42	18.44	- 61	2610
1500	1.816	- 59	7.219	- 232	12.56	- 40	17.83	- 57	2700
1550	1.757	- 55	6.987	- 217	12.16	- 38	17.26	- 53	2790
1600	1.702	- 51	6.770	- 204	11.78	- 35	16.73	- 50	2880
1650	1.651	- 49	6.566	- 191	11.43	- 34	16.23	- 47	2970
1700	1.602	- 45	6.375	- 182	11.09	- 31	15.76	- 44	3060
1750	1.557	- 44	6.193	- 171	10.78	- 30	15.32	- 42	3150
1800	1.513	- 40	6.022	- 161	10.48	- 28	14.90	- 40	3240
1850	1.473	- 39	5.861	- 154	10.20	- 26	14.50	- 37	3330
1900	1.434	- 37	5.707	- 145	9.938	- 252	14.13	- 36	3420
1950	1.397	- 35	5.562	- 139	9.686	- 239	13.77	- 34	3510
2000	1.362	- 33	5.423	- 131	9.447	- 229	13.43	- 32	3600
2050	1.329	- 31	5.292	- 125	9.218	- 218	13.11	- 31	3690
2100	1.298	- 31	5.167	- 120	9.000	- 206	12.80	- 29	3780
2150	1.267	- 28	5.047	- 114	8.794	- 199	12.51	- 28	3870
2200	1.239	- 28	4.933	- 109	8.595	- 189	12.23	- 27	3960
2250	1.211	- 26	4.824	- 104	8.406	- 181	11.96	- 26	4050
2300	1.185	- 25	4.720	- 100	8.225	- 173	11.70	- 24	4140
2350	1.160	- 25	4.620	- 96	8.052	- 167	11.46	- 24	4230
2400	1.135	- 23	4.524	- 92	7.885	- 159	11.22	- 23	4320
2450	1.112	- 22	4.432	- 88	7.726	- 154	10.99	- 21	4410
2500	1.090	- 42	4.344	- 166	7.572	- 289	10.78	- 41	4500
2600	1.048	- 38	4.178	- 154	7.283	- 267	10.37	- 38	4680
2700	1.010	- 36	4.024	- 143	7.016	- 248	9.987	- 352	4860
2800	.9735	- 335	3.881	- 134	6.768	- 232	9.635	- 329	5040
2900	.9400	- 313	3.747	- 124	6.536	- 216	9.306	- 307	5220
3000	.9087	- 294	3.623	- 116	6.320	- 203	8.999	- 287	5400
3100	.8793	- 273	3.507	- 110	6.117	- 190	8.712	- 270	5580
3200	.8520	- 259	3.397	- 102	5.927	- 178	8.442	- 253	5760
3300	.8261	- 243	3.295	- 97	5.749	- 168	8.189	- 239	5940
3400	.8018	- 228	3.198	- 91	5.581	- 158	7.950	- 225	6120
3500	.7790	- 216	3.107	- 86	5.423	- 150	7.725	- 212	6300
3600	.7574	- 205	3.021	- 81	5.273	- 142	7.513	- 202	6480
3700	.7369	- 194	2.940	- 77	5.131	- 134	7.311	- 190	6660
3800	.7175	- 183	2.863	- 73	4.997	- 127	7.121	- 181	6840
3900	.6992	- 175	2.790	- 70	4.870	- 121	6.940	- 172	7020
4000	.6817	- 166	2.720	- 66	4.749	- 115	6.768	- 164	7200
4100	.6651	- 159	2.654	- 63	4.634	- 110	6.604	- 156	7380
4200	.6492	- 151	2.591	- 60	4.524	- 105	6.448	- 149	7560
4300	.6341	- 143	2.531	- 57	4.419	- 99	6.299	- 142	7740
4400	.6198	- 138	2.474	- 55	4.320	- 96	6.157	- 135	7920
4500	.6060	- 132	2.419	- 53	4.224	- 91	6.022	- 131	8100
4600	.5928		2.366		4.133		5.891		8280

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°K	10 atm		40 atm		70 atm		100 atm		°R
4600	.5928	- 126	2.366	- 50	4.133	- 88	5.891	- 124	8280
4700	.5802	- 121	2.316	- 48	4.045	- 84	5.767	- 119	8460
4800	.5681	- 116	2.268	- 46	3.961	- 80	5.648	- 115	8640
4900	.5565	- 110	2.222	- 44	3.881	- 77	5.533	- 109	8820
5000	.5455		2.178		3.804		5.424		9000

Table 3-3. SPECIFIC HEAT OF ARGON Cp/R

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	2.5010	-2	2.5100	-24	2.5413	-105	2.5739	-191	180
110	2.5008	-2	2.5076	-17	2.5308	-69	2.5548	-126	198
120	2.5006	-1	2.5059	-12	2.5239	-49	2.5422	-88	216
130	2.5005	-1	2.5047	-9	2.5190	-35	2.5334	-61	234
140	2.5004	-1	2.5038	-6	2.5155	-27	2.5273	-48	252
150	2.5003		2.5032	-5	2.5128	-20	2.5225	-36	270
160	2.5003	-1	2.5027	-4	2.5108	-15	2.5189	-27	288
170	2.5002		2.5023	-3	2.5093	-12	2.5162	-23	306
180	2.5002		2.5020	-3	2.5081	-12	2.5139	-17	324
190	2.5002		2.5017	-2	2.5069	-8	2.5122	-15	342
200	2.5002	-1	2.5015	-2	2.5061	-7	2.5107	-12	360
210	2.5001		2.5013	-1	2.5054	-6	2.5095	-11	378
220	2.5001		2.5012	-1	2.5048	-5	2.5084	-9	396
230	2.5001		2.5011	-1	2.5043	-4	2.5075	-7	414
240	2.5001		2.5010	-1	2.5039	-4	2.5068	-7	432
250	2.5001		2.5009	-1	2.5035	-3	2.5061	-5	450
260	2.5001		2.5008	-1	2.5032	-3	2.5056	-5	468
270	2.5001		2.5007		2.5029	-2	2.5051	-4	486
280	2.5001		2.5007	-1	2.5027	-2	2.5047	-4	504
290	2.5001		2.5006		2.5025	-2	2.5043	-3	522
300	2.5001		2.5006	-1	2.5023	-2	2.5040	-3	540
310	2.5001	-1	2.5005		2.5021	-1	2.5037	-3	558
320	2.5000		2.5005		2.5020	-2	2.5034	-2	576
330	2.5000		2.5005	-1	2.5018	-1	2.5032	-2	594
340	2.5000		2.5004		2.5017	-1	2.5030	-2	612
350	2.5000		2.5004		2.5016	-1	2.5028	-2	630
360	2.5000		2.5004		2.5015	-1	2.5026	-1	648
370	2.5000		2.5004	-1	2.5014	-1	2.5025	-2	666
380	2.5000		2.5003		2.5013	-1	2.5023	-1	684
390	2.5000		2.5003		2.5012		2.5022	-1	702
400	2.5000		2.5003		2.5012	-1	2.5021	-1	720
410	2.5000		2.5003		2.5011	-1	2.5020	-2	738
420	2.5000		2.5003	-1	2.5010		2.5018		756
430	2.5000		2.5002		2.5010		2.5018	-1	774
440	2.5000		2.5002		2.5010	-1	2.5017	-1	792
450	2.5000		2.5002		2.5009		2.5016	-1	810
460	2.5000		2.5002		2.5009	-1	2.5015	-1	828
470	2.5000		2.5002		2.5008		2.5014		846
480	2.5000		2.5002		2.8008	-1	2.5014	-1	864
490	2.5000		2.5002		2.5007		2.5013	-1	882
500	2.5000		2.5002		2.5007		2.5012		900
510	2.5000		2.5002		2.5007		2.5012	-1	918
520	2.5000		2.5002		2.5007	-1	2.5011		936
530	2.5000		2.5002	-1	2.5006		2.5011	-1	954
540	2.5000		2.5001		2.5006		2.5010		972
550	2.5000		2.5001		2.5006		2.5010		990
560	2.5000		2.5001		2.5006		2.5010	-1	1008
570	2.5000		2.5001		2.5006	-1	2.5009		1026
580	2.5000		2.5001		2.5005		2.5009		1044
590	2.5000		2.5001		2.5005		2.5009	-1	1062
600	2.5000		2.5001		2.5005		2.5008		1080
610	2.5000		2.5001		2.5005	-1	2.5008		1098
620	2.5000		2.5001		2.5004		2.5008	-1	1116
630	2.5000		2.5001		2.5004		2.5007		1134
640	2.5000		2.5001		2.5004		2.5007		1152
650	2.5000		2.5001		2.5004		2.5007		1170
660	2.5000		2.5001		2.5004		2.5007	-1	1188
670	2.5000		2.5001		2.5004		2.5006		1206
680	2.5000		2.5001		2.5004	-1	2.5006		1224
690	2.5000		2.5001		2.5003		2.5006		1242
700	2.5000		2.5001		2.5003		2.5006		1260

Table 3-3. SPECIFIC HEAT OF ARGON - Cont.

C_p/R

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
700	2.5000	2.5001		2.5003		2.5006		1260
710		2.5001		2.5003		2.5006		1278
720		2.5001		2.5003		2.5006		1296
730		2.5001		2.5003		2.5005	– 1	1314
740		2.5001		2.5003		2.5005		1332
750		2.5001		2.5003		2.5005		1350
760		2.5001		2.5003		2.5005		1368
770		2.5001		2.5003		2.5005		1386
780		2.5001		2.5003		2.5005	– 1	1404
790		2.5001		2.5003		2.5004		1422
800		2.5001	– 1	2.5003	– 1	2.5004	– 1	1440
900		2.5000		2.5002		2.5003		1620
1000		2.5000		2.5002	– 1	2.5003	– 1	1800
1100		2.5000		2.5001		2.5002		1980
1200		2.5000		2.5001		2.5002	– 1	2160
1300		2.5000		2.5001		2.5001		2340
1400		2.5000		2.5001		2.5001		2520
1500		2.5000		2.5001		2.5001		2700
1600		2.5000		2.5001	– 1	2.5001		2880
1700		2.5000		2.5000		2.5001		3060
1800		2.5000		2.5000		2.5001		3240
1900		2.5000		2.5000		2.5001		3420
2000		2.5000		2.5000		2.5001	– 1	3600
2100		2.5000		2.5000		2.5000		3780
2200		2.5000		2.5000		2.5000		3960
2300		2.5000		2.5000		2.5000		4140
2400		2.5000		2.5000		2.5000		4320
2500		2.5000		2.5000		2.5000		4500
2600		2.5000		2.5000		2.5000		4680
2700		2.5000		2.5000		2.5000		4860
2800		2.5000		2.5000		2.5000		5040
2900		2.5000		2.5000		2.5000		5220
3000	2.5000	2.5000		2.5000		2.5000		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	2.6077	-281	3.016	-151	3.55	-33			180
110	2.5796	-186	2.865	- 93	3.22	-20			198
120	2.5610	-125	2.772	- 62	3.02	-12			216
130	2.5485	- 94	2.710	- 42	2.90	- 9			234
140	2.5391	- 67	2.668	- 31	2.81	- 6			252
150	2.5324	- 52	2.637	- 23	2.753	- 43	2.98	-17	270
160	2.5272	- 40	2.614	- 18	2.710	- 35	2.81	- 5	288
170	2.5232	- 33	2.596	- 14	2.675	- 26	2.76	- 5	306
180	2.5199	- 24	2.582	- 11	2.649	- 21	2.71	- 3	324
190	2.5175	- 21	2.571	- 8	2.628	- 16	2.68	- 2	342
200	2.5154	- 17	2.5626	- 75	2.6120	- 137	2.663	- 22	360
210	2.5137	- 14	2.5551	- 61	2.5983	- 111	2.641	- 14	378
220	2.5123	- 13	2.5490	- 52	2.5872	- 94	2.627	- 14	396
230	2.5110	- 13	2.5438	- 43	2.5778	- 80	2.613	- 12	414
240	2.5097	- 9	2.5395	- 39	2.5698	- 67	2.601	- 10	432
250	2.5088	- 8	2.5356	- 32	2.5631	- 59	2.5910	- 85	450
260	2.5080	- 7	2.5324	- 29	2.5572	- 50	2.5825	- 75	468
270	2.5073	- 6	2.5295	- 25	2.5522	- 44	2.5750	- 64	486
280	2.5067	- 5	2.5270	- 21	2.5478	- 40	2.5686	- 56	504
290	2.5062	- 5	2.5249	- 19	2.5438	- 34	2.5630	- 49	522
300	2.5057	- 4	2.5230	- 18	2.5404	- 30	2.5581	- 46	540
310	2.5053	- 4	2.5212	- 15	2.5374	- 27	2.5535	- 38	558
320	2.5049	- 3	2.5197	- 13	2.5347	- 25	2.5497	- 35	576
330	2.5046	- 3	2.5184	- 12	2.5322	- 21	2.5462	- 31	594
340	2.5043	- 3	2.5172	- 12	2.5301	- 21	2.5431	- 29	612
350	2.5040	- 3	2.5160	- 10	2.5280	- 17	2.5402	- 26	630
360	2.5037	- 2	2.5150	- 10	2.5263	- 16	2.5376	- 24	648
370	2.5035	- 2	2.5140	- 8	2.5247	- 15	2.5352	- 21	666
380	2.5033	- 2	2.5132	- 7	2.5232	- 14	2.5331	- 19	684
390	2.5031	- 2	2.5125	- 7	2.5218	- 12	2.5312	- 18	702
400	2.5029	- 1	2.5118	- 7	2.5206	- 11	2.5294	- 16	720
410	2.5028	- 2	2.5111	- 6	2.5195	- 11	2.5278	- 15	738
420	2.5026	- 1	2.5105	- 5	2.5184	- 9	2.5263	- 14	756
430	2.5025	- 1	2.5100	- 5	2.5175	- 9	2.5249	- 12	774
440	2.5024	- 2	2.5095	- 5	2.5166	- 9	2.5237	- 12	792
450	2.5022	- 1	2.5090	- 4	2.5157	- 7	2.5225	- 12	810
460	2.5021	- 1	2.5086	- 4	2.5150	- 7	2.5213	- 10	828
470	2.5020	- 1	2.5082	- 4	2.5143	- 7	2.5203	- 10	846
480	2.5019		2.5078	- 4	2.5136	- 6	2.5193	- 8	864
490	2.5019	- 1	2.5074	- 3	2.5130	- 6	2.5185	- 9	882
500	2.5018	- 1	2.5071	- 3	2.5124	- 5	2.5176	- 7	900
510	2.5017	- 1	2.5068	- 3	2.5119	- 5	2.5169	- 8	918
520	2.5016		2.5065	- 3	2.5114	- 5	2.5161	- 6	936
530	2.5016	- 1	2.5062	- 2	2.5109	- 5	2.5155	- 7	954
540	2.5015	- 1	2.5060	- 3	2.5104	- 4	2.5148	- 6	972
550	2.5014		2.5057	- 2	2.5100	- 4	2.5142	- 6	990
560	2.5014	- 1	2.5055	- 2	2.5096	- 4	2.5136	- 5	1008
570	2.5013		2.5053	- 2	2.5092	- 3	2.5131	- 5	1026
580	2.5013	- 1	2.5051	- 2	2.5089	- 3	2.5126	- 5	1044
590	2.5012		2.5049	- 2	2.5086	- 4	2.5121	- 4	1062
600	2.5012	- 1	2.5047	- 2	2.5082	- 3	2.5117	- 5	1080
610	2.5011		2.5045	- 1	2.5079	- 2	2.5112	- 4	1098
620	2.5011		2.5044	- 2	2.5077	- 3	2.5108	- 3	1116
630	2.5011	- 1	2.5042	- 1	2.5074	- 3	2.5105	- 4	1134
640	2.5010		2.5041	- 2	2.5071	- 2	2.5101	- 4	1152
650	2.5010		2.5039	- 1	2.5069	- 2	2.5097	- 3	1170
660	2.5010	- 1	2.5038	- 1	2.5067	- 3	2.5094	- 3	1188
670	2.5009		2.5037	- 1	2.5064	- 2	2.5091	- 3	1206
680	2.5009		2.5036	- 2	2.5062	- 2	2.5088	- 3	1224
690	2.5009	- 1	2.5034	- 1	2.5060	- 2	2.5085	- 3	1242
700	2.5008		2.5033		2.5058		2.5082		1260

Table 3-3. SPECIFIC HEAT OF ARGON - Cont. C_p/R

°K	1 atm		4 atm		7 atm		10 atm		°R
700	2.5008		2.5033	- 1	2.5058		2.5082	- 1	1260
710	2.5008		2.5032	- 1	2.5058	- 3	2.5081	- 3	1278
720	2.5008		2.5031	- 1	2.5055	- 2	2.5078	- 2	1296
730	2.5008	- 1	2.5030	- 1	2.5053	- 2	2.5076	- 3	1314
740	2.5007		2.5029		2.5051	- 1	2.5073	- 2	1332
750	2.5007		2.5029	- 1	2.5050	- 2	2.5071	- 2	1350
760	2.5007		2.5028	- 1	2.5048	- 1	2.5069	- 2	1368
770	2.5007		2.5027	- 1	2.5047	- 1	2.5067	- 2	1386
780	2.5007	- 1	2.5026	- 1	2.5046	- 2	2.5065	- 2	1404
790	2.5006		2.5025		2.5044	- 1	2.5063	- 1	1422
800	2.5006	- 1	2.5025	- 5	2.5043	- 10	2.5062	- 15	1440
900	2.5005	- 1	2.5020	- 5	2.5033	- 7	2.5047	- 10	1620
1000	2.5004	- 1	2.5015	- 3	2.5026	- 5	2.5037	- 7	1800
1100	2.5003	- 1	2.5012	- 2	2.5021	- 4	2.5030	- 6	1980
1200	2.5002		2.5010	- 2	2.5017	- 3	2.5024	- 4	2160
1300	2.5002		2.5008	- 1	2.5014	- 2	2.5020	- 3	2340
1400	2.5002	- 1	2.5007	- 1	2.5012	- 2	2.5017	- 3	2520
1500	2.5001		2.5006	- 1	2.5010	- 1	2.5014	- 2	2700
1600	2.5001		2.5005	- 1	2.5009	- 2	2.5012	- 1	2880
1700	2.5001		2.5004		2.5007	- 1	2.5011	- 2	3060
1800	2.5001		2.5004	- 1	2.5006		2.5009	- 1	3240
1900	2.5001		2.5003		2.5006	- 1	2.5008	- 1	3420
2000	2.5001		2.5003	- 1	2.5005	- 1	2.5007	- 1	3600
2100	2.5001		2.5002		2.5004		2.5006	- 1	3780
2200	2.5001	- 1	2.5002		2.5004	- 1	2.5005		3960
2300	2.5000		2.5002		2.5003		2.5005	- 1	4140
2400	2.5000		2.5002		2.5003		2.5004		4320
2500	2.5000		2.5002	- 1	2.5003	- 1	2.5004	- 1	4500
2600	2.5000		2.5001		2.5002		2.5003		4680
2700	2.5000		2.5001		2.5002		2.5003		4860
2800	2.5000		2.5001		2.5002		2.5003		5040
2900	2.5000		2.5001		2.5002		2.5003	- 1	5220
3000	2.5000		2.5001		2.5002		2.5002		5400

Table 3-3. SPECIFIC HEAT OF ARGON - Cont. C_p/R

°K	10 atm		40 atm		70 atm		100 atm		°R
200	2.66	-2	3.31	-12	4.2	-3	5.2	-5	360
210	2.64	-1	3.19	-10	3.9	-2	4.7	-3	378
220	2.63	-2	3.09	- 9	3.7	-2	4.4	-2	396
230	2.61	-1	3.00	- 4	3.5	-1	4.2	-3	414
240	2.60	-1	2.96	- 6	3.4	-1	3.9	-2	432
250	2.59	-1	2.90	- 5	3.26	-13	3.66	-26	450
260	2.58	-1	2.85	- 4	3.13	- 7	3.40	-10	468
270	2.57		2.81	- 2	3.06	- 5	3.30	- 7	486
280	2.57	-1	2.79	- 2	3.01	- 4	3.23	- 6	504
290	2.56		2.77	- 3	2.97	- 4	3.17	- 5	522
300	2.56	-1	2.74	- 2	2.93	- 4	3.12	- 5	540
310	2.55		2.72	- 1	2.89	- 4	3.07	- 4	558
320	2.55		2.71	- 2	2.85	- 4	3.03	- 4	576
330	2.55	-1	2.69	- 2	2.81	- 4	2.99	- 3	594
340	2.54		2.67	- 2	2.77	- 2	2.96	- 4	612
350	2.54		2.65		2.75	1	2.92	- 4	630
360	2.54		2.65	- 1	2.75	- 1	2.88	- 3	648
370	2.54	-1	2.64	- 1	2.74	- 1	2.85	- 2	666
380	2.53		2.63		2.73	- 1	2.83	- 1	684
390	2.53		2.63	- 2	2.72	- 2	2.82	- 3	702
400	2.53		2.61		2.70	- 1	2.79	- 1	720
410	2.53		2.61	- 1	2.69	- 1	2.78	- 2	738
420	2.53	-1	2.60		2.68	- 1	2.76	- 1	756
430	2.52		2.600	- 6	2.674	- 10	2.747	- 13	774
440	2.52		2.594	- 5	2.664	- 9	2.734	- 13	792
450	2.523	- 2	2.589	- 4	2.655	- 7	2.721	- 12	810
460	2.521	- 1	2.585	- 4	2.648	- 8	2.709	- 11	828
470	2.520	- 1	2.581	- 4	2.640	- 7	2.698	- 10	846
480	2.519		2.577	- 4	2.633	- 6	2.688	- 9	864
490	2.519	- 1	2.573	- 3	2.627	- 6	2.679	- 9	882
500	2.518	- 1	2.570	- 3	2.621	- 5	2.670	- 7	900
510	2.517	- 1	2.567	- 3	2.616	- 5	2.663	- 7	918
520	2.516		2.564	- 3	2.611	- 5	2.656	- 7	936
530	2.516	- 1	2.561	- 2	2.606	- 5	2.649	- 7	954
540	2.515	- 1	2.559	- 3	2.601	- 4	2.642	- 6	972
550	2.514		2.556	- 2	2.597	- 4	2.636	- 6	990
560	2.514	- 1	2.554	- 2	2.593	- 4	2.630	- 5	1008
570	2.513		2.552	- 2	2.589	- 3	2.625	- 5	1026
580	2.513	- 1	2.550	- 2	2.586	- 3	2.620	- 5	1044
590	2.512		2.548	- 2	2.583	- 4	2.615	- 4	1062
600	2.512	- 1	2.546	- 2	2.579	- 3	2.611	- 4	1080
610	2.511		2.544	- 1	2.576	- 2	2.607	- 4	1098
620	2.511		2.543	- 2	2.574	- 3	2.603	- 3	1116
630	2.511	- 1	2.541	- 1	2.571	- 3	2.600	- 4	1134
640	2.510		2.540	- 2	2.568	- 2	2.596	- 4	1152
650	2.510	- 1	2.538	- 1	2.566	- 2	2.592	- 3	1170
660	2.509		2.537	- 1	2.564	- 3	2.589	- 3	1188
670	2.509		2.536	- 1	2.561	- 2	2.586	- 2	1206
680	2.509		2.535	- 2	2.559	- 2	2.584	- 3	1224
690	2.509	- 1	2.533	- 1	2.557	- 2	2.581	- 3	1242
700	2.508		2.532	- 1	2.555	- 1	2.578	- 2	1260
710	2.508		2.531	- 1	2.554	- 1	2.576	- 3	1278
720	2.508		2.530	- 1	2.553	- 2	2.573	- 2	1296
730	2.508	- 1	2.529	- 1	2.551	- 2	2.571	- 2	1314
740	2.507		2.528		2.549	- 1	2.569	- 2	1332
750	2.507		2.528	- 1	2.548	- 2	2.567	- 2	1350
760	2.507		2.527	- 1	2.546	- 1	2.565	- 2	1368
770	2.507		2.526	- 1	2.545	- 1	2.563	- 2	1386
780	2.507	- 1	2.525	- 1	2.544	- 2	2.561	- 2	1404
790	2.506		2.524		2.542	- 1	2.559	- 1	1422
800	2.506		2.524		2.541		2.558		1440

Table 3-3. SPECIFIC HEAT OF ARGON - Cont. C_p/R

°K	10 atm		40 atm		70 atm		100 atm		°R
800	2.506	-1	2.524	-5	2.541	-10	2.558	-14	1440
900	2.505	-1	2.519	-4	2.531	-6	2.544	-8	1620
1000	2.504	-1	2.515	-3	2.525	-5	2.536	-8	1800
1100	2.503	-1	2.512	-2	2.520	-4	2.528	-5	1980
1200	2.502		2.510	-2	2.516	-2	2.523	-4	2160
1300	2.502		2.508	-1	2.514	-2	2.519	-3	2340
1400	2.502	-1	2.507	-1	2.512	-2	2.516	-3	2520
1500	2.501		2.506	-1	2.510	-1	2.513	-2	2700
1600	2.501		2.505	-1	2.509	-2	2.511		2880
1700	2.501		2.504		2.507	-1	2.511	-2	3060
1800	2.501		2.504	-1	2.506		2.509	-1	3240
1900	2.501		2.503		2.506	-1	2.508	-1	3420
2000	2.501		2.503	-1	2.505	-1	2.507	-1	3600
2100	2.501		2.502		2.504		2.506	-1	3780
2200	2.501		2.502		2.504	-1	2.505		3960
2300	2.501	-1	2.502		2.503		2.505	-1	4140
2400	2.500		2.502		2.503		2.504		4320
2500	2.500		2.502	-1	2.503	-1	2.504	-1	4500
2600	2.500		2.501		2.502		2.503		4680
2700	2.500		2.501		2.502		2.503		4860
2800	2.500		2.501		2.502		2.503		5040
2900	2.500		2.501		2.502		2.503	-1	5220
3000	2.500		2.501		2.502		2.502		5400

Table 3-4. ENTHALPY OF ARGON* $(H-E_0^o)/RT_0$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	.9150	915	.9131	918	.9066	928	.9000	939	180
110	1.0065	916	1.0049	918	.9994	927	.9939	934	198
120	1.0981	916	1.0967	917	1.0921	922	1.0873	928	216
130	1.1897	915	1.1884	917	1.1843	922	1.1801	927	234
140	1.2812	915	1.2801	916	1.2765	920	1.2728	924	252
150	1.3727	915	1.3717	916	1.3685	919	1.3652	923	270
160	1.4642	916	1.4633	917	1.4604	920	1.4575	922	288
170	1.5558	915	1.5550	916	1.5524	918	1.5497	920	306
180	1.6473	915	1.6466	916	1.6442	917	1.6417	920	324
190	1.7388	915	1.7382	915	1.7359	918	1.7337	919	342
200	1.8303	916	1.8297	917	1.8277	918	1.8256	920	360
210	1.9219	915	1.9214	915	1.9195	917	1.9176	918	378
220	2.0134	915	2.0129	916	2.0112	916	2.0094	918	396
230	2.1049	915	2.1045	915	2.1028	917	2.1012	918	414
240	2.1964	916	2.1960	915	2.1945	916	2.1930	917	432
250	2.2880	916	2.2875	917	2.2861	917	2.2847	918	450
260	2.3796	915	2.3792	915	2.3778	916	2.3765	917	468
270	2.4711	915	2.4707	915	2.4694	917	2.4682	917	486
280	2.5626	915	2.5622	915	2.5611	915	2.5599	917	504
290	2.6541	915	2.6537	916	2.6526	916	2.6516	916	522
300	2.7456	916	2.7453	916	2.7442	917	2.7432	917	540
310	2.8372	915	2.8369	915	2.8359	916	2.8349	917	558
320	2.9287	915	2.9284	915	2.9275	916	2.9266	916	576
330	3.0202	915	3.0199	915	3.0191	915	3.0182	916	594
340	3.1117	916	3.1114	916	3.1106	917	3.1098	917	612
350	3.2033	915	3.2030	916	3.2023	915	3.2015	916	630
360	3.2948	915	3.2946	915	3.2938	916	3.2931	916	648
370	3.3863	915	3.3861	915	3.3854	915	3.3847	916	666
380	3.4778	915	3.4776	915	3.4769	916	3.4763	916	684
390	3.5693	916	3.5691	916	3.5685	916	3.5679	917	702
400	3.6609	915	3.6607	915	3.6601	916	3.6596	915	720
410	3.7524	915	3.7522	915	3.7517	915	3.7511	916	738
420	3.8439	915	3.8437	915	3.8432	916	3.8427	916	756
430	3.9354	915	3.9352	915	3.9348	915	3.9343	915	774
440	4.0269	916	4.0267	917	4.0263	916	4.0258	917	792
450	4.1185	915	4.1184	915	4.1179	916	4.1175	915	810
460	4.2100	915	4.2099	915	4.2095	915	4.2090	916	828
470	4.3015	915	4.3014	915	4.3010	915	4.3006	915	846
480	4.3930	916	4.3929	916	4.3925	916	4.3921	917	864
490	4.4846	915	4.4845	915	4.4841	916	4.4838	915	882
500	4.5761	915	4.5760	915	4.5757	915	4.5753	916	900
510	4.6676	915	4.6675	915	4.6672	915	4.6669	915	918
520	4.7591	915	4.7590	915	4.7587	915	4.7584	916	936
530	4.8506	916	4.8505	916	4.8502	917	4.8500	916	954
540	4.9422	915	4.9421	915	4.9419	915	4.9416	915	972
550	5.0337	915	5.0336	915	5.0334	915	5.0331	916	990
560	5.1252	915	5.1251	915	5.1249	915	5.1247	915	1008
570	5.2167	915	5.2166	915	5.2164	915	5.2162	915	1026
580	5.3082	916	5.3081	916	5.3079	917	5.3077	917	1044
590	5.3998	915	5.3997	915	5.3996	915	5.3994	915	1062
600	5.4913	915	5.4912	915	5.4911	915	5.4909	915	1080
610	5.5828	915	5.5827	916	5.5826	915	5.5824	916	1098
620	5.6743	916	5.6743	916	5.6741	916	5.6740	916	1116
630	5.7659	915	5.7659	915	5.7657	915	5.7656	915	1134
640	5.8574	915	5.8574	915	5.8572	916	5.8571	915	1152
650	5.9489	915	5.9489	915	5.9488	915	5.9486	916	1170
660	6.0404	915	6.0404	915	6.0403	915	6.0402	915	1188
670	6.1319	916	6.1319	916	6.1318	916	6.1317	916	1206
680	6.2235	915	6.2235	915	6.2234	915	6.2233	915	1224
690	6.3150	915	6.3150	915	6.3149	915	6.3148	916	1242
700	6.4065		6.4065		6.4064		6.4064		1260

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	6.4065	915	6.4065	915	6.4064	915	6.4064	915	1260
710	6.4980	915	6.4980	915	6.4979	915	6.4979	915	1278
720	6.5895	916	6.5895	916	6.5894	917	6.5894	916	1296
730	6.6811	915	6.6811	915	6.6811	915	6.6810	915	1314
740	6.7726	915	6.7726	915	6.7726	915	6.7725	913	1332
750	6.8641	915	6.8641	915	6.8641	915	6.8638	917	1350
760	6.9556	916	6.9556	916	6.9556	916	6.9555	917	1368
770	7.0472	915	7.0472	915	7.0472	915	7.0472	915	1386
780	7.1387	915	7.1387	915	7.1387	915	7.1387	915	1404
790	7.2302	915	7.2302	915	7.2302	915	7.2302	916	1422
800	7.3217	4576	7.3217	4576	7.3217	4577	7.3218	4576	1440
850	7.7793	4576	7.7793	4576	7.7794	4576	7.7794	4577	1530
900	8.2369	4576	8.2369	4576	8.2370	4576	8.2371	4576	1620
950	8.6945	4576	8.6945	4576	8.6946	4577	8.6947	4577	1710
1000	9.1521	4577	9.1521	4577	9.1523	4577	9.1524	4577	1800
1050	9.6098	4576	9.6098	4577	9.6100	4576	9.6101	4577	1890
1100	10.0674	4576	10.0675	4576	10.0676	4576	10.0678	4576	1980
1150	10.5250	4576	10.5251	4576	10.5252	4577	10.5254	4577	2070
1200	10.9826	4576	10.9827	4576	10.9829	4576	10.9831	4576	2160
1250	11.4402	4576	11.4403	4576	11.4405	4576	11.4407	4576	2250
1300	11.8978	4576	11.8979	4576	11.8981	4576	11.8983	4576	2340
1350	12.3554	4576	12.3555	4576	12.3557	4576	12.3559	4577	2430
1400	12.8130	4576	12.8131	4576	12.8133	4576	12.8136	4576	2520
1450	13.2706	4576	13.2707	4576	13.2709	4576	13.2712	4576	2610
1500	13.7282	4576	13.7283	4576	13.7285	4577	13.7288	4576	2700
1550	14.1858	4576	14.1859	4576	12.1862	4576	14.1864	4576	2790
1600	14.6434	4576	14.6435	4576	14.6438	4576	14.6440	4576	2880
1650	15.1010	4576	15.1011	4576	15.1014	4576	15.1016	4577	2970
1700	15.5586	4577	15.5587	4577	15.5590	4577	15.5593	4577	3060
1750	16.0163	4576	16.0164	4576	16.0167	4576	16.0170	4576	3150
1800	16.4739	4576	16.4740	4576	16.4743	4576	16.4746	4576	3240
1850	16.9315	4576	16.9316	4576	16.9319	4576	16.9222	4576	3330
1900	17.3891	4576	17.3892	4576	17.3895	4576	17.3898	4576	3420
1950	17.8467	4576	17.8468	4576	17.8471	4576	17.8474	4576	3510
2000	18.3043	4576	18.3044	4576	18.3047	4576	18.3050	4576	3600
2050	18.7619	4576	18.7620	4576	18.7623	4576	18.7626	4576	3690
2100	19.2195	4576	19.2196	4576	19.2199	4576	19.2202	4577	3780
2150	19.6771	4576	19.6772	4576	19.6775	4576	19.6779	4576	3870
2200	20.1347	4576	20.1348	4576	20.1351	4576	20.1355	4576	3960
2250	20.5923	4576	20.5924	4576	20.5927	4576	20.5931	4576	4050
2300	21.0499	4576	21.0500	4576	21.0503	4577	21.0507	4576	4140
2350	21.5075	4576	21.5076	4576	21.5080	4576	21.5083	4576	4230
2400	21.9651	4577	21.9652	4577	21.9656	4577	21.9659	4577	4320
2450	22.4228	4576	22.4229	4576	22.4233	4576	22.4236	4576	4410
2500	22.8804	4576	22.8805	4576	22.8809	4576	22.8812	4576	4500
2550	23.3380	4576	23.3381	4576	23.3385	4576	23.3388	4576	4590
2600	23.7956	4576	23.7957	4576	23.7961	4576	23.7964	4576	4680
2650	24.2532	4576	24.2533	4576	24.2537	4576	24.2540	4576	4770
2700	24.7108	4576	24.7109	4576	24.7113	4576	24.7116	4576	4860
2750	25.1684	4576	25.1685	4576	25.1689	4576	25.1692	4576	4950
2800	25.6260	4576	25.6261	4576	25.6265	4576	25.6268	4576	5040
2850	26.0836	4576	26.0837	4576	26.0841	4576	26.0844	4576	5130
2900	26.5412	4576	26.5413	4576	26.5417	4576	26.5420	4576	5220
2950	26.9988	4576	26.9989	4576	26.9993	4576	26.9996	4576	5310
3000	27.4564		27.4565		27.4569		27.4572		5400

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.8935	949	.8220	1075	.7413	1235			180
110	.9884	941	.9295	1031	.8648	1142			198
120	1.0825	935	1.0326	1003	.9790	1082	.92	12	216
130	1.1760	931	1.1329	983	1.0872	1045	1.04	11	234
140	1.2691	928	1.2312	972	1.1917	1018	1.15	11	252
150	1.3619	925	1.3284	960	1.2935	999	1.258	104	270
160	1.4544	926	1.4244	954	1.3934	986	1.362	102	288
170	1.5470	923	1.5198	948	1.4920	975	1.464	100	306
180	1.6393	922	1.6146	943	1.5895	965	1.564	99	324
190	1.7315	921	1.7089	940	1.6860	959	1.663	98	342
200	1.8236	921	1.8029	937	1.7819	954	1.7606	973	360
210	1.9157	920	1.8966	934	1.8773	949	1.8579	963	378
220	2.0077	919	1.9900	932	1.9722	945	1.9542	960	396
230	2.0996	919	2.0832	930	2.0667	942	2.0502	953	414
240	2.1915	918	2.1762	928	2.1609	939	2.1455	951	432
250	2.2833	919	2.2690	930	2.2548	939	2.2406	947	450
260	2.3752	918	2.3620	926	2.3487	934	2.3353	944	468
270	2.4670	917	2.4546	925	2.4421	934	2.4297	941	486
280	2.5587	918	2.5471	925	2.5355	932	2.5238	939	504
290	2.6505	917	2.6396	923	2.6287	930	2.6177	937	522
300	2.7422	918	2.7319	924	2.7217	930	2.7114	936	540
310	2.8340	917	2.8243	923	2.8147	928	2.8050	934	558
320	2.9257	916	2.9166	922	2.9075	927	2.8984	932	576
330	3.0173	917	3.0088	921	3.0002	926	2.9916	932	594
340	3.1090	918	3.1009	922	3.0928	927	3.0848	932	612
350	3.2008	916	3.1931	921	3.1855	925	3.1780	929	630
360	3.2924	916	3.2852	920	3.2780	925	3.2709	928	648
370	3.3840	917	3.3772	920	3.3705	924	3.3637	927	666
380	3.4757	916	3.4692	920	3.4629	923	3.4564	927	684
390	3.5673	917	3.5612	920	3.5552	924	3.5491	927	702
400	3.6590	916	3.6532	920	3.6476	922	3.6418	926	720
410	3.7506	916	3.7452	918	3.7398	922	3.7344	925	738
420	3.8422	916	3.8370	919	3.8320	922	3.8269	924	756
430	3.9338	916	3.9289	919	3.9242	921	3.9193	924	774
440	4.0254	917	4.0208	919	4.0163	922	4.0117	924	792
450	4.1171	915	4.1127	918	4.1085	920	4.1041	923	810
460	4.2086	916	4.2045	918	4.2005	921	4.1964	923	828
470	4.3002	916	4.2963	918	4.2926	920	4.2887	922	846
480	4.3918	917	4.3881	919	4.3846	921	4.3809	923	864
490	4.4835	915	4.4800	918	4.4767	919	4.4732	922	882
500	4.5750	916	4.5718	917	4.5686	920	4.5654	921	900
510	4.6666	915	4.6635	918	4.6606	919	4.6575	921	918
520	4.7581	916	4.7553	917	4.7525	919	4.7496	921	936
530	4.8497	917	4.8470	918	4.8444	920	4.8417	922	954
540	4.9414	915	4.9388	917	4.9364	919	4.9339	920	972
550	5.0329	916	5.0305	918	5.0283	917	5.0259	920	990
560	5.1245	915	5.1223	916	5.1200	919	5.1179	920	1008
570	5.2160	916	5.2139	917	5.2119	918	5.2099	920	1026
580	5.3076	916	5.3056	918	5.3037	919	5.3019	920	1044
590	5.3992	915	5.3974	917	5.3956	918	5.3939	920	1062
600	5.4907	916	5.4891	917	5.4874	918	5.4859	919	1080
610	5.5823	915	5.5808	916	5.5792	918	5.5778	919	1098
620	5.6738	917	5.6724	918	5.6710	919	5.6697	920	1116
630	5.7655	915	5.7642	916	5.7629	918	5.7617	919	1134
640	5.8570	915	5.8558	917	5.8547	917	5.8536	919	1152
650	5.9485	916	5.9475	916	5.9464	918	5.9455	918	1170
660	6.0401	915	6.0391	917	6.0382	917	6.0373	919	1188
670	6.1316	916	6.1308	917	6.1299	918	6.1292	919	1206
680	6.2232	916	6.2225	916	6.2217	918	6.2211	918	1224
690	6.3148	915	6.3141	916	6.3135	917	6.3129	918	1242
700	6.4063		6.4057		6.4052		6.4047		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
700	6.4063	915	6.4057	917	6.4052	917	6.4047	918	1260
710	6.4978	916	6.4974	916	6.4969	917	6.4965	918	1278
720	6.5894	916	6.5890	917	6.5886	918	6.5883	919	1296
730	6.6810	915	6.6807	916	6.6804	917	6.6802	918	1314
740	6.7725	916	6.7723	916	6.7721	917	6.7720	917	1332
750	6.8641	915	6.8639	916	6.8638	917	6.8637	918	1350
760	6.9556	916	6.9555	917	6.9555	917	6.9555	918	1368
770	7.0472	915	7.0472	916	7.0472	917	7.0473	918	1386
780	7.1387	916	7.1388	916	7.1389	917	7.1391	917	1404
790	7.2303	915	7.2304	916	7.2306	916	7.2308	918	1422
800	7.3218	9154	7.3220	9160	7.3222	9166	7.3226	9170	1440
900	8.2372	9153	8.2380	9158	8.2388	9163	8.2396	9168	1620
1000	9.1525	9154	9.1538	9158	9.1551	9161	9.1564	9165	1800
1100	10.0679	9153	10.0696	9156	10.0712	9159	10.0729	9162	1980
1200	10.9832	9153	10.9852	9155	10.9871	9158	10.9891	9160	2160
1300	11.8985	9153	11.9007	9155	11.9029	9157	11.9051	9159	2340
1400	12.8138	9153	12.8162	9154	12.8186	9156	12.8210	9157	2520
1500	13.7291	9152	13.7316	9154	13.7342	9155	13.7367	9157	2700
1600	14.6443	9152	14.6470	9154	14.6497	9155	14.6524	9156	2880
1700	15.5595	9154	15.5624	9154	15.5652	9156	15.5680	9157	3060
1800	16.4749	9152	16.4778	9153	16.4808	9154	16.4837	9155	3240
1900	17.3901	9152	17.3931	9154	17.3962	9154	17.3992	9155	3420
2000	18.3053	9153	18.3085	9153	18.3116	9153	18.3147	9154	3600
2100	19.2206	9152	19.2238	9152	19.2269	9154	19.2301	9155	3780
2200	20.1358	9152	20.1390	9153	20.1423	9153	20.1456	9153	3960
2300	21.0510	9152	21.0543	9153	21.0576	9153	21.0609	9154	4140
2400	21.9662	9153	21.9696	9153	21.9729	9155	21.9763	9155	4320
2500	22.8815	9152	22.8849	9153	22.8884	9152	22.8918	9153	4500
2600	23.7967	9153	23.8002	9152	23.8036	9153	23.8071	9153	4680
2700	24.7120	9152	24.7154	9153	24.7189	9153	24.7224	9153	4860
2800	25.6272	9152	25.6307	9152	25.6342	9153	25.6377	9153	5040
2900	26.5424	9152	26.5459	9153	26.5495	9152	26.5530	9153	5220
3000	27.4576		27.4612		27.4647		27.4683		5400

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 3-4. ENTHALPY OF ARGON - Cont.* $(H-E_0^0)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
200	1.7606	973	1.53	12	1.3	1			360
210	1.8579	963	1.65	12	1.4	2			378
220	1.9542	960	1.77	11	1.6	1			396
230	2.0502	953	1.88	11	1.7	1			414
240	2.1455	951	1.99	11	1.8	2			432
250	2.2406	947	2.096	106	1.95	12	1.81	13	450
260	2.3353	944	2.202	103	2.07	12	1.94	12	468
270	2.4297	941	2.305	103	2.19	10	2.06	12	486
280	2.5238	939	2.408	101	2.29	11	2.18	12	504
290	2.6177	937	2.509	101	2.40	11	2.30	12	522
300	2.7114	936	2.610	100	2.512	108	2.42	12	540
310	2.8050	934	2.710	100	2.620	106	2.54	11	558
320	2.8984	932	2.810	98	2.726	104	2.65	11	576
330	2.9916	932	2.908	98	2.830	103	2.76	10	594
340	3.0848	932	3.006	98	2.933	101	2.86	11	612
350	3.1780	929	3.104	97	3.034	101	2.97	10	630
360	3.2709	928	3.201	96	3.135	100	3.07	11	648
370	3.3637	927	3.297	97	3.235	101	3.18	10	666
380	3.4564	927	3.394	96	3.336	99	3.28	10	684
390	3.5491	927	3.490	96	3.435	98	3.38	10	702
400	3.6418	926	3.586	96	3.533	99	3.480	104	720
410	3.7344	925	3.682	96	3.632	98	3.584	102	738
420	3.8269	924	3.778	95	3.730	99	3.686	101	756
430	3.9193	924	3.873	95	3.829	97	3.787	100	774
440	4.0117	924	3.968	95	3.926	98	3.887	100	792
450	4.1041	923	4.063	94	4.024	97	3.987	99	810
460	4.1964	923	4.157	95	4.121	96	4.086	99	828
470	4.2887	922	4.252	94	4.217	97	4.185	99	846
480	4.3809	923	4.346	95	4.314	96	4.284	98	864
490	4.4732	922	4.441	94	4.410	96	4.382	98	882
500	4.5654	921	4.535	94	4.506	96	4.480	97	900
510	4.6575	921	4.629	94	4.602	96	4.577	98	918
520	4.7496	921	4.723	93	4.698	95	4.675	97	936
530	4.8417	922	4.816	94	4.793	96	4.772	97	954
540	4.9339	920	4.910	94	4.889	95	4.869	96	972
550	5.0259	920	5.004	93	4.984	95	4.965	97	990
560	5.1179	920	5.097	94	5.079	94	5.062	96	1008
570	5.2099	920	5.191	93	5.173	95	5.158	96	1026
580	5.3019	920	5.284	94	5.268	95	5.254	96	1044
590	5.3939	920	5.378	93	5.363	94	5.350	95	1062
600	5.4859	919	5.471	93	5.457	95	5.445	96	1080
610	5.5778	919	5.564	93	5.552	94	5.541	95	1098
620	5.6697	920	5.657	93	5.646	94	5.636	96	1116
630	5.7617	919	5.750	93	5.740	94	5.732	95	1134
640	5.8536	919	5.843	93	5.834	94	5.827	95	1152
650	5.9455	918	5.936	93	5.928	94	5.922	94	1170
660	6.0373	919	6.029	93	6.022	94	6.016	95	1188
670	6.1292	919	6.122	92	6.116	94	6.111	95	1206
680	6.2211	918	6.214	93	6.210	93	6.206	94	1224
690	6.3129	918	6.307	93	6.303	94	6.300	95	1242
700	6.4047		6.400		6.397		6.395		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 3-4. ENTHALPY OF ARGON - Cont.* $(H-E_0^o)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
700	6.4047	918	6.400	93	6.397	93	6.395	94	1260
710	6.4965	918	6.493	92	6.490	94	6.489	94	1278
720	6.5883	919	6.585	93	6.584	93	6.583	95	1296
730	6.6802	918	6.678	93	6.677	94	6.678	94	1314
740	6.7720	917	6.771	92	6.771	93	6.772	94	1332
750	6.8637	918	6.863	93	6.864	93	6.866	94	1350
760	6.9555	918	6.956	92	6.957	93	6.960	93	1368
770	7.0473	918	7.048	93	7.050	94	7.053	94	1386
780	7.1391	917	7.141	92	7.144	93	7.147	94	1404
790	7.2308	918	7.233	93	7.237	93	7.241	94	1422
800	7.3226	9170	7.326	923	7.330	928	7.335	933	1440
900	8.2396	9168	8.249	921	8.258	926	8.268	930	1620
1000	9.1564	9165	9.170	920	9.184	923	9.198	927	1800
1100	10.0729	9162	10.090	919	10.107	922	10.125	924	1980
1200	10.9891	9160	11.009	918	11.029	921	11.049	923	2160
1300	11.9051	9159	11.927	918	11.950	919	11.972	922	2340
1400	12.8210	9157	12.845	918	12.869	919	12.894	921	2520
1500	13.7367	9157	13.763	917	13.788	919	13.815	920	2700
1600	14.6524	9156	14.680	917	14.707	918	14.735	919	2880
1700	15.5680	9157	15.597	916	15.625	918	15.654	918	3060
1800	16.4837	9155	16.513	917	16.543	917	16.572	919	3240
1900	17.3992	9155	17.430	916	17.460	917	17.491	918	3420
2000	18.3147	9154	18.346	916	18.377	917	18.409	917	3600
2100	19.2301	9155	19.262	916	19.294	917	19.326	917	3780
2200	20.1456	9153	20.178	916	20.211	916	20.243	917	3960
2300	21.0609	9154	21.094	916	21.127	917	21.160	917	4140
2400	21.9763	9155	22.010	916	22.044	916	22.077	917	4320
2500	22.8918	9153	22.926	916	22.960	916	22.994	917	4500
2600	23.8071	9153	23.842	915	23.876	916	23.911	916	4680
2700	24.7224	9153	24.757	916	24.792	916	24.827	916	4860
2800	25.6377	9153	25.673	916	25.708	916	25.743	916	5040
2900	26.5530	9153	26.589	915	26.624	916	26.659	916	5220
3000	27.4683		27.504		27.540		27.575		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	20.4852	2384	18.1793	2392	16.7818	2417	16.2108	2444	180
110	20.7236	2176	18.4185	2180	17.0235	2199	16.4552	2217	198
120	20.9412	2001	18.6365	2006	17.2434	2018	16.6769	2031	216
130	21.1413	1853	18.8371	1856	17.4452	1866	16.8800	1875	234
140	21.3266	1726	19.0227	1727	17.6318	1735	17.0675	1743	252
150	21.4992	1613	19.1954	1615	17.8053	1620	17.2418	1626	270
160	21.6605	1516	19.3569	1518	17.9673	1522	17.4044	1527	288
170	21.8121	1429	19.5087	1430	18.1195	1434	17.5571	1438	306
180	21.9550	1352	19.6517	1353	18.2629	1356	17.7009	1359	324
190	22.0902	1282	19.7870	1283	18.3985	1285	17.8368	1287	342
200	22.2184	1220	19.9153	1220	18.5270	1223	17.9655	1225	360
210	22.3404	1163	20.0373	1164	18.6493	1166	18.0880	1167	378
220	22.4567	1112	20.1537	1111	18.7659	1113	18.2047	1115	396
230	22.5679	1064	20.2648	1065	18.8772	1065	18.3162	1067	414
240	22.6743	1020	20.3713	1020	18.9837	1022	18.4229	1023	432
250	22.7763	981	20.4733	982	19.0859	982	18.5252	983	450
260	22.8744	944	20.5715	944	19.1841	945	18.6235	946	468
270	22.9688	909	20.6659	909	19.2786	910	18.7181	911	486
280	23.0597	877	20.7568	877	19.3696	878	18.8092	878	504
290	23.1474	848	20.8445	849	19.4574	849	18.8970	850	522
300	23.2322	819	20.9294	819	19.5423	820	18.9820	820	540
310	23.3141	794	21.0113	794	19.6243	794	19.0640	795	558
320	23.3935	769	21.0907	769	19.7037	770	19.1435	770	576
330	23.4704	747	21.1676	747	19.7807	748	19.2205	748	594
340	23.5451	724	21.2423	724	19.8555	724	19.2953	725	612
350	23.6175	705	21.3147	705	19.9279	705	19.3678	706	630
360	23.6880	685	21.3852	685	19.9984	686	19.4384	685	648
370	23.7565	666	21.4537	667	20.0670	666	19.5069	667	666
380	23.8231	650	21.5204	650	20.1336	651	19.5736	650	684
390	23.8881	633	21.5854	633	20.1987	633	19.6386	634	702
400	23.9514	617	21.6487	617	20.2620	617	19.7020	618	720
410	24.0131	602	21.7104	602	20.3237	602	19.7638	602	738
420	24.0733	589	21.7706	589	20.3839	590	19.8240	589	756
430	24.1322	574	21.8295	574	20.4429	574	19.8829	575	774
440	24.1896	562	21.8869	562	20.5003	562	19.9404	562	792
450	24.2458	550	21.9431	550	20.5565	550	19.9966	550	810
460	24.3008	537	21.9981	537	50.6115	537	20.0516	538	828
470	24.3545	527	22.0518	527	20.6652	528	20.1054	527	846
480	24.4072	515	22.1045	515	20.7180	515	20.1581	515	864
490	24.4587	505	22.1560	505	20.7695	505	20.2096	506	882
500	24.5092	495	22.2065	495	20.8200	495	20.2602	495	900
510	24.5587	486	22.2560	486	20.8695	486	20.3097	486	918
520	24.6073	476	22.3046	476	20.9181	476	20.3583	476	936
530	24.6549	467	22.3522	467	20.9657	467	20.4059	468	954
540	24.7016	459	22.3989	459	21.0124	460	20.4527	459	972
550	24.7475	450	22.4448	450	21.0584	450	20.4986	450	990
560	24.7925	443	22.4898	443	21.1034	443	20.5436	443	1008
570	24.8368	435	22.5341	435	21.1477	435	20.5879	435	1026
580	24.8803	427	22.5776	427	21.1912	427	20.6314	427	1044
590	24.9230	420	22.6203	420	21.2339	420	20.6741	420	1062
600	24.9650	413	22.6623	414	21.2759	413	20.7161	414	1080
610	25.0063	407	22.7037	407	21.3172	407	20.7575	407	1098
620	25.0470	400	22.7444	400	21.3579	400	20.7982	400	1116
630	25.0870	394	22.7844	394	21.3979	394	20.8382	394	1134
640	25.1264	387	22.8238	387	21.4373	387	20.8776	387	1152
650	25.1651	382	22.8625	382	21.4760	382	20.9163	382	1170
660	25.2033	376	22.9007	376	21.5142	376	20.9545	376	1188
670	25.2409	370	22.9383	370	21.5518	371	20.9921	370	1206
680	25.2779	365	22.9753	365	21.5889	365	21.0291	365	1224
690	25.3144	360	23.0118	360	21.6254	360	21.0656	361	1242
700	25.3504		23.0478		21.6614		21.1017		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	25.3504	355	23.0478	355	21.6614	355	21.1017	355	1260
710	25.3859	349	23.0833	349	21.6969	349	21.1372	349	1278
720	25.4208	345	23.1182	345	21.7318	345	21.1721	345	1296
730	25.4553	340	23.1527	340	21.7663	340	21.2066	340	1314
740	25.4893	336	23.1867	336	21.8003	336	21.2406	336	1332
750	25.5229	331	23.2203	331	21.8339	331	21.2742	331	1350
760	25.5560	327	23.2534	327	21.8670	327	21.3073	327	1368
770	25.5887	322	23.2861	322	21.8997	322	21.3400	322	1386
780	25.6209	319	23.3183	319	21.9319	319	21.3722	319	1404
790	25.6528	314	23.3502	314	21.9638	314	21.4041	314	1422
800	25.6842	1516	23.3816	1516	21.9952	1516	21.4355	1516	1440
850	25.8358	1429	23.5332	1429	22.1468	1429	21.5871	1430	1530
900	25.9787	1352	23.6761	1352	22.2897	1352	21.7301	1352	1620
950	26.1139	1282	23.8113	1282	22.4249	1282	21.8653	1282	1710
1000	26.2421	1220	23.9395	1220	22.5531	1220	21.9935	1220	1800
1050	26.3641	1163	24.0615	1163	22.6751	1164	22.1155	1163	1890
1100	26.4804	1111	24.1778	1111	22.7915	1111	22.2318	1111	1980
1150	26.5915	1064	24.2889	1064	22.9026	1064	22.3429	1064	2070
1200	26.6979	1020	24.3953	1020	23.0090	1020	22.4493	1020	2160
1250	26.7999	981	24.4973	981	23.1110	981	22.5513	981	2250
1300	26.8980	943	24.5954	943	23.2091	943	22.6494	944	2340
1350	26.9923	910	24.6897	910	23.3034	910	22.7438	910	2430
1400	27.0833	877	24.7807	877	23.3944	877	22.8348	877	2520
1450	27.1710	847	24.8684	847	23.4821	847	22.9225	847	2610
1500	27.2557	820	24.9531	820	23.5668	820	23.0072	820	2700
1550	27.3377	794	25.0351	794	23.6488	794	23.0892	794	2790
1600	27.4171	769	25.1145	769	23.7282	769	23.1686	769	2880
1650	27.4940	747	25.1914	747	23.8051	747	23.2455	747	2970
1700	27.5687	724	25.2661	724	23.8798	724	23.3202	724	3060
1750	27.6411	705	25.3385	705	23.9522	705	23.3926	705	3150
1800	27.7116	684	25.4090	684	24.0227	684	23.4631	684	3240
1850	27.7800	667	25.4774	667	24.0911	667	23.5315	667	3330
1900	27.8467	650	25.5441	650	24.1578	650	23.5982	650	3420
1950	27.9117	633	25.6091	633	24.2228	633	23.6632	633	3510
2000	27.9750	617	25.6724	617	24.2861	617	23.7265	617	3600
2050	28.0367	602	25.7341	602	24.3478	602	23.7882	602	3690
2100	28.0969	589	25.7943	589	24.4080	589	23.8484	589	3780
2150	28.1558	574	25.8532	574	24.4669	574	23.9073	574	3870
2200	28.2132	562	25.9106	562	24.5243	562	23.9647	562	3960
2250	28.2694	550	25.9668	550	24.5805	550	24.0209	550	4050
2300	28.3244	537	26.0218	537	24.6355	537	24.0759	537	4140
2350	28.3781	527	26.0755	527	24.6892	527	24.1296	527	4230
2400	28.4308	515	26.1282	515	24.7419	515	24.1823	515	4320
2450	28.4823	505	26.1797	505	24.7934	505	24.2338	505	4410
2500	28.5328	495	26.2302	495	24.8439	495	24.2843	495	4500
2550	28.5823	486	26.2797	486	24.8934	486	24.3338	486	4590
2600	28.6309	476	26.3283	476	24.9420	476	24.3824	476	4680
2650	28.6785	467	26.3759	467	24.9896	467	24.4300	467	4770
2700	28.7252	459	26.4226	459	25.0363	459	24.4767	459	4860
2750	28.7711	450	26.4685	450	25.0822	450	24.5226	450	4950
2800	28.8161	443	26.5135	443	25.1272	443	24.5676	443	5040
2850	28.8604	435	26.5578	435	25.1715	435	24.6119	435	5130
2900	28.9039	427	26.6013	427	25.2150	427	24.6554	427	5220
2950	28.9466	420	26.6440	420	25.2577	420	24.6981	420	5310
3000	28.9886		26.6860		25.2997		24.7401		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	15.8425	2472	14.328	280	13.620	322			180
110	16.0897	2235	14.608	245	13.942	271			198
120	16.3132	2045	14.853	220	14.213	237	13.77	26	216
130	16.5177	1885	15.073	199	14.450	211	14.03	22	234
140	16.7062	1750	15.272	183	14.661	192	14.25	20	252
150	16.8812	1632	15.455	169	14.853	177	14.453	183	270
160	17.0444	1531	15.624	158	15.030	163	14.636	169	288
170	17.1975	1442	15.782	148	15.193	152	14.805	157	306
180	17.3417	1362	15.930	140	15.345	142	14.962	146	324
190	17.4779	1290	16.070	131	15.487	135	15.108	137	342
200	17.6069	1227	16.2012	1249	15.6218	1271	15.2450	1294	360
210	17.7296	1169	16.3261	1186	15.7489	1206	15.3744	1226	378
220	17.8465	1116	16.4447	1132	15.8695	1148	15.4970	1165	396
230	17.9581	1068	16.5579	1082	15.9843	1095	15.6135	1109	414
240	18.0649	1024	16.6661	1035	16.0938	1047	15.7244	1059	432
250	18.1673	984	16.7696	995	16.1985	1005	15.8303	1015	450
260	18.2657	947	16.8691	955	16.2990	965	15.9318	974	468
270	18.3604	912	16.9646	920	16.3955	926	16.0292	935	486
280	18.4516	879	17.0566	886	16.4881	894	16.1227	900	504
290	18.5395	850	17.1452	856	16.5775	862	16.2127	868	522
300	18.6245	821	17.2308	826	16.6637	832	16.2995	838	540
310	18.7066	796	17.3134	800	16.7469	805	16.3833	810	558
320	18.7862	770	17.3934	775	16.8274	779	16.4643	784	576
330	18.8632	748	17.4709	753	16.9053	757	16.5427	760	594
340	18.9380	726	17.5462	728	16.9810	732	16.6187	736	612
350	19.0106	706	17.6190	710	17.0542	713	16.6923	716	630
360	19.0812	686	17.6900	689	17.1255	692	16.7639	695	648
370	19.1498	667	17.7589	669	17.1947	672	16.8334	675	666
380	19.2165	650	17.8258	654	17.2619	656	16.9009	658	684
390	19.2815	634	17.8912	636	17.3275	638	16.9667	641	702
400	19.3449	618	17.9548	620	17.3913	622	17.0308	624	720
410	19.4067	603	18.0168	604	17.4535	607	17.0932	608	738
420	19.4670	589	18.0772	592	17.5142	593	17.1540	595	756
430	19.5259	575	18.1364	576	17.5735	578	17.2135	580	774
440	19.5834	562	18.1940	564	17.6313	565	17.2715	567	792
450	19.6396	551	18.2504	552	17.6878	554	17.3282	555	810
460	19.6947	537	18.3056	539	17.7432	540	17.3837	541	828
470	19.7484	528	18.3595	528	17.7972	530	17.4378	532	846
480	19.8012	515	18.4123	517	17.8502	518	17.4910	519	864
490	19.8527	505	18.4640	506	17.9020	507	17.5429	508	882
500	19.9032	496	18.5146	497	17.9527	498	17.5937	499	900
510	19.9528	486	18.5643	487	18.0025	488	17.6436	489	918
520	20.0014	476	18.6130	477	18.0513	478	17.6925	479	936
530	20.0490	468	18.6607	468	18.0991	469	17.7404	470	954
540	20.0958	459	18.7075	460	18.1460	461	17.7874	461	972
550	20.1417	450	18.7535	451	18.1921	452	17.8335	453	990
560	20.1867	443	18.7986	444	18.2373	444	17.8788	445	1008
570	20.2310	436	18.8430	436	18.2817	437	17.9233	438	1026
580	20.2746	427	18.8866	428	18.3254	428	17.9671	429	1044
590	20.3173	420	18.9294	421	18.3682	422	18.0100	422	1062
600	20.3593	413	18.9715	414	18.4104	414	18.0522	415	1080
610	20.4006	408	19.0129	407	18.4518	408	18.0937	408	1098
620	20.4414	400	19.0536	401	18.4926	402	18.1345	402	1116
630	20.4814	394	19.0937	395	18.5328	395	18.1747	396	1134
640	20.5208	387	19.1332	387	18.5723	388	18.2143	388	1152
650	20.5595	382	19.1719	383	18.6111	383	18.2531	384	1170
660	20.5977	376	19.2102	377	18.6494	377	18.2915	377	1188
670	20.6353	370	19.2479	370	18.6871	371	18.3292	372	1206
680	20.6723	365	19.2849	366	18.7242	366	18.3664	366	1224
690	20.7088	361	19.3215	360	18.7608	361	18.4030	361	1242
700	20.7449		19.3575		18.7969		18.4391		1260

Table 3-5. ENTROPY OF ARGON - Cont. S/R

°K	1 atm		4 atm		7 atm		10 atm		°R
700	20.7449	355	19.3575	355	18.7969	355	18.4391	356	1260
710	20.7804	349	19.3930	350	18.8324	350	18.4747	350	1278
720	20.8153	345	19.4280	345	18.8674	346	18.5097	346	1296
730	20.8498	340	19.4625	341	18.9020	341	18.5443	341	1314
740	20.8838	336	19.4966	336	18.9361	336	18.5784	337	1332
750	20.9174	331	19.5302	332	18.9697	332	18.6121	332	1350
760	20.9505	327	19.5634	327	19.0029	328	18.6453	328	1368
770	20.9832	322	19.5961	322	19.0357	322	18.6781	323	1386
780	21.0154	319	19.6283	320	19.0679	320	18.7104	320	1404
790	21.0473	314	19.6603	314	19.0999	314	18.7424	315	1422
800	21.0787	1517	19.6917	1517	19.1313	1519	18.7739	1519	1440
850	21.2304	1429	19.8434	1430	19.2832	1431	18.9258	1432	1530
900	21.3733	1352	19.9864	1353	19.4263	1353	19.0690	1354	1620
950	21.5085	1283	20.1217	1283	19.5616	1284	19.2044	1284	1710
1000	21.6368	1220	20.2500	1221	19.6900	1221	19.3328	1222	1800
1050	21.7588	1163	20.3721	1163	19.8121	1164	19.4550	1165	1890
1100	21.8751	1111	20.4884	1112	19.9285	1112	19.5715	1112	1980
1150	21.9862	1064	20.5996	1064	20.0397	1065	19.6827	1065	2070
1200	22.0926	1020	20.7060	1021	20.1462	1020	19.7892	1021	2160
1250	22.1946	981	20.8081	981	20.2482	982	19.8913	982	2250
1300	22.2927	943	20.9062	943	20.3464	944	19.9895	944	2340
1350	22.3870	910	21.0005	911	20.4408	910	20.0839	910	2430
1400	22.4780	877	21.0916	877	20.5318	877	20.1749	878	2520
1450	22.5657	848	21.1793	847	20.6195	848	20.2627	847	2610
1500	22.6505	820	21.2640	820	20.7043	820	20.3474	821	2700
1550	22.7325	794	21.3460	794	20.7863	794	20.4295	794	2790
1600	22.8119	769	21.4254	770	20.8657	770	20.5089	769	2880
1650	22.8888	747	21.5024	747	20.9427	747	20.5858	748	2970
1700	22.9635	724	21.5771	724	21.0174	724	20.6606	724	3060
1750	23.0359	705	21.6495	705	21.0898	705	20.7330	705	3150
1800	23.1064	684	21.7200	684	21.1603	684	20.8035	685	3240
1850	23.1748	667	21.7884	667	21.2287	668	20.8720	667	3330
1900	23.2415	650	21.8551	650	21.2955	650	20.9387	650	3420
1950	23.3065	633	21.9201	633	21.3605	633	21.0037	633	3510
2000	23.3698	617	21.9834	617	21.4238	617	21.0670	617	3600
2050	23.4315	602	22.0451	602	21.4855	602	21.1287	603	3690
2100	23.4917	589	22.1053	589	21.5457	589	21.1890	589	3780
2150	23.5506	574	22.1642	575	21.6046	574	21.2479	574	3870
2200	23.6080	562	22.2217	562	21.6620	562	21.3053	562	3960
2250	23.6642	550	22.2779	550	21.7182	550	21.3615	550	4050
2300	23.7192	537	22.3329	537	21.7732	537	21.4165	537	4140
2350	23.7729	527	22.3866	527	21.8269	528	21.4702	527	4230
2400	23.8256	515	22.4393	515	21.8797	515	21.5229	515	4320
2450	23.8771	505	22.4908	505	21.9312	505	21.5744	505	4410
2500	23.9276	495	22.5413	495	21.9817	495	21.6249	495	4500
2550	23.9771	486	22.5908	486	22.0312	486	21.6744	487	4590
2600	24.0257	476	22.6394	476	22.0798	476	21.7231	476	4680
2650	24.0733	467	22.6870	467	22.1274	467	21.7707	467	4770
2700	24.1200	459	22.7337	459	22.1741	459	21.8174	459	4860
2750	24.1659	450	22.7796	450	22.2200	450	21.8633	450	4950
2800	24.2109	443	22.8246	443	22.2650	443	21.9083	443	5040
2850	24.2552	435	22.8689	435	22.3093	435	21.9526	435	5130
2900	24.2987	427	22.9124	427	22.3528	427	21.9961	427	5220
2950	24.3414	420	22.9551	420	22.3955	420	22.0388	420	5310
3000	24.3834		22.9971		22.4375		22.0808		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
120	13.77	26	11.1	6					216
130	14.03	22	11.7	5					234
140	14.25	20	12.2	3					252
150	14.453	183	12.5	3	11.2	5			270
160	14.636	169	12.8	3	11.7	3			288
170	14.805	157	13.1	2	12.0	3			306
180	14.962	146	13.3	2	12.3	3	11.6	3	324
190	15.108	137	13.5	1	12.6	2	11.9	3	342
200	15.2450	1294	13.64	16	12.83	19	12.2	2	360
210	15.3744	1226	13.80	14	13.02	18	12.4	2	378
220	15.4970	1165	13.94	14	13.20	16	12.6	2	396
230	15.6135	1109	14.08	13	13.36	15	12.8	2	414
240	15.7244	1059	14.21	12	13.51	13	13.0	2	432
250	15.8303	1015	14.326	113	13.64	13	13.18	13	450
260	15.9318	974	14.439	107	13.77	12	13.31	13	468
270	16.0292	935	14.546	102	13.889	111	13.44	12	486
280	16.1227	900	14.6479	975	14.000	106	13.56	11	504
290	16.2127	868	14.7454	935	14.106	101	13.67	11	522
300	16.2995	838	14.8389	895	14.2067	952	13.781	101	540
310	16.3833	810	14.9284	862	14.3019	916	13.882	97	558
320	16.4643	784	15.0146	830	14.3935	881	13.979	94	576
330	16.5427	760	15.0976	801	14.4816	841	14.073	85	594
340	16.6187	736	15.1777	771	14.5657	802	14.158	78	612
350	16.6923	716	15.2548	748	14.6459	778	14.236	82	630
360	16.7639	695	15.3296	724	14.7237	752	14.318	79	648
370	16.8334	675	15.4020	702	14.7989	729	14.397	76	666
380	16.9009	658	15.4722	684	14.8718	711	14.473	74	684
390	16.9667	641	15.5406	661	14.9429	689	14.547	71	702
400	17.0308	624	15.6067	646	15.0118	652	14.618	68	720
410	17.0932	608	15.6713	628	15.0770	647	14.686	67	738
420	17.1540	595	15.7341	613	15.1417	631	14.753	65	756
430	17.2135	580	15.7954	596	15.2048	613	14.818	63	774
440	17.2715	567	15.8550	583	15.2661	598	14.881	61	792
450	17.3282	555	15.9133	569	15.3259	583	14.9422	597	810
460	17.3837	541	15.9702	555	15.3842	568	15.0019	581	828
470	17.4378	532	16.0257	544	15.4410	558	15.0600	570	846
480	17.4910	519	16.0801	530	15.4968	540	15.1170	551	864
490	17.5429	508	16.1331	519	15.5508	529	15.1721	540	882
500	17.5937	499	16.1850	509	15.6037	520	15.2261	529	900
510	17.6436	489	16.2359	499	15.6557	507	15.2790	516	918
520	17.6925	479	16.2858	488	15.7064	496	15.3306	505	936
530	17.7404	470	16.3346	478	15.7560	488	15.3811	495	954
540	17.7874	461	16.3824	469	15.8048	476	15.4306	483	972
550	17.8335	453	16.4293	460	15.8524	467	15.4789	475	990
560	17.8788	445	16.4753	452	15.8991	459	15.5264	465	1008
570	17.9233	438	16.5205	444	15.9450	450	15.5729	457	1026
580	17.9671	429	16.5649	435	15.9900	441	15.6186	446	1044
590	18.0100	422	16.6084	429	16.0341	435	15.6632	440	1062
600	18.0522	415	16.6513	420	16.0776	425	15.7072	431	1080
610	18.0937	408	16.6933	414	16.1201	419	15.7503	424	1098
620	18.1345	402	16.7347	407	16.1620	411	15.7927	416	1116
630	18.1747	396	16.7754	400	16.2031	406	15.8343	409	1134
640	18.2143	388	16.8154	394	16.2437	397	15.8752	402	1152
650	18.2531	384	16.8548	387	16.2834	392	15.9154	395	1170
660	18.2915	377	16.8935	382	16.3226	386	15.9549	391	1188
670	18.3292	372	16.9317	374	16.3612	378	15.9940	382	1206
680	18.3664	366	16.9691	371	16.3990	374	16.0322	377	1224
690	18.4030	361	17.0062	364	16.4364	368	16.0699	371	1242
700	18.4391		17.0426		16.4732		16.1070		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	18.4391	356	17.0426	360	16.4732	362	16.1070	366	1260
710	18.4747	350	17.0786	354	16.5094	358	16.1436	360	1278
720	18.5097	346	17.1140	349	16.5452	351	16.1796	354	1296
730	18.5443	341	17.1489	344	16.5803	347	16.2150	350	1314
740	18.5784	337	17.1833	340	16.6150	343	16.2500	345	1332
750	18.6121	332	17.2173	334	16.6493	336	16.2845	339	1350
760	18.6453	328	17.2507	330	16.6829	333	16.3184	336	1368
770	18.6781	323	17.2837	325	16.7162	329	16.3520	330	1386
780	18.7104	320	17.3162	323	16.7491	324	16.3850	327	1404
790	18.7424	315	17.3485	317	16.7815	319	16.4177	321	1422
800	18.7739	1519	17.3802	1530	16.8134	1539	16.4498	1549	1440
850	18.9258	1432	17.5332	1440	16.9673	1449	16.6047	1456	1530
900	19.0690	1354	17.6772	1361	17.1122	1368	16.7503	1375	1620
950	19.2044	1284	17.8133	1290	17.2490	1295	16.8878	1301	1710
1000	19.3328	1222	17.9423	1227	17.3785	1232	17.0179	1236	1800
1050	19.4550	1165	18.0650	1169	17.5017	1173	17.1415	1177	1890
1100	19.5715	1112	18.1819	1116	17.6190	1120	17.2592	1123	1980
1150	19.6827	1065	18.2935	1068	17.7310	1071	17.3715	1074	2070
1200	19.7892	1021	18.4003	1023	17.8381	1026	17.4789	1029	2160
1250	19.8913	982	18.5026	984	17.9407	987	17.5818	989	2250
1300	19.9895	944	18.6010	946	18.0394	948	17.6807	950	2340
1350	20.0839	910	18.6956	913	18.1342	914	17.7757	916	2430
1400	20.1749	878	18.7869	879	18.2256	882	17.8673	883	2520
1450	20.2627	847	18.8748	849	18.3138	850	17.9556	852	2610
1500	20.3474	821	18.9597	822	18.3988	822	18.0408	823	2700
1550	20.4295	794	19.0419	795	18.4810	797	18.1231	798	2790
1600	20.5089	769	19.1214	771	18.5607	771	18.2029	773	2880
1650	20.5858	748	19.1985	748	18.6378	750	18.2802	750	2970
1700	20.6606	724	19.2733	725	18.7128	726	18.3552	727	3060
1750	20.7330	705	19.3458	707	18.7854	707	18.4279	708	3150
1800	20.8035	685	19.4165	685	18.8561	686	18.4987	687	3240
1850	20.8720	667	19.4850	668	18.9247	668	18.5674	669	3330
1900	20.9387	650	19.5518	650	18.9915	652	18.6343	652	3420
1950	21.0037	633	19.6168	634	19.0567	634	18.6995	635	3510
2000	21.0670	617	19.6802	618	19.1201	618	18.7630	617	3600
2050	21.1287	603	19.7420	602	19.1819	603	18.8247	604	3690
2100	21.1890	589	19.8022	590	19.2422	590	18.8851	590	3780
2150	21.2479	574	19.8612	575	19.3012	575	18.9441	576	3870
2200	21.3053	562	19.9187	562	19.3587	563	19.0017	563	3960
2250	21.3615	550	19.9749	550	19.4150	551	19.0580	551	4050
2300	21.4165	537	20.0299	538	19.4701	537	19.1131	538	4140
2350	21.4702	527	20.0837	527	19.5238	528	19.1669	528	4230
2400	21.5229	515	20.1364	516	19.5766	516	19.2197	516	4320
2450	21.5744	505	20.1880	505	19.6282	505	19.2713	505	4410
2500	21.6249	495	20.2385	495	19.6787	495	19.3218	496	4500
2550	21.6744	487	20.2880	486	19.7282	487	19.3714	487	4590
2600	21.7231	476	20.3366	477	19.7769	477	19.4201	477	4680
2650	21.7707	467	20.3843	467	19.8246	467	19.4678	467	4770
2700	21.8174	459	20.4310	459	19.8713	460	19.5145	460	4860
2750	21.8633	450	20.4769	450	19.9173	450	19.5605	450	4950
2800	21.9083	443	20.5219	444	19.9623	443	19.6055	444	5040
2850	21.9526	435	20.5663	435	20.0066	435	19.6499	435	5130
2900	21.9961	427	20.6098	427	20.0501	428	19.6934	428	5220
2950	22.0388	420	20.6525	420	20.0929	420	19.7362	420	5310
3000	22.0808		20.6945		20.1349		19.7782		5400

Table 3-6. SPECIFIC-HEAT RATIO OF ARGON $\gamma = C_p/C_v$

°K	.01 atm	.1 atm		°R
100	1.667	1.670	-1	180
120	1.667	1.669	-1	216
140	1.667	1.668		252
160	1.667	1.668		288
180	1.667	1.668	-1	324

At higher temperatures in this pressure range, the values of the specific-heat ratio are constant (1. 667).

Table 3-6. SPECIFIC-HEAT RATIO OF ARGON - Cont. $\gamma = C_p/C_v$

°K	1 atm		4 atm		7 atm		10 atm		°R
100	1.706	-14	1.858	-88					180
120	1.692	- 8	1.770	-30	1.890	-80			216
140	1.684	- 5	1.740	-20	1.810	-47			252
160	1.679	- 3	1.720	-13	1.763	-25			288
180	1.676	- 2	1.707	-10	1.738	-16	1.781	-33	324
200	1.674	- 1	1.697	- 6	1.722	-12	1.748	-18	360
220	1.673	- 1	1.691	- 4	1.710	- 8	1.730	-12	396
240	1.672	- 1	1.687	- 4	1.702	- 6	1.718	- 9	432
260	1.671	- 1	1.683	- 2	1.696	- 5	1.709	- 7	468
280	1.670		1.681	- 2	1.691	- 3	1.702	- 5	504
300	1.670	- 1	1.679	- 2	1.688	- 3	1.697	- 4	540
320	1.669		1.677	- 1	1.685	- 3	1.693	- 4	576
340	1.669		1.676	- 1	1.682	- 1	1.689	- 3	612
360	1.669	- 1	1.675	- 1	1.681	- 2	1.686	- 2	648
380	1.668		1.674	- 1	1.679	- 2	1.684	- 2	684
400	1.668		1.673	- 1	1.677	- 1	1.682	- 1	720
420	1.668		1.672		1.676	- 1	1.681	- 2	756
440	1.668		1.672	- 1	1.675	- 1	1.679	- 1	792
460	1.668		1.671		1.674		1.678	- 1	828
480	1.668		1.671	- 1	1.674	- 1	1.677	- 1	864
500	1.668		1.670		1.673	- 1	1.676	- 1	900
520	1.668		1.670		1.672		1.675	- 1	936
540	1.668	- 1	1.670	- 1	1.672		1.674		972
560	1.667		1.669		1.672	- 1	1.674	- 1	1008
580	1.667		1.669		1.671		1.673		1044
600	1.667		1.669		1.671	- 1	1.673	- 1	1080
620	1.667		1.669		1.670		1.672		1116
640	1.667		1.669		1.670		1.672	- 1	1152
660	1.667		1.669	- 1	1.670		1.671		1188
680	1.667		1.668		1.670		1.671		1224
700	1.667		1.668		1.670	- 1	1.671		1260
720	1.667		1.668		1.669		1.671	- 1	1296
740	1.667		1.668		1.669		1.670		1332
760	1.667		1.668		1.669		1.670		1368
780	1.667		1.668		1.669		1.670	- 1	1404
800	1.667		1.668	- 1	1.669	- 1	1.669		1440
900	1.667		1.667		1.668		1.669	- 1	1620
1000	1.667		1.667		1.668		1.668		1800
1100	1.667		1.667		1.668	- 1	1.668		1980
1200	1.667		1.667		1.667		1.668	- 1	2160
1300	1.667		1.667		1.667		1.667		2340

At higher temperatures in this pressure range, the values of the specific-heat ratio are constant.

Table 3-6. SPECIFIC-HEAT RATIO OF ARGON - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
180	1.781	-33							324
200	1.748	-18							360
220	1.730	-12							396
240	1.718	- 9	1.89	-4	2.08	-7	2.3	-1	432
260	1.709	- 7	1.85	-4	2.01	-7	2.17	-11	468
280	1.702	- 5	1.81	-2	1.94	-7	2.06	-10	504
300	1.697	- 4	1.79	-2	1.87	-3	1.96	- 5	540
320	1.693	- 4	1.77	-1	1.84	-1	1.91	- 2	576
340	1.689	- 3	1.76	-1	1.83	-2	1.89	- 4	612
360	1.686	- 2	1.75	-1	1.81	-2	1.85	- 2	648
380	1.684	- 2	1.74	-1	1.79	-3	1.83	- 3	684
400	1.682	- 1	1.726	- 4	1.76		1.80		720
420	1.681	- 2	1.722	- 6	1.76	-1	1.80	- 1	756
440	1.679	- 1	1.716	- 5	1.751	- 9	1.786	- 13	792
460	1.678	- 1	1.711	- 5	1.742	- 7	1.773	- 11	828
480	1.677	- 1	1.706	- 3	1.735	- 7	1.762	- 9	864
500	1.676	- 1	1.703	- 4	1.728	- 6	1.753	- 9	900
520	1.675	- 1	1.699	- 3	1.722	- 5	1.744	- 7	936
540	1.674		1.696	- 2	1.717	- 4	1.737	- 5	972
560	1.674	- 1	1.694	- 2	1.713	- 4	1.732	- 6	1008
580	1.673		1.692	- 2	1.709	- 3	1.726	- 5	1044
600	1.673	- 1	1.690	- 2	1.706	- 3	1.721	- 4	1080
620	1.672		1.688	- 2	1.703	- 3	1.717	- 4	1116
640	1.672	- 1	1.686	- 1	1.700	- 2	1.713	- 3	1152
660	1.671		1.685	- 2	1.698	- 3	1.710	- 4	1188
680	1.671		1.683	- 1	1.695	- 2	1.706	- 2	1224
700	1.671		1.682	- 1	1.693	- 2	1.704	- 3	1260
720	1.671	- 1	1.681		1.691	- 2	1.701	- 2	1296
740	1.670		1.681	- 2	1.689	- 1	1.699	- 2	1332
760	1.670		1.679		1.688	- 1	1.697	- 2	1368
780	1.670	- 1	1.679	- 1	1.687	- 2	1.695	- 2	1404
800	1.669		1.678	- 3	1.685	- 4	1.693	- 7	1440
900	1.669	- 1	1.675	- 2	1.681	- 4	1.686	- 6	1620
1000	1.668		1.673	- 2	1.677	- 3	1.680	- 2	1800
1100	1.668		1.671	- 1	1.674	- 1	1.678	- 3	1980
1200	1.668	- 1	1.670	- 1	1.673	- 2	1.675	- 2	2160
1300	1.667		1.669		1.671	- 1	1.673	- 1	2340
1400	1.667		1.669	- 1	1.670	- 1	1.672	- 1	2520
1500	1.667		1.668		1.669		1.671	- 1	2700
1600	1.667		1.668		1.669	- 1	1.670	- 2	2880
1700	1.667		1.668	- 1	1.668		1.668		3060
1800	1.667		1.667		1.668	- 1	1.668		3240
1900	1.667		1.667		1.667		1.668	- 1	3420
2000	1.667		1.667		1.667		1.667		3600
2100	1.667		1.667		1.667		1.667		3780
2200	1.667		1.667		1.667		1.667		3960
2300	1.667		1.667		1.667		1.667		4140
2400	1.667		1.667		1.667		1.667		4320
2500	1.667		1.667		1.667		1.667		4500
2600	1.667		1.667		1.667		1.667		4680
2700	1.667		1.667		1.667		1.667		4860
2800	1.667		1.667		1.667		1.667		5040
2900	1.667		1.667		1.667		1.667		5220
3000	1.667		1.667		1.667		1.667		5400

Table 3-7. SOUND VELOCITY AT LOW FREQUENCY IN ARGON a/a_0

°K	.01 atm		.1 atm		1 atm		°R
100	.605	58	.604	58	.599	60	180
120	.663	53	.662	53	.659	54	216
140	.716	49	.715	50	.713	51	252
160	.765	47	.765	47	.764	47	288
180	.812	44	.812	43	.811	44	324
200	.856	41	.855	42	.855	42	360
220	.897	40	.897	40	.897	40	396
240	.937	39	.937	38	.937	39	432
260	.976	36	.975	37	.976	36	468
280	1.012	36	1.012	36	1.012	36	504
300	1.048	34	1.048	34	1.048	34	540
320	1.082	34	1.082	34	1.082	34	576
340	1.116	32	1.116	32	1.116	32	612
360	1.148	31	1.148	31	1.148	32	648
380	1.179	31	1.179	31	1.180	30	684
400	1.210	30	1.210	30	1.210	30	720
420	1.240	29	1.240	29	1.240	30	756
440	1.269	29	1.269	29	1.270	28	792
460	1.298	28	1.298	28	1.298	28	828
480	1.326	27	1.326	27	1.326	28	864
500	1.353	27	1.353	27	1.354	26	900
520	1.380	26	1.380	26	1.380	27	936
540	1.406	26	1.406	26	1.407	25	972
560	1.432	25	1.432	25	1.432	25	1008
580	1.457	25	1.457	25	1.457	25	1044
600	1.482	25	1.482	25	1.482	25	1080
620	1.507	24	1.507	24	1.507	24	1116
640	1.531	23	1.531	23	1.531	24	1152
660	1.554	24	1.554	24	1.555	23	1188
680	1.578	23	1.578	23	1.578	23	1224
700	1.601	22	1.601	22	1.601	23	1260
720	1.623	23	1.623	23	1.624	22	1296
740	1.646	22	1.646	22	1.646	22	1332
760	1.668	22	1.668	22	1.668	22	1368
780	1.690	21	1.690	21	1.690	22	1404
800	1.711	104	1.711	104	1.712	104	1440
900	1.815	98	1.815	98	1.816	98	1620
1000	1.913	94	1.913	94	1.914	93	1800
1100	2.007	89	2.007	89	2.007	89	1980
1200	2.096	85	2.096	85	2.096	86	2160
1300	2.181	83	2.181	83	2.182	82	2340
1400	2.264	79	2.264	79	2.264	80	2520
1500	2.343	77	2.343	77	2.344	77	2700
1600	2.420	75	2.420	75	2.421	74	2880
1700	2.495	72	2.495	72	2.495	72	3060
1800	2.567	70	2.567	70	2.567	71	3240
1900	2.637	69	2.637	69	2.638	68	3420
2000	2.706	67	2.706	67	2.706	67	3600
2100	2.773	65	2.773	65	2.773	65	3780
2200	2.838	64	2.838	64	2.838	64	3960
2300	2.902	62	2.902	62	2.902	62	4140
2400	2.964	61	2.964	61	2.964	61	4320
2500	3.025	60	3.025	60	3.025	60	4500
2600	3.085	59	3.085	59	3.085	59	4680
2700	3.144	57	3.144	57	3.144	58	4860
2800	3.201	57	3.201	57	3.202	56	5040
2900	3.258	56	3.258	56	3.258	56	5220
3000	3.314		3.314		3.314		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.599	60	.578	67					180
120	.659	54	.645	61	.63	7			216
140	.713	51	.706	53	.70	5			252
160	.764	47	.759	49	.754	51			288
180	.811	44	.808	45	.805	46	.80	5	324
200	.855	42	.853	43	.851	44	.850	44	360
220	.897	40	.896	41	.895	42	.894	42	396
240	.937	39	.937	39	.937	39	.936	40	432
260	.976	36	.976	37	.976	38	.976	38	468
280	1.012	36	1.013	36	1.014	36	1.014	37	504
300	1.048	34	1.049	35	1.050	35	1.051	35	540
320	1.082	34	1.084	33	1.085	33	1.086	34	576
340	1.116	32	1.117	33	1.118	33	1.120	32	612
360	1.148	32	1.150	31	1.151	32	1.152	32	648
380	1.180	30	1.181	31	1.183	30	1.184	31	684
400	1.210	30	1.212	30	1.213	31	1.215	31	720
420	1.240	30	1.242	29	1.244	29	1.246	29	756
440	1.270	28	1.271	29	1.273	28	1.275	29	792
460	1.298	28	1.300	28	1.301	29	1.304	28	828
480	1.326	28	1.328	27	1.330	27	1.332	27	864
500	1.354	26	1.355	27	1.357	27	1.359	27	900
520	1.380	27	1.382	26	1.384	26	1.386	26	936
540	1.407	25	1.408	26	1.410	26	1.412	26	972
560	1.432	25	1.434	25	1.436	25	1.438	25	1008
580	1.457	25	1.459	25	1.461	25	1.463	25	1044
600	1.482	25	1.484	25	1.486	25	1.488	25	1080
620	1.507	24	1.509	24	1.511	24	1.513	24	1116
640	1.531	24	1.533	24	1.535	24	1.537	23	1152
660	1.555	23	1.557	23	1.559	23	1.560	24	1188
680	1.578	23	1.580	23	1.582	23	1.584	23	1224
700	1.601	23	1.603	23	1.605	23	1.607	23	1260
720	1.624	22	1.626	22	1.628	22	1.630	22	1296
740	1.646	22	1.648	22	1.650	22	1.652	22	1332
760	1.668	22	1.670	22	1.672	22	1.674	22	1368
780	1.690	22	1.692	22	1.694	22	1.696	21	1404
800	1.712	104	1.714	103	1.716	103	1.717	104	1440
900	1.816	98	1.817	98	1.819	98	1.821	98	1620
1000	1.914	93	1.915	94	1.917	94	1.919	93	1800
1100	2.007	89	2.009	89	2.011	88	2.012	89	1980
1200	2.096	86	2.098	85	2.099	86	2.101	85	2160
1300	2.182	82	2.183	83	2.185	82	2.186	83	2340
1400	2.264	80	2.266	79	2.267	80	2.269	79	2520
1500	2.344	77	2.345	77	2.347	76	2.348	77	2700
1600	2.421	74	2.422	74	2.423	75	2.425	74	2880
1700	2.495	72	2.496	73	2.498	72	2.499	72	3060
1800	2.567	71	2.569	70	2.570	70	2.571	71	3240
1900	2.638	68	2.639	69	2.640	69	2.642	68	3420
2000	2.706	67	2.708	66	2.709	67	2.710	67	3600
2100	2.773	65	2.774	65	2.776	65	2.777	65	3780
2200	2.838	64	2.839	64	2.841	63	2.842	64	3960
2300	2.902	62	2.903	63	2.904	63	2.906	62	4140
2400	2.964	61	2.966	61	2.967	61	2.968	61	4320
2500	3.025	60	3.027	60	3.028	60	3.029	60	4500
2600	3.085	59	3.087	58	3.088	58	3.089	59	4680
2700	3.144	58	3.145	58	3.146	58	3.148	57	4860
2800	3.202	56	3.203	57	3.204	57	3.205	57	5040
2900	3.258	56	3.260	55	3.261	55	3.262	55	5220
3000	3.314		3.315		3.316		3.317		5400

Table 3-7. SOUND VELOCITY AT LOW FREQUENCY IN ARGON - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
180	.80	5							324
200	.850	44							360
220	.894	42							396
240	.936	40	.94	4	.95	5	.98	4	432
260	.976	38	.98	4	1.00	4	1.02	4	468
280	1.014	37	1.02	4	1.04	4	1.06	4	504
300	1.051	35	1.06	4	1.08	4	1.10	4	540
320	1.086	34	1.10	4	1.12	4	1.14	4	576
340	1.120	32	1.14	3	1.16	3	1.18	3	612
360	1.152	32	1.17	3	1.19	3	1.21	3	648
380	1.184	31	1.20	3	1.22	3	1.24	3	684
400	1.215	31	1.232	32	1.25	3	1.27	4	720
420	1.246	29	1.264	30	1.284	30	1.31	3	756
440	1.275	29	1.294	29	1.314	29	1.34	3	792
460	1.304	28	1.323	28	1.343	29	1.366	28	828
480	1.332	27	1.351	28	1.372	27	1.394	28	864
500	1.359	27	1.379	26	1.399	27	1.422	26	900
520	1.386	26	1.405	27	1.426	26	1.448	26	936
540	1.412	26	1.432	26	1.452	26	1.474	26	972
560	1.438	25	1.458	25	1.478	26	1.500	25	1008
580	1.463	25	1.483	25	1.504	25	1.525	25	1044
600	1.488	25	1.508	25	1.529	24	1.550	24	1080
620	1.513	24	1.533	24	1.553	24	1.574	24	1116
640	1.537	23	1.557	23	1.577	24	1.598	24	1152
660	1.560	24	1.580	23	1.601	22	1.622	22	1188
680	1.584	23	1.603	23	1.623	23	1.644	23	1224
700	1.607	23	1.626	23	1.646	23	1.667	22	1260
720	1.630	22	1.649	23	1.669	22	1.689	22	1296
740	1.652	22	1.672	21	1.691	22	1.711	22	1332
760	1.674	22	1.693	22	1.713	22	1.733	21	1368
780	1.696	21	1.715	21	1.735	20	1.754	21	1404
800	1.717	104	1.736	104	1.755	103	1.775	102	1440
900	1.821	98	1.840	97	1.858	97	1.877	95	1620
1000	1.919	93	1.937	92	1.955	91	1.972	92	1800
1100	2.012	89	2.029	89	2.046	89	2.064	87	1980
1200	2.101	85	2.118	85	2.135	84	2.151	84	2160
1300	2.186	83	2.203	81	2.219	81	2.235	81	2340
1400	2.269	79	2.284	79	2.300	78	2.316	78	2520
1500	2.348	77	2.363	77	2.378	76	2.394	75	2700
1600	2.425	74	2.440	74	2.454	73	2.469	72	2880
1700	2.499	72	2.514	71	2.527	72	2.541	72	3060
1800	2.571	71	2.585	70	2.599	69	2.613	69	3240
1900	2.642	68	2.655	68	2.668	68	2.682	67	3420
2000	2.710	67	2.723	67	2.736	66	2.749	66	3600
2100	2.777	65	2.790	64	2.802	65	2.815	64	3780
2200	2.842	64	2.854	64	2.867	63	2.879	62	3960
2300	2.906	62	2.918	61	2.930	62	2.941	62	4140
2400	2.968	61	2.979	61	2.992	60	3.003	61	4320
2500	3.029	60	3.040	60	3.052	59	3.064	59	4500
2600	3.089	59	3.100	58	3.111	58	3.123	58	4680
2700	3.148	57	3.158	57	3.169	58	3.181	57	4860
2800	3.205	57	3.215	57	3.227	56	3.238	56	5040
2900	3.262	55	3.272	55	3.283	55	3.294	55	5220
3000	3.317		3.327		3.338		3.349		5400

Table 3-8. VISCOSITY OF ARGON AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R
50	.1965	371	90
60	.2336	382	108
70	.2718	390	126
80	.3108	398	144
90	.3506	399	162
100	.3905	397	180
110	.4302	394	198
120	.4696	386	216
130	.5082	386	234
140	.5468	381	252
150	.5849	372	270
160	.6221	367	288
170	.6588	358	306
180	.6946	353	324
190	.7299	348	342
200	.7647	344	360
210	.7991	324	378
220	.8315	334	396
230	.8649	325	414
240	.8974	315	432
250	.9289	311	450
260	.9600	306	468
270	.9906	301	486
280	1.0207	297	504
290	1.0504	291	522
300	1.0795	287	540
310	1.1082	283	558
320	1.1365	277	576
330	1.1642	278	594
340	1.1920	27	612
350	1.219	26	630
360	1.245	27	648
370	1.272	26	666
380	1.298	25	684
390	1.323	26	702
400	1.349	25	720
410	1.374	24	738
420	1.398	25	756
430	1.423	25	774
440	1.448	24	792
450	1.472	24	810
460	1.496	23	828
470	1.519	23	846
480	1.542	23	864
490	1.565	23	882
500	1.588	23	900
510	1.611	22	918
520	1.633	22	936
530	1.655	22	954
540	1.677	22	972
550	1.699		990

°K	η/η_0		°R
550	1.699	22	990
560	1.721	21	1008
570	1.742	22	1026
580	1.764	21	1044
590	1.785	21	1062
600	1.806	21	1080
610	1.827	20	1098
620	1.847	21	1116
630	1.868	20	1134
640	1.888	20	1152
650	1.908	20	1170
660	1.928	20	1188
670	1.948	20	1206
680	1.968	20	1224
690	1.988	20	1242
700	2.008	20	1260
710	2.028	19	1278
720	2.047	20	1296
730	2.067	19	1314
740	2.086	19	1332
750	2.105	18	1350
760	2.123	19	1368
770	2.142	19	1386
780	2.161	19	1404
790	2.180	18	1422
800	2.198	18	1440
810	2.216	19	1458
820	2.235	19	1476
830	2.254	18	1494
840	2.272	18	1512
850	2.290	18	1530
860	2.308	18	1548
870	2.326	18	1566
880	2.344	17	1584
890	2.361	18	1602
900	2.379	17	1620
910	2.396	18	1638
920	2.414	17	1656
930	2.431	18	1674
940	2.449	17	1692
950	2.466	17	1710
960	2.483	17	1728
970	2.500	17	1746
980	2.517	17	1764
990	2.534	17	1782
1000	2.551	17	1800
1010	2.568	17	1818
1020	2.585	17	1836
1030	2.602	16	1854
1040	2.618	16	1872
1050	2.634		1890

°K	η/η_0		°R
1050	2.634	17	1890
1060	2.651	17	1908
1070	2.668	16	1926
1080	2.684	17	1944
1090	2.701	16	1962
1100	2.717	16	1980
1110	2.733	17	1998
1120	2.750	16	2016
1130	2.766	16	2034
1140	2.782	16	2052
1150	2.798	16	2070
1160	2.814	16	2088
1170	2.830	15	2106
1180	2.845	16	2124
1190	2.861	15	2142
1200	2.876	16	2160
1210	2.892	16	2178
1220	2.908	16	2196
1230	2.924	16	2214
1240	2.940	16	2232
1250	2.956	15	2250
1260	2.971	16	2268
1270	2.987	15	2286
1280	3.002	16	2304
1290	3.018	16	2322
1300	3.034	15	2340
1310	3.049	16	2358
1320	3.065	16	2376
1330	3.081	16	2394
1340	3.097	15	2412
1350	3.112	15	2430
1360	3.127	15	2448
1370	3.142	15	2466
1380	3.157	15	2484
1390	3.172	14	2502
1400	3.186	15	2520
1410	3.201	15	2538
1420	3.216	14	2556
1430	3.230	15	2574
1440	3.245	14	2592
1450	3.259	15	2610
1460	3.274	14	2628
1470	3.288	15	2646
1480	3.303	14	2664
1490	3.317	14	2682
1500	3.331		2700

Table 3-9. THERMAL CONDUCTIVITY OF ARGON AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
90	.361	33	162
100	.394	44	180
110	.438	38	198
120	.476	38	216
130	.514	36	234
140	.550	36	252
150	.586	36	270
160	.622	36	288
170	.658	35	306
180	.693	35	324
190	.728	35	342
200	.763	33	360
210	.796	34	378
220	.830	33	396
230	.863	33	414
240	.896	31	432
250	.927	31	450
260	.958	33	468
270	.991	31	486
280	1.022	30	504
290	1.052	29	522
300	1.081	30	540
310	1.111	29	558
320	1.140	29	576
330	1.169	29	594
340	1.198	29	612
350	1.227	28	630
360	1.255	28	648
370	1.283	27	666
380	1.310	27	684
390	1.337	26	702
400	1.363	27	720
410	1.390	26	738
420	1.416	26	756
430	1.442	25	774
440	1.467	26	792
450	1.493	25	810
460	1.518	25	828
470	1.543	25	846
480	1.568	24	864
490	1.592	24	882
500	1.616	24	900
510	1.640	24	918
520	1.664	24	936
530	1.688	23	954
540	1.711	23	972
550	1.734	23	990
560	1.757	23	1008
570	1.780	22	1026
580	1.802	22	1044
590	1.824	22	1062
600	1.846	211	1080
700	2.057	197	1260
800	2.254	184	1440
900	2.438	173	1620
1000	2.611	164	1800
1100	2.775	157	1980
1200	2.932	149	2160
1300	3.081	144	2340
1400	3.225	137	2520
1500	3.362		2700

Table 3-10. PRANDTL NUMBER OF ARGON AT ATMOSPHERIC PRESSURE $\eta C_p/k$

°K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		°R
100	.700	-14	.789	-11	.888	-6	.836	-8	180
110	.686	-3	.778	-3	.882	-1	.828	-2	198
120	.683	-1	.775	-1	.881	-1	.826		216
130	.682	1	.774	1	.880	1	.826		234
140	.683	1	.775	1	.881		.826	1	252
150	.684	-1	.776	-1	.881		.827	-1	270
160	.683		.775		.881		.826		288
170	.683		.775		.881		.826		306
180	.683		.775		.881		.826		324
190	.683		.775		.881		.826		342
200	.683		.775		.881		.826		360
210	.683	-2	.775	-1	.881	-1	.826	-1	378
220	.681		.774		.880		.825		396
230	.681	-1	.774		.880	-1	.825		414
240	.680		.774		.879		.825		432
250	.680	-1	.774	-1	.879		.825	-1	450
260	.679	-1	.773	-1	.879	-1	.824		468
270	.678	-1	.772	-1	.878		.824	-1	486
280	.677		.771		.878		.823		504
290	.677		.771		.878		.823		522
300	.677	-1	.771	-1	.878		.823	-1	540
310	.676	-1	.770		.878	-1	.822		558
320	.675		.770		.877		.822		576
330	.675	-1	.770	-1	.877		.822	-1	594
340	.674	-1	.769	-1	.877	-1	.821	-1	612
350	.673	-1	.768	-1	.876		.820		630
360	.672		.767		.876		.820		648
370	.672	-1	.767	-1	.876	-1	.820	-1	666
380	.671		.766		.875		.819		684
390	.671		.766		.875		.819		702
400	.671	-1	.766		.875		.819		720
420	.670	-1	.766	-1	.875		.819	-1	756
440	.669	-1	.765	-1	.875	-1	.818	-1	792
460	.668	-2	.764	-1	.874	-1	.817	-1	828
480	.666		.763		.873		.816		864
500	.666	-1	.763	-1	.873		.816	-1	900
520	.665	-1	.762	-1	.873	-1	.815		936
540	.664	-1	.761	-1	.872		.815	-1	972
560	.663		.760		.872		.814		1008
580	.663	-1	.760		.872		.814		1044
600	.662	-1	.760	-1	.872	-1	.814	-1	1080
700	.661	-1	.759	-1	.871		.813	-1	1260
800	.660	1	.758	1	.871		.812	1	1440
900	.661		.759		.871		.813		1620
1000	.661	2	.759	1	.871	1	.813	1	1800
1100	.663	1	.760	1	.872		.814	1	1980
1200	.664	3	.761	2	.872	2	.815	2	2160
1300	.667	2	.763	2	.874	1	.817	1	2340
1400	.669	2	.765	1	.875		.818	1	2520
1500	.671		.766		.875		.819		2700

Table 3-11. VAPOR PRESSURE OF ARGON

Remarks	T	P	P	P	T
	°K	m Hg	atm	psia	°R
Triple point - - - - - - -	83.78	.5168	.6800	9.993	150.80
Normal boiling point- - -	87.29	.7600	1.000	14.696	157.12
Critical point- - - - - -	150.$_{65}$	36.$_{45}$	48.0	705.	271.$_{17}$
Solid- - - - - - - - - - -	65	.021	.028	.40	117.
	70	.058	.076	1.12	126.
	75	.141	.185	2.72	135.
	80	.306	.402	5.91	144.
Liquid- - - - - - - - - -	85	.593	.780	11.46	153.
	90	1.004	1.321	19.41	162.
	95	1.617	2.13	31.3	171.
	100	2.46	3.23	47.5	180.
	105	3.56	4.69	68.9	189.
	110	5.01	6.59	96.9	198.
	115	6.84	9.00	132.3	207.
	120	9.11	11.98	176.1	216.
	125	11.86	15.61	229.	225.
	130	15.19	19.99	294.	234.
	135	19.15	25.2	370.	243.
	140	23.8	31.3	461.	252.
	145	29.3	38.5	566.	261.
	150	35.6	46.8	688.	270.

Table 3-11/a. VAPOR PRESSURE OF LIQUID ARGON.

200/T	T	Log $_{10}$P (atm)*		P	T	360/T
°K^{-1}	°K			atm	°R	°R^{-1}
2.4	83.33	(9.810 - 10)**	174	(.646)	150.00	2.4
2.3	86.96	9.984 - 10	176	.964	156.52	2.3
2.2	90.91	.160	177	1.45	163.64	2.2
2.1	95.24	.337	172	2.17	171.43	2.1
2.0	100.00	.509	170	3.23	180.00	2.0
1.9	105.26	.679	171	4.78	189.47	1.9
1.8	111.11	.850	171	7.08	200.00	1.8
1.7	117.65	1.021	172	10.5	211.76	1.7
1.6	125.00	1.193	175	15.61	225.00	1.6
1.5	133.33	1.368	179	23.3	240.00	1.5
1.4	142.86	1.547	185	35.2	257.14	1.4
1.3	153.85	(1.732)		(54.0)	276.92	1.3

*Tabulated values in this column are for interpolation with respect to reciprocal temperature.

** Figures in parentheses are extrapolated to permit interpolation to the critical point and triple point.

Table 3-11/b. CONSTANTS FOR LOG$_{10}$P (SOLID) = A - B/T

Units of P	A	Units of T	B
mm Hg	7.5344	°K	403.91
atm	4.6536	°R	727.04
psia	5.8208		

Table 3-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR ARGON

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)}{RT_0}$*		$\frac{S^\circ}{R}$		°R
10	2.5000	.0915	915	10.1240	17328	18
20		.1830	916	11.8568	10137	36
30		.2746	915	12.8705	7192	54
40		.3661	915	13.5897	5579	72
50		.4576	915	14.1476	4558	90
60		.5491	916	14.6034	3853	108
70		.6407	915	14.9887	3339	126
80		.7322	915	15.3226	2944	144
90		.8237	915	15.6170	2634	162
100		.9152	915	15.8804	2383	180
110		1.0067	916	16.1187	2175	198
120		1.0983	915	16.3362	2001	216
130		1.1898	915	16.5363	1853	234
140		1.2813	915	16.7216	1725	252
150		1.3728	915	16.8941	1613	270
160		1.4643	916	17.0554	1516	288
170		1.5559	915	17.2070	1429	306
180		1.6474	915	17.3499	1352	324
190		1.7389	915	17.4851	1282	342
200		1.8304	916	17.6133	1220	360
210		1.9220	915	17.7353	1163	378
220		2.0135	915	17.8516	1111	396
230		2.1050	915	17.9627	1064	414
240		2.1965	915	18.0691	1020	432
250		2.2880	916	18.1711	981	450
260		2.3796	915	18.2692	944	468
270		2.4711	915	18.3636	909	486
280		2.5626	915	18.4545	877	504
290		2.6541	915	18.5422	848	522
300		2.7456	916	18.6270	819	540
310		2.8372	915	18.7089	794	558
320		2.9287	915	18.7883	769	576
330		3.0202	915	18.8652	747	594
340		3.1117	916	18.9399	724	612
350		3.2033	915	19.0123	705	630
360		3.2948	915	19.0828	685	648
370		3.3863	915	19.1513	666	666
380		3.4778	915	19.2179	650	684
390		3.5693	916	19.2829	633	702
400		3.6609	915	19.3462	617	720
410		3.7524	915	19.4079	602	738
420		3.8439	915	19.4681	589	756
430		3.9354	915	19.5270	574	774
440		4.0269	916	19.5844	562	792
450		4.1185	915	19.6406	550	810
460		4.2100	915	19.6956	537	828
470		4.3015	915	19.7493	527	846
480		4.3930	916	19.8020	515	864
490		4.4846	915	19.8535	505	882
500		4.5761	915	19.9040	495	900
510		4.6676	915	19.9535	486	918
520		4.7591	915	20.0021	476	936
530		4.8506	916	20.0497	467	954
540		4.9422	915	20.0964	459	972
550		5.0337	915	20.1423	450	990
560		5.1252	915	20.1873	443	1008
570		5.2167	915	20.2316	435	1026
580		5.3082	916	20.2751	427	1044
590		5.3998	915	20.3178	420	1062
600	2.5000	5.4913		20.3598		1080

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	C_p°/R	$(H^\circ - E_0^\circ)^*/RT_0$		S°/R		°R
600	2.5000	5.4913	915	20.3598	413	1080
610		5.5828	915	20.4011	407	1098
620		5.6743	916	20.4418	400	1116
630		5.7659	915	20.4818	394	1134
640		5.8574	915	20.5212	387	1152
650		5.9489	915	20.5599	382	1170
660		6.0404	915	20.5981	376	1188
670		6.1319	916	20.6357	370	1206
680		6.2235	915	20.6727	365	1224
690		6.3150	915	20.7092	360	1242
700		6.4065	915	20.7452	355	1260
710		6.4980	915	20.7807	349	1278
720		6.5895	916	20.8156	345	1296
730		6.6811	915	20.8501	340	1314
740		6.7726	915	20.8841	336	1332
750		6.8641	915	20.9177	331	1350
760		6.9556	916	20.9508	327	1368
770		7.0472	915	20.9835	322	1386
780		7.1387	915	21.0157	319	1404
790		7.2302	915	21.0476	314	1422
800		7.3217	4576	21.0790	1516	1440
850		7.7793	4576	21.2306	1429	1530
900		8.2369	4576	21.3735	1352	1620
950		8.6945	4576	21.5087	1282	1710
1000		9.1521	4577	21.6369	1220	1800
1050		9.6098	4576	21.7589	1163	1890
1100		10.0674	4576	21.8752	1111	1980
1150		10.5250	4576	21.9863	1064	2070
1200		10.9826	4576	22.0927	1020	2160
1250		11.4402	4576	22.1947	981	2250
1300		11.8978	4576	22.2928	943	2340
1350		12.3554	4576	22.3871	910	2430
1400		12.8130	4576	22.4781	877	2520
1450		13.2706	4576	22.5658	847	2610
1500		13.7282	4576	22.6505	820	2700
1550		14.1858	4576	22.7325	794	2790
1600		14.6434	4576	22.8119	769	2880
1650		15.1010	4576	22.8888	747	2970
1700		15.5586	4577	22.9635	724	3060
1750		16.0163	4576	23.0359	705	3150
1800		16.4739	4576	23.1064	684	3240
1850		16.9315	4576	23.1748	667	3330
1900		17.3891	4576	23.2415	650	3420
1950		17.8467	4576	23.3065	633	3510
2000		18.3043	4576	23.3698	617	3600
2050		18.7619	4576	23.4315	602	3690
2100		19.2195	4576	23.4917	589	3780
2150		19.6771	4576	23.5506	574	3870
2200		20.1347	4576	23.6080	562	3960
2250		20.5923	4576	23.6642	550	4050
2300		21.0499	4576	23.7192	537	4140
2350		21.5075	4576	23.7729	527	4230
2400		21.9651	4577	23.8256	515	4320
2450		22.4228	4576	23.8771	505	4410
2500		22.8804	4576	23.9276	495	4500
2550		23.3380	4576	23.9771	486	4590
2600		23.7956	4576	24.0257	476	4680
2650		24.2532	4576	24.0733	467	4770
2700		24.7108	4576	24.1200	459	4860
2750		25.1684	4576	24.1659	450	4950
2800	2.5000	25.6260		24.2109		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 3-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR ARGON - Cont.

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		°R
2800	2.5000	25.6260	4576	24.2109	443	5040
2850		26.0836	4576	24.2552	435	5130
2900		26.5412	4576	24.2987	427	5220
2950		26.9988	4576	24.3414	420	5310
3000		27.4564	4576	24.3834	413	5400
3050		27.9140	4577	24.4247	407	5490
3100		28.3717	4576	24.4654	400	5580
3150		28.8293	4576	24.5054	394	5670
3200		29.2869	4576	24.5448	387	5760
3250		29.7445	4576	24.5835	382	5850
3300		30.2021	4576	24.6217	376	5940
3350		30.6597	4576	24.6593	370	6030
3400		31.1173	4576	24.6963	365	6120
3450		31.5749	4576	24.7328	360	6210
3500		32.0325	4576	24.7688	355	6300
3550		32.4901	4576	24.8043	349	6390
3600		32.9477	4576	24.8392	345	6480
3650		33.4053	4576	24.8737	340	6570
3700		33.8629	4576	24.9077	336	6660
3750		34.3205	4577	24.9413	331	6750
3800		34.7782	4576	24.9744	327	6840
3850		35.2358	4576	25.0071	322	6930
3900		35.6934	4576	25.0393	319	7020
3950		36.1510	4576	25.0712	314	7110
4000		36.6086	4576	25.1026	311	7200
4050		37.0662	4576	25.1337	307	7290
4100		37.5238	4576	25.1644	303	7380
4150		37.9814	4576	25.1947	299	7470
4200		38.4390	4576	25.2246	296	7560
4250		38.8966	4576	25.2542	292	7650
4300		39.3542	4576	25.2834	289	7740
4350		39.8118	4576	25.3123	286	7830
4400		40.2694	4576	25.3409	282	7920
4450		40.7270	4577	25.3691	280	8010
4500		41.1847	4576	25.3971	276	8100
4550		41.6423	4576	25.4247	273	8190
4600		42.0999	4576	25.4520	271	8280
4650		42.5575	4576	25.4791	267	8370
4700		43.0151	4576	25.5058	264	8460
4750		43.4727	4576	25.5322	262	8550
4800		43.9303	4576	25.5584	259	8640
4850		44.3879	4576	25.5843	257	8730
4900		44.8455	4576	25.6100	254	8820
4950		45.3031	4576	25.6354	251	8910
5000	2.5000	45.7607		25.6605		9000

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 3-13. COEFFICIENTS FOR THE EQUATION OF STATE FOR ARGON

$$Z = \frac{PV}{RT} = 1 + B_1P + C_1P^2 + D_1P^3 + E_1P^4 + F_1P^5$$

T	B_1	$C_1 \times 10^3$	$D_1 \times 10^9$	$E_1 \times 10^{11}$	$F_1 \times 10^{13}$
°K	atm^{-1} *	atm^{-2}	atm^{-3}	atm^{-4}	atm^{-5}
80	-.(1)3919	-1.82			
90	-.(1)2836	-.885			
100	-.(1)2127	-.4677			
110	-.(1)1640	-.2634			
120	-.(1)1292	-.1555			
130	-.(1)1036	-.(1)9513 *			
140	-.(2)8432	-.(1)5973			
150	-.(2)6938	-.(1)3816			
160	-.(2)5765	-.(1)2463			
170	-.(2)4830	-.(1)1595			
180	-.(2)4072	-.(1)1025	-29.40	-2.02	+0.01
190	-.(2)3453	-.(2)646	+20.00	-3.65	0.86
200	-.(2)2941	-.(2)391	28.47	-5.16	1.58
210	-.(2)2515	-.(2)219	31.97	-6.25	2.06
220	-.(2)2156	-.(2)101	33.24	-6.98	2.39
230	-.(2)1851	-.(3)21	31.56	-7.43	2.40
240	-.(2)1592	+.(3)33	27.62	-7.69	2.25
250	-.(2)1370	.(3)69	23.66	-7.76	2.03
260	-.(2)1179	.(3)93	20.12	-7.80	1.80
270	-.(2)1012	.(2)107	17.47	-7.75	1.60
280	-.(3)868	.(2)116	15.45	-7.63	1.50
290	-.(3)742	.(2)119	13.53	-7.24	1.45
300	-.(3)631	.(2)120	11.61	-6.60	1.40
310	-.(3)534	.(2)119	9.68	-5.74	1.24
320	-.(3)448	.(2)116	7.81	-4.54	0.94
330	-.(3)372	.(2)113	5.95	-3.21	0.51
340	-.(3)304	.(2)109	4.09	-1.90	0.12
350	-.(3)244	.(2)104	2.75	-0.87	0.02
360	-.(3)190	.(3)99	1.88	-0.41	0
370	-.(3)142	.(3)94	1.40	-0.30	
380	-.(4)99	.(3)90	1.06	-0.29	
390	-.(4)61	.(3)85	0.75	-0.22	
400	-.(4)26	.(3)81	0.42	-0.10	
410	+.(5)5	.(3)76	0	0	
420	+.(4)33	.(3)72			
430	.(4)58	.(3)68			
440	.(4)81	.(3)64			
450	.(3)101	.(3)61			
460	.(3)120	.(3)57			
470	.(3)136	.(3)54			
480	.(3)152	.(3)51			
490	.(3)165	.(3)49			
500	.(3)178	.(3)46			
510	.(3)189	.(3)43			
520	.(3)199	.(3)41			
530	.(3)208	.(3)39			
540	.(3)217	.(3)37			
550	.(3)224	.(3)35			
560	.(3)231	.(3)33			
570	.(3)237	.(3)31			
580	.(3)242	.(3)30			
590	.(3)247	.(3)28			
600	.(3)252	.(3)27			
650	.(3)268	.(3)21			
700	.(3)276	.(3)16			
750	.(3)279	.(3)13			
800	.(3)278	.(3)10			
850	.(3)276	.(4)8			
900	.(3)272	.(4)7			
950	.(3)267	.(4)5			
1000	.(3)261	.(4)4			

T	B_1	$C_1 \times 10^3$
°K	atm^{-1}	atm^{-2}
1200	+.(3)237	+.(4)2
1400	.(3)213	0
1600	.(3)193	
1800	.(3)175	
2000	.(3)159	
2200	.(3)146	
2400	.(3)135	
2600	.(3)125	
2800	.(3)116	
3000	.(3)108	
3200	.(3)102	
3400	.(4)96	
3600	.(4)90	
3800	.(4)85	
4000	.(4)81	
4200	.(4)77	
4400	.(4)73	
4600	.(4)70	
4800	.(4)66	
5000	.(4)63	

*Numbers in parentheses indicate the number of zeros immediately to the right of the decimal point.

Table 3-14. A COMPARISON OF EXPERIMENTAL AND CALCULATED SECOND VIRIAL COEFFICIENTS, B, FOR ARGON**

	Experimental *								Calculated
T	a	b	c	d	e	f	g	h	NBS
°K					cm^3/mole				
80						-227.89	-278.7		-257.3
90						-179.31	-217.4		-209.5
100						-150.66	-178.6		-174.5
110						-130.96	-150.9		-148.0
125						-109.02	-120.7		-118.5
150						- 82.38	- 85.51		- 85.40
151.92	-82.52								- 83.41
152.89	-82.14								- 82.43
153.93	-81.17								- 81.40
156.51	-79.00								- 78.90
157.27	-79.25								- 78.19
159.33	-75.67								- 76.29
163.25	-72.22								- 72.85
170.62	-65.07								- 66.89
173.16		-64.32							- 64.98
186.07	-53.83								- 56.22
200.00						- 48.35	- 44.55		- 48.27
215.43	-37.02								- 40.88
223.16		-37.79							- 37.61
250.00						- 28.21	- 23.06		- 28.10
273.16	-16.55	-22.08		-21.45	-21.12			-22.6	- 21.62
293.55	-12.54								- 16.88
298.16			-16.34	-15.75	-15.48				- 15.91
323.16		-11.02	-11.48	-11.24	-11.05				- 11.20
348.16			- 7.49	- 7.25	- 7.14				- 7.28
373.16		- 4.29	- 4.10	- 4.00	- 3.89			- 4.9	- 3.92
398.16			- .72	- 1.18	- 1.08				- 1.06
423.16		+ 1.16	+ 2.18	+ 1.38	+ 1.42				+ 1.42
447.16			3.71						3.50
473.16		4.67							5.49
573.16		11.22							11.23
673.16		15.29							15.03

* a Kamerlingh Onnes and Crommelin [1] from PVT data.
b Holborn and Schultze and Holborn and Otto [3, 38, 39, 40] from PVT data.
c Tanner and Masson [4] from PVT data.
d Michels, et al., [6] from PVT data fitted to a third degree series.
e Michels, et al., [6] from P VT data fitted to a sixth degree series.
f Van Itterbeek and Van Paemel [8] from sound velocity data and Holborn's B.
g Van Itterbeek and Van Paemel [8] from sound velocity data and Onnes B.
h Oishi [5] from PVT data.

**This coefficient appears in the equation $PV/RT = 1 + B/V + C/V^2 + D/V^3$.

Table 3-15. A COMPARISON OF EXPERIMENTAL AND CALCULATED THIRD, C, AND FOURTH, D, VIRIAL COEFFICIENTS FOR ARGON**

	Experimental *							Calculated	
	a	b		c	d	e		NBS	
T	C	C	Dx10^5	C	C	C	Dx10^5	C	Dx10^5
°K	$\frac{cm^6}{mole^2}$	$\frac{cm^6}{mole^2}$	$\frac{cm^9}{mole^3}$	$\frac{cm^6}{mole^2}$	$\frac{cm^6}{mole^2}$	$\frac{cm^6}{mole^2}$	$\frac{cm^9}{mole^3}$	$\frac{cm^6}{mole^2}$	$\frac{cm^9}{mole^3}$
151.92	+2141.7							1509.6	
152.89	2240.5							1507.3	
153.93	2058.0							1504.7	
156.51	2241.0							1496.8	
157.27	2388.4							1494.0	
159.33	2029.4							1486.4	
163.25	2155.2							1469.5	
170.62	1829.8							1432.8	
173.16		+ 888.9	+ 3.6					1419.5	
186.07	1564.5							1349.1	
215.43	1042.0							1204.7	
223.16		1752.9	-0.9					1172.7	
273.16	2.45	1676.3			+1270.1	+1053.20	+0.26	1021.8	+1.4
293.56	309.39							981.2	
298.16				+1464.2	1157.4	1990.5	0.22	973.2	1.2
323.16		1186.4		1263.9	1129.4	1016.3	0.095	936.6	1.1
348.16				1141.6	1039.9	959.0	0.099	908.6	0.5
373.16		1120.51		1029.4	1003.5	918.0	0.12	886.8	0.3
398.16				822.4	967.4	876.9	0.14	869.5	0.1
423.16		967.1		704.5	884.0	832.6	0.16	855.7	0.01
447.16				835.0				844.7	
473.16		991.0						835.0	
573.16		609.9						808.5	

*a Kamerlingh Onnes and Crommelin [1] from PVT data.
b Holborn and Schultze and Holborn and Otto [3, 38, 39, 40] from PVT data.
c Tanner and Masson [4] from PVT data.
d Michels, et al., [6] from PVT data fitted to a third degree series.
e Michels, et al., [6] from PVT data fitted to a sixth degree series.

**These coefficients appear in the equation $PV/RT = 1 + B/V + C/V^2 + D/V^3$.

CHAPTER 4

THE THERMODYNAMIC PROPERTIES OF CARBON DIOXIDE

Several compilations of thermodynamic properties of carbon dioxide are to be found in the literature [1 - 11]. They differ considerably from the present series in range and in the list of properties tabulated. In the present work, an equation of state has been derived from experimental heat-capacity measurements and data of state and has been used to calculate tables of the compressibility factor and density of carbon dioxide gas from near-saturation conditions to 1500°K and 100 atmospheres. Over these same ranges, quantities derived from the equation of state have been combined with new thermodynamic functions for the ideal gas to obtain tables of heat capacity, enthalpy, entropy, heat-capacity ratio, and sound velocity at low frequency for the real gas. A full discussion of the method of fitting the data and of other details of the calculation of the derived thermodynamic properties is to be found in a report by Masi [12].

The Correlation of the Experimental Data

The PVT relationships of carbon dioxide have been investigated over rather extensive ranges in four different laboratories. The first measurements were made by Amagat [15] and published in 1891. Probably the most accurate data obtained to date are those of Michels and Michels [8], which covered the range 0° to 150°C and 16 to 3000 atmospheres. The work of MacCormack and Schneider [11] in 1950 covered the range 0° to 600°C and up to 50 atmospheres. The recent density measurements of Kennedy [16], from 0° to 1000°C and from 25 to 500 bars, became available too late for inclusion in the present correlation. Low-pressure measurements of the density of carbon dioxide gas have been made by several investigators, among whom are Maass and Mennie [17], Cooper and Maass [18], Cawood and Patterson [19], and Schäfer [20].

The heat capacity of carbon dioxide gas has been measured by a number of workers. The early work was reviewed by Partington and Shilling [21], and much of it need not be mentioned here. Swann [22] first adapted the flow calorimeter method to carbon dioxide gas and measured the heat capacity (C_p) at 1 atmosphere from 20° to 100°C. Scheel and Heuse [23], using a different flow calorimeter, made determinations at 1 atmosphere at -75° and 20°C. Michels and Strijland [24] reported measurments of C_v of the compressed gas and liquid from 20° to 40°C and from 60 to 190 atmospheres. Masi and Petkof [25] have made measurements with an accuracy of within 0.1 percent at several low pressures over the temperature range -30° to 90°C. Schrock [26] has reported measurements of C_p made with a flow calorimeter, from 100° to 1000°F and to a pressure of 1000 pounds per square inch. Among the indirect measurements of heat capacity, those for which the adiabatic expansion method was used may be mentioned here. Eucken and Von Lüde [27] have reported values at 1 atmosphere from 0° to 270°C, and Kistiakowsky and Rice [28] have made measurements at 1 atmosphere at 300.06°, 331.86°, and 367.72°K.

The velocity of sound in carbon dioxide has been measured a number of times; the early work has been reviewed by Partington and Shilling [21]. King and Partington [29] and Sherratt and Griffiths [30] made measurements at 1 atmosphere to 1000°C; and Hubbard and Hodge [31], using ultrasonic frequencies, measured the sound velocity at 27°C from 1 to 60 atmospheres. These workers, using one or another equation of state, converted their results to the heat-capacity ratio, $\gamma = C_p/C_v$. Measurements of γ have been made in two other ways. Katz, Leverton, and Woods [32] used the "resonance" method to obtain values from 1.2 to 8.2 atmospheres at 29.9°C. Koehler [33] used a method of self-sustained oscillations to obtain a value at 25°C and 1 atmosphere.

The Joule-Thomson coefficient of carbon dioxide has been measured by Kester [34], Jenkin and Pye [35], Jenkin and Shorthose [36], Burnett [37], and Roebuck, Murrell, and Miller [38]. The results of the last-named authors essentially supersede all of the earlier ones, since they are generally more precise and cover a larger range (-55° to 300°C and 1 to 200 atmospheres).

The values of the ideal-gas thermodynamic properties tabulated here and used for obtaining the real-gas properties are the newly calculated values of Woolley [13], which are based on improved spectroscopic data.

The tables of viscosity and thermal conductivity were computed from empirical equations (see summary tables 1-B and 1-C), whose coefficients were fitted to the existing experimental data.

The tabulated values of the vapor pressure were obtained by interpolation in the tables of Meyers and Van Dusen [14]. The critical constants of carbon dioxide have been reported by many investigators, among whom are Plank and Kuprianoff [1], Meyers and Van Dusen [14], and Michels, Blaisse, and Michels [7]. From Michel's data, T_c = 304.20°K and P_c = 72.85 atmospheres. Meyers and Van Dusen [14] observed the triple point temperature of carbon dioxide as 216.56°K and the pressure as 5.112 atmospheres. From the same source, the normal sublimation temperature is 194.65°K.

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density, the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0 result, in general, from the correlating equations which were fitted to represent the experimental data over as wide a range as possible. Values for these quantities are given in various units in table 4-b. The value of ρ_0 for carbon dioxide as given, 1.9771 $g\ell^{-1}$, is within the range of the experimental determinations [17, 18, 19, 54-60] and quite close to that of Cawood and Patterson [19]. Comparisons of the adopted values of η_0 and k_0 with the experimental data at standard conditions can be made by examining figures 4d and 4e, respectively. The value of a_0 for carbon dioxide as given, 257.0 m/sec, is within the range of the experimental determinations at standard conditions [53, 61-67], though slightly below their mean of 259.3 m/sec.

The reliability of the tables of thermodynamic functions of the real gas is affected by the accuracy of the available experimental data, the method of correlation, and the extrapolations. Some idea of the closeness of fit of experimental data can be gained from the deviation plots. Figure 4a gives a comparison of the modern experimental values of Z with those of table 4-1. It is seen that the discrepancy is usually within ± 0.1 percent but that larger departures occur. It is believed that the tables of the compressibility factor and of density are reliable to within 0.2 percent in the least accurate region, which is above 10 atmospheres and below 500°K. In other regions, the tables are thought to be accurate to one in the next to last place tabulated. The tabulated densities (table 4-2) have corresponding uncertainties.

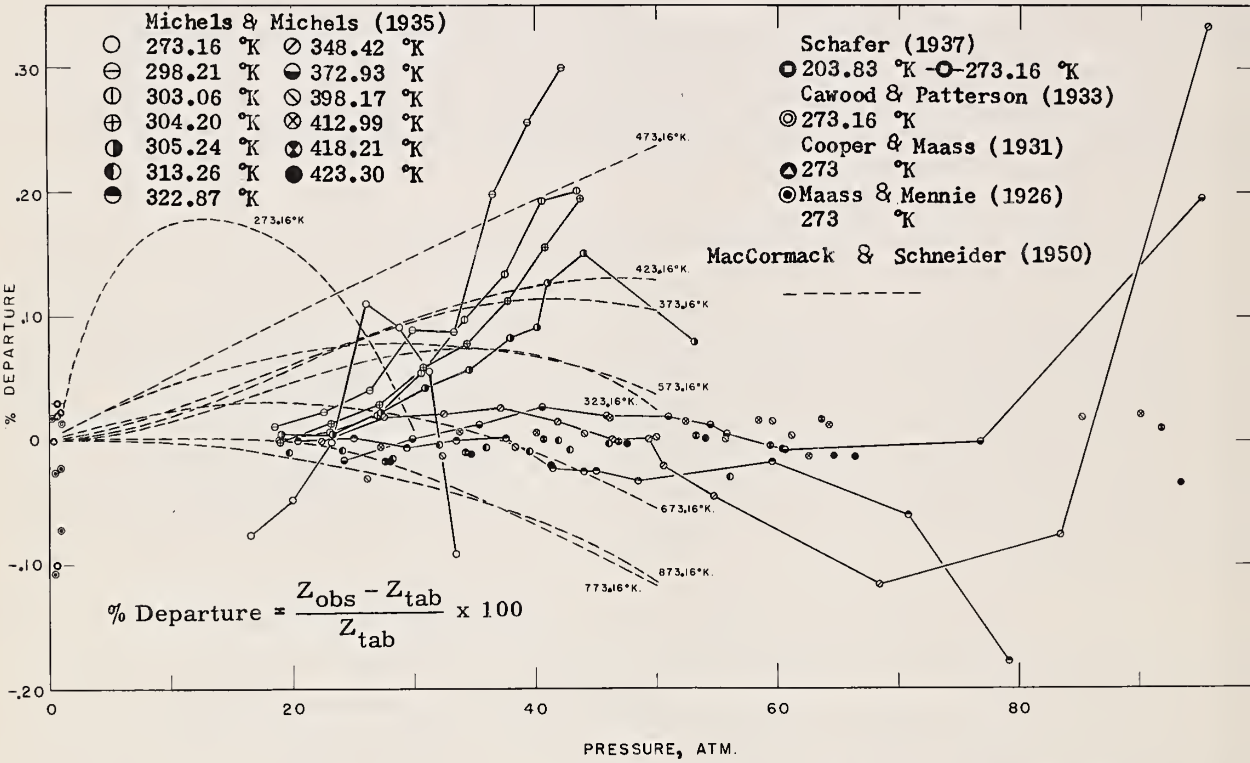

Figure 4a. Departures of experimental compressibility factors from the tabulated values for carbon dioxide (table 4-1)

Figure 4b shows the percent departures of direct measurements of heat capacity at 1 atmosphere from the values of table 4-3. Experimental values at higher pressures are generally too scattered to warrant a comparison curve; however, a comparison with the recent data of Shrock [2 showed an average deviation of about 1.5 percent.

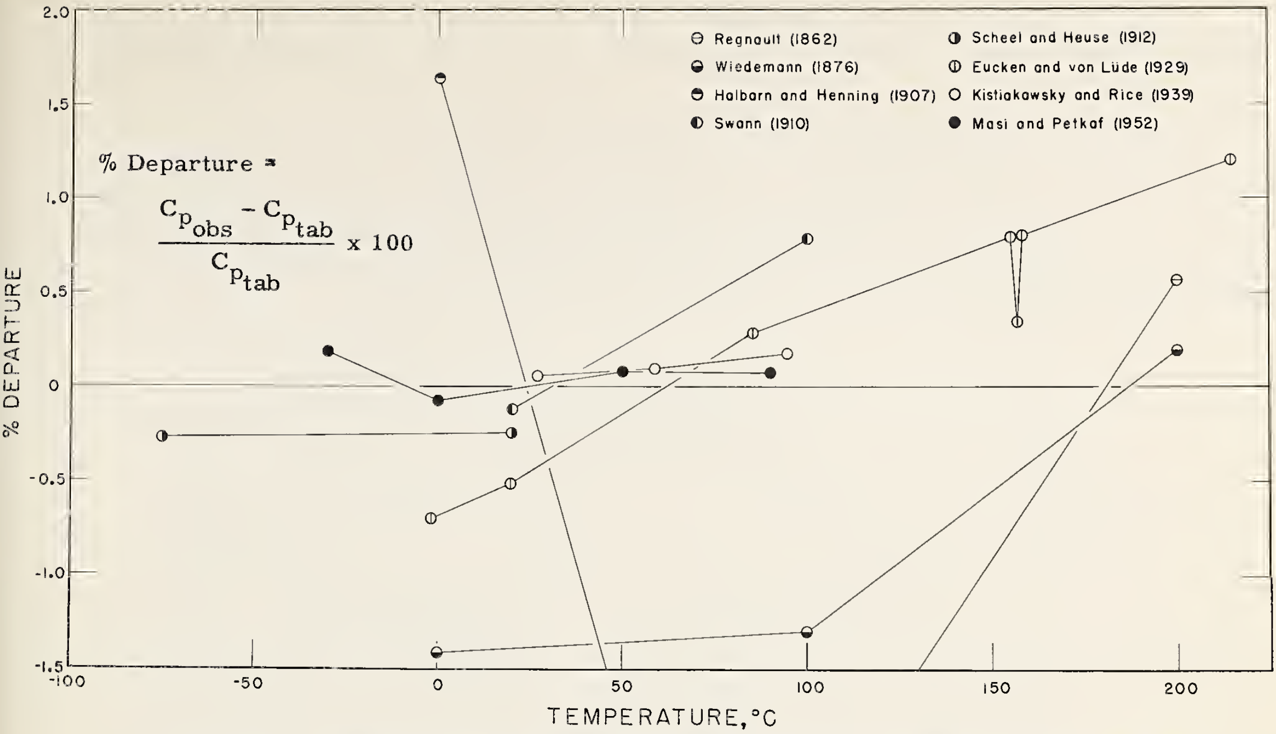

Figure 4b. Departures of the experimental C_p at one atmosphere from the tabulated values for carbon dioxide (table 4-3)

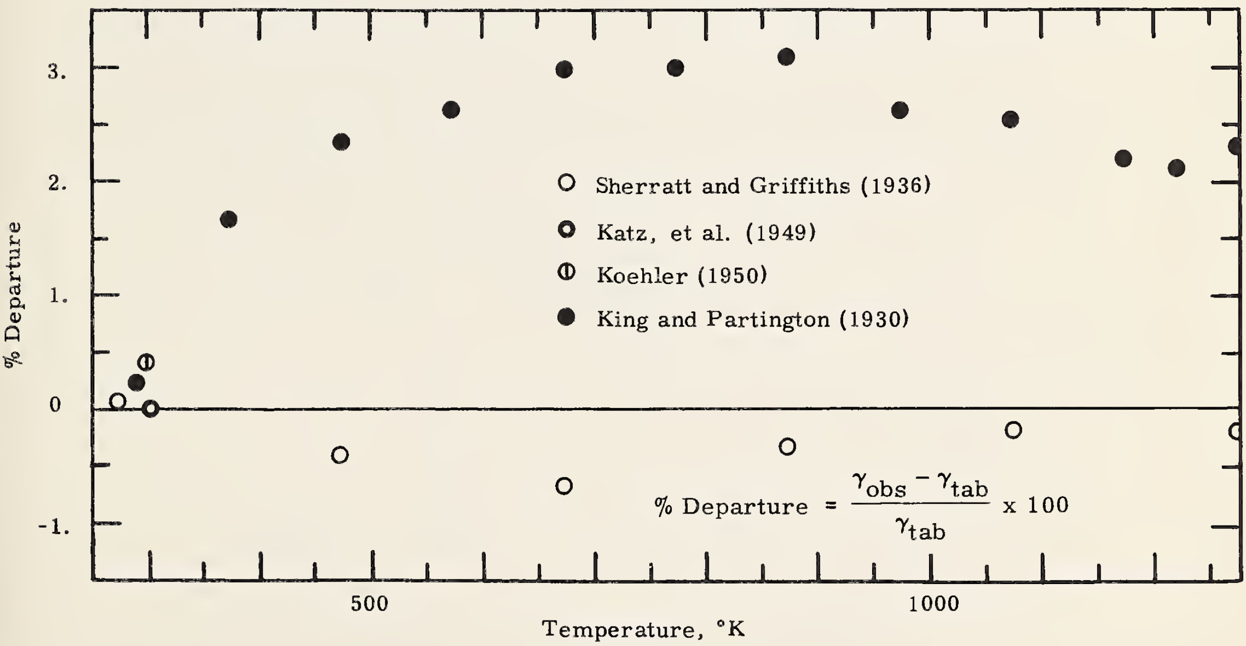

Figure 4c. Departures of experimental values of γ at 1 atmosphere from the tabulated values for carbon dioxide (table 4-6)

Figure 4c shows a comparison of experimental and tabulated values of the heat-capacity ratio, γ, at 1 atmosphere. The data of Partington, et al., show a similar deviation in the case of oxygen and nitrogen.

Figure 4d shows the departures of the experimental values of viscosity from those of table 4-8, in the region of 1 atmosphere. Figure 4e is a similar plot for thermal conductivity (table 4-9). The table of low-pressure viscosities is thought to be correct to about 2 percent; the thermal conductivity, and therefore also the Prandtl number (table 4-10), are not certain to better than 5 percent.

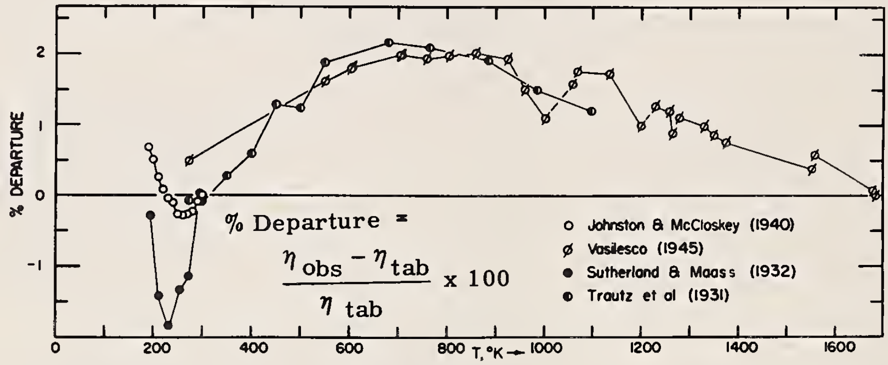

Figure 4d. Departures of experimental viscosities from the tabulated values for carbon dioxide (table 4-8)

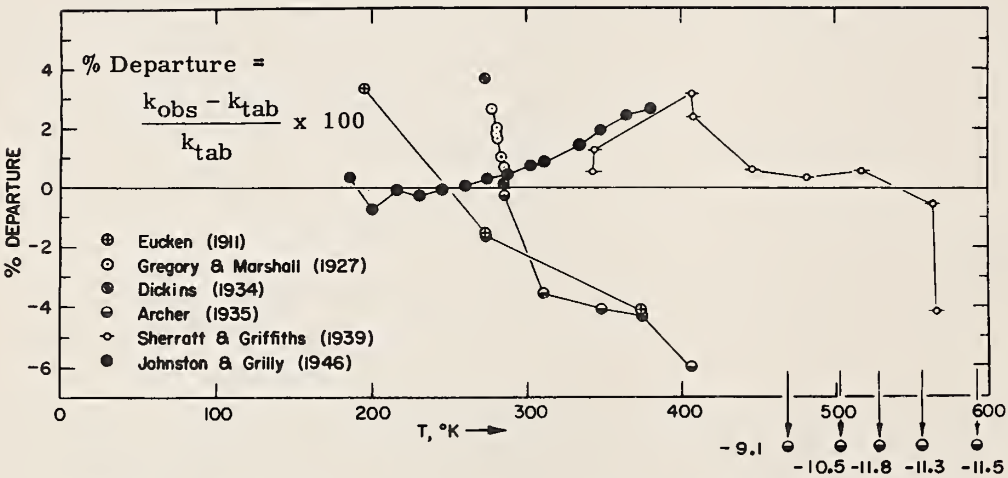

Figure 4e. Departures of experimental thermal conductivities from the tabulated values for carbon dioxide (table 4-9)

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Table 4-a. VALUES OF THE GAS CONSTANT, R, FOR CARBON DIOXIDE

Values of R for Carbon Dioxide for Temperatures in Degrees Kelvin

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.86450	1.92645	1417.02	27.4007
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0298662	0.0308586	22.6983	0.438914
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Carbon Dioxide for Temperatures in Degrees Rankine

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.03583	1.07025	787.233	15.2226
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0165923	0.0171437	12.6102	0.243841
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 4-b. CONVERSION FACTORS FOR THE CARBON DIOXIDE TABLES

Conversion Factors for Table 4-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	1.9770×10^{-3}
		mole cm^{-3}	4.4922×10^{-5}
		g $liter^{-1}$	1.9771
		lb in^{-3}	7.1424×10^{-5}
		lb ft^{-3}	0.12342

Conversion Factors for Tables 4-4 and 4-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E^o_0)/RT_0$,	$(H^o - E^o_0)$,	cal $mole^{-1}$	542.821
$(H - E^o_0)/RT_0$	$(H - E^o_0)$	cal g^{-1}	12.3340
		joules g^{-1}	51.6056
		Btu (lb $mole)^{-1}$	976.437
		Btu lb^{-1}	22.1867

Conversion Factors for Tables 4-3, 4-5, and 4-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C^o_p/R, S^o/R,	C^o_p, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R,	C_p, S,	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.0451531
$-(F^o - E^o_0)/RT$	$-(F^o - E^o_0)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.188921
		Btu (lb $mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.0451234

Molecular weight of carbon dioxide used in these calculations is 44.010 g $mole^{-1}$. The recent revision in the atomic weight of carbon [52] changes this value to 44.011. This will, in general, produce changes that are less than the stated uncertainties. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 4-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	257.0
		ft sec^{-1}	843.2

Conversion Factors for Table 4-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	1.3701×10^{-4}
		kg hr^{-1} m^{-1}	4.9324×10^{-2}
		slug hr^{-1} ft^{-1}	1.0302×10^{-3}
		lb sec^{-1} ft^{-1}	9.2067×10^{-6}
		lb hr^{-1} ft^{-1}	3.3144×10^{-2}

Conversion Factors for Table 4-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^oK^{-1}$	3.477×10^{-5}
		Btu ft^{-1} hr^{-1} $^oR^{-1}$	8.407×10^{-3}
		watts cm^{-1} $^oK^{-1}$	1.455×10^{-4}

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	.99980	3	.99805	30	.99222	120			360
210	.99983	3	.99835	24	.99342	96			378
220	.99986	1	.99859	20	.99438	79	.99015	139	396
230	.99987	2	.99879	16	.99517	64	.99154	112	414
240	.99989	1	.99895	13	.99581	53	.99266	94	432
250	.99990	2	.99908	11	.99634	45	.99360	78	450
260	.99992		.99919	10	.99679	38	.99438	66	468
270	.99992	1	.99929	8	.99717	32	.99504	56	486
280	.99993	1	.99937	7	.99749	27	.99560	49	504
290	.99994	1	.99944	6	.99776	24	.99609	42	522
300	.99995		.99950	5	.99800	21	.99651	36	540
310	.99995	1	.99955	5	.99821	18	.99687	32	558
320	.99996		.99960	4	.99839	16	.99719	28	576
330	.99996		.99964	3	.99855	14	.99747	24	594
340	.99996	1	.99967	3	.99869	13	.99771	22	612
350	.99997		.99970	3	.99882	11	.99793	20	630
360	.99997		.99973	2	.99893	10	.99813	17	648
370	.99997		.99975	3	.99903	9	.99830	15	666
380	.99997	1	.99978	2	.99912	7	.99845	14	684
390	.99998		.99980	1	.99919	8	.99859	13	702
400	.99998		.99981	2	.99927	6	.99872	11	720
410	.99998		.99983	1	.99933	6	.99883	10	738
420	.99998		.99984	2	.99939	5	.99893	10	756
430	.99998		.99986	1	.99944	5	.99903	8	774
440	.99998		.99987	1	.99949	5	.99911	8	792
450	.99998	1	.99988	1	.99954	4	.99919	7	810
460	.99999		.99989	1	.99958	3	.99926	7	828
470	.99999		.99990	1	.99961	4	.99933	5	846
480	.99999		.99991	1	.99965	3	.99938	6	864
490	.99999		.99992	.	.99968	3	.99944	5	882
500	.99999		.99992	1	.99971	2	.99949	5	900
510	.99999		.99993	1	.99973	3	.99954	4	918
520	.99999		.99994		.99976	2	.99958	4	936
530	.99999		.99994	1	.99978	2	.99962	3	954
540	.99999		.99995		.99980	2	.99965	4	972
550	.99999		.99995	1	.99982	2	.99969	3	990
560	.99999		.99996		.99984	1	.99972	3	1008
570	.99999		.99996		.99985	2	.99975	2	1026
580	.99999		.99996	1	.99987	1	.99977	3	1044
590	.99999		.99997		.99988	2	.99980	2	1062
600	.99999		.99997		.99990	1	.99982	3	1080
610	.99999		.99997	1	.99991	1	.99985	2	1098
620	.99999		.99998		.99992	1	.99987	1	1116
630	.99999		.99998		.99993	1	.99988	2	1134
640	.99999		.99998		.99994	1	.99990	2	1152
650	.99999		.99998	1	.99995	1	.99992	1	1170
660	.99999		.99999		.99996	1	.99993	2	1188
670	.99999	1	.99999		.99997	1	.99995	1	1206
680	1.00000		.99999		.99998		.99996	2	1224
690	1.00000		.99999		.99998	1	.99998	1	1242
700	1.00000		.99999	1	.99999	1	.99999	1	1260
710	1.00000		1.00000		1.00000		1.00000	1	1278
720	1.00000		1.00000		1.00000	1	1.00001	1	1296
730	1.00000		1.00000		1.00001		1.00002	1	1314
740	1.00000		1.00000		1.00001	1	1.00003	1	1332
750	1.00000		1.00000		1.00002		1.00004	1	1350
760	1.00000		1.00000		1.00002	1	1.00005		1368
770	1.00000		1.00000		1.00003		1.00005	1	1386
780	1.00000		1.00000	1	1.00003	1	1.00006	1	1404
790	1.00000		1.00001		1.00004		1.00007		1422
800	1.00000		1.00001		1.00004		1.00007		1440

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
800	1.00000	1.00001		1.00004	2	1.00007	3	1440
850	1.00000	1.00001		1.00006	1	1.00010	2	1530
900	1.00000	1.00001	1	1.00007	1	1.00012	2	1620
950	1.00000	1.00002		1.00008		1.00014	1	1710
1000	1.00000	1.00002		1.00008	1	1.00015	1	1800
1050	1.00000	1.00002		1.00009		1.00016		1890
1100	1.00000	1.00002		1.00009		1.00016	1	1980
1150	1.00000	1.00002		1.00009		1.00017		2070
1200	1.00000	1.00002		1.00009	1	1.00017		2160
1250	1.00000	1.00002		1.00010		1.00017		2250
1300	1.00000	1.00002		1.00010		1.00017		2340
1350	1.00000	1.00002		1.00010		1.00017		2430
1400	1.00000	1.00002		1.00010		1.00017		2520
1450	1.00000	1.00002		1.00010		1.00017		2610
1500	1.00000	1.00002		1.00010		1.00017		2700

°K	1 atm		4 atm		7 atm		10 atm		°R
220	.9859	20							396
230	.9879	16	.9495	77	.9032	187			414
240	.9895	14	.9572	57	.9219	118	.8813	209	432
250	.99085	112	.9629	46	.9337	86	.9022	136	450
260	.99197	94	.9675	38	.9423	69	.9158	104	468
270	.99291	81	.9713	33	.9492	58	.9262	86	486
280	.99372	69	.9746	28	.9550	50	.9348	74	504
290	.99441	60	.9774	24	.9600	44	.9422	64	522
300	.99501	52	.9798	21	.9644	37	.9486	55	540
310	.99553	45	.9819	19	.9681	33	.9541	47	558
320	.99598	40	.9838	16	.9714	29	.9588	42	576
330	.99638	35	.9854	14	.9743	25	.9630	37	594
340	.99673	32	.9868	13	.9768	22	.9667	32	612
350	.99705	27	.98812	113	.9790	20	.9699	29	630
360	.99732	25	.98925	100	.9810	18	.9728	25	648
370	.99757	22	.99025	89	.9828	16	.9753	23	666
380	.99779	20	.99114	80	.9844	14	.9776	21	684
390	.99799	18	.99194	73	.9858	13	.9797	18	702
400	.99817	16	.99267	66	.98714	116	.9815	17	720
410	.99833	15	.99333	59	.98830	104	.9832	15	738
420	.99848	13	.99392	54	.98934	95	.9847	14	756
430	.99861	12	.99446	49	.99029	86	.9861	12	774
440	.99873	12	.99495	44	.99115	78	.9873	12	792
450	.99885	10	.99539	41	.99193	72	.98848	103	810
460	.99895	9	.99580	37	.99265	65	.98951	93	828
470	.99904	8	.99617	34	.99330	60	.99044	86	846
480	.99912	8	.99651	31	.99390	55	.99130	79	864
490	.99920	7	.99682	29	.99445	51	.99209	72	882
500	.99927	7	.99711	26	.99496	46	.99281	67	900
510	.99934	6	.99737	25	.99542	43	.99348	62	918
520	.99940	6	.99762	22	.99585	40	.99410	57	936
530	.99946	5	.99784	21	.99625	36	.99467	52	954
540	.99951	5	.99805	20	.99661	34	.99519	49	972
550	.99956	4	.99825	18	.99695	32	.99568	45	990
560	.99960	4	.99843	16	.99727	29	.99613	42	1008
570	.99964	4	.99859	16	.99756	27	.99655	38	1026
580	.99968	4	.99875	14	.99783	25	.99693	36	1044
590	.99972	3	.99889	14	.99808	24	.99729	34	1062
600	.99975	3	.99903	12	.99832	22	.99763	31	1080
610	.99978	3	.99915	12	.99854	20	.99794	29	1098
620	.99981	3	.99927	10	.99874	19	.99823	27	1116
630	.99984	2	.99937	11	.99893	18	.99850	25	1134
640	.99986	3	.99948	9	.99911	16	.99875	24	1152
650	.99989	2	.99957	9	.99927	16	.99899	22	1170
660	.99991	2	.99966	8	.99943	14	.99921	21	1188
670	.99993	2	.99974	8	.99957	14	.99942	19	1206
680	.99995	2	.99982	7	.99971	13	.99961	18	1224
690	.99997	1	.99989	7	.99984	11	.99979	17	1242
700	.99998	2	.99996	7	.99995	12	.99996	16	1260
710	1.00000	2	1.00003	6	1.00007	10	1.00012	15	1278
720	1.00002	1	1.00009	5	1.00017	10	1.00027	14	1296
730	1.00003	1	1.00014	6	1.00027	9	1.00041	13	1314
740	1.00004	2	1.00020	5	1.00036	9	1.00054	13	1332
750	1.00006	1	1.00025	4	1.00045	8	1.00067	11	1350
760	1.00007	1	1.00029	5	1.00053	8	1.00078	11	1368
770	1.00008	1	1.00034	4	1.00061	7	1.00089	10	1386
780	1.00009	1	1.00038	4	1.00068	7	1.00099	10	1404
790	1.00010	1	1.00042	4	1.00075	6	1.00109	9	1422
800	1.00011		1.00046		1.00081		1.00118		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	1.0001		1.0004	2	1.0008	2	1.0012	3	1440
850	1.0001		1.0006	1	1.0010	2	1.0015	3	1530
900	1.0001	1	1.0007	1	1.0012	2	1.0018	2	1620
950	1.0002		1.0008		1.0014	1	1.0020	2	1710
1000	1.0002		1.0008	1	1.0015	1	1.0022	1	1800
1050	1.0002		1.0009		1.0016		1.0023	1	1890
1100	1.0002		1.0009		1.0016	1	1.0024		1980
1150	1.0002		1.0009		1.0017		1.0024		2070
1200	1.0002		1.0009	1	1.0017		1.0024	1	2160
1250	1.0002		1.0010		1.0017		1.0025		2250
1300	1.0002		1.0010		1.0017		1.0025		2340
1350	1.0002		1.0010		1.0017		1.0025		2430
1400	1.0002		1.0010		1.0017		1.0025		2520
1450	1.0002		1.0010		1.0017		1.0025		2610
1500	1.0002		1.0010		1.0017		1.0025		2700

°K	10 atm		40 atm		70 atm		100 atm		°R
300	.9486	55	.7611	335					540
310	.9541	47	.7946	260					558
320	.9588	42	.8206	209	.6417	537	.3727	1234	576
330	.9630	37	.8415	176	.6954	427	.4961	944	594
340	.9667	32	.8591	149	.7381	321	.5905	602	612
350	.9699	29	.8740	130	.7702	263	.6507	461	630
360	.9728	25	.8870	113	.7965	224	.6968	378	648
370	.9753	23	.8983	101	.8189	194	.7346	316	666
380	.9776	21	.9084	85	.8383	155	.7662	238	684
390	.9797	18	.9169	83	.8538	159	.7900	255	702
400	.9815	17	.9252	71	.8697	130	.8155	197	720
410	.9832	15	.9323	63	.8827	115	.8352	172	738
420	.9847	14	.9386	58	.8942	103	.8524	153	756
430	.9861	12	.9444	52	.9045	93	.8677	137	774
440	.9873	11	.9496	46	.9138	84	.8814	123	792
450	.98848	103	.9542	43	.9222	76	.8937	112	810
460	.98951	93	.9585	38	.9298	66	.9049	91	828
470	.99044	86	.9623	35	.9364	60	.9140	79	846
480	.99130	79	.9658	33	.9424	56	.9219	75	864
490	.99209	72	.9691	30	.9480	51	.9294	71	882
500	.99281	67	.9721	27	.9531	49	.9365	68	900
510	.99348	62	.9748	25	.9580	44	.9433	63	918
520	.99410	57	.9773	23	.9624	41	.9496	58	936
530	.99467	52	.9796	22	.9665	38	.9554	53	954
540	.99519	49	.9818	20	.9703	35	.9607	50	972
550	.99568	45	.9838	18	.9738	32	.9657	45	990
560	.99613	42	.9856	17	.9770	29	.9702	42	1008
570	.99655	38	.9873	15	.9799	27	.9744	38	1026
580	.99693	36	.9888	15	.9826	25	.9782	35	1044
590	.99729	34	.9903	13	.9851	23	.9817	33	1062
600	.99763	31	.9916	12	.9874	22	.9850	30	1080
610	.99794	29	.9928	12	.9896	20	.9880	28	1098
620	.99823	27	.9940	11	.9916	18	.9908	26	1116
630	.99850	25	.9951	10	.9934	17	.9934	24	1134
640	.99875	24	.9961	9	.9951	16	.9958	22	1152
650	.99899	22	.9970	9	.9967	14	.9980	20	1170
660	.99921	21	.9979	8	.9981	14	1.0000	19	1188
670	.99942	19	.9987	7	.9995	13	1.0019	18	1206
680	.99961	18	.9994	7	1.0008	12	1.0037	16	1224
690	.99979	17	1.0001	7	1.0020	11	1.0053	15	1242
700	.99996	16	1.0008	6	1.0031	10	1.0068	15	1260
710	1.00012	15	1.0014	6	1.0041	10	1.0083	13	1278
720	1.00027	14	1.0020	5	1.0051	9	1.0096	12	1296
730	1.00041	13	1.0025	5	1.0060	8	1.0108	11	1314
740	1.00054	13	1.0030	5	1.0068	8	1.0119	11	1332
750	1.00067	11	1.0035	4	1.0076	7	1.0130	10	1350
760	1.00078	11	1.0039	4	1.0083	7	1.0140	9	1368
770	1.00089	10	1.0043	4	1.0090	6	1.0149	8	1386
780	1.00099	10	1.0047	4	1.0096	6	1.0157	8	1404
790	1.00109	10	1.0051	3	1.0102	6	1.0165	7	1422
800	1.0011	4	1.0054	14	1.0108	23	1.0172	30	1440
850	1.0015	3	1.0068	11	1.0131	16	1.0202	22	1530
900	1.0018	2	1.0079	7	1.0147	12	1.0224	14	1620
950	1.0020	2	1.0086	6	1.0159	8	1.0238	10	1710
1000	1.0022	1	1.0092	4	1.0167	6	1.0248	7	1800
1050	1.0023	1	1.0096	2	1.0173	4	1.0255	5	1890
1100	1.0024		1.0098	2	1.0177	2	1.0260	2	1980
1150	1.0024		1.0100	1	1.0179	2	1.0262	1	2070
1200	1.0024	1	1.0101	1	1.0181		1.0263		2160
1250	1.0025		1.0102		1.0181		1.0263	1	2250
1300	1.0025		1.0102		1.0181		1.0262		2340

°K	10 atm	40 atm		70 atm		100 atm		°R
1300	1.0025	1.0102		1.0181	- 1	1.0262	- 2	2340
1350	1.0025	1.0102	- 1	1.0180	- 1	1.0260	- 2	2430
1400	1.0025	1.0101		1.0179	- 2	1.0258	- 3	2520
1450	1.0025	1.0101	- 1	1.0177	- 1	1.0255	- 2	2610
1500	1.0025	1.0100		1.0176		1.0253		2700

ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	.013567	-646	.13591	-651	.54684	-2667			360
210	.012921	-588	.12940	-591	.52017	-2412			378
220	.012333	-536	.12349	-540	.49605	-2194	.8718	-391	396
230	.011797	-492	.11809	-494	.47411	-2005	.8327	-356	414
240	.011305	-452	.11315	-454	.45406	-1840	.7971	-326	432
250	.010853	-418	.10861	-419	.43566	-1694	.76452	-2999	450
260	.010435	-386	.10442	-387	.41872	-1566	.73453	-2766	468
270	.010049	-359	.10055	-360	.40306	-1452	.70687	-2564	486
280	.0096898	-3342	.09695	-335	.38854	-1351	.68123	-2382	504
290	.0093556	-3119	.09360	-313	.37503	-1258	.65741	-2217	522
300	.0090437	-2918	.09047	-292	.36245	-1177	.63524	-2072	540
310	.0087519	-2735	.08755	-274	.35068	-1102	.61452	-1939	558
320	.0084784	-2570	.08481	-257	.33966	-1034	.59513	-1820	576
330	.0082214	-2418	.08224	-243	.32932	- 974	.57693	-1710	594
340	.0079796	-2280	.07981	-228	.31958	- 917	.55983	-1612	612
350	.0077516	-2154	.07753	-215	.31041	- 865	.54371	-1521	630
360	.0075362	-2037	.07538	-204	.30176	- 819	.52850	-1437	648
370	.0073325	-1930	.07334	-193	.29357	- 775	.51413	-1361	666
380	.0071395	-1830	.07141	-184	.28582	- 735	.50052	-1290	684
390	.0069565	-1740	.06957	-174	.27847	- 698	.48762	-1225	702
400	.0067825	-1654	.06783	-165	.27149	- 664	.47537	-1165	720
410	.0066171	-1576	.06618	-158	.26485	- 632	.46372	-1108	738
420	.0064595	-1502	.06460	-150	.25853	- 603	.45264	-1057	756
430	.0063093	-1434	.06310	-144	.25250	- 575	.44207	-1009	774
440	.0061659	-1370	.06166	-137	.24675	- 549	.43198	- 963	792
450	.0060289	-1311	.06029	-131	.24126	- 526	.42235	- 921	810
460	.0058978	-1255	.05898	-126	.23600	- 503	.41314	- 881	828
470	.0057723	-1202	.05772	-120	.23097	- 481	.40433	- 845	846
480	.0056521	-1154	.05652	-115	.22616	- 463	.39588	- 810	864
490	.0055367	-1107	.05537	-111	.22153	- 443	.38778	- 778	882
500	.0054260	-1064	.05426	-107	.21710	- 427	.38000	- 746	900
510	.0053196	-1023	.05319	-102	.21283	- 409	.37254	- 718	918
520	.0052173	- 985	.05217	- 98	.20874	- 395	.36536	- 691	936
530	.0051188	- 948	.05119	- 95	.20479	- 379	.35845	- 665	954
540	.0050240	- 913	.05024	- 91	.20100	- 366	.35180	- 641	972
550	.0049327	- 881	.049329	- 881	.19734	- 353	.34539	- 618	990
560	.0048446	- 850	.048448	- 850	.19381	- 340	.33921	- 596	1008
570	.0047596	- 821	.047598	- 821	.19041	- 329	.33325	- 576	1026
580	.0046775	- 792	.046777	- 793	.18712	- 317	.32749	- 555	1044
590	.0045983	- 767	.045984	- 767	.18395	- 307	.32194	- 538	1062
600	.0045216	- 741	.045217	- 741	.18088	- 297	.31656	- 519	1080
610	.0044475	- 717	.044476	- 718	.17791	- 287	.31137	- 503	1098
620	.0043758	- 695	.043758	- 694	.17504	- 278	.30634	- 487	1116
630	.0043063	- 673	.043064	- 673	.17226	- 270	.30147	- 472	1134
640	.0042390	- 652	.042391	- 653	.16956	- 261	.29675	- 457	1152
650	.0041738	- 632	.041738	- 632	.16695	- 253	.29218	- 443	1170
660	.0041106	- 614	.041106	- 614	.16442	- 245	.28775	- 430	1188
670	.0040492	- 595	.040492	- 595	.16197	- 239	.28345	- 417	1206
680	.0039897	- 579	.039897	- 579	.15958	- 231	.27928	- 405	1224
690	.0039318	- 561	.039318	- 561	.15727	- 225	.27523	- 394	1242
700	.0038757	- 546	.038757	- 546	.15502	- 218	.27129	- 382	1260
710	.0038211	- 531	.038211	- 531	.15284	- 213	.26747	- 372	1278
720	.0037680	- 516	.037680	- 516	.15071	- 206	.26375	- 361	1296
730	.0037164	- 502	.037164	- 502	.14865	- 201	.26014	- 352	1314
740	.0036662	- 489	.036662	- 489	.14664	- 196	.25662	- 343	1332
750	.0036173	- 476	.036173	- 476	.14468	- 190	.25319	- 333	1350
760	.0035697	- 464	.035697	- 464	.14278	- 186	.24986	- 325	1368
770	.0035233	- 451	.035233	- 452	.14092	- 180	.24661	- 316	1386
780	.0034782	- 441	.034781	- 440	.13912	- 176	.24345	- 308	1404
790	.0034341	- 429	.034341	- 429	.13736	- 172	.24037	- 301	1422
800	.0033912		.033912		.13564		.23736		1440

Table 4-2. DENSITY OF CARBON DIOXIDE - Cont. ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	.0033912	-1995	.033912	-1995	.13564	- 798	.23736	-1397	1440
850	.0031917	-1773	.031917	-1773	.12766	- 710	.22339	-1241	1530
900	.0030144	-1587	.030144	-1587	.12056	- 634	.21098	-1111	1620
950	.0028557	-1428	.028557	-1428	.11422	- 572	.19987	-1000	1710
1000	.0027129	-1291	.027129	-1292	.10850	- 516	.18987	- 904	1800
1050	.0025838	-1175	.025837	-1174	.10334	- 470	.18083	- 822	1890
1100	.0024663	-1072	.024663	-1073	.09864	- 429	.17261	- 751	1980
1150	.0023591	- 983	.023590	- 983	.09435	- 393	.16510	- 688	2070
1200	.0022608	- 904	.022607	- 904	.09042	- 362	.15822	- 633	2160
1250	.0021704	- 835	.021703	- 835	.08680	- 334	.15189	- 584	2250
1300	.0020869	- 773	.020868	- 772	.08346	- 309	.14605	- 541	2340
1350	.0020096	- 718	.020096	- 718	.08037	- 287	.14064	- 502	2430
1400	.0019378	- 668	.019378	- 668	.07750	- 267	.13562	- 468	2520
1450	.0018710	- 624	.018710	- 624	.07483	- 250	.13094	- 436	2610
1500	.0018086		.018086		.07233		.12658		2700

ρ/ρ_0

°K	1 atm		4 atm		7 atm		10 atm		°R
220	1.2508	-568							396
230	1.1940	-516	4.9693	-2456	9.1418	-5586			414
240	1.1424	-472	4.7237	-2156	8.5832	-4475	12.827	-799	432
250	1.0952	-433	4.5081	-1941	8.1357	-3844	12.028	-634	450
260	1.0519	-399	4.3140	-1763	7.7513	-3413	11.394	-546	468
270	1.0120	-370	4.1377	-1612	7.4100	-3084	10.848	-484	486
280	.9750	-343	3.9765	-1481	7.1016	-2807	10.364	-436	504
290	.9407	-319	3.8284	-1368	6.8209	-2572	9.928	-396	522
300	.9088	-298	3.6916	-1267	6.5637	-2360	9.532	-360	540
310	.8790	-278	3.5649	-1179	6.3277	-2186	9.172	-331	558
320	.8512	-262	3.4470	-1100	6.1091	-2027	8.841	-305	576
330	.8250	-245	3.3370	-1028	5.9064	-1885	8.536	-282	594
340	.8005	-231	3.2342	-964	5.7179	-1761	8.254	-263	612
350	.7774	-218	3.1378	-906	5.5418	-1649	7.991	-245	630
360	.7556	-206	3.0472	-854	5.3769	-1546	7.746	-229	648
370	.7350	-195	2.9618	-806	5.2223	-1458	7.517	-215	666
380	.7155	-185	2.8812	-761	5.0765	-1372	7.302	-202	684
390	.6970	-176	2.8051	-722	4.9393	-1298	7.100	-191	702
400	.6794	-166	2.7329	-684	4.8095	-1227	6.909	-180	720
410	.6628	-159	2.6645	-650	4.6868	-1164	6.729	-170	738
420	.6469	-152	2.5995	-618	4.5704	-1107	6.559	-161	756
430	.6317	-144	2.5377	-589	4.4597	-1051	6.398	-154	774
440	.6173	-138	2.4788	-562	4.3546	-1002	6.244	-145	792
450	.6035	-132	2.4226	-536	4.2544	-955	6.099	-139	810
460	.5903	-126	2.3690	-513	4.1589	-911	5.960	-133	828
470	.5777	-121	2.3177	-490	4.0678	-872	5.827	-126	846
480	.5656	-115	2.2687	-470	3.9806	-834	5.701	-121	864
490	.5541	-112	2.2217	-451	3.8972	-799	5.580	-115	882
500	.5429	-106	2.1766	-432	3.8173	-766	5.465	-111	900
510	.5323	-103	2.1334	-416	3.7407	-735	5.354	-106	918
520	.5220	-99	2.0918	-399	3.6672	-706	5.248	-102	936
530	.5121	-95	2.0519	-384	3.5966	-679	5.146	-98	954
540	.5026	-91	2.0135	-370	3.5287	-653	5.048	-94	972
550	.49348	-883	1.9765	-357	3.4634	-630	4.9540	-906	990
560	.48465	-853	1.9408	-343	3.4004	-606	4.8634	-874	1008
570	.47612	-822	1.9065	-332	3.3398	-585	4.7760	-841	1026
580	.46790	-795	1.8733	-320	3.2813	-564	4.6919	-812	1044
590	.45995	-768	1.8413	-309	3.2249	-545	4.6107	-784	1062
600	.45227	-743	1.8104	-299	3.1704	-527	4.5323	-757	1080
610	.44484	-719	1.7805	-290	3.1177	-509	4.4566	-731	1098
620	.43765	-696	1.7515	-280	3.0668	-492	4.3835	-708	1116
630	.43069	-674	1.7235	-271	3.0176	-477	4.3127	-685	1134
640	.42395	-653	1.6964	-262	2.9699	-462	4.2442	-662	1152
650	.41742	-633	1.6702	-255	2.9237	-447	4.1780	-643	1170
660	.41109	-615	1.6447	-247	2.8790	-434	4.1137	-622	1188
670	.40494	-596	1.6200	-239	2.8356	-421	4.0515	-603	1206
680	.39898	-579	1.5961	-233	2.7935	-408	3.9912	-586	1224
690	.39319	-562	1.5728	-225	2.7527	-397	3.9326	-568	1242
700	.38757	-547	1.5503	-220	2.7130	-385	3.8758	-552	1260
710	.38210	-531	1.5283	-213	2.6745	-374	3.8206	-537	1278
720	.37679	-517	1.5070	-207	2.6371	-364	3.7669	-521	1296
730	.37162	-503	1.4863	-202	2.6007	-354	3.7148	-507	1314
740	.36659	-489	1.4661	-196	2.5653	-344	3.6641	-493	1332
750	.36170	-476	1.4465	-191	2.5309	-335	3.6148	-480	1350
760	.35694	-464	1.4274	-186	2.4974	-326	3.5668	-467	1368
770	.35230	-452	1.4088	-181	2.4648	-318	3.5201	-455	1386
780	.34778	-441	1.3907	-177	2.4330	-310	3.4746	-443	1404
790	.34337	-429	1.3730	-172	2.4020	-301	3.4303	-432	1422
800	33908		1.3558		2.3719		3.3871		1440

Table 4-2. DENSITY OF CARBON DIOXIDE - Cont.

ρ/ρ_0

°K	1 atm		4 atm		7 atm		10 atm		°R
800	.33908	-1996	1.3558	- 799	2.3719	-1402	3.3871	-2004	1440
850	.31912	-1774	1.2759	- 711	2.2317	-1244	3.1867	-1779	1530
900	.30138	-1587	1.2048	- 635	2.1073	-1112	3.0088	-1590	1620
950	.28551	-1428	1.1413	- 571	1.9961	-1000	2.8498	-1429	1710
1000	.27123	-1292	1.0842	- 517	1.8961	- 904	2.7069	-1292	1800
1050	.25831	-1174	1.0325	- 470	1.8057	- 822	2.5777	-1173	1890
1100	.24657	-1072	.9855	- 428	1.7235	- 750	2.4604	-1071	1980
1150	.23585	-1000	.9427	- 393	1.6485	- 687	2.3533	- 982	2070
1200	.22585	- 887	.9034	- 362	1.5798	- 633	2.2551	- 902	2160
1250	.21698	- 835	.8672	- 333	1.5165	- 583	2.1649	- 833	2250
1300	.20863	- 772	.8339	- 309	1.4582	- 540	2.0816	- 771	2340
1350	.20091	- 718	.8030	- 287	1.4042	- 501	2.0045	- 716	2430
1400	.19373	- 668	.7743	- 267	1.3541	- 468	1.9329	- 666	2520
1450	.18705	- 624	.7476	- 249	1.3073	- 435	1.8663	- 622	2610
1500	.18081		.7227		1.2638		1.8041		2700

°K	10 atm		40 atm		70 atm		100 atm		°R
240	12.827	-799							432
250	12.028	-634							450
260	11.394	-546							468
270	10.848	-484							486
280	10.364	-436							504
290	9.928	-396							522
300	9.532	-360	47.52	-347					540
310	9.172	-331	44.05	-273					558
320	8.841	-305	41.32	-225	92.48	-972	227.48	-6177	576
330	8.536	-282	39.07	-192	82.76	-709	165.71	-3058	594
340	8.254	-263	37.15	-167	75.67	-522	135.13	-1601	612
350	7.991	-245	35.475	-1491	70.448	-4218	119.12	-1097	630
360	7.746	-229	33.984	-1337	66.230	-3553	108.15	- 834	648
370	7.517	-215	32.647	-1211	62.677	-3061	99.81	- 663	666
380	7.302	-202	31.436	-1089	59.616	-2584	93.18	- 512	684
390	7.100	-191	30.347	-1026	57.032	-2432	88.06	- 489	702
400	6.909	-180	29.321	- 932	54.600	-2126	83.17	- 394	720
410	6.729	-170	28.389	- 864	52.474	-1908	79.23	- 345	738
420	6.559	-161	27.525	- 803	50.566	-1742	75.78	- 307	756
430	6.398	-154	26.722	- 749	48.824	-1594	72.71	- 275	774
440	6.244	-145	25.973	- 703	47.230	-1469	69.96	- 250	792
450	6.099	-139	25.270	- 658	45.761	-1360	67.457	- 2284	810
460	5.960	-133	24.612	- 620	44.401	-1253	65.173	- 2019	828
470	5.827	-126	23.992	- 585	43.148	-1167	63.154	- 1846	846
480	5.701	-121	23.407	- 555	41.981	-1098	61.308	- 1737	864
490	5.580	-115	22.852	- 525	40.883	-1035	59.571	- 1634	882
500	5.465	-111	22.327	- 500	39.848	- 978	57.937	- 1544	900
510	5.354	-106	21.827	- 475	38.870	- 924	56.393	- 1451	918
520	5.248	-102	21.352	- 452	37.946	- 874	54.942	- 1365	936
530	5.146	- 98	20.900	- 433	37.072	- 828	53.577	- 1285	954
540	5.048	- 94	20.467	- 411	36.244	- 785	52.292	- 1212	972
550	4.9540	- 906	20.056	- 395	35.459	- 747	51.080	- 1146	990
560	4.8634	- 874	19.661	- 378	34.712	- 712	49.934	- 1086	1008
570	4.7760	- 841	19.283	- 362	34.000	- 678	48.848	- 1030	1026
580	4.6919	- 812	18.921	- 348	33.322	- 648	47.818	- 981	1044
590	4.6107	- 784	18.573	- 335	32.674	- 620	46.837	- 933	1062
600	4.5323	- 757	18.238	- 321	32.054	- 594	45.904	- 890	1080
610	4.4566	- 731	17.917	- 310	31.460	- 569	45.014	- 851	1098
620	4.3835	- 708	17.607	- 298	30.891	- 547	44.163	- 814	1116
630	4.3127	- 685	17.309	- 287	30.344	- 525	43.349	- 780	1134
640	4.2442	- 662	17.022	- 278	29.819	- 506	42.569	- 748	1152
650	4.1780	- 643	16.744	- 268	29.313	- 487	41.821	- 717	1170
660	4.1137	- 622	16.476	- 259	28.826	- 470	41.104	- 691	1188
670	4.0515	- 603	16.217	- 250	28.356	- 452	40.413	- 665	1206
680	3.9912	- 586	15.967	- 243	27.904	- 437	39.748	- 640	1224
690	3.9326	- 568	15.724	- 235	27.467	- 423	39.108	- 617	1242
700	3.8758	- 552	15.489	- 227	27.044	- 408	38.491	- 595	1260
710	3.8206	- 537	15.262	- 221	26.636	- 395	37.896	- 575	1278
720	3.7669	- 521	15.041	- 214	26.241	- 382	37.321	- 556	1296
730	3.7148	- 507	14.827	- 207	25.859	- 371	36.765	- 537	1314
740	3.6641	- 493	14.620	- 202	25.488	- 359	36.228	- 521	1332
750	3.6148	- 480	14.418	- 195	25.129	- 349	35.707	- 503	1350
760	3.5668	- 467	14.223	- 192	24.780	- 338	35.204	- 489	1368
770	3.5201	- 455	14.031	- 185	24.442	- 329	34.715	- 474	1386
780	3.4746	- 443	13.846	- 180	24.113	- 319	34.241	- 459	1404
790	3.4303	- 432	13.666	- 175	23.794	- 311	33.782	- 447	1422
800	3.3871		13.491		23.483		33.335		1440

Table 4-2. DENSITY OF CARBON DIOXIDE - Cont. ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
800	3.3871	-2004	13.491	- 812	23.483	-1431	33.335	- 2053	1440
850	3.1867	-1779	12.679	- 717	22.052	-1259	31.282	- 1799	1530
900	3.0088	-1590	11.962	- 638	20.793	-1117	29.483	- 1591	1620
950	2.8498	-1429	11.324	- 572	19.676	- 999	27.892	- 1422	1710
1000	2.7069	-1292	10.752	- 516	18.677	- 900	26.470	- 1277	1800
1050	2.5777	-1173	10.236	- 468	17.777	- 814	25.193	- 1155	1890
1100	2.4604	-1071	9.768	- 426	16.963	- 742	24.038	- 1051	1980
1150	2.3533	- 982	9.342	- 390	16.221	- 677	22.987	- 959	2070
1200	2.2551	- 902	8.952	- 359	15.544	- 623	22.028	- 881	2160
1250	2.1649	- 833	8.593	- 331	14.921	- 573	21.147	- 812	2250
1300	2.0816	- 771	8.262	- 305	14.348	- 531	20.335	- 750	2340
1350	2.0045	- 716	7.957	- 284	13.817	- 492	19.585	- 695	2430
1400	1.9329	- 666	7.673	- 264	13.325	- 457	18.890	- 647	2520
1450	1.8663	- 622	7.409	- 247	12.868	- 427	18.243	- 604	2610
1500	1.8041		7.162		12.441		17.639		2700

Table 4-3. SPECIFIC HEAT OF CARBON DIOXIDE C_p/R

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	3.8935	583	3.9108	548	3.9708	421			360
210	3.9518	592	3.9656	567	4.0129	472			378
220	4.0110	595	4.0223	576	4.0601	509	4.1002	427	396
230	4.0705	600	4.0799	584	4.1110	533	4.1429	477	414
240	4.1305	594	4.1383	583	4.1643	543	4.1906	500	432
250	4.1899	591	4.1966	581	4.2186	550	4.2406	519	450
260	4.2490	584	4.2547	576	4.2736	550	4.2925	524	468
270	4.3074	574	4.3123	568	4.3286	547	4.3449	526	486
280	4.3648	564	4.3691	559	4.3833	542	4.3975	525	504
290	4.4212	555	4.4250	550	4.4375	536	4.4500	519	522
300	4.4767	543	4.4800	540	4.4911	527	4.5019	518	540
310	4.5310	533	4.5340	529	4.5438	520	4.5537	509	558
320	4.5843	521	4.5869	518	4.5958	509	4.6046	500	576
330	4.6364	509	4.6387	508	4.6467	499	4.6546	492	594
340	4.6873	500	4.6895	498	4.6966	491	4.7038	485	612
350	4.7373	488	4.7393	486	4.7457	481	4.7523	474	630
360	4.7861	476	4.7879	474	4.7938	469	4.7997	464	648
370	4.8337	466	4.8353	464	4.8407	460	4.8461	456	666
380	4.8803	456	4.8817	455	4.8867	451	4.8917	446	684
390	4.9259	446	4.9272	446	4.9318	442	4.9363	439	702
400	4.9705	436	4.9718	435	4.9760	432	4.9802	429	720
410	5.0141	426	5.0153	425	5.0192	422	5.0231	419	738
420	5.0567	417	5.0578	416	5.0614	414	5.0650	411	756
430	5.0984	409	5.0994	408	5.1028	406	5.1061	404	774
440	5.1393	400	5.1402	400	5.1434	397	5.1465	395	792
450	5.1793	391	5.1802	390	5.1831	388	5.1860	387	810
460	5.2184	383	5.2192	383	5.2219	381	5.2247	379	828
470	5.2567	376	5.2575	375	5.2600	374	5.2626	372	846
480	5.2943	368	5.2950	368	5.2974	366	5.2998	365	864
490	5.3311	361	5.3318	360	5.3340	359	5.3363	358	882
500	5.3672	353	5.3678	353	5.3699	352	5.3721	350	900
510	5.4025	347	5.4031	346	5.4051	346	5.4071	345	918
520	5.4372	340	5.4377	340	5.4397	338	5.4416	337	936
530	5.4712	333	5.4717	333	5.4735	332	5.4753	331	954
540	5.5045	327	5.5050	326	5.5067	326	5.5084	325	972
550	5.5372	320	5.5376	320	5.5393	319	5.5409	318	990
560	5.5692	315	5.5696	315	5.5712	314	5.5727	313	1008
570	5.6007	308	5.6011	309	5.6026	308	5.6040	308	1026
580	5.6315	303	5.6320	302	5.6334	302	5.6348	301	1044
590	5.6618	297	5.6622	297	5.6636	296	5.6649	296	1062
600	5.6915	292	5.6919	292	5.6932	291	5.6945	291	1080
610	5.7207	287	5.7211	287	5.7223	287	5.7236	285	1098
620	5.7494	281	5.7498	281	5.7510	280	5.7521	280	1116
630	5.7775	277	5.7779	277	5.7790	276	5.7801	276	1134
640	5.8052	272	5.8056	271	5.8066	272	5.8077	271	1152
650	5.8324	267	5.8327	267	5.8338	266	5.8348	266	1170
660	5.8591	262	5.8594	262	5.8604	262	5.8614	261	1188
670	5.8853	257	5.8856	257	5.8866	256	5.8875	256	1206
680	5.9110	253	5.9113	253	5.9122	253	5.9131	253	1224
690	5.9363	248	5.9366	248	5.9375	247	5.9384	247	1242
700	5.9611	244	5.9614	244	5.9622	244	5.9631	243	1260
710	5.9855	239	5.9858	239	5.9866	238	5.9874	238	1278
720	6.0094	235	6.0097	235	6.0104	235	6.0112	235	1296
730	6.0329	230	6.0332	229	6.0339	230	6.0347	229	1314
740	6.0559	227	6.0561	227	6.0569	226	6.0576	226	1332
750	6.0786	223	6.0788	223	6.0795	223	6.0802	223	1350
760	6.1009	219	6.1011	219	6.1018	219	6.1025	219	1368
770	6.1228	214	6.1230	214	6.1237	213	6.1244	213	1386
780	6.1442	211	6.1444	211	6.1450	211	6.1457	210	1404
790	6.1653	207	6.1655	207	6.1661	207	6.1667	207	1422
800	6.1860		6.1862		6.1868		6.1874		1440

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	6.1860	983	6.1862	983	6.1868	982	6.1874	981	1440
850	6.2843	899	6.2845	899	6.2850	898	6.2855	897	1530
900	6.3742	823	6.3744	822	6.3748	822	6.3752	822	1620
950	6.4565	753	6.4566	753	6.4570	753	6.4574	752	1710
1000	6.5318	69	6.5319	69	6.5323	69	6.5326	68	1800
1050	6.601	63	6.601	63	6.601	63	6.601	63	1890
1100	6.664	59	6.664	59	6.664	59	6.664	59	1980
1150	6.723	53	6.723	53	6.723	53	6.723	53	2070
1200	6.776	50	6.776	50	6.776	50	6.776	50	2160
1250	6.826	46	6.826	46	6.826	46	6.826	46	2250
1300	6.872	41	6.872	41	6.872	41	6.872	41	2340
1350	6.913	39	6.913	39	6.913	39	6.913	39	2430
1400	6.952	36	6.952	36	6.952	36	6.952	36	2520
1450	6.988	33	6.988	33	6.988	33	6.988	33	2610
1500	7.021		7.021		7.021		7.021		2700

Table 4-3. SPECIFIC HEAT OF CARBON DIOXIDE - Cont. C_p/R

°K	1 atm		4 atm		7 atm		10 atm		°R
220	4.145	31							396
230	4.176	41	4.822	- 214	6.720	-1204			414
240	4.217	45	4.608	- 84	5.516	- 543	7.355	-1586	432
250	4.262	49	4.524	- 15	4.973	- 210	5.769	- 640	450
260	4.311	50	4.509	10	4.763	- 86	5.129	- 287	468
270	4.361	50	4.519	33	4.677	17	4.842	2	486
280	4.411	51	4.552	35	4.694	21	4.844	8	504
290	4.462	51	4.587	37	4.715	24	4.852	10	522
300	4.513	50	4.624	37	4.739	26	4.862	12	540
310	4.563	50	4.661	41	4.765	28	4.874	15	558
320	4.613	49	4.702	40	4.793	30	4.889	16	576
330	4.662	49	4.742	41	4.823	33	4.905	26	594
340	4.711	47	4.783	41	4.856	35	4.931	28	612
350	4.758	47	4.824	41	4.891	35	4.959	30	630
360	4.805	46	4.865	41	4.926	36	4.989	30	648
370	4.851	45	4.906	41	4.962	36	5.019	32	666
380	4.896	45	4.947	40	4.998	36	5.051	31	684
390	4.941	43	4.987	40	5.034	36	5.082	33	702
400	4.984	43	5.027	39	5.070	37	5.115	33	720
410	5.027	41	5.066	39	5.107	35	5.148	32	738
420	5.068	41	5.105	38	5.142	36	5.180	34	756
430	5.109	40	5.143	38	5.178	36	5.214	33	774
440	5.149	40	5.181	37	5.214	35	5.247	33	792
450	5.189	38	5.218	37	5.249	34	5.280	32	810
460	5.227	38	5.255	36	5.283	34	5.312	32	828
470	5.265	37	5.291	35	5.317	34	5.344	33	846
480	5.302	36	5.326	35	5.351	34	5.377	32	864
490	5.338	36	5.361	35	5.385	33	5.409	31	882
500	5.374	35	5.396	33	5.418	32	5.440	31	900
510	5.409	34	5.429	34	5.450	32	5.471	31	918
520	5.443	34	5.463	32	5.482	32	5.502	31	936
530	5.477	33	5.495	32	5.514	31	5.533	30	954
540	5.510	32	5.527	32	5.545	30	5.563	30	972
550	5.542	32	5.559	31	5.575	31	5.593	29	990
560	5.574	31	5.590	30	5.606	29	5.622	28	1008
570	5.605	31	5.620	30	5.635	29	5.650	29	1026
580	5.636	30	5.650	30	5.664	29	5.679	29	1044
590	5.666	30	5.680	28	5.693	28	5.708	26	1062
600	5.696	29	5.708	29	5.721	28	5.734	28	1080
610	5.725	28	5.737	28	5.749	28	5.762	27	1098
620	5.753	28	5.765	27	5.777	27	5.789	26	1116
630	5.781	28	5.792	27	5.804	26	5.815	26	1134
640	5.809	27	5.819	27	5.830	26	5.841	26	1152
650	5.836	26	5.846	26	5.856	26	5.867	25	1170
660	5.862	26	5.872	26	5.882	25	5.892	25	1188
670	5.888	26	5.898	25	5.907	25	5.917	25	1206
680	5.914	25	5.923	25	5.932	25	5.942	24	1224
690	5.939	25	5.948	24	5.957	24	5.966	23	1242
700	5.964	24	5.972	24	5.981	23	5.989	23	1260
710	5.988	24	5.996	24	6.004	24	6.012	23	1278
720	6.012	23	6.020	23	6.028	22	6.035	23	1296
730	6.035	23	6.043	22	6.050	23	6.058	22	1314
740	6.058	23	6.065	23	6.073	22	6.080	21	1332
750	6.081	22	6.088	22	6.095	22	6.101	23	1350
760	6.103	22	6.110	21	6.117	21	6.124	21	1368
770	6.125	21	6.131	22	6.138	21	6.145	20	1386
780	6.146	21	6.153	20	6.159	21	6.165	21	1404
790	6.167	21	6.173	21	6.180	20	6.186	20	1422
800	6.188		6.194		6.200		6.206		1440

Table 4-3. SPECIFIC HEAT OF CARBON DIOXIDE - Cont. C_p/R

°K	1 atm		4 atm		7 atm		10 atm		°R
800	6.188	98	6.194	97	6.200	96	6.206	95	1440
850	6.286	90	6.291	89	6.296	88	6.301	88	1530
900	6.376	82	6.380	82	6.384	81	6.389	80	1620
950	6.458	75	6.462	74	6.465	75	6.469	74	1710
1000	6.533	69	6.536	69	6.540	68	6.543	68	1800
1050	6.602	63	6.605	63	6.608	63	6.611	63	1890
1100	6.665	58	6.668	58	6.671	57	6.674	57	1980
1150	6.723	53	6.726	53	6.728	53	6.731	52	2070
1200	6.776	50	6.779	49	6.781	49	6.783	50	2160
1250	6.826	46	6.828	46	6.830	46	6.833	45	2250
1300	6.872	41	6.874	41	6.876	40	6.878	41	2340
1350	6.913	39	6.915	39	6.916	39	6.919	38	2430
1400	6.952	36	6.954	35	6.955	36	6.957	36	2520
1450	6.988	33	6.989	33	6.991	33	6.993	32	2610
1500	7.021		7.022		7.024		7.025		2700

°K	10 atm		40 atm		70 atm		100 atm		°R
240	7.355	-1586							432
250	5.769	- 640							450
260	5.129	- 287							468
270	4.842	2							486
280	4.844	8							504
290	4.852	10							522
300	4.862	12	7.45	-40					540
310	4.874	15	7.05	-47					558
320	4.889	16	6.58	-61	11.12	-319	20.68	-923	576
330	4.905	26	5.97	-17	7.93	- 81	11.45	-228	594
340	4.931	28	5.80	- 4	7.12	- 19	9.17	- 50	612
350	4.959	30	5.76	- 4	6.93	- 18	8.67	- 42	630
360	4.989	30	5.72	- 4	6.75	- 17	8.25	- 43	648
370	5.019	32	5.68	- 3	6.58	- 15	7.82	- 36	666
380	5.051	31	5.65	- 2	6.43	- 12	7.46	- 28	684
390	5.082	33	5.63	- 1	6.31	- 8	7.18	- 22	702
400	5.115	33	5.615	- 7	6.225	- 75	6.960	- 183	720
410	5.148	32	5.608	- 8	6.150	- 74	6.777	- 185	738
420	5.180	34	5.600	2	6.076	- 39	6.592	- 92	756
430	5.214	33	5.602	3	6.037	- 41	6.500	- 106	774
440	5.247	33	5.605	4	5.996	- 43	6.394	- 118	792
450	5.280	32	5.609	4	5.953	- 51	6.276	- 148	810
460	5.312	32	5.613	8	5.902	- 30	6.128	- 90	828
470	5.344	33	5.621	12	5.872	- 20	6.038	- 66	846
480	5.377	32	5.633	16	5.852	3	5.972	- 4	864
490	5.409	31	5.649	20	5.855	20	5.968	46	882
500	5.440	31	5.669	22	5.875	31	6.014	72	900
510	5.471	31	5.691	23	5.906	29	6.086	64	918
520	5.502	31	5.714	20	5.935	14	6.150	17	936
530	5.533	30	5.734	19	5.949	8	6.167	1	954
540	5.563	30	5.753	20	5.957	10	6.168	- 1	972
550	5.593	29	5.773	19	5.967	9	6.167		990
560	5.622	28	5.792	20	5.976	10	6.167	- 1	1008
570	5.650	29	5.812	20	5.986	11	6.166	2	1026
580	5.679	29	5.832	21	5.997	12	6.168	3	1044
590	5.708	26	5.853	20	6.009	11	6.171	2	1062
600	5.734	28	5.873	21	6.020	14	6.173	7	1080
610	5.762	27	5.894	21	6.034	14	6.180	7	1098
620	5.789	26	5.915	20	6.048	14	6.187	8	1116
630	5.815	26	5.935	21	6.062	15	6.195	9	1134
640	5.841	26	5.956	20	6.077	15	6.204	9	1152
650	5.867	25	5.976	21	6.092	16	6.213	11	1170
660	5.892	25	5.997	20	6.108	15	6.224	11	1188
670	5.917	25	6.017	21	6.123	16	6.235	11	1206
680	5.942	24	6.038	20	6.139	16	6.246	10	1224
690	5.966	23	6.058	20	6.155	16	6.256	11	1242
700	5.989	23	6.078	19	6.171	15	6.267	11	1260
710	6.012	23	6.097	20	6.186	16	6.278	12	1278
720	6.035	23	6.117	20	6.202	16	6.290	12	1296
730	6.058	22	6.137	19	6.218	16	6.302	12	1314
740	6.080	21	6.156	18	6.234	15	6.314	12	1332
750	6.101	23	6.174	20	6.249	16	6.326	12	1350
760	6.124	21	6.194	18	6.265	16	6.338	12	1368
770	6.145	20	6.212	18	6.281	15	6.350	12	1386
780	6.165	21	6.230	18	6.296	15	6.362	12	1404
790	6.186	20	6.248	18	6.311	15	6.374	13	1422
800	6.206		6.266		6.326		6.387		1440

°K	10 atm		40 atm		70 atm		100 atm		°R
800	6.206	95	6.266	87	6.326	78	6.387	67	1440
850	6.301	88	6.353	80	6.404	72	6.454	64	1530
900	6.389	80	6.433	74	6.476	68	6.518	62	1620
950	6.469	74	6.507	70	6.544	65	6.580	60	1710
1000	6.543	68	6.577	64	6.609	60	6.640	56	1800
1050	6.611	63	6.641	59	6.669	56	6.696	53	1890
1100	6.674	57	6.700	55	6.725	52	6.749	49	1980
1150	6.731	52	6.755	50	6.777	48	6.798	46	2070
1200	6.783	50	6.805	47	6.825	45	6.844	43	2160
1250	6.833	45	6.852	44	6.870	42	6.887	41	2250
1300	6.878	41	6.896	39	6.912	38	6.928	36	2340
1350	6.919	38	6.935	37	6.950	36	6.964	35	2430
1400	6.957	36	6.972	34	6.986	33	6.999	32	2520
1450	6.993	32	7.006	32	7.019	31	7.031	30	2610
1500	7.025		7.038		7.050		7.061		2700

Table 4-4. ENTHALPY OF CARBON DIOXIDE * $(H-E_0^0)/RT_0$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	2.6203	1436	2.6159	1441	2.6008	1461			360
210	2.7639	1458	2.7600	1462	2.7469	1477	2.7337	1494	378
220	2.9097	1479	2.9062	1483	2.8946	1496	2.8831	1509	396
230	3.0576	1501	3.0545	1505	3.0442	1515	3.0340	1526	414
240	3.2077	1524	3.2050	1526	3.1957	1535	3.1866	1543	432
250	3.3601	1544	3.3576	1546	3.3492	1554	3.3409	1561	450
260	3.5145	1566	3.5122	1568	3.5046	1574	3.4970	1581	468
270	3.6711	1587	3.6690	1589	3.6620	1595	3.6551	1600	486
280	3.8298	1608	3.8279	1610	3.8215	1614	3.8151	1620	504
290	3.9906	1630	3.9889	1630	3.9829	1635	3.9771	1639	522
300	4.1536	1649	4.1519	1650	4.1464	1654	4.1410	1658	540
310	4.3185	1668	4.3169	1670	4.3118	1673	4.3068	1676	558
320	4.4853	1688	4.4839	1689	4.4791	1692	4.4744	1695	576
330	4.6541	1706	4.6528	1706	4.6483	1709	4.6439	1712	594
340	4.8247	1725	4.8234	1726	4.8192	1729	4.8151	1731	612
350	4.9972	1744	4.9960	1745	4.9921	1747	4.9882	1749	630
360	5.1716	1760	5.1705	1761	5.1668	1763	5.1631	1765	648
370	5.3476	1778	5.3466	1778	5.3431	1780	5.3396	1783	666
380	5.5254	1795	5.5244	1796	5.5211	1797	5.5179	1799	684
390	5.7049	1812	5.7040	1812	5.7008	1814	5.6978	1815	702
400	5.8861	1828	5.8852	1828	5.8822	1829	5.8793	1831	720
410	6.0689	1844	6.0680	1844	6.0651	1846	6.0624	1847	738
420	6.2533	1859	6.2524	1860	6.2497	1861	6.2471	1862	756
430	6.4392	1874	6.4384	1874	6.4358	1876	6.4333	1877	774
440	6.6266	1888	6.6258	1889	6.6234	1889	6.6210	1890	792
450	6.8154	1903	6.8147	1903	6.8123	1904	6.8100	1906	810
460	7.0057	1918	7.0050	1918	7.0027	1920	7.0006	1920	828
470	7.1975	1931	7.1968	1932	7.1947	1932	7.1926	1933	846
480	7.3906	1945	7.3900	1945	7.3879	1946	7.3859	1947	864
490	7.5851	1958	7.5845	1958	7.5825	1959	7.5806	1960	882
500	7.7809	1972	7.7803	1972	7.7784	1973	7.7766	1974	900
510	7.9781	1984	7.9775	1985	7.9757	1985	7.9740	1986	918
520	8.1765	1996	8.1760	1996	8.1742	1997	8.1726	1997	936
530	8.3761	2009	8.3756	2009	8.3739	2010	8.3723	2011	954
540	8.5770	2021	8.5765	2021	8.5749	2022	8.5734	2022	972
550	8.7791	2033	8.7786	2033	8.7771	2033	8.7756	2034	990
560	8.9824	2045	8.9819	2046	8.9804	2046	8.9790	2047	1008
570	9.1869	2056	9.1865	2056	9.1850	2057	9.1837	2057	1026
580	9.3925	2067	9.3921	2067	9.3907	2068	9.3894	2068	1044
590	9.5992	2078	9.5988	2078	9.5975	2078	9.5962	2079	1062
600	9.8070	2089	9.8066	2089	9.8053	2090	9.8041	2090	1080
610	10.0159	2100	10.0155	2100	10.0143	2100	10.0131	2101	1098
620	10.2259	2110	10.2255	2111	10.2243	2111	10.2232	2111	1116
630	10.4369	2120	10.4366	2120	10.4354	2121	10.4343	2121	1134
640	10.6489	2130	10.6486	2130	10.6475	2130	10.6464	2131	1152
650	10.8619	2140	10.8616	2140	10.8605	2141	10.8595	2141	1170
660	11.0759	2150	11.0756	2150	11.0746	2150	11.0736	2151	1188
670	11.2909	2159	11.2906	2159	11.2896	2159	11.2887	2160	1206
680	11.5068	2169	11.5065	2169	11.5055	2170	11.5047	2169	1224
690	11.7237	2177	11.7234	2177	11.7225	2177	11.7216	2178	1242
700	11.9414	2187	11.9411	2188	11.9402	2188	11.9394	2188	1260
710	12.1601	2196	12.1599	2196	12.1590	2196	12.1582	2197	1278
720	12.3797	2204	12.3795	2204	12.3786	2204	12.3779	2204	1296
730	12.6001	2213	12.5999	2213	12.5990	2214	12.5983	2214	1314
740	12.8214	2221	12.8212	2221	12.8204	2221	12.8197	2221	1332
750	13.0435	2229	13.0433	2229	13.0425	2230	13.0418	2230	1350
760	13.2664	2238	13.2662	2238	13.2655	2238	13.2648	2239	1368
770	13.4902	2245	13.4900	2245	13.4893	2245	13.4887	2245	1386
780	13.7147	2253	13.7145	2253	13.7138	2253	13.7132	2254	1404
790	13.9400	2261	13.9398	2262	13.9391	2262	13.9386	2261	1422
800	14.1661		14.1660		14.1653		14.1647		1440

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	14.166	1141	14.166	1141	14.165	1141	14.165	1141	1440
850	15.307	1159	15.307	1159	15.306	1159	15.306	1159	1530
900	16.466	1174	16.466	1174	16.465	1175	16.465	1174	1620
950	17.640	1189	17.640	1189	17.640	1189	17.639	1189	1710
1000	18.829	1202	18.829	1202	18.829	1202	18.828	1202	1800
1050	20.031	1214	20.031	1214	20.031	1214	20.030	1215	1890
1100	21.245	1225	21.245	1225	21.245	1225	21.245	1225	1980
1150	22.470	1236	22.470	1236	22.470	1236	22.470	1236	2070
1200	23.706	1245	23.706	1245	23.706	1245	23.706	1245	2160
1250	24.951	1254	24.951	1254	24.951	1254	24.951	1254	2250
1300	26.205	1261	26.205	1261	26.205	1261	26.205	1261	2340
1350	27.466	1269	27.466	1269	27.466	1269	27.466	1269	2430
1400	28.735	1276	28.735	1276	28.735	1276	28.735	1276	2520
1450	30.011	1282	30.011	1282	30.011	1282	30.011	1282	2610
1500	31.293		31.293		31.293		31.293		2700

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 4-4. ENTHALPY OF CARBON DIOXIDE - Cont. * $(H-E_0^0)/RT_0$

°K	1 atm		4 atm		7 atm		10 atm		°R
220	2.871	152							396
230	3.023	154	2.908	172	2.745	221			414
240	3.177	155	3.080	167	2.966	190	2.818	236	432
250	3.332	157	3.247	165	3.156	178	3.054	198	450
260	3.489	158	3.412	165	3.334	172	3.252	181	468
270	3.647	161	3.577	166	3.506	172	3.433	177	486
280	3.808	162	3.743	167	3.678	172	3.610	178	504
290	3.970	165	3.910	169	3.850	173	3.788	177	522
300	4.135	166	4.079	170	4.023	174	3.965	179	540
310	4.301	168	4.249	171	4.197	175	4.144	178	558
320	4.469	169	4.420	173	4.372	176	4.322	179	576
330	4.638	172	4.593	174	4.548	177	4.501	180	594
340	4.810	174	4.767	177	4.725	179	4.681	182	612
350	4.984	175	4.944	178	4.904	180	4.863	183	630
360	5.159	177	5.122	178	5.084	181	5.046	183	648
370	5.336	178	5.300	181	5.265	182	5.229	184	666
380	5.514	180	5.481	181	5.447	184	5.413	185	684
390	5.694	182	5.662	184	5.631	185	5.598	187	702
400	5.876	183	5.846	185	5.816	186	5.785	188	720
410	6.059	185	6.031	186	6.002	188	5.973	189	738
420	6.244	186	6.217	187	6.190	189	6.162	190	756
430	6.430	188	6.404	189	6.379	190	6.352	192	774
440	6.618	189	6.593	190	6.569	191	6.544	192	792
450	6.807	191	6.783	192	6.760	193	6.736	194	810
460	6.998	192	6.975	193	6.953	194	6.930	195	828
470	7.190	193	7.168	195	7.147	195	7.125	196	846
480	7.383	195	7.363	195	7.342	197	7.321	198	864
490	7.578	196	7.558	197	7.539	198	7.519	198	882
500	7.774	198	7.755	198	7.737	198	7.717	200	900
510	7.972	198	7.953	200	7.935	201	7.917	201	918
520	8.170	200	8.153	200	8.136	201	8.118	202	936
530	8.370	201	8.353	202	8.337	202	8.320	203	954
540	8.571	203	8.555	203	8.539	204	8.523	204	972
550	8.774	203	8.758	204	8.743	204	8.727	205	990
560	8.977	205	8.962	205	8.947	206	8.932	207	1008
570	9.182	205	9.167	206	9.153	207	9.139	207	1026
580	9.387	207	9.373	208	9.360	208	9.346	208	1044
590	9.594	208	9.581	208	9.568	209	9.554	210	1062
600	9.802	209	9.789	210	9.777	210	9.764	210	1080
610	10.011	210	9.999	210	9.987	211	9.974	212	1098
620	10.221	211	10.209	211	10.198	212	10.186	212	1116
630	10.432	212	10.420	213	10.410	212	10.398	213	1134
640	10.644	215	10.633	215	10.622	215	10.611	216	1152
650	10.859	214	10.848	214	10.837	215	10.827	215	1170
660	11.073	215	11.062	215	11.052	216	11.042	216	1188
670	11.288	216	11.277	217	11.268	217	11.258	217	1206
680	11.504	217	11.494	217	11.485	217	11.475	218	1224
690	11.721	217	11.711	218	11.702	219	11.693	219	1242
700	11.938	219	11.929	219	11.921	219	11.912	220	1260
710	12.157	220	12.148	220	12.140	220	12.132	220	1278
720	12.377	220	12.368	221	12.360	221	12.352	221	1296
730	12.597	222	12.589	222	12.581	222	12.573	222	1314
740	12.819	222	12.811	222	12.803	223	12.795	223	1332
750	13.041	223	13.033	223	13.026	224	13.018	224	1350
760	13.264	224	13.256	224	13.250	224	13.242	225	1368
770	13.488	224	13.480	225	13.474	225	13.467	225	1386
780	13.712	226	13.705	226	13.699	226	13.692	226	1404
790	13.938	226	13.931	226	13.925	226	13.918	227	1422
800	14.164		14.157		14.151		14.145		1440

*The enthalpy function is divided here by a constant RT_0 where T_0= 273.16°K (491.688°R).

Table 4-4. ENTHALPY OF CARBON DIOXIDE - Cont. * $(H-E_0^o)/RT_0$

°K	1 atm		4 atm		7 atm		10 atm		°R
800	14.164	1141	14.157	1143	14.151	1144	14.145	1145	1440
850	15.305	1159	15.300	1159	15.295	1161	15.290	1161	1530
900	16.464	1175	16.459	1176	16.456	1176	16.451	1177	1620
950	17.639	1189	17.635	1189	17.632	1190	17.628	1191	1710
1000	18.828	1203	18.824	1204	18.822	1204	18.819	1204	1800
1050	20.031	1214	20.028	1215	20.026	1215	20.023	1216	1890
1100	21.245	1225	21.243	1225	21.241	1227	21.239	1227	1980
1150	22.470	1236	22.468	1236	22.468	1236	22.466	1237	2070
1200	23.706	1245	23.704	1246	23.704	1246	23.703	1246	2160
1250	24.951	1253	24.950	1254	24.950	1254	24.949	1254	2250
1300	26.204	1262	26.204	1262	26.204	1262	26.203	1263	2340
1350	27.466	1269	27.466	1269	27.466	1270	27.466	1270	2430
1400	28.735	1276	28.735	1276	28.736	1276	28.736	1277	2520
1450	30.011	1282	30.011	1283	30.012	1283	30.013	1283	2610
1500	31.293		31.294		31.295		31.296		2700

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 4-4. ENTHALPY OF CARBON DIOXIDE - Cont. * $(H-E_0^o)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
240	2.818	236							432
250	3.054	198							450
260	3.252	181							468
270	3.433	177							486
280	3.610	178							504
290	3.788	177							522
300	3.965	179	3.25	26					540
310	4.144	178	3.51	25					558
320	4.322	179	3.76	23	3.05	35	2.09	57	576
330	4.501	180	3.99	21	3.40	27	2.66	37	594
340	4.681	182	4.20	22	3.67	25	3.03	32	612
350	4.863	183	4.42	21	3.92	26	3.35	31	630
360	5.046	183	4.63	21	4.18	24	3.66	30	648
370	5.229	184	4.84	20	4.42	24	3.96	28	666
380	5.413	185	5.04	21	4.66	23	4.24	26	684
390	5.598	187	5.25	22	4.89	24	4.50	27	702
400	5.785	188	5.466	205	5.128	227	4.771	251	720
410	5.973	189	5.671	206	5.355	223	5.022	245	738
420	6.162	190	5.877	205	5.578	222	5.267	239	756
430	6.352	192	6.082	205	5.800	220	5.506	237	774
440	6.544	192	6.287	205	6.020	219	5.743	231	792
450	6.736	194	6.492	205	6.239	217	5.974	227	810
460	6.930	195	6.697	206	6.456	215	6.201	223	828
470	7.125	196	6.903	206	6.671	215	6.424	220	846
480	7.321	198	7.109	206	6.886	214	6.644	218	864
490	7.519	198	7.315	207	7.100	215	6.862	219	882
500	7.717	200	7.522	208	7.315	215	7.081	222	900
510	7.917	201	7.730	209	7.530	217	7.303	224	918
520	8.118	202	7.939	210	7.747	217	7.527	225	936
530	8.320	203	8.149	210	7.964	218	7.752	226	954
540	8.523	204	8.359	211	8.182	219	7.978	226	972
550	8.727	205	8.570	211	8.401	218	8.204	225	990
560	8.932	207	8.781	213	8.619	219	8.429	226	1008
570	9.139	207	8.994	213	8.838	219	8.655	226	1026
580	9.346	208	9.207	214	9.057	220	8.881	226	1044
590	9.554	210	9.421	214	9.277	220	9.107	226	1062
600	9.764	210	9.635	216	9.497	221	9.333	226	1080
610	9.974	212	9.851	216	9.718	221	9.559	226	1098
620	10.186	212	10.067	217	9.939	222	9.785	227	1116
630	10.398	213	10.284	218	10.161	222	10.012	227	1134
640	10.611	216	10.502	219	10.383	224	10.239	228	1152
650	10.827	215	10.721	219	10.607	223	10.467	228	1170
660	11.042	216	10.940	220	10.830	224	10.695	228	1188
670	11.258	217	11.160	221	11.054	224	10.923	228	1206
680	11.475	218	11.381	221	11.278	225	11.151	229	1224
690	11.693	219	11.602	222	11.503	226	11.380	229	1242
700	11.912	220	11.824	223	11.729	226	11.609	230	1260
710	12.132	220	12.047	224	11.955	227	11.839	230	1278
720	12.352	221	12.271	224	12.182	227	12.069	230	1296
730	12.573	222	12.495	225	12.409	228	12.299	231	1314
740	12.795	223	12.720	225	12.637	228	12.530	231	1332
750	13.018	224	12.945	227	12.865	229	12.761	232	1350
760	13.242	225	13.172	227	13.094	230	12.993	232	1368
770	13.467	225	13.399	228	13.324	230	13.225	233	1386
780	13.692	226	13.627	228	13.554	231	13.458	233	1404
790	13.918	227	13.855	229	13.785	231	13.691	234	1422
800	14.145		14.084		14.016		13.925		1440

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 4-4. ENTHALPY OF CARBON DIOXIDE - Cont. * $(H-E_0^o)RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
800	14.145	1145	14.084	1155	14.016	1165	13.925	1175	1440
850	15.290	1161	15.239	1170	15.181	1179	15.100	1187	1530
900	16.451	1177	16.409	1184	16.360	1192	16.287	1199	1620
950	17.628	1191	17.593	1198	17.552	1203	17.486	1210	1710
1000	18.819	1204	18.791	1210	18.755	1216	18.696	1221	1800
1050	20.023	1216	20.001	1221	19.971	1226	19.917	1230	1890
1100	21.239	1227	21.222	1232	21.197	1236	21.147	1240	1980
1150	22.466	1237	22.454	1241	22.433	1244	22.387	1248	2070
1200	23.703	1246	23.695	1249	23.677	1254	23.635	1257	2160
1250	24.949	1254	24.944	1258	24.931	1261	24.892	1264	2250
1300	26.203	1263	26.202	1266	26.192	1268	26.156	1272	2340
1350	27.466	1270	27.468	1273	27.460	1276	27.428	1277	2430
1400	28.736	1277	28.741	1279	28.736	1282	28.705	1285	2520
1450	30.013	1283	30.020	1286	30.018	1287	29.990	1289	2610
1500	31.296		31.306		31.305		31.279		2700

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	28.6423	1913	26.3354	1920	24.9344	1946			360
210	28.8336	1853	26.5274	1859	25.1290	1878	24.5571	1899	378
220	29.0189	1795	26.7133	1800	25.3168	1816	24.7470	1832	396
230	29.1984	1746	26.8933	1749	25.4984	1761	24.9302	1773	414
240	29.3730	1698	27.0682	1701	25.6745	1711	25.1075	1721	432
250	29.5428	1654	27.2383	1657	25.8456	1665	25.2796	1673	450
260	29.7082	1615	27.4040	1617	26.0121	1624	25.4469	1630	468
270	29.8697	1578	27.5657	1579	26.1745	1584	25.6099	1590	486
280	30.0275	1541	27.7236	1542	26.3329	1547	25.7689	1552	504
290	30.1816	1508	27.8778	1510	26.4876	1514	25.9241	1517	522
300	30.3324	1477	28.0288	1478	26.6390	1481	26.0758	1485	540
310	30.4801	1447	28.1766	1448	26.7871	1451	26.2243	1454	558
320	30.6248	1418	28.3214	1419	26.9322	1422	26.3697	1424	576
330	30.7666	1391	28.4633	1392	27.0744	1394	26.5121	1396	594
340	30.9057	1366	28.6025	1366	27.2138	1368	26.6517	1371	612
350	31.0423	1341	28.7391	1342	27.3506	1343	26.7888	1345	630
360	31.1764	1319	28.8733	1319	27.4849	1322	26.9233	1323	648
370	31.3083	1295	29.0052	1296	27.6171	1296	27.0556	1298	666
380	31.4378	1274	29.1348	1274	27.7467	1276	27.1854	1277	684
390	31.5652	1253	29.2622	1253	27.8743	1254	27.3131	1255	702
400	31.6905	1233	29.3875	1233	27.9997	1234	27.4386	1235	720
410	31.8138	1213	29.5108	1213	28.1231	1214	27.5621	1215	738
420	31.9351	1195	29.6321	1195	28.2445	1196	27.6836	1197	756
430	32.0546	1177	29.7516	1178	28.3641	1178	27.8033	1179	774
440	32.1723	1159	29.8694	1159	28.4819	1160	27.9212	1160	792
450	32.2882	1143	29.9853	1143	28.5979	1144	28.0372	1145	810
460	32.4025	1126	30.0996	1126	28.7123	1127	28.1517	1127	828
470	32.5151	1111	30.2122	1111	28.8250	1111	28.2644	1112	846
480	32.6262	1096	30.3233	1097	28.9361	1097	28.3756	1097	864
490	32.7358	1080	30.4330	1080	29.0458	1081	28.4853	1081	882
500	32.8438	1066	30.5410	1066	29.1539	1066	28.5934	1067	900
510	32.9504	1053	30.6476	1053	29.2605	1054	28.7001	1054	918
520	33.0557	1038	30.7529	1038	29.3659	1038	28.8055	1039	936
530	33.1595	1026	30.8567	1026	29.4697	1027	28.9094	1027	954
540	33.2621	1013	30.9593	1013	29.5724	1013	29.0121	1013	972
550	33.3634	1001	31.0606	1001	29.6737	1001	29.1134	1002	990
560	33.4635	988	31.1607	989	29.7738	989	29.2136	989	1008
570	33.5623	977	31.2596	977	29.8727	977	29.3125	977	1026
580	33.6600	966	31.3573	966	29.9704	966	29.4102	967	1044
590	33.7566	953	31.4539	953	30.0670	954	29.5069	953	1062
600	33.8519	944	31.5492	944	30.1624	944	29.6022	945	1080
610	33.9463	932	31.6436	932	30.2568	932	29.6967	932	1098
620	34.0395	922	31.7368	922	30.3500	922	29.7899	923	1116
630	34.1317	913	31.8290	913	30.4422	914	29.8822	913	1134
640	34.2230	902	31.9203	902	30.5336	902	29.9735	903	1152
650	34.3132	892	32.0105	892	30.6238	892	30.0638	892	1170
660	34.4024	883	32.0997	883	30.7130	883	30.1530	883	1188
670	34.4907	873	32.1880	873	30.8013	873	30.2413	874	1206
680	34.5780	866	32.2753	866	30.8886	867	30.3287	866	1224
690	34.6646	856	32.3619	856	30.9753	856	30.4153	856	1242
700	34.7502	847	32.4475	847	31.0609	847	30.5009	847	1260
710	34.8349	839	32.5322	839	31.1456	839	30.5856	840	1278
720	34.9188	831	32.6161	831	31.2295	831	30.6696	831	1296
730	35.0019	821	32.6992	821	31.3126	821	30.7527	821	1314
740	35.0840	815	32.7813	815	31.3947	815	30.8348	815	1332
750	35.1655	806	32.8628	807	31.4762	807	30.9163	807	1350
760	35.2461	800	32.9435	800	31.5569	800	30.9970	800	1368
770	35.3261	791	33.0235	791	31.6369	791	31.0770	791	1386
780	35.4052	784	33.1026	784	31.7160	784	31.1561	784	1404
790	35.4836	777	33.1810	776	31.7944	776	31.2345	776	1422
800	35.5613		33.2586		31.8720		31.3121		1440

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	35.5613	3780	33.2586	3780	31.8720	3781	31.3121	3781	1440
850	35.9393	3618	33.6366	3618	32.2501	3618	31.6902	3619	1530
900	36.3011	3468	33.9984	3468	32.6119	3468	32.0521	3468	1620
950	36.6479	3331	34.3452	3331	32.9587	3331	32.3989	3332	1710
1000	36.9810	320	34.6783	320	33.2918	320	32.7321	320	1800
1050	37.301	309	34.998	309	33.612	309	33.052	309	1890
1100	37.610	297	35.307	297	33.921	297	33.361	297	1980
1150	37.907	287	35.604	287	34.218	287	33.658	287	2070
1200	38.194	279	35.891	279	34.505	279	33.945	279	2160
1250	38.473	268	36.170	268	34.784	268	34.224	268	2250
1300	38.741	261	36.438	261	35.052	261	34.492	261	2340
1350	39.002	252	36.699	252	35.313	252	34.753	252	2430
1400	39.254	244	36.951	244	35.565	244	35.005	244	2520
1450	39.498	238	37.195	238	35.809	238	35.249	238	2610
1500	39.736		37.433		36.047		35.487		2700

°K	1 atm		4 atm		7 atm		10 atm		°R
220	24.380	185							396
230	24.565	178	23.079	200	22.365	256			414
240	24.743	174	23.279	186	22.621	213	22.132	263	432
250	24.917	168	23.465	177	22.834	190	22.395	212	450
260	25.085	163	23.642	170	23.024	178	22.607	187	468
270	25.248	160	23.812	165	23.202	170	22.794	176	486
280	25.408	155	23.977	160	23.372	165	22.970	170	504
290	25.563	152	24.137	156	23.537	161	23.140	165	522
300	25.715	149	24.293	152	23.698	155	23.305	159	540
310	25.864	146	24.445	149	23.853	152	23.464	155	558
320	26.010	143	24.594	145	24.005	148	23.619	151	576
330	26.153	140	24.739	143	24.153	144	23.770	147	594
340	26.293	137	24.882	139	24.297	142	23.917	143	612
350	26.430	134	25.021	136	24.439	138	24.060	140	630
360	26.564	133	25.157	134	24.577	135	24.200	137	648
370	26.697	130	25.291	131	24.712	133	24.337	134	666
380	26.827	127	25.422	129	24.845	130	24.471	132	684
390	26.954	126	25.551	127	24.975	128	24.603	129	702
400	27.080	124	25.678	125	25.103	126	24.732	127	720
410	27.204	121	25.803	122	25.229	123	24.859	124	738
420	27.325	120	25.925	121	25.352	122	24.983	122	756
430	27.445	118	26.046	119	25.474	119	25.105	121	774
440	27.563	116	26.165	116	25.593	118	25.226	118	792
450	27.679	114	26.281	116	25.711	116	25.344	116	810
460	27.793	113	26.397	113	25.827	114	25.460	115	828
470	27.906	111	26.510	112	25.941	112	25.575	113	846
480	28.017	110	26.622	110	26.053	111	25.688	111	864
490	28.127	108	26.732	108	26.164	109	25.799	109	882
500	28.235	107	26.840	108	26.273	107	25.908	108	900
510	28.342	105	26.948	105	26.380	106	26.016	107	918
520	28.447	104	27.053	105	26.486	105	26.123	105	936
530	28.551	103	27.158	103	26.591	103	26.228	104	954
540	28.654	101	27.261	101	26.694	102	26.332	102	972
550	28.755	101	27.362	101	26.796	101	26.434	101	990
560	28.856	99	27.463	99	26.897	100	26.535	100	1008
570	28.955	97	27.562	98	26.997	98	26.635	98	1026
580	29.052	97	27.660	97	27.095	97	26.733	98	1044
590	29.149	95	27.757	96	27.192	96	26.831	96	1062
600	29.244	95	27.853	94	27.288	95	26.927	95	1080
610	29.339	93	27.947	94	27.383	93	27.022	94	1098
620	29.432	92	28.041	92	27.476	93	27.116	93	1116
630	29.524	92	28.133	92	27.569	92	27.209	91	1134
640	29.616	90	28.225	90	27.661	90	27.300	91	1152
650	29.706	89	28.315	89	27.751	90	27.391	90	1170
660	29.795	89	28.404	89	27.841	88	27.481	89	1188
670	29.884	87	28.493	87	27.929	88	27.570	88	1206
680	29.971	86	28.580	87	28.017	87	27.658	86	1224
690	30.057	86	28.667	86	28.104	86	27.744	86	1242
700	30.143	85	28.753	85	28.190	85	27.830	86	1260
710	30.228	84	28.838	84	28.275	84	27.916	84	1278
720	30.312	83	28.922	83	28.359	83	28.000	83	1296
730	30.395	82	29.005	82	28.442	83	28.083	83	1314
740	30.477	82	29.087	82	28.525	81	28.166	81	1332
750	30.559	80	29.169	81	28.606	81	28.247	81	1350
760	30.639	80	29.250	80	28.687	80	28.328	81	1368
770	30.719	79	29.330	79	28.767	80	28.409	79	1386
780	30.798	79	29.409	78	28.847	78	28.488	79	1404
790	30.877	77	29.487	78	28.925	78	28.567	78	1422
800	30.954		29.565		29.003		28.645		1440

Table 4-5. ENTROPY OF CARBON DIOXIDE - Cont. S/R

°K	1 atm		4 atm		7 atm		10 atm		°R
800	30.954	380	29.565	380	29.003	380	28.645	380	1440
850	31.334	361	29.945	362	29.383	362	29.025	362	1530
900	31.695	347	30.307	347	29.745	348	29.387	348	1620
950	32.042	333	30.654	333	30.093	333	29.735	334	1710
1000	32.375	321	30.987	321	30.426	321	30.069	321	1800
1050	32.696	308	31.308	308	30.747	308	30.390	308	1890
1100	33.004	298	31.616	298	31.055	299	30.698	299	1980
1150	33.302	287	31.914	288	31.354	287	30.997	287	2070
1200	33.589	278	32.202	278	31.641	278	31.284	278	2160
1250	33.867	268	32.480	268	31.919	268	31.562	269	2250
1300	34.135	260	32.748	260	32.187	260	31.831	260	2340
1350	34.395	252	33.008	252	32.447	253	32.091	252	2430
1400	34.647	245	33.260	245	32.700	245	32.343	245	2520
1450	34.892	237	33.505	237	32.945	237	32.588	237	2610
1500	35.129		33.742		33.182		32.825		2700

°K	10 atm		40 atm		70 atm		100 atm		°R
240	22.132	263							432
250	22.395	212							450
260	22.607	187							468
270	22.794	176							486
280	22.970	170							504
290	23.140	165							522
300	23.305	159	21.43	24					540
310	23.464	155	21.67	22					558
320	23.619	151	21.89	19	20.85	29	19.83	48	576
330	23.770	147	22.08	17	21.14	23	20.31	30	594
340	23.917	143	22.25	17	21.37	20	20.61	26	612
350	24.060	140	22.42	16	21.57	19	20.87	24	630
360	24.200	137	22.58	16	21.76	18	21.11	22	648
370	24.337	134	22.74	15	21.94	18	21.33	20	666
380	24.471	132	22.89	15	22.12	16	21.53	19	684
390	24.603	129	23.04	14	22.28	17	21.72	18	702
400	24.732	127	23.183	139	22.449	153	21.904	170	720
410	24.859	124	23.322	135	22.602	147	22.074	161	738
420	24.983	122	23.457	131	22.749	142	22.235	153	756
430	25.105	121	23.588	129	22.891	139	22.388	149	774
440	25.226	118	23.717	126	23.030	134	22.537	142	792
450	25.344	116	23.843	123	23.164	130	22.679	136	810
460	25.460	115	23.966	121	23.294	127	22.815	131	828
470	25.575	113	24.087	119	23.421	123	22.946	126	846
480	25.688	111	24.206	116	23.544	121	23.072	124	864
490	25.799	109	24.322	114	23.665	118	23.196	120	882
500	25.908	108	24.436	113	23.783	117	23.316	120	900
510	26.016	107	24.549	110	23.900	115	23.436	119	918
520	26.123	105	24.659	109	24.015	113	23.555	117	936
530	26.228	104	24.768	108	24.128	111	23.672	116	954
540	26.332	102	24.876	105	24.239	110	23.788	113	972
550	26.434	101	24.981	105	24.349	107	23.901	111	990
560	26.535	100	25.086	102	24.456	106	24.012	109	1008
570	26.635	98	25.188	102	24.562	104	24.121	107	1026
580	26.733	98	25.290	100	24.666	103	24.228	106	1044
590	26.831	96	25.390	98	24.769	101	24.334	103	1062
600	26.927	95	25.488	97	24.870	100	24.437	103	1080
610	27.022	94	25.585	96	24.970	98	24.540	100	1098
620	27.116	93	25.681	95	25.068	97	24.640	99	1116
630	27.209	91	25.776	94	25.165	95	24.739	98	1134
640	27.300	91	25.870	92	25.260	95	24.837	96	1152
650	27.391	90	25.962	92	25.355	93	24.933	95	1170
660	27.481	89	26.054	90	25.448	92	25.028	94	1188
670	27.570	88	26.144	89	25.540	91	25.122	92	1206
680	27.658	86	26.233	88	25.631	89	25.214	91	1224
690	27.744	86	26.321	88	25.720	89	25.305	90	1242
700	27.830	86	26.409	86	25.809	88	25.395	89	1260
710	27.916	84	26.495	86	25.897	86	25.484	88	1278
720	28.000	83	26.581	84	25.983	86	25.572	87	1296
730	28.083	83	26.665	84	26.069	85	25.659	86	1314
740	28.166	81	26.749	82	26.154	83	25.745	85	1332
750	28.247	81	26.831	82	26.237	83	25.830	84	1350
760	28.328	81	26.913	81	26.320	82	25.914	82	1368
770	28.409	79	26.994	81	26.402	81	25.996	83	1386
780	28.488	79	27.075	79	26.483	81	26.079	81	1404
790	28.567	78	27.154	79	26.564	79	26.160	80	1422
800	28.645		27.233		26.643		26.240		1440

°K	10 atm		40 atm		70 atm		100 atm		°R
800	28.645	380	27.233	383	26.643	387	26.240	390	1440
850	29.025	362	27.616	366	27.030	368	26.630	371	1530
900	29.387	348	27.982	350	27.398	352	27.001	354	1620
950	29.735	334	28.332	335	27.750	337	27.355	339	1710
1000	30.069	321	28.667	323	28.087	325	27.694	326	1800
1050	30.390	308	28.990	310	28.412	311	28.020	312	1890
1100	30.698	299	29.300	299	28.723	300	28.332	301	1980
1150	30.997	287	29.599	288	29.023	289	28.633	290	2070
1200	31.284	278	29.887	280	29.312	280	28.923	281	2160
1250	31.562	269	30.167	269	29.592	270	29.204	270	2250
1300	31.831	260	30.436	260	29.862	261	29.474	262	2340
1350	32.091	252	30.696	253	30.123	254	29.736	254	2430
1400	32.343	245	30.949	246	30.377	246	29.990	247	2520
1450	32.588	237	31.195	236	30.623	235	30.237	238	2610
1500	32.825		31.431		30.858		30.475		2700

Table 4-6. SPECIFIC-HEAT RATIO OF CARBON DIOXIDE $\gamma = C_p/C_v$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	1.3462	-70	1.3481	-71	1.3555	-89			360
210	1.3392	-67	1.3410	-70	1.3466	-78			378
220	1.3325	-65	1.3340	-68	1.3388	-74	1.3436	-81	396
230	1.3260	-63	1.3272	-64	1.3314	-70	1.3355	-75	414
240	1.3197	-60	1.3208	-61	1.3244	-66	1.3280	-71	432
250	1.3137	-57	1.3147	-59	1.3178	-62	1.3209	-66	450
260	1.3080	-54	1.3088	-55	1.3116	-60	1.3143	-62	468
270	1.3026	-52	1.3033	-53	1.3056	-54	1.3081	-58	486
280	1.2974	-49	1.2980	-50	1.3002	-53	1.3023	-55	504
290	1.2925	-47	1.2930	-47	1.2949	-49	1.2968	-51	522
300	1.2878	-44	1.2883	-45	1.2900	-47	1.2917	-48	540
310	1.2834	-43	1.2838	-43	1.2853	-44	1.2869	-46	558
320	1.2791	-40	1.2795	-40	1.2809	-42	1.2823	-43	576
330	1.2751	-38	1.2755	-38	1.2767	-39	1.2780	-41	594
340	1.2713	-36	1.2717	-37	1.2728	-38	1.2739	-38	612
350	1.2677	-35	1.2680	-35	1.2690	-35	1.2701	-37	630
360	1.2642	-33	1.2645	-33	1.2655	-34	1.2664	-35	648
370	1.2609	-31	1.2612	-31	1.2621	-33	1.2629	-33	666
380	1.2578	-30	1.2581	-31	1.2588	-30	1.2596	-31	684
390	1.2548	-29	1.2550	-29	1.2558	-30	1.2565	-30	702
400	1.2519	-27	1.2521	-27	1.2528	-28	1.2535	-29	720
410	1.2492	-26	1.2494	-26	1.2500	-26	1.2506	-27	738
420	1.2466	-25	1.2468	-26	1.2474	-26	1.2479	-26	756
430	1.2441	-24	1.2442	-24	1.2448	-25	1.2453	-25	774
440	1.2417	-23	1.2418	-23	1.2423	-23	1.2428	-24	792
450	1.2394	-23	1.2395	-22	1.2400	-23	1.2404	-23	810
460	1.2371	-21	1.2373	-22	1.2377	-22	1.2381	-22	828
470	1.2350	-21	1.2351	-21	1.2355	-21	1.2359	-21	846
480	1.2329	-19	1.2330	-20	1.2334	-20	1.2338	-20	864
490	1.2310	-20	1.2310	-19	1.2314	-19	1.2318	-20	882
500	1.2290	-18	1.2291	-18	1.2295	-19	1.2298	-19	900
510	1.2272	-18	1.2273	-18	1.2276	-18	1.2279	-18	918
520	1.2254	-17	1.2255	-17	1.2258	-17	1.2261	-17	936
530	1.2237	-17	1.2238	-17	1.2241	-17	1.2244	-17	954
540	1.2220	-16	1.2221	-16	1.2224	-16	1.2227	-16	972
550	1.2204	-15	1.2205	-15	1.2208	-16	1.2211	-16	990
560	1.2189	-15	1.2190	-15	1.2192	-15	1.2195	-15	1008
570	1.2174	-14	1.2175	-15	1.2177	-15	1.2180	-15	1026
580	1.2160	-15	1.2160	-14	1.2162	-14	1.2165	-14	1044
590	1.2145	-13	1.2146	-14	1.2148	-13	1.2151	-14	1062
600	1.2132	-13	1.2132	-13	1.2135	-14	1.2137	-14	1080
610	1.2119	-13	1.2119	-13	1.2121	-13	1.2123	-13	1098
620	1.2106	-13	1.2106	-12	1.2108	-12	1.2110	-12	1116
630	1.2093	-12	1.2094	-12	1.2096	-12	1.2098	-13	1134
640	1.2081	-11	1.2082	-12	1.2084	-12	1.2085	-12	1152
650	1.2070	-12	1.2070	-11	1.2072	-12	1.2073	-11	1170
660	1.2058	-11	1.2059	-11	1.2060	-11	1.2062	-11	1188
670	1.2047	-10	1.2048	-11	1.2049	-10	1.2051	-11	1206
680	1.2037	-11	1.2037	-10	1.2039	-11	1.2040	-11	1224
690	1.2026	-10	1.2027	-11	1.2028	-10	1.2029	-10	1242
700	1.2016	-10	1.2016	-10	1.2018	-10	1.2019	-10	1260
710	1.2006	-9	1.2006	-9	1.2008	-10	1.2009	-10	1278
720	1.1997	-10	1.1997	-9	1.1998	-9	1.1999	-9	1296
730	1.1987	-9	1.1988	-9	1.1989	-9	1.1990	-9	1314
740	1.1978	-9	1.1979	-9	1.1980	-9	1.1981	-9	1332
750	1.1969	-8	1.1970	-9	1.1971	-9	1.1972	-9	1350
760	1.1961	-9	1.1961	-8	1.1962	-8	1.1963	-8	1368
770	1.1952	-8	1.1953	-8	1.1954	-8	1.1955	-8	1386
780	1.1944	-8	1.1945	-8	1.1946	-8	1.1947	-8	1404
790	1.1936	-7	1.1937	-8	1.1938	-8	1.1939	-8	1422
800	1.1929		1.1929		1.1930		1.1931		1440

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	1.1929	-36	1.1929	-36	1.1930	-36	1.1931	-36	1440
850	1.1893	-32	1.1893	-32	1.1894	-32	1.1895	-32	1530
900	1.1861	-28	1.1861	-28	1.1862	-28	1.1863	-29	1620
950	1.1833	-25	1.1833	-25	1.1834	-25	1.1834	-25	1710
1000	1.1808	-22	1.1808	-22	1.1809	-23	1.1809	-22	1800
1050	1.1786	-20	1.1786	-20	1.1786	-20	1.1787	-20	1890
1100	1.1766	-18	1.1766	-18	1.1766	-18	1.1767	-19	1980
1150	1.1748	-16	1.1748	-16	1.1748	-16	1.1748	-16	2070
1200	1.1732	-15	1.1732	-15	1.1732	-15	1.1732	-14	2160
1250	1.1717	-14	1.1717	-14	1.1717	-13	1.1718	-14	2250
1300	1.1703	-12	1.1703	-12	1.1704	-12	1.1704	-12	2340
1350	1.1691	-11	1.1691	-11	1.1692	-12	1.1692	-11	2430
1400	1.1680	-10	1.1680	-10	1.1680	-10	1.1681	-10	2520
1450	1.1670	- 9	1.1670	- 9	1.1670	- 9	1.1671	-10	2610
1500	1.1661		1.1661		1.1661		1.1661		2700

°K	1 atm		4 atm		7 atm		10 atm		°R
220	1.349	-9							396
230	1.340	-8	1.385	-18	1.451	-48			414
240	1.332	-8	1.367	-11	1.403	-16	1.448	-32	432
250	1.324	-7	1.356	-11	1.387	-13	1.416	-15	450
260	1.317	-6	1.345	- 9	1.374	- 9	1.401	- 2	468
270	1.311	-7	1.336	- 9	1.365	-13	1.399	-17	486
280	1.304	-5	1.327	- 8	1.352	-11	1.382	-16	504
290	1.299	-6	1.319	- 8	1.341	-10	1.366	-14	522
300	1.293	-5	1.311	- 7	1.331	-10	1.352	-12	540
310	1.288	-4	1.304	- 6	1.321	- 8	1.340	-11	558
320	1.284	-5	1.298	- 6	1.313	- 7	1.329	- 9	576
330	1.279	-4	1.292	- 5	1.306	- 7	1.320	- 8	594
340	1.275	-4	1.287	- 5	1.299	- 6	1.312	- 7	612
350	1.271	-4	1.282	- 5	1.293	- 6	1.305	- 7	630
360	1.267	-3	1.277	- 4	1.287	- 5	1.298	- 6	648
370	1.264	-4	1.273	- 4	1.282	- 5	1.292	- 6	666
380	1.260	-3	1.269	- 4	1.277	- 4	1.286	- 5	684
390	1.257	-3	1.265	- 4	1.273	- 5	1.281	- 5	702
400	1.254	-3	1.261	- 3	1.268	- 3	1.276	- 5	720
410	1.251	-3	1.258	- 4	1.265	- 4	1.271	- 4	738
420	1.248	-2	1.254	- 3	1.261	- 4	1.267	- 4	756
430	1.246	-3	1.251	- 3	1.257	- 3	1.263	- 4	774
440	1.243	-2	1.248	- 2	1.254	- 3	1.259	- 3	792
450	1.241	-2	1.246	- 3	1.251	- 3	1.256	- 4	810
460	1.239	-3	1.243	- 2	1.248	- 3	1.252	- 3	828
470	1.236	-2	1.241	- 3	1.245	- 3	1.249	- 3	846
480	1.234	-2	1.238	- 2	1.242	- 2	1.246	- 3	864
490	1.232	-2	1.236	- 2	1.240	- 3	1.243	- 2	882
500	1.230	-2	1.234	- 2	1.237	- 2	1.241	- 3	900
510	1.228	-2	1.232	- 2	1.235	- 2	1.238	- 2	918
520	1.226	-1	1.230	- 2	1.233	- 2	1.236	- 2	936
530	1.225	-2	1.228	- 2	1.231	- 2	1.234	- 2	954
540	1.223	-2	1.226	- 2	1.229	- 2	1.232	- 3	972
550	1.221	-1	1.224	- 2	1.227	- 2	1.229	- 2	990
560	1.220	-2	1.222	- 1	1.225	- 2	1.227	- 2	1008
570	1.218	-1	1.221	- 2	1.223	- 2	1.225	- 2	1026
580	1.217	-2	1.219	- 2	1.221	- 1	1.223	- 1	1044
590	1.215	-1	1.217	- 1	1.220	- 2	1.222	- 2	1062
600	1.214	-1	1.216	- 2	1.218	- 2	1.220	- 2	1080
610	1.213	-2	1.214	- 1	1.216	- 1	1.218	- 1	1098
620	1.211	-1	1.213	- 1	1.215	- 1	1.217	- 2	1116
630	1.210	-1	1.212	- 2	1.214	- 2	1.215	- 1	1134
640	1.209	-1	1.210	- 1	1.212	- 1	1.214	- 2	1152
650	1.208	-2	1.209	- 1	1.211	- 1	1.212	- 1	1170
660	1.206	-1	1.208	- 1	1.210	- 2	1.211	- 1	1188
670	1.205	-1	1.207	- 1	1.208	- 1	1.210	- 2	1206
680	1.204	-1	1.206	- 1	1.207	- 1	1.208	- 1	1224
690	1.203	-1	1.205	- 2	1.206	- 1	1.207	- 1	1242
700	1.202	-1	1.203	- 1	1.205	- 1	1.206	- 1	1260
710	1.201	-1	1.202	- 1	1.204	- 1	1.205	- 1	1278
720	1.200	-1	1.201	- 1	1.203	- 1	1.204	- 1	1296
730	1.199	-1	1.200	- 1	1.202	- 1	1.203	- 1	1314
740	1.198	-1	1.199	- 1	1.201	- 1	1.202	- 1	1332
750	1.197	-1	1.198	- 1	1.200	- 1	1.201	- 1	1350
760	1.196		1.197		1.199	- 1	1.200	- 1	1368
770	1.196	-1	1.197	- 1	1.198	- 1	1.199	- 1	1386
780	1.195	-1	1.196	- 1	1.197	- 1	1.198	- 1	1404
790	1.194	-1	1.195	- 1	1.196	- 1	1.197	- 1	1422
800	1.193		1.194		1.195		1.196		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	1.193	-3	1.194	-4	1.195	-4	1.196	-4	1440
850	1.190	-4	1.190	-3	1.191	-3	1.192	-4	1530
900	1.186	-3	1.187	-3	1.188	-3	1.188	-3	1620
950	1.183	-2	1.184	-2	1.185	-3	1.185	-2	1710
1000	1.181	-2	1.182	-3	1.182	-2	1.183	-3	1800
1050	1.179	-2	1.179	-2	1.180	-2	1.180	-2	1890
1100	1.177	-2	1.177	-2	1.178	-2	1.178	-2	1980
1150	1.175	-2	1.175	-1	1.176	-2	1.176	-2	2070
1200	1.173	-1	1.174	-2	1.174	-2	1.174	-1	2160
1250	1.172	-2	1.172	-1	1.172	-1	1.173	-2	2250
1300	1.170	-1	1.171	-1	1.171	-1	1.171	-1	2340
1350	1.169	-1	1.170	-2	1.170	-1	1.170	-1	2430
1400	1.168	-1	1.168	-1	1.169	-1	1.169	-1	2520
1450	1.167	-1	1.167	-1	1.168	-1	1.168	-1	2610
1500	1.166		1.166		1.167		1.167		2700

Table 4-6. SPECIFIC-HEAT RATIO OF CARBON DIOXIDE - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
240	1.448	-32							432
250	1.416	-15							450
260	1.401	- 2							468
270	1.399	-17							486
280	1.382	-16							504
290	1.366	-14							522
300	1.352	-12	1.72	-7					540
310	1.340	-11	1.65	-5					558
320	1.329	- 9	1.60	-5	2.23	-17	5.13	-128	576
330	1.320	- 8	1.55	-4	2.06	-13	3.85	- 90	594
340	1.312	- 7	1.51	-4	1.93	-11	2.95	- 55	612
350	1.305	- 7	1.47	-3	1.82	-10	2.40	- 34	630
360	1.298	- 6	1.44	-2	1.72	- 7	2.06	- 16	648
370	1.292	- 6	1.42	-2	1.65	- 6	1.90	- 11	666
380	1.286	- 5	1.40	-2	1.59	- 6	1.79	- 9	684
390	1.281	- 5	1.38	-2	1.53	- 5	1.70	- 7	702
400	1.276	- 5	1.364	-13	1.483	- 29	1.630	- 45	720
410	1.271	- 4	1.351	-11	1.454	- 22	1.585	- 35	738
420	1.267	- 4	1.340	-10	1.432	- 20	1.550	- 30	756
430	1.263	- 4	1.330	- 9	1.412	- 18	1.520	- 30	774
440	1.259	- 3	1.321	- 9	1.394	- 16	1.490	- 27	792
450	1.256	- 4	1.312	- 7	1.378	- 13	1.463	- 24	810
460	1.252	- 3	1.305	- 7	1.365	- 11	1.439	- 20	828
470	1.249	- 3	1.298	- 6	1.354	- 8	1.419	- 10	846
480	1.246	- 3	1.292	- 5	1.346	- 8	1.409	- 11	864
490	1.243	- 2	1.287	- 6	1.338	- 8	1.398	- 11	882
500	1.241	- 3	1.281	- 5	1.330	- 10	1.387	- 15	900
510	1.238	- 2	1.276	- 5	1.320	- 8	1.372	- 15	918
520	1.236	- 2	1.271	- 4	1.312	- 8	1.357	- 12	936
530	1.234	- 2	1.267	- 5	1.304	- 7	1.345	- 10	954
540	1.232	- 3	1.262	- 4	1.297	- 6	1.335	- 9	972
550	1.229	- 2	1.258	- 3	1.291	- 6	1.326	- 8	990
560	1.227	- 2	1.255	- 4	1.285	- 5	1.318	- 8	1008
570	1.225	- 2	1.251	- 3	1.280	- 5	1.310	- 7	1026
580	1.223	- 1	1.248	- 3	1.275	- 5	1.303	- 6	1044
590	1.222	- 2	1.245	- 3	1.270	- 5	1.297	- 6	1062
600	1.220	- 2	1.242	- 3	1.265	- 4	1.291	- 6	1080
610	1.218	- 1	1.239	- 3	1.261	- 3	1.285	- 5	1098
620	1.217	- 2	1.236	- 2	1.258	- 4	1.280	- 5	1116
630	1.215	- 1	1.234	- 2	1.254	- 4	1.275	- 5	1134
640	1.214	- 2	1.232	- 3	1.250	- 3	1.270	- 4	1152
650	1.212	- 1	1.229	- 2	1.247	- 3	1.266	- 5	1170
660	1.211	- 1	1.227	- 2	1.244	- 3	1.261	- 4	1188
670	1.210	- 2	1.225	- 2	1.241	- 3	1.257	- 4	1206
680	1.208	- 1	1.223	- 2	1.238	- 2	1.253	- 3	1224
690	1.207	- 1	1.221	- 1	1.236	- 3	1.250	- 3	1242
700	1.206	- 1	1.220	- 2	1.233	- 2	1.247	- 3	1260
710	1.205	- 1	1.218	- 2	1.231	- 3	1.244	- 3	1278
720	1.204	- 1	1.216	- 2	1.228	- 2	1.241	- 3	1296
730	1.203	- 1	1.214	- 1	1.226	- 2	1.238	- 3	1314
740	1.202	- 1	1.213	- 1	1.224	- 2	1.235	- 2	1332
750	1.201	- 1	1.212	- 2	1.222	- 2	1.233	- 3	1350
760	1.200	- 1	1.210	- 1	1.220	- 1	1.230	- 2	1368
770	1.199	- 1	1.209	- 1	1.219	- 2	1.228	- 2	1386
780	1.198	- 1	1.208	- 2	1.217	- 2	1.226	- 2	1404
790	1.197	- 1	1.206	- 1	1.215	- 1	1.224	- 2	1422
800	1.196		1.205		1.214		1.222		1440

Table 4-6. SPECIFIC-HEAT RATIO OF CARBON DIOXIDE - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
800	1.196	-4	1.205	-6	1.214	-7	1.222	-9	1440
850	1.192	-4	1.199	-4	1.207	-6	1.213	-7	1530
900	1.188	-3	1.195	-4	1.201	-5	1.206	-5	1620
950	1.185	-2	1.191	-4	1.196	-4	1.201	-5	1710
1000	1.183	-3	1.187	-3	1.192	-4	1.196	-4	1800
1050	1.180	-2	1.184	-2	1.188	-3	1.192	-4	1890
1100	1.178	-2	1.182	-3	1.185	-3	1.188	-3	1980
1150	1.176	-2	1.179	-2	1.182	-2	1.185	-2	2070
1200	1.174	-1	1.177	-2	1.180	-2	1.183	-3	2160
1250	1.173	-2	1.175	-1	1.178	-2	1.180	-2	2250
1300	1.171	-1	1.174	-2	1.176	-2	1.178	-2	2340
1350	1.170	-1	1.172	-1	1.174	-1	1.176	-2	2430
1400	1.169	-1	1.171	-1	1.173	-2	1.174	-1	2520
1450	1.168	-1	1.170	-1	1.171	-1	1.173	-1	2610
1500	1.167		1.169		1.170		1.172		2700

Table 4-7. SOUND VELOCITY AT LOW FREQUENCY IN CARBON DIOXIDE a/a_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	.8736	193	.8727	195	.8700	196			360
210	.8929	188	.8922	188	.8896	192			378
220	.9117	182	.9110	183	.9088	186	.9065	189	396
230	.9299	177	.9293	179	.9274	181	.9254	183	414
240	.9476	174	.9472	174	.9455	176	.9437	178	432
250	.9650	170	.9646	170	.9631	172	.9615	174	450
260	.9820	166	.9816	167	.9803	167	.9789	169	468
270	.9986	163	.9983	163	.9970	166	.9958	166	486
280	1.0149	161	1.0146	160	1.0136	161	1.0124	163	504
290	1.0310	157	1.0306	158	1.0297	158	1.0287	160	522
300	1.0467	155	1.0464	155	1.0455	156	1.0447	156	540
310	1.0622	152	1.0619	152	1.0611	153	1.0603	154	558
320	1.0774	150	1.0771	151	1.0764	152	1.0757	152	576
330	1.0924	147	1.0922	148	1.0916	148	1.0909	149	594
340	1.1071	146	1.1070	145	1.1064	146	1.1058	147	612
350	1.1217	143	1.1215	144	1.1210	145	1.1205	144	630
360	1.1360	142	1.1359	142	1.1355	142	1.1349	143	648
370	1.1502	140	1.1501	140	1.1497	140	1.1492	141	666
380	1.1642	138	1.1641	138	1.1637	139	1.1633	139	684
390	1.1780	137	1.1779	137	1.1776	137	1.1772	137	702
400	1.1917	135	1.1916	135	1.1913	135	1.1909	136	720
410	1.2052	133	1.2051	133	1.2048	134	1.2045	134	738
420	1.2185	132	1.2184	132	1.2182	132	1.2179	132	756
430	1.2317	130	1.2316	131	1.2314	130	1.2311	131	774
440	1.2447	129	1.2447	129	1.2444	130	1.2442	130	792
450	1.2576	128	1.2576	127	1.2574	128	1.2572	128	810
460	1.2704	126	1.2703	127	1.2702	126	1.2700	126	828
470	1.2830	125	1.2830	124	1.2828	125	1.2826	126	846
480	1.2955	124	1.2954	124	1.2953	124	1.2952	124	864
490	1.3079	122	1.3078	123	1.3077	123	1.3076	123	882
500	1.3201	122	1.3201	121	1.3200	121	1.3199	121	900
510	1.3323	120	1.3322	121	1.3321	121	1.3320	121	918
520	1.3443	119	1.3443	119	1.3442	119	1.3441	120	936
530	1.3562	118	1.3562	118	1.3561	118	1.3561	118	954
540	1.3680	117	1.3680	117	1.3679	118	1.3679	118	972
550	1.3797	116	1.3797	116	1.3797	116	1.3797	116	990
560	1.3913	115	1.3913	115	1.3913	115	1.3913	115	1008
570	1.4028	115	1.4028	114	1.4028	114	1.4028	114	1026
580	1.4143	113	1.4142	113	1.4142	113	1.4142	114	1044
590	1.4256	112	1.4255	113	1.4255	113	1.4256	112	1062
600	1.4368	111	1.4368	111	1.4368	111	1.4368	112	1080
610	1.4479	111	1.4479	110	1.4479	111	1.4480	110	1098
620	1.4590	109	1.4589	110	1.4590	110	1.4590	110	1116
630	1.4699	109	1.4699	109	1.4700	109	1.4700	109	1134
640	1.4808	108	1.4808	108	1.4809	108	1.4809	108	1152
650	1.4916	107	1.4916	108	1.4917	107	1.4917	108	1170
660	1.5023	107	1.5024	106	1.5024	107	1.5025	107	1188
670	1.5130	106	1.5130	106	1.5131	106	1.5132	106	1206
680	1.5236	104	1.5236	105	1.2537	105	1.5238	105	1224
690	1.5340	104	1.5341	104	1.5342	104	1.5343	104	1242
700	1.5444	104	1.5445	103	1.5446	103	1.5447	103	1260
710	1.5548	103	1.5548	103	1.5549	103	1.5550	103	1278
720	1.5651	102	1.5651	103	1.5652	103	1.5653	103	1296
730	1.5753	102	1.5754	102	1.5755	101	1.5756	101	1314
740	1.5855	101	1.5856	100	1.5856	101	1.5857	101	1332
750	1.5956	100	1.5956	100	1.5957	100	1.5958	100	1350
760	1.6056	99	1.6056	100	1.6057	100	1.6058	100	1368
770	1.6155	99	1.6156	99	1.6157	99	1.6158	100	1386
780	1.6254	99	1.6255	99	1.6256	99	1.6258	98	1404
790	1.6353	98	1.6354	98	1.6355	98	1.6356	98	1422
800	1.6451		1.6452		1.6453		1.6454		1440

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	1.6451	481	1.6452	480	1.6453	481	1.6454	481	1440
850	1.6932	467	1.6932	468	1.6934	467	1.6935	468	1530
900	1.7399	456	1.7400	455	1.7401	456	1.7403	455	1620
950	1.7855	445	1.7855	445	1.7857	445	1.7858	445	1710
1000	1.8300	434	1.8300	434	1.8302	434	1.8303	435	1800
1050	1.8734	425	1.8734	425	1.8736	424	1.8738	425	1890
1100	1.9159	415	1.9159	416	1.9160	416	1.9163	415	1980
1150	1.9574	408	1.9575	407	1.9576	407	1.9578	408	2070
1200	1.9982	399	1.9982	399	1.9983	400	1.9986	399	2160
1250	2.0381	391	2.0381	391	2.0383	392	2.0385	391	2250
1300	2.0772	385	2.0772	385	2.0775	384	2.0776	385	2340
1350	2.1157	378	2.1157	378	2.1159	378	2.1161	378	2430
1400	2.1535	371	2.1535	372	2.1537	372	2.1539	372	2520
1450	2.1906	366	2.1907	366	2.1909	366	2.1911	365	2610
1500	2.2272		2.2273		2.2275		2.2276		2700

°K	1 atm		4 atm		7 atm		10 atm		°R
220	.904	19							396
230	.923	19	.900	23	.868	29			414
240	.942	18	.923	21	.897	27	.863	36	432
250	.960	18	.944	19	.924	23	.899	29	450
260	.978	17	.963	19	.947	23	.928	29	468
270	.995	16	.982	18	.970	19	.957	21	486
280	1.011	17	1.000	18	.989	19	.978	19	504
290	1.028	16	1.018	17	1.008	18	.997	19	522
300	1.044	16	1.035	17	1.026	17	1.016	18	540
310	1.060	15	1.052	16	1.043	17	1.034	18	558
320	1.075	15	1.068	16	1.060	17	1.052	18	576
330	1.090	15	1.084	16	1.077	16	1.070	17	594
340	1.105	15	1.100	15	1.093	16	1.087	17	612
350	1.120	14	1.115	15	1.109	15	1.104	16	630
360	1.134	15	1.130	14	1.124	15	1.120	15	648
370	1.149	14	1.144	15	1.139	15	1.135	16	666
380	1.163	14	1.159	14	1.154	15	1.151	15	684
390	1.177	14	1.173	14	1.169	15	1.166	15	702
400	1.191	13	1.187	14	1.184	14	1.181	14	720
410	1.204	14	1.201	14	1.198	14	1.195	15	738
420	1.218	13	1.215	13	1.212	14	1.210	14	756
430	1.231	13	1.228	14	1.226	14	1.224	14	774
440	1.244	13	1.242	13	1.240	13	1.238	13	792
450	1.257	13	1.255	13	1.253	13	1.251	14	810
460	1.270	13	1.268	13	1.266	13	1.265	13	828
470	1.283	12	1.281	13	1.279	13	1.278	13	846
480	1.295	13	1.294	12	1.292	13	1.291	13	864
490	1.308	12	1.306	13	1.305	13	1.304	13	882
500	1.320	12	1.319	12	1.318	12	1.317	13	900
510	1.332	12	1.331	12	1.330	13	1.330	12	918
520	1.344	12	1.343	12	1.343	12	1.342	13	936
530	1.356	12	1.355	12	1.355	12	1.355	12	954
540	1.368	12	1.367	12	1.367	12	1.367	12	972
550	1.380	11	1.379	12	1.379	12	1.379	12	990
560	1.391	12	1.391	12	1.391	12	1.391	12	1008
570	1.403	11	1.403	11	1.403	11	1.403	11	1026
580	1.414	12	1.414	12	1.414	12	1.414	12	1044
590	1.426	11	1.426	11	1.426	11	1.426	12	1062
600	1.437	11	1.437	11	1.437	12	1.438	11	1080
610	1.448	11	1.448	11	1.449	11	1.449	11	1098
620	1.459	11	1.459	11	1.460	11	1.460	12	1116
630	1.470	11	1.470	11	1.471	11	1.472	11	1134
640	1.481	11	1.481	11	1.482	11	1.483	11	1152
650	1.492	11	1.492	11	1.493	11	1.494	10	1170
660	1.503	10	1.503	11	1.504	11	1.504	11	1188
670	1.513	11	1.514	11	1.515	10	1.515	11	1206
680	1.524	10	1.525	10	1.525	11	1.526	11	1224
690	1.534	11	1.535	11	1.536	10	1.537	10	1242
700	1.545	10	1.546	10	1.546	11	1.547	11	1260
710	1.555	10	1.556	10	1.557	10	1.558	10	1278
720	1.565	11	1.566	11	1.567	11	1.568	11	1296
730	1.576	10	1.577	10	1.578	10	1.579	10	1314
740	1.586	10	1.587	10	1.588	10	1.589	10	1332
750	1.596	10	1.597	10	1.598	10	1.599	10	1350
760	1.606	10	1.607	10	1.608	10	1.609	10	1368
770	1.616	10	1.617	10	1.618	10	1.619	10	1386
780	1.626	10	1.627	10	1.628	10	1.629	10	1404
790	1.636	10	1.637	10	1.638	10	1.639	10	1422
800	1.646		1.647		1.648		1.649		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	1.646	48	1.647	48	1.648	48	1.649	49	1440
850	1.694	46	1.695	47	1.696	47	1.698	47	1530
900	1.740	46	1.742	46	1.743	46	1.745	46	1620
950	1.786	45	1.788	44	1.789	45	1.791	44	1710
1000	1.831	43	1.832	44	1.834	43	1.835	44	1800
1050	1.874	42	1.876	42	1.877	43	1.879	43	1890
1100	1.916	42	1.918	42	1.920	41	1.922	41	1980
1150	1.958	41	1.960	40	1.961	41	1.963	41	2070
1200	1.999	40	2.000	40	2.002	40	2.004	40	2160
1250	2.039	39	2.040	40	2.042	39	2.044	39	2250
1300	2.078	38	2.080	38	2.081	39	2.083	39	2340
1350	2.116	38	2.118	38	2.120	38	2.122	38	2430
1400	2.154	37	2.156	37	2.158	37	2.160	37	2520
1450	2.191	37	2.193	37	2.195	36	2.197	36	2610
1500	2.228		2.230		2.231		2.233		2700

Table 4-7. SOUND VELOCITY AT LOW FREQUENCY IN CARBON DIOXIDE - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
240	.863	36							432
250	.899	29							450
260	.928	29							468
270	.957	21							486
280	.978	19							504
290	.997	19							522
300	1.016	18	.889	47					540
310	1.034	18	.936	39					558
320	1.052	18	.975	33	.853	71	.657	167	576
330	1.070	17	1.008	21	.924	57	.824	104	594
340	1.087	17	1.029	27	.981	43	.928	35	612
350	1.104	16	1.056	16	1.024	27	.963	19	630
360	1.120	15	1.072	22	1.051	21	.982	39	648
370	1.135	16	1.094	22	1.072	25	1.021	36	666
380	1.151	15	1.116	20	1.097	12	1.057	25	684
390	1.166	15	1.136	15	1.109	21	1.082	29	702
400	1.181	14	1.151	18	1.130	20	1.111	28	720
410	1.195	15	1.169	17	1.150	21	1.139	26	738
420	1.210	14	1.186	17	1.171	19	1.165	25	756
430	1.224	14	1.203	17	1.190	19	1.190	22	774
440	1.238	13	1.220	16	1.209	18	1.212	20	792
450	1.251	14	1.236	15	1.227	18	1.232	18	810
460	1.265	13	1.251	16	1.245	17	1.250	18	828
470	1.278	13	1.267	15	1.262	17	1.268	18	846
480	1.291	13	1.282	15	1.279	17	1.286	18	864
490	1.304	13	1.297	14	1.296	16	1.304	18	882
500	1.317	13	1.311	14	1.312	15	1.322	15	900
510	1.330	12	1.325	14	1.327	15	1.337	14	918
520	1.342	13	1.339	14	1.342	14	1.351	15	936
530	1.355	12	1.353	13	1.356	15	1.366	15	954
540	1.367	12	1.366	13	1.371	14	1.381	15	972
550	1.379	12	1.379	13	1.385	14	1.396	15	990
560	1.391	12	1.392	13	1.399	14	1.411	15	1008
570	1.403	11	1.405	13	1.413	13	1.426	14	1026
580	1.414	12	1.418	12	1.426	13	1.440	14	1044
590	1.426	12	1.430	13	1.439	13	1.454	13	1062
600	1.438	11	1.443	12	1.452	13	1.467	13	1080
610	1.449	11	1.455	12	1.465	13	1.480	13	1098
620	1.460	12	1.467	12	1.478	12	1.493	13	1116
630	1.472	11	1.479	11	1.490	13	1.506	13	1134
640	1.483	11	1.490	12	1.503	12	1.519	12	1152
650	1.494	10	1.502	11	1.515	11	1.531	12	1170
660	1.504	11	1.513	12	1.526	12	1.543	12	1188
670	1.515	11	1.525	11	1.538	12	1.555	12	1206
680	1.526	11	1.536	11	1.550	11	1.567	12	1224
690	1.537	10	1.547	11	1.561	12	1.579	11	1242
700	1.547	11	1.558	11	1.573	11	1.590	12	1260
710	1.558	10	1.569	11	1.584	11	1.602	11	1278
720	1.568	11	1.580	11	1.595	11	1.613	11	1296
730	1.579	10	1.591	10	1.606	11	1.624	11	1314
740	1.589	10	1.601	11	1.617	11	1.635	11	1332
750	1.599	10	1.612	10	1.628	10	1.646	11	1350
760	1.609	10	1.622	11	1.638	11	1.657	11	1368
770	1.619	10	1.633	10	1.649	10	1.668	11	1386
780	1.629	10	1.643	10	1.659	11	1.679	10	1404
790	1.639	10	1.653	10	1.670	10	1.689	10	1422
800	1.649		1.663		1.680		1.699		1440

Table 4-7. SOUND VELOCITY AT LOW FREQUENCY IN CARBON DIOXIDE - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
800	1.649	49	1.663	50	1.680	50	1.699	50	1440
850	1.698	47	1.713	48	1.730	48	1.749	49	1530
900	1.745	46	1.761	46	1.778	47	1.798	47	1620
950	1.791	44	1.807	45	1.825	46	1.845	45	1710
1000	1.835	44	1.852	44	1.871	44	1.890	45	1800
1050	1.879	43	1.896	43	1.915	43	1.935	43	1890
1100	1.922	41	1.939	42	1.958	42	1.978	42	1980
1150	1.963	41	1.981	41	2.000	41	2.020	40	2070
1200	2.004	40	2.022	40	2.041	40	2.060	40	2160
1250	2.044	39	2.062	39	2.081	39	2.100	40	2250
1300	2.083	39	2.101	39	2.120	39	2.140	38	2340
1350	2.122	38	2.140	38	2.159	38	2.178	38	2430
1400	2.160	37	2.178	37	2.197	37	2.216	37	2520
1450	2.197	36	2.215	37	2.234	37	2.253	37	2610
1500	2.233		2.252		2.271		2.290		2700

Table 4-8. VISCOSITY OF CARBON DIOXIDE AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R	°K	η/η_0		°R	°K	η/η_0		°R
190	.7002	373	342								
200	.7375	370	360	700	2.199	23	1260	1200	3.218	18	2160
210	.7745	366	378	710	2.222	23	1278	1210	3.236	18	2178
220	.8111	363	396	720	2.245	23	1296	1220	3.254	18	2196
230	.8474	359	414	730	2.268	23	1314	1230	3.272	17	2214
240	.8833	356	432	740	2.291	23	1332	1240	3.289	17	2232
250	.9189	353	450	750	2.314	22	1350	1250	3.306	18	2250
260	.9542	349	468	760	2.336	22	1368	1260	3.324	18	2268
270	.9891	35	486	770	2.358	22	1386	1270	3.342	17	2286
280	1.024	34	504	780	2.380	23	1404	1280	3.359	18	2304
290	1.058	33	522	790	2.403	22	1422	1290	3.377	17	2322
300	1.091	34	540	800	2.425	21	1440	1300	3.394	18	2340
310	1.125	33	558	810	2.446	22	1458	1310	3.412	18	2358
320	1.158	33	576	820	2.468	22	1476	1320	3.430	17	2376
330	1.191	33	594	830	2.490	21	1494	1330	3.447	18	2394
340	1.224	32	612	840	2.511	21	1512	1340	3.465	18	2412
350	1.256	31	630	850	2.532	22	1530	1350	3.483	17	2430
360	1.287	31	648	860	2.554	21	1548	1360	3.500	18	2448
370	1.318	31	666	870	2.575	21	1566	1370	3.518	17	2466
380	1.349	31	684	880	2.596	21	1584	1380	3.535	18	2484
390	1.380	30	702	890	2.617	20	1602	1390	3.553	17	2502
400	1.410	30	720	900	2.637	21	1620	1400	3.570	17	2520
410	1.440	30	738	910	2.658	20	1638	1410	3.587	17	2538
420	1.470	29	756	920	2.678	21	1656	1420	3.604	17	2556
430	1.499	29	774	930	2.699	20	1674	1430	3.621	17	2574
440	1.528	29	792	940	2.719	21	1692	1440	3.638	16	2592
450	1.557	28	810	950	2.740	20	1710	1450	3.654	17	2610
460	1.585	28	828	960	2.760	20	1728	1460	3.671	17	2628
470	1.613	28	846	970	2.780	20	1746	1470	3.688	16	2646
480	1.641	28	864	980	2.800	20	1764	1480	3.704	17	2664
490	1.669	28	882	990	2.820	20	1782	1490	3.721	16	2682
500	1.697	27	900	1000	2.840	19	1800	1500	3.737	17	2700
510	1.724	26	918	1010	2.859	19	1818	1510	3.754	16	2718
520	1.750	27	936	1020	2.878	19	1836	1520	3.770	17	2736
530	1.777	27	954	1030	2.897	18	1854	1530	3.787	17	2754
540	1.804	26	972	1040	2.915	19	1872	1540	3.804	16	2772
550	1.830	26	990	1050	2.934	19	1890	1550	3.820	17	2790
560	1.856	26	1008	1060	2.953	19	1908	1560	3.837	17	2808
570	1.882	26	1026	1070	2.972	19	1926	1570	3.854	16	2826
580	1.908	25	1044	1080	2.991	19	1944	1580	3.870	17	2844
590	1.933	25	1062	1090	3.010	19	1962	1590	3.887	16	2862
600	1.958	25	1080	1100	3.029	19	1980	1600	3.903	16	2880
610	1.983	25	1098	1110	3.048	19	1998	1610	3.919	16	2898
620	2.008	24	1116	1120	3.067	18	2016	1620	3.935	16	2916
630	2.032	24	1134	1130	3.085	19	2034	1630	3.951	16	2934
640	2.056	24	1152	1140	3.104	19	2052	1640	3.967	16	2952
650	2.080	25	1170	1150	3.123	19	2070	1650	3.983	16	2970
660	2.105	24	1188	1160	3.142	19	2088	1660	3.999	15	2988
670	2.129	24	1206	1170	3.161	19	2106	1670	4.014	16	3006
680	2.153	23	1224	1180	3.180	19	2124	1680	4.030	16	3024
690	2.176	23	1242	1190	3.199	19	2142	1690	4.046	16	3042
700	2.199		1260	1200	3.218		2160	1700	4.062		3060

Table 4-9. THERMAL CONDUCTIVITY OF CARBON DIOXIDE AT ATMOSPHERIC PRESSURE

$^{\circ}K$	k/k_0		$^{\circ}R$
180	.567	43	324
190	.610	49	342
200	.659	40	360
210	.699	44	378
220	.743	48	396
230	.791	46	414
240	.837	49	432
250	.886	49	450
260	.935	49	468
270	.984	51	486
280	1.035	52	504
290	1.087	52	522
300	1.139	52	540
310	1.191	51	558
320	1.242	55	576
330	1.297	55	594
340	1.352	54	612
350	1.406	58	630
360	1.464	54	648
370	1.518	58	666
380	1.576	58	684
390	1.634	57	702
400	1.691		720
400	1.691	61	720
410	1.752	60	738
420	1.812	57	756
430	1.869	61	774
440	1.930	60	792
450	1.990	63	810
460	2.053	61	828
470	2.114	63	846
480	2.177	63	864
490	2.240	64	882
500	2.304	63	900
510	2.367	63	918
520	2.430	66	936
530	2.496	66	954
540	2.562	64	972
550	2.626	66	990
560	2.692	69	1008
570	2.761	66	1026
580	2.827	66	1044
590	2.893	69	1062
600	2.962		1080

Table 4-10. PRANDTL NUMBER OF CARBON DIOXIDE AT ATMOSPHERIC PRESSURE $\eta C_p/k$

°K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		°R
220	.818	-11	.875	-8	.935	-4	.905	-6	396
230	.807	-7	.867	-5	.931	-3	.899	-5	414
240	.800	-7	.862	-5	.928	-3	.894	-4	432
250	.793	-5	.857	-4	.925	-1	.890	-2	450
260	.788	-4	.853	-3	.924	-2	.888	-2	468
270	.784	-5	.850	-3	.922	-2	.886	-3	486
280	.779	-4	.847	-3	.920	-1	.883	-3	504
290	.775	-5	.844	-4	.919	-2	.880	-2	522
300	.770	-2	.840	-1	.917	-2	.878	-3	540
310	.768	-3	.839	-2	.915	-1	.875	-1	558
320	.765	-4	.837	-3	.914	-1	.874	-2	576
330	.761	-3	.834	-3	.913	-1	.872	-1	594
340	.758	-3	.831	-2	.912	-1	.871	-2	612
350	.755	-4	.829	-3	.911	-2	.869	-2	630
360	.751	-3	.826	-2	.909	-1	.867	-2	648
370	.748	-4	.824	-3	.908	-2	.865	-2	666
380	.744	-3	.821	-2	.906	-1	.863	-2	684
390	.741	-3	.819	-2	.905	-1	.861	-2	702
400	.738	-4	.817	-3	.904	-2	.859	-2	720
410	.734	-4	.814	-3	.902	-2	.857	-2	738
420	.730	-3	.811	-2	.900	-1	.855	-2	756
430	.727	-3	.809	-3	.899	-1	.853	-2	774
440	.724	-3	.806	-3	.898	-1	.851	-2	792
450	.721	-4	.803	-2	.897	-2	.849	-2	810
460	.717	-4	.801	-3	.895	-2	.847	-3	828
470	.713	-4	.798	-3	.893	-1	.844	-2	846
480	.709	-3	.795	-3	.892	-2	.842	-2	864
490	.706	-4	.792	-2	.890	-1	.840	-2	882
500	.702	-3	.790	-3	.889	-2	.838	-2	900
510	.699	-3	.787	-2	.887	-1	.836	-2	918
520	.696	-4	.785	-3	.886	-1	.834	-1	936
530	.692	-4	.782	-2	.885	-2	.833	-3	954
540	.688	-3	.780	-3	.883	-1	.830	-2	972
550	.685	-3	.777	-2	.882	-2	.828	-2	990
560	.682	-4	.775	-3	.880	-1	.826	-3	1008
570	.678	-3	.772	-3	.879	-2	.823	-2	1026
580	.675	-3	.769	-2	.877	-1	.821	-2	1044
590	.672	-4	.767	-3	.876	-2	.819	-2	1062
600	.668		.764		.874		.817		1080

Table 4-11. VAPOR PRESSURE OF LIQUID CARBON DIOXIDE

T	$Log_{10}P$ (mmHg)*		P	P	T
°K			mm Hg	atm	°R
216	(3.5788)**	189	(3791.)	(4.988)	388.8
217	3.5977	187	3960.	5.210	390.6
218	3.6164	185	4134.	5.440	392.4
219	3.6349	183	4314.	5.677	394.2
220	3.6532	182	4500.	5.922	396.0
221	3.6714	179	4692.	6.174	397.8
222	3.6893	178	4890.	6.434	399.6
223	3.7071	176	5094.	6.703	401.4
224	3.7247	174	5304.	6.979	403.2
225	3.7421	172	5521.	7.264	405.0
226	3.7593	170	5744.	7.558	406.8
227	3.7763	169	5974.	7.861	408.6
228	3.7932	167	6211.	8.172	410.4
229	3.8099	165	6454.	8.492	412.2
230	3.8264	164	6705.	8.822	414.0
231	3.8428	162	6963.	9.162	415.8
232	3.8590	161	7227.	9.509	417.6
233	3.8751	159	7500.	9.868	419.4
234	3.8910	158	7780.	10.237	421.2
235	3.9068	156	8068.	10.616	423.0
236	3.9224	155	8363.	11.004	424.8
237	3.9379	153	8666.	11.403	426.6
238	3.9532	152	8978.	11.813	428.4
239	3.9684	150	9298.	12.234	430.2
240	3.9834	150	9625.	12.664	432.0
241	3.99836	1478	9962.	13.108	433.8
242	4.01314	1464	10307.	13.562	435.6
243	4.02778	1453	10661.	14.028	437.4
244	4.04231	1440	11023.	14.504	439.2
245	4.05671	1429	11395.	14.993	441.0
246	4.07100	1414	11776.	15.495	442.8
247	4.08514	1403	12166.	16.008	444.6
248	4.09917	1390	12565.	16.533	446.4
249	4.11307	1381	12974.	17.071	448.2
250	4.12688	1367	13393.	17.622	450.0
251	4.14055	1357	13821.	18.186	451.8
252	4.15412	1344	14260.	18.763	453.6
253	4.16756	1333	14708.	19.353	455.4
254	4.18089	1323	15167.	19.957	457.2
255	4.19412	1314	15636.	20.574	459.0
256	4.20726	1302	16116.	21.205	460.8
257	4.22028	1291	16607.	21.851	462.6
258	4.23319	1282	17108.	22.511	464.4
259	4.24601	1271	17620.	23.184	466.2
260	4.25872	1260	18143.	23.872	468.0
261	4.27132	1252	18678.	24.576	469.8
262	4.28384	1242	19224.	25.295	471.6
263	4.29626	1232	19782.	26.029	473.4
264	4.30858	1223	20351.	26.778	475.2

* Tabulated values in this column are for interpolation.

** Figures in parentheses are extrapolated to permit interpolation to the triple point.

Table 4-11. VAPOR PRESSURE OF LIQUID CARBON DIOXIDE - Cont.

T	$Log_{10}P$ (mmHg)*		P	P	T
°K			mm Hg	atm	°R
265	4.32081	1215	20932.	27.542	477.0
266	4.33296	1204	21526.	28.324	478.8
267	4.34500	1196	22131.	29.120	480.6
268	4.35696	1189	22749.	29.933	482.4
269	4.36885	1177	23380.	30.763	484.2
270	4.38062	1172	24023.	31.609	486.0
271	4.39234	1162	24680.	32.474	487.8
272	4.40396	1154	25349.	33.354	489.6
273	4.41550	1145	26032.	34.253	491.4
274	4.42695	1139	26727.	35.167	493.2
275	4.43834	1129	27437.	36.101	495.0
276	4.44963	1123	28160.	37.053	496.8
277	4.46086	1115	28897.	38.022	498.6
278	4.47201	1107	29649.	39.012	500.4
279	4.48308	1102	30414.	40.018	502.2
280	4.49410	1095	31196.	41.047	504.0
281	4.50505	1086	31993.	42.096	505.8
282	4.51591	1081	32803.	43.162	507.6
283	4.52672	1073	33629.	44.249	509.4
284	4.53745	1067	34471.	45.357	511.2
285	4.54812	1061	35328.	46.484	513.0
286	4.55873	1055	36202.	47.634	514.8
287	4.56928	1050	37092.	48.805	516.6
288	4.57978	1044	38000.	50.000	518.4
289	4.59022	1037	38924.	51.216	520.2
290	4.60059	1033	39865.	52.454	522.0
291	4.61092	1028	40824.	53.716	523.8
292	4.62120	1022	41802.	55.003	525.6
293	4.63142	1018	42798.	56.313	527.4
294	4.64160	1013	43813.	57.649	529.2
295	4.65173	1010	44847.	59.009	531.0
296	4.66183	1005	45902.	60.397	532.8
297	4.67188	1002	46976.	61.811	534.6
298	4.68190	997	48073.	63.254	536.4
299	4.69187	995	49189.	64.722	538.2
300	4.70182	992	50329.	66.222	540.0
301	4.71174	989	51492.	67.753	541.8
302	4.72163	987	52678.	69.313	543.6
303	4.73150	986	53889.	70.907	545.4
304	4.74136		55126.	72.534	547.2

* Tabulated values in this column are for interpolation.

Table 4-11/a. VAPOR PRESSURE OF SOLID CARBON DIOXIDE

T	$Log_{10}P$ (mmHg)*		P	P	T
°K			mm Hg	atm	°R
135	9.77-10	8	.59	.00078	243.0
136	9.85-10	8	.70	.00092	244.8
137	9.93-10	7	.84	.00111	246.6
138	.00	7	1.00	.00132	248.4
139	.075	69	1.18	.00155	250.2
140	.144	70	1.39	.00183	252.0
141	.214	69	1.63	.00214	253.8
142	.283	70	1.92	.00253	255.6
143	.353	66	2.25	.00296	257.4
144	.419	66	2.62	.00345	259.2
145	.485	66	3.05	.00401	261.0
146	.551	64	3.55	.00467	262.8
147	.615	63	4.12	.00542	264.6
148	.678	63	4.76	.00626	266.4
149	.741	61	5.50	.00724	268.2
150	.802	61	6.34	.00834	270.0
151	.863	60	7.29	.00959	271.8
152	.923	59	8.38	.01103	273.6
153	.982	59	9.60	.01263	275.4
154	1.0407	574	10.98	.01445	277.2
155	1.0981	567	12.53	.01649	279.0
156	1.1548	559	14.28	.01879	280.8
157	1.2107	554	16.24	.02137	282.6
158	1.2661	545	18.45	.02428	284.4
159	1.3206	536	20.91	.02751	286.2
160	1.3742	531	23.67	.03114	288.0
161	1.4273	524	26.74	.03518	289.8
162	1.4797	516	30.17	.03970	291.6
163	1.5313	510	33.98	.04471	293.4
164	1.5823	503	38.21	.05028	295.2
165	1.6326	496	42.91	.05646	297.0
166	1.6822	491	48.10	.06329	298.8
167	1.7313	485	53.86	.07087	300.6
168	1.7798	478	60.22	.07924	302.4
169	1.8276	473	67.24	.08847	304.2
170	1.8749	466	74.96	.09863	306.0
171	1.9215	461	83.46	.10982	307.8
172	1.9676	456	92.81	.12212	309.6
173	2.01317	4490	103.08	.13563	311.4
174	2.05807	4444	114.31	.15041	313.2
175	2.10251	4401	126.62	.16661	315.0
176	2.14652	4332	140.13	.18438	316.8
177	2.18984	4288	154.82	.20371	318.6
178	2.23272	4246	170.89	.22486	320.4
179	2.27518	4202	188.44	.24795	322.2
180	2.31720	4134	207.59	.27314	324.0
181	2.35854	4097	228.32	.30042	325.8
182	2.39951	4044	250.91	.33014	327.6
183	2.43995	4010	275.39	.36236	329.4
184	2.48005	3960	302.03	.39741	331.2

* Tabulated values in this column are for interpolation.

Table 4-11/a. VAPOR PRESSURE OF SOLID CARBON DIOXIDE - Cont.

T	$Log_{10}P$ (mmHg)*		P	P	T
°K			mm Hg	atm	°R
185	2.51965	3925	330.8	.4353	333.0
186	2.55890	3873	362.1	.4764	334.8
187	2.59763	3834	395.9	.5209	336.6
188	2.63597	3788	432.4	.5689	338.4
189	2.67385	3758	471.9	.6209	340.2
190	2.71143	3716	514.5	.6770	342.0
191	2.74859	3676	560.5	.7375	343.8
192	2.78535	3636	610.0	.8026	345.6
193	2.82171	3605	663.3	.8728	347.4
194	2.85776	3568	720.7	.9483	349.2
195	2.89344	3529	782.4	1.0295	351.0
196	2.92873	3498	848.6	1.1166	352.8
197	2.96371	3463	919.8	1.2103	354.6
198	2.99834	3430	996.1	1.3107	356.4
199	3.03264	3402	1078.0	1.4184	358.2
200	3.06666	3369	1165.8	1.5339	360.0
201	3.10035	3337	1259.9	1.6578	361.8
202	3.13372	3307	1360.5	1.7901	363.6
203	3.16679	3279	1468.2	1.9318	365.4
204	3.19958	3251	1583.3	2.0833	367.2
205	3.23209	3222	1706.4	2.2453	369.0
206	3.26431	3196	1837.8	2.4182	370.8
207	3.29627	3168	1978.1	2.6028	372.6
208	3.32795	3144	2127.8	2.7997	374.4
209	3.35939	3119	2287.6	3.0100	376.2
210	3.39058	3095	2457.9	3.2341	378.0
211	3.42153	3072	2639.5	3.4730	379.8
212	3.45225	3047	2833.0	3.7276	381.6
213	3.48272	3026	3038.9	3.9986	383.4
214	3.51298	3003	3258.2	4.2871	385.2
215	3.54301	2983	3491.4	4.5939	387.0
216	3.57284		3739.7	4.9207	388.8

* Tabulated values in this column are for interpolation.

Table 4-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR CARBON DIOXIDE

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$*		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
50	3.5001	1	.6400	1281	19.0885	6381	15.5922	6375	90
60	3.5002	4	.7681	1281	19.7266	5396	16.2297	5391	108
70	3.5006	14	.8962	1282	20.2662	4675	16.7688	4670	126
80	3.5020	35	1.0244	1283	20.7337	4127	17.2358	4121	144
90	3.5055	73	1.1527	1284	21.1464	3696	17.6479	3686	162
100	3.5128	121	1.2811	1288	21.5160	3354	18.0165	3336	180
110	3.5249	183	1.4099	1294	21.8514	3074	18.3501	3048	198
120	3.5432	248	1.5393	1301	22.1588	2846	18.6549	2806	216
130	3.5680	315	1.6694	1312	22.4434	2656	18.9355	2602	234
140	3.5995	377	1.8006	1325	22.7090	2495	19.1957	2426	252
150	3.6372	432	1.9331	1339	22.9585	2361	19.4383	2274	270
160	3.6804	478	2.0670	1356	23.1946	2246	19.6657	2143	288
170	3.7282	518	2.2026	1374	23.4192	2145	19.8800	2026	306
180	3.7800	547	2.3400	1394	23.6337	2059	20.0826	1924	324
190	3.8347	569	2.4794	1414	23.8396	1981	20.2750	1832	342
200	3.8916	586	2.6208	1435	24.0377	1912	20.4582	1750	360
210	3.9502	595	2.7643	1457	24.2289	1852	20.6332	1677	378
220	4.0097	598	2.9100	1479	24.4141	1795	20.8009	1610	396
230	4.0695	601	3.0579	1501	24.5936	1745	20.9619	1550	414
240	4.1296	596	3.2080	1523	24.7681	1698	21.1169	1494	432
250	4.1892	592	3.3603	1544	24.9379	1654	21.2663	1444	450
260	4.2484	584	3.5147	1566	25.1033	1615	21.4107	1398	468
270	4.3068	575	3.6713	1587	25.2648	1577	21.5505	1355	486
280	4.3643	565	3.8300	1608	25.4225	1541	21.6860	1315	504
290	4.4208	555	3.9908	1629	25.5766	1508	21.8175	1278	522
300	4.4763	544	4.1537	1649	25.7274	1477	21.9453	1244	540
310	4.5307	533	4.3186	1668	25.8751	1447	22.0697	1212	558
320	4.5840	521	4.4854	1688	26.0198	1418	22.1909	1182	576
330	4.6361	510	4.6542	1706	26.1616	1391	22.3091	1153	594
340	4.6871	500	4.8248	1725	26.3007	1366	22.4244	1127	612
350	4.7371	488	4.9973	1744	26.4373	1341	22.5371	1102	630
360	4.7859	476	5.1717	1760	26.5714	1319	22.6473	1079	648
370	4.8335	466	5.3477	1778	26.7033	1295	22.7552	1056	666
380	4.8801	456	5.5255	1795	26.8328	1274	22.8608	1035	684
390	4.9257	447	5.7050	1812	26.9602	1252	22.9643	1014	702
400	4.9704	436	5.8862	1827	27.0854	1233	23.0657	996	720
410	5.0140	426	6.0689	1844	27.2087	1213	23.1653	977	738
420	5.0566	417	6.2533	1859	27.3300	1195	23.2630	960	756
430	5.0983	409	6.4392	1874	27.4495	1177	23.3590	943	774
440	5.1392	400	6.6266	1888	27.5672	1159	23.4533	927	792
450	5.1792	391	6.8154	1903	27.6831	1143	23.5460	912	810
460	5.2183	383	7.0057	1918	27.7974	1126	23.6372	897	828
470	5.2566	376	7.1975	1931	27.9100	1111	23.7269	883	846
480	5.2942	368	7.3906	1945	28.0211	1096	23.8152	870	864
490	5.3310	361	7.5851	1958	28.1307	1080	23.9022	856	882
500	5.3671	353	7.7809	1972	28.2387	1066	23.9878	844	900
510	5.4024	347	7.9781	1984	28.3453	1053	24.0722	832	918
520	5.4371	340	8.1765	1996	28.4506	1038	24.1554	820	936
530	5.4711	333	8.3761	2009	28.5544	1026	24.2374	809	954
540	5.5044	327	8.5770	2021	28.6570	1013	24.3183	798	972
550	5.5371	320	8.7791	2033	28.7583	1001	24.3981	788	990
560	5.5691	315	8.9824	2045	28.8584	988	24.4769	777	1008
570	5.6006	309	9.1869	2056	28.9572	977	24.5546	768	1026
580	5.6315	303	9.3925	2067	29.0549	966	24.6314	758	1044
590	5.6618	297	9.5992	2078	29.1515	953	24.7072	748	1062
600	5.6915		9.8070		29.2468		24.7820		1080

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 4-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR CARBON DIOXIDE - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	5.6915	292	9.8070	2089	29.2468	944	24.7820	740	1080
610	5.7207	287	10.0159	2100	29.3412	932	24.8560	731	1098
620	5.7494	281	10.2259	2110	29.4344	922	24.9291	722	1116
630	5.7775	277	10.4369	2120	29.5266	913	25.0013	715	1134
640	5.8052	272	10.6489	2130	29.6179	902	25.0728	706	1152
650	5.8324	267	10.8619	2140	29.7081	892	25.1434	698	1170
660	5.8591	262	11.0759	2150	29.7973	883	25.2132	691	1188
670	5.8853	257	11.2909	2159	29.8856	873	25.2823	683	1206
680	5.9110	253	11.5068	2169	29.9729	866	25.3506	677	1224
690	5.9363	248	11.7237	2177	30.0595	856	25.4183	669	1242
700	5.9611	244	11.9414	2187	30.1451	847	25.4852	662	1260
710	5.9855	239	12.1601	2196	30.2298	839	25.5514	656	1278
720	6.0094	235	12.3797	2204	30.3137	831	25.6170	649	1296
730	6.0329	230	12.6001	2213	30.3968	821	25.6819	642	1314
740	6.0559	227	12.8214	2221	30.4789	815	25.7461	637	1332
750	6.0786	223	13.0435	2229	30.5604	806	25.8098	630	1350
760	6.1009	219	13.2664	2238	30.6410	800	25.8728	625	1368
770	6.1228	214	13.4902	2245	30.7210	791	25.9353	618	1386
780	6.1442	211	13.7147	2253	30.8001	784	25.9971	613	1404
790	6.1653	207	13.9400	2261	30.8785	777	26.0584	608	1422
800	6.1860	204	14.1661	2268	30.9562	770	26.1192	602	1440
810	6.2064	200	14.3929	2276	31.0332	762	26.1794	596	1458
820	6.2264	196	14.6205	2283	31.1094	757	26.2390	592	1476
830	6.2460	193	14.8488	2290	31.1851	749	26.2982	586	1494
840	6.2653	190	15.0778	2297	31.2600	742	26.3568	581	1512
850	6.2843	186	15.3075	2304	31.3342	736	26.4149	576	1530
860	6.3029	183	15.5379	2311	31.4078	730	26.4725	572	1548
870	6.3212	180	15.7690	2318	31.4808	723	26.5297	566	1566
880	6.3392	177	16.0008	2324	31.5531	718	26.5863	563	1584
890	6.3569	173	16.2332	2330	31.6249	711	26.6426	557	1602
900	6.3742	171	16.4662	2337	31.6960	705	26.6983	553	1620
910	6.3913	167	16.6999	2342	31.7665	700	26.7536	549	1638
920	6.4080	164	16.9341	2349	31.8365	693	26.8085	544	1656
930	6.4244	162	17.1690	2355	31.9058	688	26.8629	540	1674
940	6.4406	159	17.4045	2361	31.9746	682	26.9169	536	1692
950	6.4565	156	17.6406	2366	32.0428	677	26.9705	532	1710
960	6.4721	153	17.8772	2373	32.1105	672	27.0237	528	1728
970	6.4874	151	18.1145	2377	32.1777	666	27.0765	524	1746
980	6.5025	148	18.3522	2383	32.2443	661	27.1289	520	1764
990	6.5173	145	18.5905	2389	32.3104	655	27.1809	516	1782
1000	6.5318	69	18.8294	1202	32.3759	320	27.2325	252	1800
1050	6.601	63	20.031	1214	32.696	309	27.485	244	1890
1100	6.664	59	21.245	1225	33.005	297	27.729	236	1980
1150	6.723	53	22.470	1236	33.302	287	27.965	228	2070
1200	6.776	50	23.706	1245	33.589	279	28.193	222	2160
1250	6.826	46	24.951	1254	33.868	268	28.415	215	2250
1300	6.872	41	26.205	1261	34.136	261	28.630	209	2340
1350	6.913	39	27.466	1269	34.397	252	28.839	203	2430
1400	6.952	36	28.735	1276	34.649	244	29.042	197	2520
1450	6.988	33	30.011	1282	34.893	238	29.239	193	2610
1500	7.021	61	31.293	2581	35.131	454	29.432	370	2700
1600	7.082	52	33.875	2603	35.585	431	29.802	353	2880
1700	7.134	46	36.478	2620	36.016	409	30.155	337	3060
1800	7.180	42	39.098	2636	36.425	390	30.492	323	3240
1900	7.222	36	41.734	2651	36.815	371	30.815	309	3420
2000	7.258		44.385		37.186		31.124		3600

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 4-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR CARBON DIOXIDE – Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2000	7.258	33	44.385	2663	37.186	355	31.124	297	3600
2100	7.291	29	47.048	2675	37.541	340	31.421	286	3780
2200	7.320	27	49.723	2684	37.881	326	31.707	276	3960
2300	7.347	24	52.407	2694	38.207	313	31.983	266	4140
2400	7.371	22	55.101	2703	38.520	302	32.249	257	4320
2500	7.393	21	57.804	2710	38.822	290	32.506	248	4500
2600	7.414	19	60.514	2718	39.112	280	32.754	241	4680
2700	7.433	18	63.232	2724	39.392	271	32.995	233	4860
2800	7.451	17	65.956	2731	39.663	262	33.228	227	5040
2900	7.468	16	68.687	2737	39.925	253	33.455	220	5220
3000	7.484	15	71.424	2743	40.178	245	33.675	213	5400
3100	7.499	14	74.167	2748	40.423	239	33.888	208	5580
3200	7.513	13	76.915	2752	40.662	232	34.096	203	5760
3300	7.526	13	79.667	2758	40.894	224	34.299	197	5940
3400	7.539	12	82.425	2762	41.118	219	34.496	192	6120
3500	7.551	12	85.187	2767	41.337	213	34.688	188	6300
3600	7.563	12	87.954	2770	41.550	207	34.876	183	6480
3700	7.575	11	90.724	2776	41.757	202	35.059	179	6660
3800	7.586	11	93.500	2779	41.959	197	35.238	175	6840
3900	7.597	11	96.279	2783	42.156	193	35.413	171	7020
4000	7.608	10	99.062	2787	42.349	188	35.584	167	7200
4100	7.618	10	101.849	2791	42.537	184	35.751	164	7380
4200	7.628	10	104.640	2794	42.721	179	35.915	160	7560
4300	7.638	9	107.434	2798	42.900	176	36.075	158	7740
4400	7.647	10	110.232	2801	43.076	172	36.233	154	7920
4500	7.657	9	113.033	2805	43.248	169	36.387	151	8100
4600	7.666	10	115.838	2808	43.417	165	36.538	148	8280
4700	7.676	9	118.646	2812	43.582	161	36.686	145	8460
4800	7.685	9	121.458	2815	43.743	159	36.831	143	8640
4900	7.694	8	124.273	2818	43.902	155	36.974	140	8820
5000	7.702		127.091		44.057		37.114		9000

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

CHAPTER 5

THE THERMODYNAMIC PROPERTIES OF CARBON MONOXIDE

The Correlation of the Experimental Data

The computation of a set of mutually consistent tables of thermodynamic properties for carbon monoxide has been accomplished through the representation of the data of state by the equation $Z = PV/RT = 1 + B_1P + C_1P^2$. The virial coefficients and their temperature derivatives were used, together with the values for the ideal gas, to obtain values for the various derived thermodynamic properties. The second virial coefficient, B_1, was obtained by fitting the available data of state to the Lennard-Jones 6-12 intermolecular potential using the force constants $\epsilon/k = 100.8°K$ and $r_o = 3.80$ A. These force constants were obtained through a graphical treatment of the data of state. Values of the third virial coefficient, C_1, were then obtained empirically by a graphical treatment of the experimental data. At temperatures above the experimental range, values of C_1 were extrapolated in such a way as to approach values of the third virials obtained from the above force constants. The virial coefficients are given in table 5-13.

Data of state for carbon monoxide have been reported by Scott [1], Goig-Botella [2, 3], Bartlett, Hetherington, Kvalnes, and Tremearne [4], Townend and Bhatt [5], and most recently by Michels, Lupton, Wassenaar, and DeGraaff [6]. The data from Scott, Goig-Botella, and Bartlett, et al., were correlated graphically by Deming and Shupe [7], who published tables to 400°C. The experimental data have been recorrelated as indicated above in such a manner as to permit extrapolation to higher temperatures. The adequacy of the correlation is corroborated by the data and calculations of Michels, et al., [6, 8, 9] which, though not considered in this correlation, show very satisfactory agreement with the present tables (see table 5-a). The other thermodynamic data for carbon monoxide which have been considered are the specific-heat measurements of Eucken and Von Lüde [10] and Sherratt and Griffiths [11].

The tabulated viscosities were computed independently from the parameters $\epsilon/k = 110.3$ and $r_o = 3.59$ A, for the Lennard-Jones 6-12 intermolecular potential. These constants were obtained by Hirschfelder, et al., [29] largely on the basis of the data of Johnston and Grilly [19]. No effort was made here to evaluate or reconcile the earlier data [20 - 23]. The departures of these data from the tabulated values are shown in figure 5d. The thermal conductivities were computed from an empirical equation fitted to the experimental data [24 - 28]. Summary tables 1-B and 1-C give the equations employed for both of the above transport properties.

The tables and equations for the vapor pressure of carbon monoxide are based on an analysis of the data in references [12 - 16], which are arranged roughly in the order of the weight given to the data taken from them. Carbon monoxide has a solid phase transition point at 61.57°K and a triple point at 68.09°K [30]. The triple-point and transition-point pressures are those of

Clayton and Giauque [13]; the critical temperature and pressure are from Crommelin, Bijleveld, and Brown [12]. Deviations of the experimental data [12 - 16] from the tabulated values are shown in figure 5f. The systematic differences appear to be due primarily to the use of different temperature scales.

The tabulated ideal-gas thermodynamic properties (table 5-12) are based on the calculations of Goff and Gratch [17] below 2800°K and of Belzer, Savedoff and Johnston [18] at higher temperatures. The values joined smoothly at this point except for the values of the enthalpy function which were joined at 2000° in favor of the later values [18] which were slightly higher (0.003) at 2800°K. The uncertainties in these values are indicated in summary table 1-D.

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density, the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0 were computed on the basis of the Lennard-Jones intermolecular potential, whose force constants were obtained in the manner outlined above. The value of k_0 was determined from an equation based on an empirical fit of the experimental data. The value of ρ_0 for carbon monoxide as given, 1.25052 $g\ell^{-1}$, is within the range of the experimental determinations at standard conditions [31 - 36], though above their mean of 1.25012 $g\ell^{-1}$. Comparisons of the adopted values of η_0 and k_0 with the experimental data at standard conditions can be made by examining figures 5d and 5e, respectively. The value of a_0 for carbon monoxide as given, 336.93 m/sec, is slightly below the mean value, 337.4 m/sec, of the experimental determinations [37, 38].

The Reliability of the Tables

The departures of the experimental data from the tabulated values for Z (table 5-1) are shown in figure 5a. The data of Bartlett, et al., [4], part of which are shown in figure 5a (and to which little weight was given in the correlation), show a maximum deviation of 4 percent. Up to 10 atmospheres, the uncertainty in the table should not exceed 10 percent in the value of (Z - 1), except in the low-temperature region (below 250°K), between 1 and 10 atmospheres where the error may approach 20 percent in (Z - 1). Above 10 atmospheres, the uncertainty in (Z - 1) runs from 25 percent at the lowest temperatures to 10 percent at higher temperatures. These uncertainties apply also to the tabulated densities (table 5-2). The uncertainties in the values of the derived thermodynamic properties depend on the uncertainties of the ideal-gas values (see summary table 1-D) and of the corrections for gas imperfection. It is difficult to formulate precise estimates of the uncertainties in the corrections for gas imperfection, since these corrections were computed on the basis of virial coefficients fitted to the rather limited experimental PVT data. It is possible that virial coefficients somewhat different from those chosen might represent the PVT data as closely and at the same time yield somewhat different temperature derivatives and, hence, different pressure corrections to the thermodynamic properties. The corrections for enthalpy and entropy are estimated to be accurate to within about 10 percent for pressures below 10 atmospheres and temperatures above 400°K and to within roughly 20 percent for higher pressures and lower temperatures.

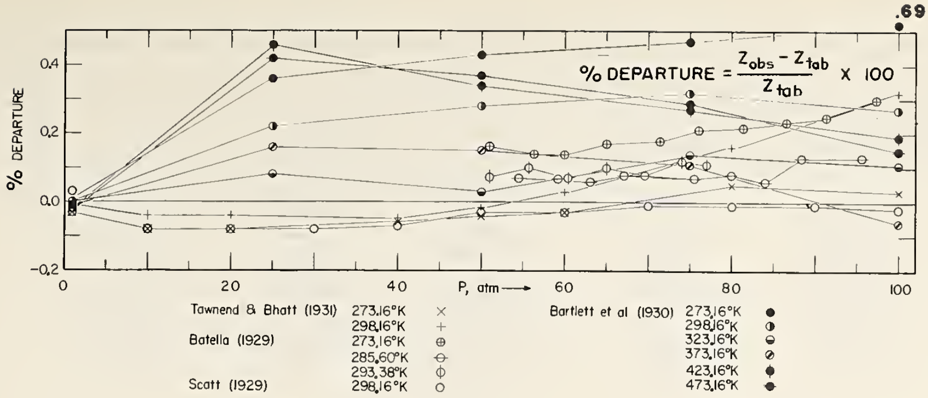

Figure 5a. Departures of experimental compressibility factors from the the tabulated values for carbon monoxide (table 5-1)

Figure 5b shows the departures of the experimental heat-capacity data from the values contained in table 5-3. Below 10 atmospheres and above 400°K, the estimate of the uncertainty in the calculated $C_p/R - C_p^o/R$ is about 20 percent and 30 to 50 percent at higher pressures and at lower temperatures.

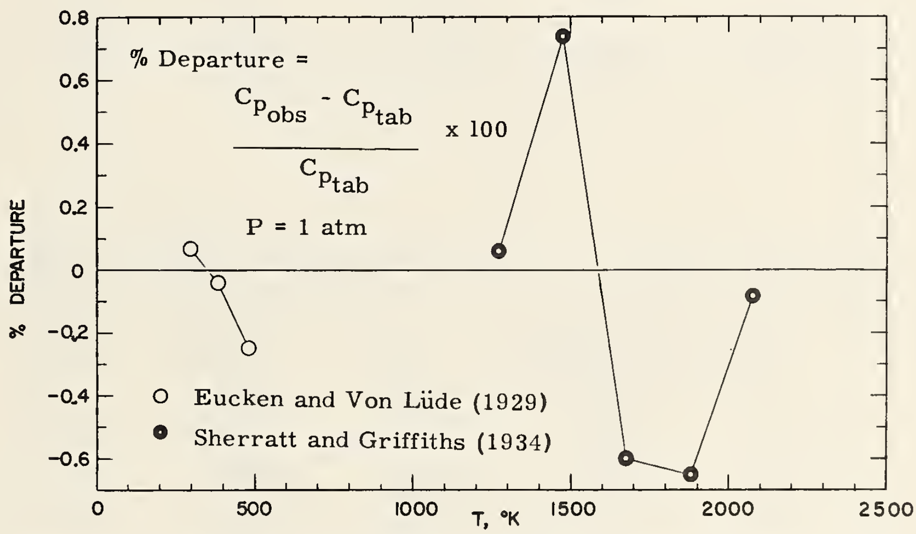

Figure 5b. Departures of experimental specific heats from the tabulated values for carbon monoxide (table 5-3)

A comparison of this correlation with the entropy and specific heats derived by Michels, et al., [8, 9] from their own PVT data is given in table 5-a. Since their data were not considered in this correlation, they may be taken as verification of the reliability of the derived thermodynamic properties.

The tabulated values of the specific-heat ratio and sound velocity at low frequency are estimated to be uncertain by about ±.002 between the ice point and 1000°K below 10 atmospheres. Above this pressure and at lower temperatures, the uncertainties increase to 1 percent at the

Table 5-a. COMPARISON OF RECENTLY PUBLISHED RESULTS WITH THIS CORRELATION

T °K	P = 1 atm		P = 50 atm		P = 100 atm	
	Z (M)*	Z (NBS)	Z (M)	Z (NBS)	Z (M)	Z (NBS)
273.16	.99939	.99933	.97689	.9749	.97136	.966
298.16	.99967	.99964	.99005	.9889	.99375	.9921
323.16	.99989	.99986	.99928	.9988	1.00929	1.0089
348.16	1.00005	1.00002	1.00596	1.0057	1.02026	1.0208
373.16	1.00017	1.00014	1.01078	1.0109	1.02805	1.0293
398.16	1.00026	1.00023	1.01425	1.0145	1.03360	1.0355
423.16	1.00031	1.00029	1.01677	1.0173	1.03772	1.0399

T °K	P = 1 atm		P = 50 atm		P = 100 atm	
	C_p/R(M)	C_p/R(NBS)	C_p/R(M)	C_p/R(NBS)	C_p/R(M)	C_p/R(NBS)
273.16	3.51	3.51	3.86	3.853	4.22	4.13
298.16	3.51	3.51	3.80	3.792	4.07	4.02
323.16	3.51	3.51	3.75	3.751	3.97	3.95
348.16	3.52	3.52	3.72	3.722	3.90	3.90
373.16	3.52	3.52	3.69	3.700	3.85	3.86
398.16	3.53	3.53	3.68	3.685	3.81	3.83
423.16	3.54	3.54	3.66	3.676	3.78	3.80

T °K	P = 1 atm		P = 50 atm		P = 100 atm	
	S/R(M)	S/R(NBS)	S/R(M)	S/R(NBS)	S/R(M)	S/R(NBS)
273.16			19.387	19.344	18.552	18.531
298.16	23.756	23.757	19.723	19.691	18.915	18.901
323.16	24.311	24.040	20.026	19.996	19.239	19.226
348.16	24.300	24.301	20.304	20.275	19.531	19.521
373.16	24.545	24.546	20.561	20.532	19.801	19.791
398.16	24.773	24.775	20.800	20.771	20.049	20.040
423.16	24.988	24.990	21.024	20.996	20.281	20.273

* (M) refers to data of Michels, Lupton, Wassenaar, and De Graaf [6, 8, 9].

lowest temperatures. Above 1000°K, where the gas approaches ideality, the values may be accurate to about ±.001. Figure 5c shows a comparison of the tabulated values of the heat-capacity ratios with those obtained from experimental heat capacities [10, 11]. The values of the thermal conductivity (table 5-9) are considered to be reliable to within 3 percent. Figure 5e shows the deviations of the tabulated values from the experimental data.

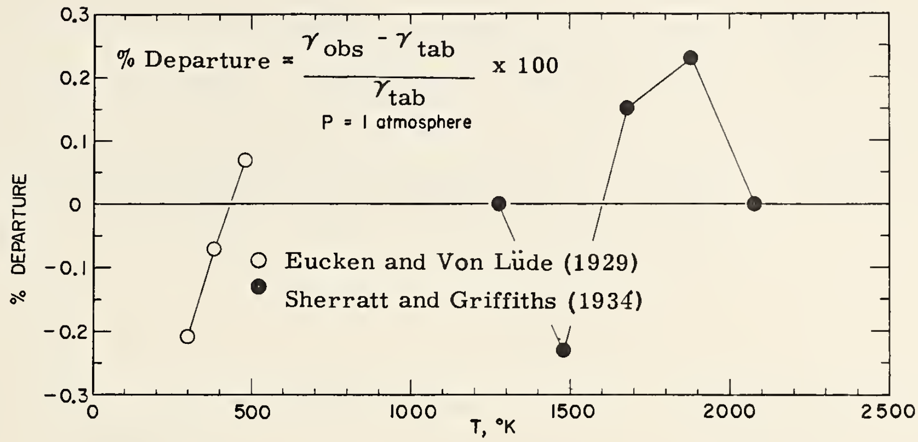

Figure 5c. Departures of experimentally derived γ's from the tabulated values for carbon monoxide (table 5-6)

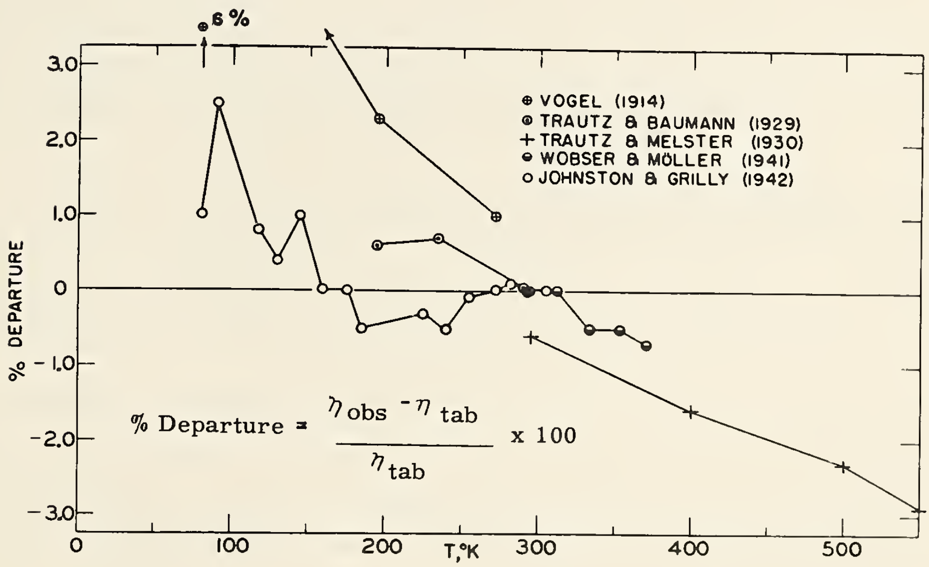

Figure 5d. Departures of experimental viscosities from the tabulated values for carbon monoxide (table 5-8)

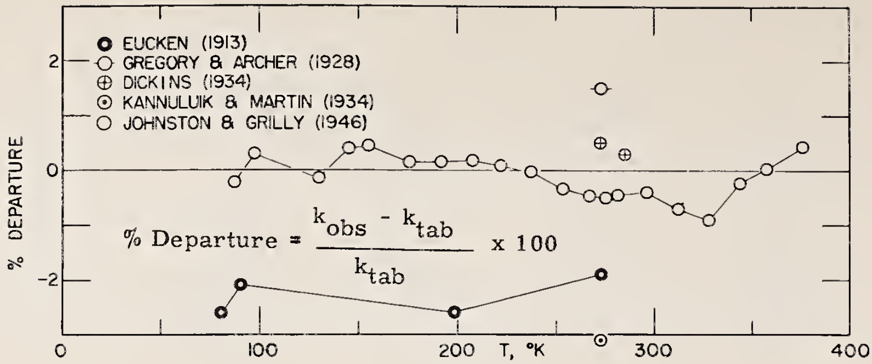

Figure 5e. Departures of experimental thermal conductivities from the tabulated values for carbon monoxide (table 5-9)

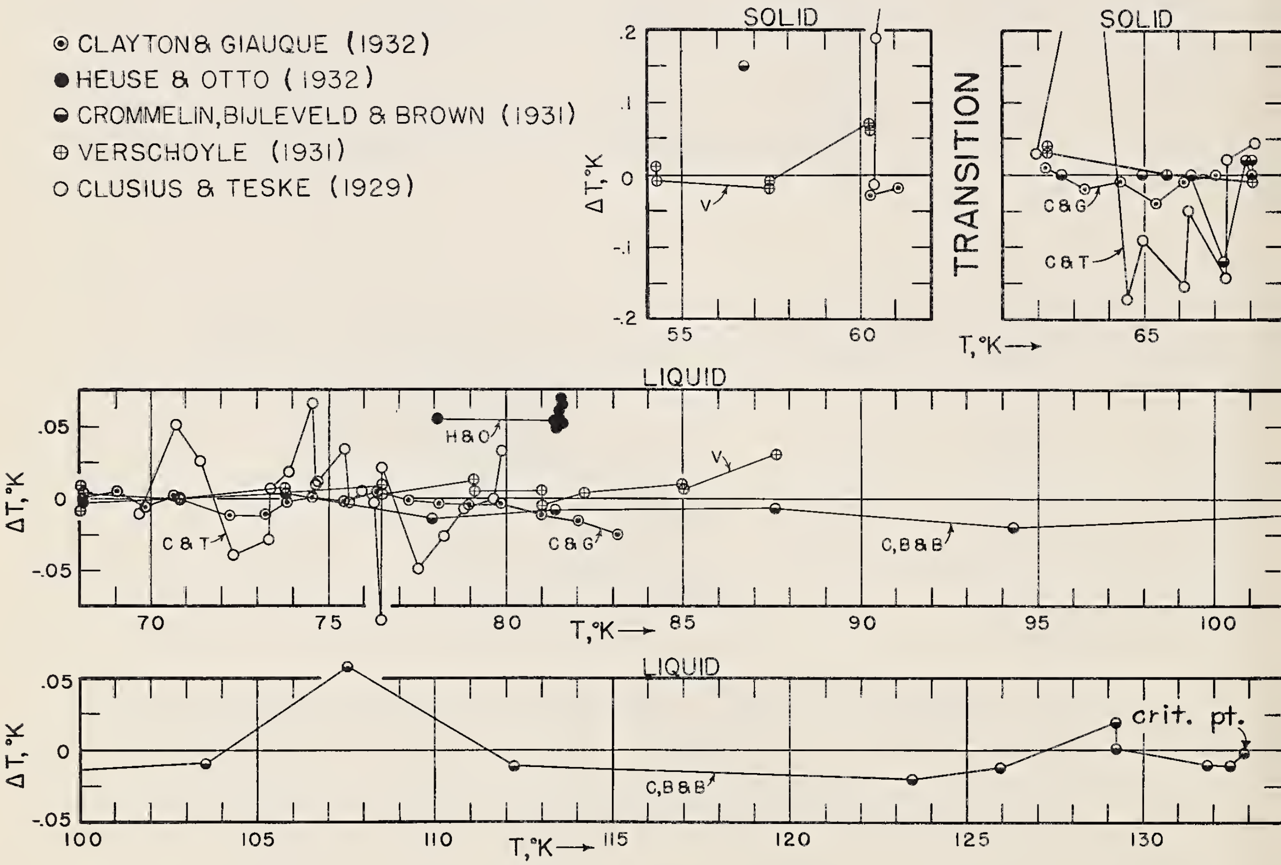

Figure 5f. Departures of the experimental vapor pressures from the tabulated values for carbon monoxide (table 5-11)

The values of the vapor pressure for the solid (5-11) were computed from two equations whose constants are given in table 5-11/b. The values for the solid are probably uncertain by about + 0.1°K. The values for the liquid (tables 5-11 and 5-11/a) up to 85°K are reliable to about + 0.03°K. At higher temperatures, where the tables are based entirely on the work of Crommelin, et al., [12], the reliability may be about ± 0.06°K. The corresponding uncertainties in vapor pressure (mm Hg) are given below.

T, °K	54	61.57	68.09	68.09	85	110	132.88
P (±)	0.1	0.7	2(solid)	0.6(liquid)	3.5	30	70

The triple-point and transition-point pressures are independent of temperature-scale error and are probably accurate to ± 0.2 mm Hg. See also figure 5f.

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Table 5-b. VALUES OF THE GAS CONSTANT, R, FOR CARBON MONOXIDE

Values of R for Carbon Monoxide for Temperatures in Degrees Kelvin

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.92955	3.02689	2226.46	43.0527
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0469264	0.0484856	35.6641	0.689631
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Carbon Monoxide for Temperatures in Degrees Rankine

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.62753	1.68161	1236.92	23.9182
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0260702	0.0269364	19.8134	0.383128
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 5-c. CONVERSION FACTORS FOR THE CARBON MONOXIDE TABLES

Conversion Factors for Table 5-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	$g\ cm^{-3}$	1.25048×10^{-3}
		$mole\ cm^{-3}$	4.46441×10^{-5}
		$g\ liter^{-1}$	1.25052
		$lb\ in^{-3}$	4.51768×10^{-5}
		$lb\ ft^{-3}$	7.80654×10^{-2}

Conversion Factors for Tables 5-4 and 5-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	$cal\ mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	$cal\ g^{-1}$	19.3795
		$joules\ g^{-1}$	81.0840
		$Btu\ (lb\ mole)^{-1}$	976.437
		$Btu\ lb^{-1}$	34.8603

Conversion Factors for Tables 5-3, 5-5, and 5-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	$cal\ mole^{-1}\ {}^oK^{-1}$ (or ${}^oC^{-1}$)	1.98719
C_p/R, S/R,	C_p, S,	$cal\ g^{-1}\ {}^oK^{-1}$ (or ${}^oC^{-1}$)	0.0709457
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	$joules\ g^{-1}\ {}^oK^{-1}$ (or ${}^oC^{-1}$)	0.296838
		$Btu\ (lb\ mole)^{-1}\ {}^oR^{-1}$ (or ${}^oF^{-1}$)	1.98588
		$Btu\ lb^{-1}\ {}^oR^{-1}$ (or ${}^oF^{-1}$)	0.0708989

The molecular weight of carbon monoxide is 28.010 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 5-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	336.93
		ft sec^{-1}	1105.41

Conversion Factors for Table 5-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	1.6568×10^{-4}
		kg hr^{-1} m^{-1}	5.9644×10^{-2}
		slug hr^{-1} ft^{-1}	1.2457×10^{-3}
		lb sec^{-1} ft^{-1}	1.1132×10^{-5}
		lb hr^{-1} ft^{-1}	4.0079×10^{-2}

Conversion Factors for Table 5-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^{o}K^{-1}$	5.549×10^{-5}
		Btu ft^{-1} hr^{-1} $^{o}R^{-1}$	1.342×10^{-2}
		watts cm^{-1} $^{o}K^{-1}$	2.322×10^{-4}

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
200	1.00000	.99973	4	.99892	18	.99811	31	360
210	1.00000	.99977	4	.99910	15	.99842	26	378
220	1.00000	.99981	3	.99925	12	.99868	22	396
230	1.00000	.99984	2	.99937	10	.99890	18	414
240	1.00000	.99986	3	.99947	9	.99908	16	432
250	1.00000	.99989	2	.99956	8	.99924	13	450
260	1.00000	.99991	1	.99964	7	.99937	12	468
270	1.00000	.99992	2	.99971	6	.99949	10	486
280	1.00000	.99994	1	.99977	5	.99959	9	504
290	1.00000	.99995	1	.99982	4	.99968	8	522
300	1.00000	.99996	1	.99986	4	.99976	6	540
310	1.00000	.99997	1	.99990	3	.99982	6	558
320	1.00000	.99998	1	.99993	3	.99988	6	576
330	1.00000	.99999	1	.99996	3	.99994	4	594
340	1.00000	1.00000		.99999	2	.99998	4	612
350	1.00000	1.00000	1	1.00001	2	1.00002	4	630
360	1.00000	1.00001		1.00003	2	1.00006	3	648
370	1.00000	1.00001	1	1.00005	2	1.00009	3	666
380	1.00000	1.00002		1.00007	1	1.00012	2	684
390	1.00000	1.00002		1.00008	1	1.00014	2	702
400	1.00000	1.00002	1	1.00009	1	1.00016	2	720
410	1.00000	1.00003		1.00010	1	1.00018	2	738
420	1.00000	1.00003		1.00011	1	1.00020	1	756
430	1.00000	1.00003		1.00012	1	1.00021	2	774
440	1.00000	1.00003		1.00013	1	1.00023	1	792
450	1.00000	1.00003	1	1.00014		1.00024	1	810
460	1.00000	1.00004		1.00014	1	1.00025	1	828
470	1.00000	1.00004		1.00015		1.00026	1	846
480	1.00000	1.00004		1.00015	1	1.00027	1	864
490	1.00000	1.00004		1.00016		1.00028		882
500	1.00000	1.00004		1.00016		1.00028	1	900
510	1.00000	1.00004		1.00016	1	1.00029		918
520	1.00000	1.00004		1.00017		1.00029	1	936
530	1.00000	1.00004		1.00017		1.00030		954
540	1.00000	1.00004		1.00017		1.00030		972
550	1.00000	1.00004		1.00017	1	1.00030	1	990
560	1.00000	1.00004		1.00018		1.00031		1008
570	1.00000	1.00004		1.00018		1.00031		1026
580	1.00000	1.00004		1.00018		1.00031		1044
590	1.00000	1.00004		1.00018		1.00031	1	1062
600	1.00000	1.00004		1.00018		1.00032		1080
610	1.00000	1.00004		1.00018		1.00032		1098
620	1.00000	1.00004		1.00018		1.00032		1116
630	1.00000	1.00004		1.00018		1.00032		1134
640	1.00000	1.00004		1.00018		1.00032		1152
650	1.00000	1.00004		1.00018		1.00032		1170
660	1.00000	1.00004		1.00018		1.00032		1188
670	1.00000	1.00004		1.00018		1.00032		1206
680	1.00000	1.00004		1.00018		1.00032		1224
690	1.00000	1.00004		1.00018		1.00032		1242
700	1.00000	1.00004		1.00018		1.00032	-1	1260
710	1.00000	1.00004		1.00018		1.00031		1278
720	1.00000	1.00004		1.00018		1.00031		1296
730	1.00000	1.00004		1.00018		1.00031		1314
740	1.00000	1.00004		1.00018		1.00031		1332
750	1.00000	1.00004		1.00018		1.00031		1350
760	1.00000	1.00004		1.00018		1.00031		1368
770	1.00000	1.00004		1.00018		1.00031		1386
780	1.00000	1.00004		1.00018	-1	1.00031	-1	1404
790	1.00000	1.00004		1.00017		1.00030		1422
800	1.00000	1.00004		1.00017		1.00030		1440

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
800	1.00000	1.00004		1.00017		1.00030		1440
850	1.00000	1.00004		1.00017	- 1	1.00030	- 1	1530
900	1.00000	1.00004		1.00016		1.00029	- 1	1620
950	1.00000	1.00004		1.00016	- 1	1.00028	- 1	1710
1000	1.00000	1.00004		1.00015		1.00027	- 1	1800
1050	1.00000	1.00004		1.00015	- 1	1.00026		1890
1100	1.00000	1.00004		1.00014		1.00026	- 1	1980
1150	1.00000	1.00004	- 1	1.00014		1.00025	- 1	2070
1200	1.00000	1.00003		1.00014	- 1	1.00024	- 1	2160
1250	1.00000	1.00003		1.00013		1.00023	- 1	2250
1300	1.00000	1.00003		1.00013	- 1	1.00022		2340
1350	1.00000	1.00003		1.00012		1.00022	- 1	2430
1400	1.00000	1.00003		1.00012		1.00021		2520
1450	1.00000	1.00003		1.00012	- 1	1.00021	- 1	2610
1500	1.00000	1.00003		1.00011		1.00020		2700
1550	1.00000	1.00003		1.00011		1.00020	- 1	2790
1600	1.00000	1.00003		1.00011	- 1	1.00019	- 1	2880
1650	1.00000	1.00003		1.00010		1.00018		2970
1700	1.00000	1.00003	- 1	1.00010		1.00018		3060
1750	1.00000	1.00002		1.00010		1.00018	- 1	3150
1800	1.00000	1.00002		1.00010		1.00017		3240
1850	1.00000	1.00002		1.00010	- 1	1.00017	- 1	3330
1900	1.00000	1.00002		1.00009		1.00016		3420
1950	1.00000	1.00002		1.00009		1.00016		3510
2000	1.00000	1.00002		1.00009		1.00016	- 1	3600
2050	1.00000	1.00002		1.00009	- 1	1.00015		3690
2100	1.00000	1.00002		1.00008		1.00015	- 1	3780
2150	1.00000	1.00002		1.00008		1.00014		3870
2200	1.00000	1.00002		1.00008		1.00014		3960
2250	1.00000	1.00002		1.00008		1.00014		4050
2300	1.00000	1.00002		1.00008		1.00014	- 1	4140
2350	1.00000	1.00002		1.00008	- 1	1.00013		4230
2400	1.00000	1.00002		1.00007		1.00013		4320
2450	1.00000	1.00002		1.00007		1.00013	- 1	4410
2500	1.00000	1.00002		1.00007		1.00012		4500
2550	1.00000	1.00002		1.00007		1.00012		4590
2600	1.00000	1.00002		1.00007		1.00012		4680
2650	1.00000	1.00002		1.00007		1.00012		4770
2700	1.00000	1.00002		1.00007	- 1	1.00012	- 1	4860
2750	1.00000	1.00002		1.00006		1.00011		4950
2800	1.00000	1.00002		1.00006		1.00011		5040
2850	1.00000	1.00002		1.00006		1.00011		5130
2900	1.00000	1.00002		1.00006		1.00011	- 1	5220
2950	1.00000	1.00002		1.00006		1.00010		5310
3000	1.00000	1.00002		1.00006		1.00010		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
200	.99730	44	.98927	177	.98131	311	.97344	444	360
210	.99774	37	.99104	148	.98442	259	.97788	371	378
220	.99811	32	.99252	124	.98701	218	.98159	311	396
230	.99843	26	.99376	106	.98919	185	.98470	262	414
240	.99869	23	.99482	90	.99104	157	.98732	223	432
250	.99892	19	.99572	77	.99261	134	.98955	191	450
260	.99911	17	.99649	67	.99395	115	.99146	165	468
270	.99928	14	.99716	57	.99510	100	.99311	142	486
280	.99942	13	.99773	50	.99610	87	.99453	123	504
290	.99955	11	.99823	43	.99697	75	.99576	107	522
300	.99966	9	.99866	38	.99772	66	.99683	93	540
310	.99975	9	.99904	34	.99838	58	.99776	82	558
320	.99984	7	.99938	28	.99896	50	.99858	72	576
330	.99991	7	.99966	27	.99946	45	.99930	64	594
340	.99998	5	.99993	22	.99991	40	.99994	56	612
350	1.00003	5	1.00015	20	1.00031	35	1.00050	49	630
360	1.00008	5	1.00035	18	1.00066	30	1.00099	43	648
370	1.00013	4	1.00053	16	1.00096	27	1.00142	39	666
380	1.00017	3	1.00069	14	1.00123	24	1.00181	34	684
390	1.00020	3	1.00083	12	1.00147	22	1.00215	30	702
400	1.00023	3	1.00095	11	1.00169	19	1.00245	27	720
410	1.00026	3	1.00106	10	1.00188	17	1.00272	24	738
420	1.00029	2	1.00116	8	1.00205	15	1.00296	21	756
430	1.00031	2	1.00124	8	1.00220	13	1.00317	19	774
440	1.00033	1	1.00132	7	1.00233	12	1.00336	16	792
450	1.00034	2	1.00139	6	1.00245	10	1.00352	15	810
460	1.00036	1	1.00145	5	1.00255	9	1.00367	13	828
470	1.00037	1	1.00150	5	1.00264	9	1.00380	12	846
480	1.00038	1	1.00155	4	1.00273	7	1.00392	10	864
490	1.00039	1	1.00159	4	1.00280	6	1.00402	9	882
500	1.00040	1	1.00163	3	1.00286	5	1.00411	7	900
510	1.00041	1	1.00166	3	1.00291	5	1.00418	7	918
520	1.00042	1	1.00169	2	1.00296	5	1.00425	6	936
530	1.00043		1.00171	2	1.00301	4	1.00431	6	954
540	1.00043	1	1.00173	2	1.00305	3	1.00437	4	972
550	1.00044		1.00175	2	1.00308	2	1.00441	3	990
560	1.00044		1.00177	1	1.00310	2	1.00444	3	1008
570	1.00044		1.00178	1	1.00312	2	1.00447	3	1026
580	1.00044	1	1.00179	1	1.00314	1	1.00450	2	1044
590	1.00045		1.00180		1.00315	1	1.00452	1	1062
600	1.00045		1.00180	1	1.00316	1	1.00453	1	1080
610	1.00045		1.00181		1.00317	1	1.00454	1	1098
620	1.00045		1.00181	1	1.00318		1.00455	1	1116
630	1.00045		1.00182		1.00318	1	1.00456		1134
640	1.00045		1.00182		1.00319		1.00456		1152
650	1.00045		1.00182		1.00319	- 1	1.00456	- 1	1170
660	1.00045		1.00182	- 1	1.00318		1.00455	- 1	1188
670	1.00045		1.00181		1.00318	- 1	1.00454		1206
680	1.00045		1.00181		1.00317		1.00454	- 1	1224
690	1.00045		1.00181	- 1	1.00317	- 1	1.00453	- 1	1242
700	1.00045		1.00180		1.00316	- 1	1.00452	- 1	1260
710	1.00045		1.00180	- 1	1.00315	- 1	1.00451	- 1	1278
720	1.00045		1.00179		1.00314	- 1	1.00450	- 2	1296
730	1.00045	- 1	1.00179	- 1	1.00313	- 1	1.00448	- 2	1314
740	1.00044		1.00178		1.00312	- 1	1.00446	- 1	1332
750	1.00044		1.00178	- 1	1.00311	- 1	1.00445	- 2	1350
760	1.00044		1.00177	- 1	1.00310	- 2	1.00443	- 2	1368
770	1.00044		1.00176	- 1	1.00308	- 1	1.00441	- 2	1386
780	1.00044		1.00175	- 1	1.00307	- 1	1.00439	- 2	1404
790	1.00044	- 1	1.00174		1.00306	- 2	1.00437	- 2	1422
800	1.00043		1.00174		1.00304		1.00435		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	1.00043	-1	1.00174	-5	1.00304	-8	1.00435	-11	1440
850	1.00042	-1	1.00169	-4	1.00296	-8	1.00424	-12	1530
900	1.00041	-1	1.00165	-5	1.00288	-9	1.00412	-12	1620
950	1.00040	-1	1.00160	-5	1.00279	-8	1.00400	-12	1710
1000	1.00039	-1	1.00155	-5	1.00271	-8	1.00388	-12	1800
1050	1.00038	-2	1.00150	-4	1.00263	-8	1.00376	-12	1890
1100	1.00036	-1	1.00146	-5	1.00255	-8	1.00364	-11	1980
1150	1.00035	-1	1.00141	-4	1.00247	-7	1.00353	-10	2070
1200	1.00034	-1	1.00137	-4	1.00240	-7	1.00343	-11	2160
1250	1.00033	-1	1.00133	-4	1.00233	-7	1.00332	-10	2250
1300	1.00032	-1	1.00129	-4	1.00226	-7	1.00322	-9	2340
1350	1.00031	-1	1.00125	-4	1.00219	-6	1.00313	-9	2430
1400	1.00030		1.00121	-3	1.00213	-6	1.00304	-9	2520
1450	1.00030	-1	1.00118	-3	1.00207	-6	1.00295	-8	2610
1500	1.00029	-1	1.00115	-3	1.00201	-6	1.00287	-8	2700
1550	1.00028	-1	1.00112	-3	1.00195	-5	1.00279	-8	2790
1600	1.00027	-1	1.00109	-3	1.00190	-5	1.00271	-7	2880
1650	1.00026		1.00106	-3	1.00185	-5	1.00264	-7	2970
1700	1.00026	-1	1.00103	-3	1.00180	-5	1.00257	-6	3060
1750	1.00025	-1	1.00100	-2	1.00175	-4	1.00251	-7	3150
1800	1.00024		1.00098	-3	1.00171	-4	1.00244	-6	3240
1850	1.00024	-1	1.00095	-2	1.00167	-4	1.00238	-6	3330
1900	1.00023		1.00093	-2	1.00163	-4	1.00232	-5	3420
1950	1.00023	-1	1.00091	-2	1.00159	-4	1.00227	-6	3510
2000	1.00022		1.00089	-2	1.00155	-4	1.00221	-5	3600
2050	1.00022	-1	1.00087	-2	1.00151	-3	1.00216	-5	3690
2100	1.00021		1.00085	-2	1.00148	-3	1.00211	-4	3780
2150	1.00021	-1	1.00083	-2	1.00145	-3	1.00207	-5	3870
2200	1.00020		1.00081	-2	1.00142	-3	1.00202	-4	3960
2250	1.00020	-1	1.00079	-2	1.00139	-3	1.00198	-4	4050
2300	1.00019		1.00077	-1	1.00136	-3	1.00194	-4	4140
2350	1.00019	-1	1.00076	-2	1.00133	-3	1.00190	-4	4230
2400	1.00018		1.00074	-1	1.00130	-3	1.00186	-4	4320
2450	1.00018		1.00073	-2	1.00127	-2	1.00182	-4	4410
2500	1.00018	-1	1.00071	-1	1.00125	-3	1.00178	-3	4500
2550	1.00017		1.00070	-1	1.00122	-2	1.00175	-4	4590
2600	1.00017		1.00069	-2	1.00120	-2	1.00171	-3	4680
2650	1.00017	-1	1.00067	-1	1.00118	-2	1.00168	-3	4770
2700	1.00016		1.00066	-1	1.00116	-3	1.00165	-3	4860
2750	1.00016		1.00065	-1	1.00113	-2	1.00162	-3	4950
2800	1.00016		1.00064	-1	1.00111	-2	1.00159	-3	5040
2850	1.00016	-1	1.00063	-2	1.00109	-2	1.00156	-3	5130
2900	1.00015		1.00061	-1	1.00107	-1	1.00153	-2	5220
2950	1.00015		1.00060	-1	1.00106	-2	1.00151	-3	5310
3000	1.00015		1.00059		1.00104		1.00148		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
250	.9896	19	.9632	73					450
260	.9915	16	.9705	63					468
270	.9931	14	.9768	53	.9669	87			486
280	.9945	13	.9821	46	.9756	75	.9752	99	504
290	.9958	10	.9867	40	.9831	65	.9851	84	522
300	.9968	10	.9907	35	.9896	56	.9935	73	540
310	.9978	8	.9942	30	.9952	48	1.0008	63	558
320	.9986	7	.9972	26	1.0000	42	1.0071	54	576
330	.9993	6	.9998	23	1.0042	37	1.0125	48	594
340	.9999	6	1.0021	21	1.0079	33	1.0173	43	612
350	1.0005	5	1.0042	18	1.0112	29	1.0216	36	630
360	1.0010	4	1.0060	16	1.0141	25	1.0252	32	648
370	1.0014	4	1.0076	14	1.0166	22	1.0284	29	666
380	1.0018	4	1.0090	12	1.0188	20	1.0313	25	684
390	1.0022	3	1.0102	11	1.0208	17	1.0338	21	702
400	1.0025	2	1.0113	10	1.0225	15	1.0359	19	720
410	1.0027	3	1.0123	8	1.0240	14	1.0378	17	738
420	1.0030	2	1.0131	8	1.0254	11	1.0395	15	756
430	1.0032	2	1.0139	7	1.0265	10	1.0410	13	774
440	1.0034	1	1.0146	6	1.0275	10	1.0423	10	792
450	1.0035	2	1.0152	5	1.0285	8	1.0433	9	810
460	1.0037	1	1.0157	5	1.0293	6	1.0442	9	828
470	1.0038	1	1.0162	4	1.0299	6	1.0451	7	846
480	1.0039	1	1.0166	3	1.0305	5	1.0458	6	864
490	1.0040	1	1.0169	3	1.0310	4	1.0464	5	882
500	1.0041	1	1.0172	2	1.0314	4	1.0469	4	900
510	1.0042	1	1.0174	3	1.0318	4	1.0473	4	918
520	1.0043		1.0177	2	1.0322	3	1.0477	3	936
530	1.0043	1	1.0179	2	1.0325	2	1.0480	2	954
540	1.0044		1.0181	1	1.0327	2	1.0482	2	972
550	1.0044		1.0182	1	1.0329	1	1.0484	1	990
560	1.0044	1	1.0183	1	1.0330		1.0485		1008
570	1.0045		1.0184	1	1.0330	1	1.0485		1026
580	1.0045		1.0185		1.0331	1	1.0485		1044
590	1.0045		1.0185	1	1.0332		1.0485		1062
600	1.0045		1.0186		1.0332		1.0485	- 1	1080
610	1.0045	1	1.0186		1.0332		1.0484	- 1	1098
620	1.0046		1.0186		1.0332	- 1	1.0483	- 1	1116
630	1.0046		1.0186		1.0331		1.0482	- 1	1134
640	1.0046		1.0186		1.0331	- 1	1.0481	- 2	1152
650	1.0046		1.0186	- 1	1.0330	- 1	1.0479	- 2	1170
660	1.0046	- 1	1.0185		1.0329	- 1	1.0477	- 1	1188
670	1.0045		1.0185	- 1	1.0328	- 1	1.0476	- 2	1206
680	1.0045		1.0184		1.0327	- 1	1.0474	- 2	1224
690	1.0045		1.0184	- 1	1.0326	- 1	1.0472	- 2	1242
700	1.0045		1.0183	- 1	1.0325	- 2	1.0470	- 3	1260
710	1.0045		1.0182		1.0323	- 1	1.0467	- 2	1278
720	1.0045		1.0182	- 1	1.0322	- 2	1.0465	- 2	1296
730	1.0045		1.0181	- 1	1.0320	- 1	1.0463	- 3	1314
740	1.0045		1.0180		1.0319	- 2	1.0460	- 2	1332
750	1.0045	- 1	1.0180	- 1	1.0317	- 1	1.0458	- 3	1350
760	1.0044		1.0179	- 1	1.0316	- 2	1.0455	- 2	1368
770	1.0044		1.0178	- 1	1.0314	- 2	1.0453	- 3	1386
780	1.0044		1.0177	- 1	1.0312	- 1	1.0450	- 2	1404
790	1.0044		1.0176	- 1	1.0311	- 2	1.0448	- 3	1422
800	1.0044	- 2	1.0175	- 5	1.0309	- 9	1.0445	- 14	1440
850	1.0042	- 1	1.0170	- 4	1.0300	- 9	1.0431	- 13	1530
900	1.0041	- 1	1.0166	- 5	1.0291	- 9	1.0418	- 14	1620
950	1.0040	- 1	1.0161	- 5	1.0282	- 9	1.0404	- 13	1710
1000	1.0039	- 1	1.0156	- 5	1.0273	- 9	1.0391	- 14	1800
1050	1.0038		1.0151		1.0264		1.0377		1890

°K	10 atm		40 atm		70 atm		100 atm		°R
1050	1.0038	- 2	1.0151	- 5	1.0264	- 8	1.0377	- 13	1890
1100	1.0036	- 1	1.0146	- 4	1.0256	- 8	1.0364	- 11	1980
1150	1.0035	- 1	1.0142	- 5	1.0248	- 8	1.0353	- 10	2070
1200	1.0034	- 1	1.0137	- 4	1.0240	- 7	1.0343	- 11	2160
1250	1.0033	- 1	1.0133	- 4	1.0233	- 7	1.0332	- 10	2250
1300	1.0032	- 1	1.0129	- 4	1.0226	- 7	1.0322	- 9	2340
1350	1.0031	- 1	1.0125	- 4	1.0219	- 7	1.0313	- 9	2430
1400	1.0030		1.0121	- 3	1.0212	- 6	1.0304	- 9	2520
1450	1.0030	- 1	1.0118	- 3	1.0206	- 6	1.0295	- 9	2610
1500	1.0029	- 1	1.0115	- 4	1.0200	- 5	1.0286	- 8	2700
1550	1.0028	- 1	1.0111	- 3	1.0195	- 5	1.0278	- 8	2790
1600	1.0027	- 1	1.0108	- 2	1.0190	- 5	1.0270	- 7	2880
1650	1.0026		1.0106	- 3	1.0185	- 5	1.0263	- 7	2970
1700	1.0026	- 1	1.0103	- 3	1.0180	- 5	1.0256	- 7	3060
1750	1.0025	- 1	1.0100	- 2	1.0175	- 4	1.0249	- 6	3150
1800	1.0024		1.0098	- 3	1.0171	- 5	1.0243	- 6	3240
1850	1.0024	- 1	1.0095	- 2	1.0166	- 4	1.0237	- 6	3330
1900	1.0023		1.0093	- 3	1.0162	- 4	1.0231	- 5	3420
1950	1.0023	- 1	1.0090	- 2	1.0158	- 3	1.0226	- 5	3510
2000	1.0022		1.0088	- 2	1.0155	- 4	1.0221	- 5	3600
2050	1.0022	- 1	1.0086	- 2	1.0151	- 3	1.0216	- 5	3690
2100	1.0021		1.0084	- 1	1.0148	- 4	1.0211	- 5	3780
2150	1.0021	- 1	1.0083	- 2	1.0144	- 3	1.0206	- 4	3870
2200	1.0020		1.0081	- 2	1.0141	- 3	1.0202	- 5	3960
2250	1.0020	- 1	1.0079	- 2	1.0138	- 3	1.0197	- 4	4050
2300	1.0019		1.0077	- 1	1.0135	- 3	1.0193	- 4	4140
2350	1.0019		1.0076	- 2	1.0132	- 3	1.0189	- 4	4230
2400	1.0019	- 1	1.0074	- 1	1.0129	- 2	1.0185	- 4	4320
2450	1.0018		1.0073	- 2	1.0127	- 3	1.0181	- 3	4410
2500	1.0018	- 1	1.0071	- 1	1.0124	- 2	1.0178	- 4	4500
2550	1.0017		1.0070	- 2	1.0122	- 2	1.0174	- 3	4590
2600	1.0017		1.0068	- 1	1.0120	- 3	1.0171	- 3	4680
2650	1.0017		1.0067	- 1	1.0117	- 2	1.0168	- 3	4770
2700	1.0017	- 1	1.0066	- 1	1.0115	- 2	1.0165	- 3	4860
2750	1.0016		1.0065	- 1	1.0113	- 2	1.0162	- 3	4950
2800	1.0016		1.0064	- 2	1.0111	- 2	1.0159	- 3	5040
2850	1.0016	- 1	1.0062	- 1	1.0109	- 2	1.0156	- 3	5130
2900	1.0015		1.0061	- 1	1.0107	- 2	1.0153	- 3	5220
2950	1.0015		1.0060	- 1	1.0105	- 1	1.0150	- 2	5310
3000	1.0015		1.0059		1.0104		1.0148		5400

Table 5-2. DENSITY OF CARBON MONOXIDE ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	.013649	-650	.136524	-6507	.54654	-2612	.95722	-4587	360
210	.012999	-591	.130017	-5914	.52042	-2373	.91135	-4165	378
220	.012408	-539	.124103	-5400	.49669	-2165	.86970	-3799	396
230	.011869	-495	.118703	-4949	.47504	-1984	.83171	-3480	414
240	.011374	-455	.113754	-4553	.45520	-1825	.79691	-3200	432
250	.010919	-420	.109201	-4202	.43695	-1684	.76491	-2952	450
260	.010499	-389	.104999	-3890	.42011	-1559	.73539	-2732	468
270	.010110	-361	.101109	-3613	.40452	-1447	.70807	-2536	486
280	.009749	-336	.097496	-3363	.39005	-1347	.68271	-2360	504
290	.009413	-314	.094133	-3138	.37658	-1256	.65911	-2202	522
300	.009099	-293	.090995	-2937	.36402	-1176	.63709	-2059	540
310	.008806	-276	.088058	-2752	.35226	-1102	.61650	-1930	558
320	.008530	-258	.085306	-2586	.34124	-1035	.59720	-1813	576
330	.008272	-243	.082720	-2433	.33089	- 974	.57907	-1705	594
340	.008029	-230	.080287	-2295	.32115	- 918	.56202	-1608	612
350	.007799	-216	.077992	-2166	.31197	- 867	.54594	-1519	630
360	.007583	-205	.075826	-2050	.30330	- 821	.53075	-1436	648
370	.007378	-194	.073776	-1942	.29509	- 777	.51639	-1360	666
380	.007184	-185	.071834	-1842	.28732	- 737	.50279	-1291	684
390	.006999	-175	.069992	-1750	.27995	- 701	.48988	-1225	702
400	.006824	-166	.068242	-1665	.27294	- 665	.47763	-1166	720
410	.006658	-159	.066577	-1585	.26629	- 634	.46597	-1110	738
420	.006499	-151	.064992	-1512	.25995	- 605	.45487	-1059	756
430	.006348	-144	.063480	-1443	.25390	- 577	.44428	-1010	774
440	.006204	-138	.062037	-1378	.24813	- 552	.43418	- 966	792
450	.006066	-132	.060659	-1319	.24261	- 527	.42452	- 923	810
460	.005934	-126	.059340	-1263	.23734	- 506	.41529	- 884	828
470	.005808	-121	.058077	-1210	.23228	- 484	.40645	- 847	846
480	.005687	-116	.056867	-1160	.22744	- 464	.39798	- 813	864
490	.005571	-112	.055707	-1114	.22280	- 446	.38985	- 779	882
500	.005459	-107	.054593	-1071	.21834	- 428	.38206	- 750	900
510	.005352	-103	.053522	-1029	.21406	- 412	.37456	- 720	918
520	.005249	- 99	.052493	- 991	.20994	- 396	.36736	- 694	936
530	.005150	- 95	.051502	- 953	.20598	- 381	.36042	- 667	954
540	.005055	- 92	.050549	- 920	.20217	- 368	.35375	- 643	972
550	.004963	- 88	.049629	- 886	.19849	- 354	.34732	- 621	990
560	.004875	- 86	.048743	- 855	.19495	- 342	.34111	- 598	1008
570	.004789	- 83	.047888	- 826	.19153	- 331	.33513	- 578	1026
580	.004706	- 79	.047062	- 797	.18822	- 319	.32935	- 558	1044
590	.004627	- 77	.046265	- 771	.18503	- 308	.32377	- 540	1062
600	.004550	- 75	.045494	- 746	.18195	- 298	.31837	- 522	1080
610	.004475	- 72	.044748	- 722	.17897	- 289	.31315	- 505	1098
620	.004403	- 70	.044026	- 699	.17608	- 279	.30810	- 489	1116
630	.004333	- 68	.043327	- 677	.17329	- 271	.30321	- 474	1134
640	.004265	- 65	.042650	- 656	.17058	- 263	.29847	- 459	1152
650	.004200	- 64	.041994	- 636	.16795	- 254	.29388	- 445	1170
660	.004136	- 62	.041358	- 617	.16541	- 247	.28943	- 432	1188
670	.004074	- 60	.040741	- 600	.16294	- 240	.28511	- 420	1206
680	.004014	- 58	.040141	- 581	.16054	- 232	.28091	- 407	1224
690	.003956	- 56	.039560	- 565	.15822	- 226	.27684	- 395	1242
700	.003900	- 55	.038995	- 550	.15596	- 220	.27289	- 384	1260
710	.003845	- 54	.038445	- 534	.15376	- 214	.26905	- 374	1278
720	.003791	- 52	.037911	- 519	.15162	- 207	.26531	- 364	1296
730	.003739	- 50	.037392	- 505	.14955	- 202	.26167	- 353	1314
740	.003689	- 49	.036887	- 492	.14753	- 197	.25814	- 344	1332
750	.003640	- 48	.036395	- 479	.14556	- 192	.25470	- 335	1350
760	.003592	- 47	.035916	- 466	.14364	- 186	.25135	- 327	1368
770	.003545	- 45	.035450	- 455	.14178	- 182	.24808	- 318	1386
780	.003500	- 45	.034995	- 443	.13996	- 177	.24490	- 310	1404
790	.003455	- 43	.034552	- 432	.13819	- 173	.24180	- 302	1422
800	.003412		.034120		.13646		.23878		1440

Table 5-2. DENSITY OF CARBON MONOXIDE - Cont. ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	.003412	-201	.034120	-2007	.13646	- 802	.23878	-1405	1440
850	.003211	-178	.032113	-1784	.12844	- 714	.22473	-1248	1530
900	.003033	-160	.030329	-1596	.12130	- 638	.21225	-1117	1620
950	.002873	-143	.028733	-1437	.11492	- 575	.20108	-1005	1710
1000	.002730	-130	.027296	-1299	.10917	- 520	.19103	- 909	1800
1050	.002600	-118	.025997	-1182	.10397	- 472	.18194	- 827	1890
1100	.002482	-108	.024815	-1079	.099249	- 4315	.17367	- 755	1980
1150	.002374	- 99	.023736	- 989	.094934	- 3955	.16612	- 692	2070
1200	.002275	- 91	.022747	- 910	.090979	- 3639	.15920	- 637	2160
1250	.002184	- 84	.021837	- 840	.087340	- 3359	.15283	- 588	2250
1300	.002100	- 78	.020997	- 777	.083981	- 3110	.14695	- 544	2340
1350	.002022	- 72	.020220	- 722	.080871	- 2888	.14151	- 505	2430
1400	.001950	- 67	.019498	- 673	.077983	- 2689	.13646	- 471	2520
1450	.001883	- 63	.018825	- 627	.075294	- 2509	.13175	- 439	2610
1500	.001820	- 59	.018198	- 587	.072785	- 2348	.12736	- 411	2700
1550	.001761	- 55	.017611	- 551	.070437	- 2201	.12325	- 385	2790
1600	.001706	- 52	.017060	- 517	.068236	- 2067	.11940	- 361	2880
1650	.001654	- 48	.016543	- 486	.066169	- 1946	.11579	- 341	2970
1700	.001606	- 46	.016057	- 459	.064223	- 1835	.11238	- 321	3060
1750	.001560	- 43	.015598	- 433	.062388	- 1733	.10917	- 303	3150
1800	.001517	- 41	.015165	- 410	.060655	- 1639	.10614	- 287	3240
1850	.001476	- 39	.014755	- 388	.059016	- 1553	.10327	- 272	3330
1900	.001437	- 37	.014367	- 369	.057463	- 1473	.10055	- 258	3420
1950	.001400	- 35	.013998	- 350	.055990	- 1400	.09797	- 245	3510
2000	.001365	- 33	.013648	- 332	.054590	- 1332	.09552	- 233	3600
2050	.001332	- 32	.013316	- 318	.053258	- 1267	.09319	- 222	3690
2100	.001300	- 30	.012998	- 302	.051991	- 1209	.09097	- 211	3780
2150	.001270	- 29	.012696	- 288	.050782	- 1154	.08886	- 202	3870
2200	.001241	- 28	.012408	- 276	.049628	- 1103	.08684	- 193	3960
2250	.001213	- 26	.012132	- 264	.048525	- 1055	.08491	- 185	4050
2300	.001187	- 25	.011868	- 252	.047470	- 1010	.08306	- 176	4140
2350	.001162	- 25	.011616	- 242	.046460	- 968	.08130	- 170	4230
2400	.001137	- 23	.011374	- 232	.045492	- 928	.07960	- 162	4320
2450	.001114	- 22	.011142	- 223	.044564	- 891	.07798	- 156	4410
2500	.001092	- 22	.010919	- 214	.043673	- 857	.07642	- 150	4500
2550	.001070	- 20	.010705	- 206	.042816	- 823	.07492	- 144	4590
2600	.001050	- 20	.010499	- 198	.041993	- 792	.07348	- 139	4680
2650	.001030	- 19	.010301	- 191	.041201	- 763	.07209	- 133	4770
2700	.001011	- 18	.010110	- 184	.040438	- 735	.07076	- 129	4860
2750	.000993	- 18	.009926	- 177	.039703	- 709	.06947	- 124	4950
2800	.000975	- 17	.009749	- 171	.038994	- 684	.06823	- 120	5040
2850	.000958	- 17	.009578	- 165	.038310	- 661	.06703	- 115	5130
2900	.000941	- 16	.009413	- 160	.037649	- 638	.06588	- 112	5220
2950	.000925	- 15	.009253	- 154	.037011	- 617	.06476	- 108	5310
3000	.000910	- 15	.009099	- 149	.036394	- 596	.06368	- 104	5400

Table 5-2. DENSITY OF CARBON MONOXIDE - Cont. ρ/ρ_0

°K	1 atm		4 atm		7 atm		10 atm		°R
200	1.3686	-658	5.5187	-2722	9.7361	-4930	14.021	-728	360
210	1.3028	-597	5.2465	-2459	9.2431	-4433	13.293	-652	378
220	1.2431	-544	5.0006	-2234	8.7998	-4011	12.641	-588	396
230	1.1887	-498	4.7772	-2039	8.3987	-3650	12.053	-533	414
240	1.1389	-458	4.5733	-1869	8.0337	-3335	11.520	-486	432
250	1.0931	-423	4.3864	-1720	7.7002	-3062	11.034	-445	450
260	1.0508	-391	4.2144	-1588	7.3940	-2820	10.589	-409	468
270	1.0117	-362	4.0556	-1471	7.1120	-2609	10.180	-377	486
280	.97547	-3376	3.9085	-1367	6.8511	-2420	9.8027	-3497	504
290	.94171	-3149	3.7718	-1273	6.6091	-2252	9.4530	-3249	522
300	.91022	-2944	3.6445	-1189	6.3839	-2100	9.1281	-3027	540
310	.88078	-2760	3.5256	-1113	6.1739	-1964	8.8254	-2828	558
320	.85318	-2591	3.4143	-1044	5.9775	-1840	8.5426	-2649	576
330	.82727	-2439	3.3099	- 982	5.7935	-1729	8.2777	-2486	594
340	.80288	-2298	3.2117	- 925	5.6206	-1628	8.0291	-2337	612
350	.77990	-2170	3.1192	- 872	5.4578	-1535	7.7954	-2203	630
360	.75820	-2053	3.0320	- 825	5.3043	-1449	7.5751	-2079	648
370	.73767	-1944	2.9495	- 781	5.1594	-1371	7.3672	-1967	666
380	.71823	-1844	2.8714	- 740	5.0223	-1300	7.1705	-1862	684
390	.69979	-1751	2.7974	- 703	4.8923	-1233	6.9843	-1766	702
400	.68228	-1666	2.7271	- 668	4.7690	-1172	6.8077	-1679	720
410	.66562	-1587	2.6603	- 636	4.6518	-1115	6.6398	-1596	738
420	.64975	-1512	2.5967	- 606	4.5403	-1063	6.4802	-1520	756
430	.63463	-1444	2.5361	- 578	4.4340	-1013	6.3282	-1450	774
440	.62019	-1379	2.4783	- 552	4.3327	- 968	6.1832	-1384	792
450	.60640	-1319	2.4231	- 528	4.2359	- 925	6.0448	-1323	810
460	.59321	-1263	2.3703	- 506	4.1434	- 885	5.9125	-1265	828
470	.58058	-1210	2.3197	- 484	4.0549	- 849	5.7860	-1212	846
480	.56848	-1161	2.2713	- 465	3.9700	- 813	5.6648	-1162	864
490	.55687	-1114	2.2248	- 446	3.8887	- 780	5.5486	-1115	882
500	.54573	-1071	2.1802	- 428	3.8107	- 749	5.4371	-1069	900
510	.53502	-1029	2.1374	- 411	3.7358	- 720	5.3302	-1029	918
520	.52473	- 991	2.0963	- 396	3.6638	- 693	5.2273	- 990	936
530	.51482	- 953	2.0567	- 382	3.5945	- 667	5.1283	- 952	954
540	.50529	- 919	2.0185	- 367	3.5278	- 643	5.0331	- 917	972
550	.49610	- 886	1.9818	- 354	3.4635	- 619	4.9414	- 884	990
560	.48724	- 855	1.9464	- 342	3.4016	- 597	4.8530	- 853	1008
570	.47869	- 825	1.9122	- 330	3.3419	- 577	4.7677	- 823	1026
580	.47044	- 798	1.8792	- 319	3.2842	- 557	4.6854	- 795	1044
590	.46246	- 771	1.8473	- 307	3.2285	- 538	4.6059	- 768	1062
600	.45475	- 745	1.8166	- 298	3.1747	- 521	4.5291	- 743	1080
610	.44730	- 722	1.7868	- 289	3.1226	- 504	4.4548	- 719	1098
620	.44008	- 698	1.7579	- 279	3.0722	- 488	4.3829	- 696	1116
630	.43310	- 677	1.7300	- 270	3.0234	- 472	4.3133	- 674	1134
640	.42633	- 656	1.7030	- 262	2.9762	- 458	4.2459	- 654	1152
650	.41977	- 636	1.6768	- 254	2.9304	- 444	4.1805	- 633	1170
660	.41341	- 617	1.6514	- 246	2.8860	- 431	4.1172	- 614	1188
670	.40724	- 599	1.6268	- 240	2.8429	- 418	4.0558	- 596	1206
680	.40125	- 581	1.6028	- 232	2.8011	- 405	3.9962	- 579	1224
690	.39544	- 565	1.5796	- 226	2.7606	- 395	3.9383	- 562	1242
700	.38979	- 549	1.5570	- 219	2.7211	- 383	3.8821	- 547	1260
710	.38430	- 534	1.5351	- 213	2.6828	- 372	3.8274	- 531	1278
720	.37896	- 519	1.5138	- 207	2.6456	- 362	3.7743	- 516	1296
730	.37377	- 505	1.4931	- 202	2.6094	- 352	3.7227	- 502	1314
740	.36872	- 491	1.4729	- 196	2.5742	- 343	3.6725	- 490	1332
750	.36381	- 479	1.4533	- 191	2.5399	- 334	3.6235	- 476	1350
760	.35902	- 466	1.4342	- 186	2.5065	- 325	3.5759	- 463	1368
770	.35436	- 455	1.4156	- 182	2.4740	- 317	3.5296	- 452	1386
780	.34981	- 443	1.3974	- 177	2.4423	- 309	3.4844	- 441	1404
790	.34538	- 431	1.3797	- 172	2.4114	- 301	3.4403	- 429	1422
800	.34107		1.3625		2.3813		3.3974		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	.34107	-2006	1.3625	- 801	2.3813	-1399	3.3974	-1995	1440
850	.32101	-1783	1.2824	- 712	2.2414	-1244	3.1979	-1773	1530
900	.30318	-1595	1.2112	- 637	2.1170	-1112	3.0206	-1586	1620
950	.28723	-1436	1.1475	- 573	2.0058	-1001	2.8620	-1428	1710
1000	.27287	-1299	1.0902	- 519	1.9057	- 906	2.7192	-1292	1800
1050	.25988	-1181	1.0383	- 471	1.8151	- 824	2.5900	-1174	1890
1100	.24807	-1078	.99119	- 4305	1.7327	- 752	2.4726	-1073	1980
1150	.23729	- 989	.94814	- 3947	1.6575	- 690	2.3653	- 983	2070
1200	.22740	- 909	.90867	- 3631	1.5885	- 634	2.2670	- 904	2160
1250	.21831	- 840	.87236	- 3352	1.5251	- 586	2.1766	- 835	2250
1300	.20991	- 777	.83884	- 3104	1.4665	- 542	2.0931	- 774	2340
1350	.20214	- 722	.80780	- 2882	1.4123	- 503	2.0157	- 718	2430
1400	.19492	- 672	.77898	- 2684	1.3620	- 469	1.9439	- 669	2520
1450	.18820	- 627	.75214	- 2505	1.3151	- 438	1.8770	- 624	2610
1500	.18193	- 587	.72709	- 2343	1.2713	- 409	1.8146	- 584	2700
1550	.17606	- 550	.70366	- 2197	1.2304	- 384	1.7562	- 547	2790
1600	.17056	- 516	.68169	- 2064	1.1920	- 361	1.7015	- 515	2880
1650	.16540	- 487	.66105	- 1942	1.1559	- 339	1.6500	- 484	2970
1700	.16053	- 458	.64163	- 1831	1.1220	- 320	1.6016	- 457	3060
1750	.15595	- 433	.62332	- 1731	1.0900	- 302	1.5559	- 431	3150
1800	.15162	- 410	.60601	- 1636	1.0598	- 286	1.5128	- 408	3240
1850	.14752	- 388	.58965	- 1550	1.0312	- 271	1.4720	- 386	3330
1900	.14364	- 369	.57415	- 1471	1.0041	- 257	1.4334	- 367	3420
1950	.13995	- 349	.55944	- 1398	.97835	- 2442	1.3967	- 348	3510
2000	.13646	- 333	.54546	- 1329	.95393	- 2323	1.3619	- 332	3600
2050	.13313	- 317	.53217	- 1266	.93070	- 2213	1.3287	- 316	3690
2100	.12996	- 302	.51951	- 1207	.90857	- 2110	1.2971	- 301	3780
2150	.12694	- 289	.50744	- 1153	.88747	- 2015	1.2670	- 287	3870
2200	.12405	- 275	.49591	- 1101	.86732	- 1925	1.2383	- 275	3960
2250	.12130	- 264	.48490	- 1053	.84807	- 1841	1.2108	- 263	4050
2300	.11866	- 252	.47437	- 1009	.82966	- 1763	1.1845	- 251	4140
2350	.11614	- 242	.46428	- 966	.81203	- 1689	1.1594	- 241	4230
2400	.11372	- 232	.45462	- 927	.79514	- 1620	1.1353	- 231	4320
2450	.11140	- 223	.44535	- 890	.77894	- 1557	1.1122	- 222	4410
2500	.10917	- 214	.43645	- 856	.76337	- 1494	1.0900	- 214	4500
2550	.10703	- 206	.42789	- 822	.74843	- 1438	1.0686	- 205	4590
2600	.10497	- 198	.41967	- 791	.73405	- 1384	1.0481	- 197	4680
2650	.10299	- 190	.41176	- 762	.72021	- 1332	1.0284	- 191	4770
2700	.10109	- 185	.40414	- 734	.70689	- 1283	1.0093	- 183	4860
2750	.09924	- 177	.39680	- 709	.69406	- 1238	.9910	- 176	4950
2800	.09747	- 171	.38971	- 683	.68168	- 1195	.9734	- 171	5040
2850	.09576	- 165	.38288	- 659	.66973	- 1153	.9563	- 164	5130
2900	.09411	- 159	.37629	- 638	.65820	- 1115	.9399	- 160	5220
2950	.09252	- 155	.36991	- 616	.64705	- 1077	.9239	- 153	5310
3000	.09097		.36375		.63628		.9086		5400

Table 5-2. DENSITY OF CARBON MONOXIDE - Cont. ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
250	11.03	-44	45.34	-207					450
260	10.59	-41	43.27	-187					468
270	10.18	-38	41.40	-169					486
280	9.803	-349	39.71	-155	69.95	-293	99.97	- 442	504
290	9.454	-326	38.16	-142	67.02	-266	95.55	- 396	522
300	9.128	-303	36.74	-131	64.36	-242	91.59	- 360	540
310	8.825	-283	35.43	-121	61.94	-223	87.99	- 329	558
320	8.542	-264	34.22	-113	59.71	-205	84.70	- 300	576
330	8.278	-249	33.09	-104	57.66	-190	81.70	- 278	594
340	8.029	-234	32.05	- 98	55.76	-177	78.92	- 258	612
350	7.795	-220	31.07	- 92	53.99	-165	76.34	- 238	630
360	7.575	-208	30.15	- 86	52.34	-154	73.96	- 222	648
370	7.367	-196	29.29	- 81	50.80	-144	71.74	- 208	666
380	7.171	-186	28.48	- 77	49.36	-136	69.66	- 196	684
390	6.985	-177	27.71	- 72	48.00	-128	67.70	- 182	702
400	6.808	-168	26.99	- 68	46.72	-121	65.88	- 173	720
410	6.640	-160	26.31	- 65	45.51	-114	64.15	- 163	738
420	6.480	-152	25.66	- 62	44.37	-108	62.52	- 154	756
430	6.328	-144	25.04	- 58	43.29	-102	60.98	- 146	774
440	6.184	-139	24.46	- 56	42.27	- 98	59.52	- 138	792
450	6.045	-133	23.90	- 53	41.29	- 93	58.14	- 131	810
460	5.912	-126	23.37	- 51	40.36	- 88	56.83	- 126	828
470	5.786	-121	22.86	- 48	39.48	- 85	55.57	- 119	846
480	5.665	-116	22.38	- 47	38.63	- 81	54.38	- 114	864
490	5.549	-112	21.91	- 44	37.82	- 77	53.24	- 109	882
500	5.437	-107	21.47	- 43	37.05	- 74	52.15	- 104	900
510	5.330	-102	21.04	- 41	36.31	- 71	51.11	- 101	918
520	5.228	-100	20.63	- 39	35.60	- 68	50.10	- 95	936
530	5.128	- 95	20.24	- 38	34.92	- 65	49.15	- 92	954
540	5.033	- 92	19.86	- 36	34.27	- 63	48.23	- 89	972
550	4.941	- 88	19.50	- 35	33.64	- 61	47.34	- 85	990
560	4.853	- 85	19.15	- 34	33.03	- 58	46.49	- 82	1008
570	4.768	- 83	18.81	- 33	32.45	- 56	45.67	- 78	1026
580	4.685	- 79	18.48	- 31	31.89	- 54	44.89	- 76	1044
590	4.606	- 77	18.17	- 30	31.35	- 53	44.13	- 74	1062
600	4.529	- 74	17.87	- 30	30.82	- 50	43.39	- 71	1080
610	4.455	- 72	17.57	- 28	30.32	- 49	42.68	- 68	1098
620	4.383	- 69	17.29	- 27	29.83	- 47	42.00	- 66	1116
630	4.314	- 68	17.02	- 27	29.36	- 46	41.34	- 65	1134
640	4.246	- 65	16.75	- 26	28.90	- 44	40.69	- 61	1152
650	4.181	- 64	16.49	- 25	28.46	- 43	40.08	- 60	1170
660	4.117	- 61	16.24	- 24	28.03	- 42	39.48	- 59	1188
670	4.056	- 60	16.00	- 23	27.61	- 40	38.89	- 56	1206
680	3.996	- 58	15.77	- 23	27.21	- 39	38.33	- 55	1224
690	3.938	- 56	15.54	- 22	26.82	- 38	37.78	- 53	1242
700	3.882	- 55	15.32	- 22	26.44	- 37	37.25	- 52	1260
710	3.827	- 53	15.10	- 21	26.07	- 36	36.73	- 50	1278
720	3.774	- 51	14.89	- 20	25.71	- 35	36.23	- 49	1296
730	3.723	- 51	14.69	- 20	25.36	- 34	35.74	- 47	1314
740	3.672	- 48	14.49	- 19	25.02	- 33	35.27	- 47	1332
750	3.624	- 48	14.30	- 19	24.69	- 32	34.80	- 45	1350
760	3.576	- 46	14.11	- 18	24.37	- 31	34.35	- 44	1368
770	3.530	- 46	13.93	- 17	24.06	- 30	33.91	- 42	1386
780	3.484	- 44	13.76	- 18	23.76	- 30	33.49	- 42	1404
790	3.440	- 42	13.58	- 17	23.46	- 29	33.07	- 40	1422
800	3.398	-200	13.41	- 78	23.17	-134	32.67	- 188	1440
850	3.198	-177	12.63	- 70	21.83	-120	30.79	- 168	1530
900	3.021	-159	11.93	- 62	20.63	-107	29.11	- 149	1620
950	2.862	-143	11.31	- 56	19.56	- 96	27.62	- 135	1710
1000	2.719	-129	10.75	- 51	18.60	- 87	26.27	- 122	1800
1050	2.590		10.24		17.73		25.05		1890

ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
1050	2.590	-117	10.24	- 46	17.73	- 79	25.05	- 111	1890
1100	2.473	-108	9.783	- 421	16.94	- 73	23.94	- 101	1980
1150	2.365	- 98	9.362	- 386	16.21	- 66	22.93	- 94	2070
1200	2.267	- 90	8.976	- 355	15.55	- 61	21.99	- 85	2160
1250	2.177	- 84	8.621	- 329	14.94	- 57	21.14	- 80	2250
1300	2.093	- 77	8.292	- 304	14.37	- 52	20.34	- 73	2340
1350	2.016	- 72	7.988	- 282	13.85	- 48	19.61	- 69	2430
1400	1.944	- 67	7.706	- 264	13.37	- 46	18.92	- 63	2520
1450	1.877	- 62	7.442	- 245	12.91	- 42	18.29	- 60	2610
1500	1.815	- 59	7.197	- 230	12.49	- 40	17.69	- 56	2700
1550	1.756	- 55	6.967	- 216	12.09	- 37	17.13	- 52	2790
1600	1.701	- 51	6.751	- 203	11.72	- 35	16.61	- 49	2880
1650	1.650	- 48	6.548	- 191	11.37	- 33	16.12	- 46	2970
1700	1.602	- 46	6.357	- 179	11.04	- 31	15.66	- 44	3060
1750	1.556	- 43	6.178	- 171	10.73	- 29	15.22	- 42	3150
1800	1.513	- 41	6.007	- 160	10.44	- 28	14.80	- 39	3240
1850	1.472	- 39	5.847	- 153	10.16	- 26	14.41	- 37	3330
1900	1.433	- 36	5.694	- 144	9.897	- 250	14.04	- 35	3420
1950	1.397	- 35	5.550	- 138	9.647	- 239	13.69	- 34	3510
2000	1.362	- 33	5.412	- 131	9.408	- 226	13.35	- 32	3600
2050	1.329	- 32	5.281	- 125	9.182	- 216	13.03	- 30	3690
2100	1.297	- 30	5.156	- 119	8.966	- 205	12.73	- 29	3780
2150	1.267	- 29	5.037	- 114	8.761	- 196	12.44	- 28	3870
2200	1.238	- 27	4.923	- 108	8.565	- 188	12.16	- 26	3960
2250	1.211	- 26	4.815	- 104	8.377	- 180	11.90	- 26	4050
2300	1.185	- 26	4.711	- 100	8.197	- 172	11.64	- 24	4140
2350	1.159	- 24	4.611	- 95	8.025	- 165	11.40	- 23	4230
2400	1.135	- 23	4.516	- 92	7.860	- 159	11.17	- 23	4320
2450	1.112	- 22	4.424	- 87	7.701	- 151	10.94	- 21	4410
2500	1.090	- 21	4.337	- 85	7.550	- 147	10.73	- 21	4500
2550	1.069	- 21	4.252	- 81	7.403	- 141	10.52	- 20	4590
2600	1.048	- 20	4.171	- 78	7.262	- 135	10.32	- 19	4680
2650	1.028	- 19	4.093	- 75	7.127	- 130	10.13	- 18	4770
2700	1.009	- 18	4.018	- 73	6.997	- 126	9.946	- 178	4860
2750	.9910	- 177	3.945	- 70	6.871	- 122	9.768	- 172	4950
2800	.9733	- 170	3.875	- 67	6.749	- 117	9.596	- 165	5040
2850	.9563	- 164	3.808	- 66	6.632	- 113	9.431	- 160	5130
2900	.9399	- 160	3.742	- 63	6.519	- 109	9.271	- 154	5220
2950	.9239	- 153	3.679	- 61	6.410	- 106	9.117	- 151	5310
3000	.9086		3.618		6.304		8.966		5400

°K	.01 atm		.1 atm		1 atm		10 atm		°R
200	3.501		3.503	- 1	3.517	- 1	3.665	-20	360
210	3.501		3.502		3.516	- 2	3.645	-16	378
220	3.501		3.502		3.514	- 1	3.629	-14	396
230	3.501	1	3.502	1	3.513		3.615	-10	414
240	3.502		3.503		3.513	- 1	3.605	- 9	432
250	3.502		3.503		3.512	- 1	3.596	- 9	450
260	3.502	1	3.503	1	3.511		3.587	- 6	468
270	3.503		3.504		3.511	- 1	3.581	- 6	486
280	3.503	1	3.504	1	3.510	1	3.575	- 5	504
290	3.504	1	3.505	1	3.511		3.570	- 3	522
300	3.505	1	3.506	1	3.511	1	3.567	- 4	540
310	3.506	2	3.507	2	3.512	1	3.563	- 2	558
320	3.508	1	3.509	1	3.513	1	3.561	- 3	576
330	3.509	2	3.510	1	3.514	2	3.558	- 1	594
340	3.511	2	3.511	2	3.516	1	3.557		612
350	3.513	3	3.513	3	3.517	3	3.557		630
360	3.516	3	3.516	3	3.520	3	3.557	1	648
370	3.519	3	3.519	3	3.523	3	3.558	1	666
380	3.522	3	3.522	3	3.526	2	3.559	1	684
390	3.525	4	3.525	4	3.528	4	3.560	2	702
400	3.529	4	3.529	4	3.532	4	3.562	2	720
410	3.533	4	3.533	4	3.536	4	3.564	2	738
420	3.537	5	3.537	5	3.540	5	3.566	4	756
430	3.542	5	3.542	5	3.545	5	3.570	3	774
440	3.547	5	3.547	5	3.550	4	3.573	4	792
450	3.552	6	3.552	6	3.554	6	3.577	5	810
460	3.558	6	3.558	6	3.560	6	3.582	4	828
470	3.564	6	3.564	6	3.566	6	3.586	5	846
480	3.570	7	3.570	7	3.572	7	3.591	6	864
490	3.577	6	3.577	6	3.579	6	3.597	6	882
500	3.583	7	3.583	7	3.585	7	3.603	6	900
510	3.590	7	3.590	7	3.592	7	3.609	6	918
520	3.597	8	3.597	8	3.599	8	3.615	7	936
530	3.605	7	3.605	7	3.607	7	3.622	6	954
540	3.612	8	3.612	8	3.614	8	3.628	8	972
550	3.620	8	3.620	8	3.622	8	3.636	7	990
560	3.628	8	3.628	8	3.630	7	3.643	8	1008
570	3.636	8	3.636	8	3.637	8	3.651	7	1026
580	3.644	9	3.644	9	3.645	9	3.658	8	1044
590	3.653	8	3.653	8	3.654	8	3.666	8	1062
600	3.661	9	3.661	9	3.662	9	3.674	8	1080
610	3.670	8	3.670	8	3.671	8	3.682	8	1098
620	3.678	9	3.678	9	3.679	9	3.690	9	1116
630	3.687	9	3.687	9	3.688	9	3.699	8	1134
640	3.696	9	3.696	9	3.697	9	3.707	9	1152
650	3.705	9	3.705	9	3.706	9	3.716	8	1170
660	3.714	8	3.714	8	3.715	8	3.724	8	1188
670	3.722	9	3.722	9	3.723	9	3.732	9	1206
680	3.731	9	3.731	9	3.732	9	3.741	8	1224
690	3.740	9	3.740	9	3.741	9	3.749	9	1242
700	3.749	9	3.749	9	3.750	9	3.758	9	1260
710	3.758	9	3.758	9	3.759	9	3.767	9	1278
720	3.767	9	3.767	9	3.768	9	3.776	8	1296
730	3.776	9	3.776	9	3.777	9	3.784	9	1314
740	3.785	9	3.785	9	3.786	9	3.793	9	1332
750	3.794	8	3.794	8	3.795	8	3.802	8	1350
760	3.802	9	3.802	9	3.803	9	3.810	8	1368
770	3.811	9	3.811	9	3.812	9	3.818	9	1386
780	3.820	8	3.820	8	3.821	8	3.827	8	1404
790	3.828	9	3.828	9	3.829	9	3.835	9	1422
800	3.837		3.837		3.838		3.844		1440

At higher temperatures in the .01, .1, and 1 atmosphere range, the values of the specific heat are equal to the value for the ideal gas (see table 5-12). In the 10 atmosphere range, values at higher temperatures may be found on page 227.

°K	10 atm		40 atm		70 atm		100 atm		°R
250	3.596	- 9	3.855	-32					450
260	3.587	- 6	3.823	-27					468
270	3.581	- 6	3.796	-23	3.984	-39			486
280	3.575	- 5	3.773	-20	3.945	-32	4.091	-42	504
290	3.570	- 3	3.753	-17	3.913	-26	4.049	-33	522
300	3.567	- 4	3.736	-14	3.887	-25	4.016	-30	540
310	3.563	- 2	3.722	-12	3.862	-19	3.986	-26	558
320	3.561	- 3	3.710	-12	3.843	-19	3.960	-23	576
330	3.558	- 1	3.698	- 9	3.824	-16	3.937	-21	594
340	3.557		3.689	- 9	3.808	-14	3.916	-19	612
350	3.557		3.680	- 7	3.794	-12	3.897	-16	630
360	3.557	1	3.673	- 6	3.782	-11	3.881	-15	648
370	3.558	1	3.667	- 5	3.771	-11	3.866	-15	666
380	3.559	1	3.662	- 5	3.760	- 9	3.851	-13	684
390	3.560	2	3.657	- 2	3.751	- 8	3.838	-11	702
400	3.562	2	3.655	- 3	3.743	- 7	3.827	-11	720
410	3.564	2	3.652	- 2	3.736	- 7	3.816	-10	738
420	3.566	4	3.650	- 1	3.729	- 5	3.806	- 8	756
430	3.570	3	3.649	- 1	3.724	- 3	3.798	- 9	774
440	3.573	4	3.648	1	3.721	- 4	3.789	- 6	792
450	3.577	5	3.649	1	3.717	- 2	3.783	- 6	810
460	3.582	4	3.650	1	3.715	- 1	3.777	- 5	828
470	3.586	5	3.651	2	3.714	- 2	3.772	- 3	846
480	3.591	6	3.653	3	3.712	1	3.769	- 3	864
490	3.597	6	3.656	3	3.713		3.766	- 3	882
500	3.603	6	3.659	4	3.713	1	3.763	- 2	900
510	3.609	6	3.663	4	3.714	1	3.761	1	918
520	3.615	7	3.667	5	3.715	3	3.762	1	936
530	3.622	6	3.672	4	3.718	3	3.763	1	954
540	3.628	8	3.676	5	3.721	3	3.764	1	972
550	3.636	7	3.681	6	3.724	4	3.765	2	990
560	3.643	8	3.687	6	3.728	4	3.767	3	1008
570	3.651	7	3.693	5	3.732	5	3.770	3	1026
580	3.658	8	3.698	7	3.737	5	3.773	4	1044
590	3.666	8	3.705	6	3.742	5	3.777	3	1062
600	3.674	8	3.711	7	3.747	5	3.780	4	1080
610	3.682	8	3.718	7	3.752	6	3.784	4	1098
620	3.690	9	3.725	7	3.758	6	3.788	5	1116
630	3.699	8	3.732	8	3.764	6	3.793	6	1134
640	3.707	9	3.740	7	3.770	7	3.799	5	1152
650	3.716	8	3.747	8	3.777	6	3.804	6	1170
660	3.724	8	3.755	6	3.783	6	3.810	5	1188
670	3.732	9	3.761	8	3.789	7	3.815	6	1206
680	3.741	8	3.769	8	3.796	6	3.821	6	1224
690	3.749	9	3.777	8	3.802	8	3.827	6	1242
700	3.758	9	3.785	7	3.810	7	3.833	6	1260
710	3.767	9	3.792	8	3.817	7	3.839	7	1278
720	3.776	8	3.800	8	3.824	7	3.846	6	1296
730	3.784	9	3.808	8	3.831	7	3.852	7	1314
740	3.793	9	3.816	8	3.838	8	3.859	7	1332
750	3.802	8	3.824	8	3.846	6	3.866	6	1350
760	3.810	8	3.832	8	3.852	8	3.872	7	1368
770	3.818	9	3.840	8	3.860	7	3.879	7	1386
780	3.827	8	3.848	7	3.867	7	3.886	6	1404
790	3.835	9	3.855	8	3.874	8	3.892	7	1422
800	3.844		3.863		3.882		3.899		1440

°K	10 atm		40 atm		70 atm		100 atm		°R
800	3.844	40	3.863	38	3.882	35	3.899	33	1440
850	3.884	39	3.901	37	3.917	35	3.932	34	1530
900	3.923	38	3.938	36	3.952	34	3.966	32	1620
950	3.961	34	3.974	33	3.986	32	3.998	31	1710
1000	3.995	33	4.007	31	4.018	31	4.029	29	1800
1050	4.028	29	4.038	29	4.049	27	4.058	26	1890
1100	4.057	29	4.067	27	4.076	27	4.084	26	1980
1150	4.086	27	4.094	26	4.103	25	4.110	25	2070
1200	4.113	24	4.120	24	4.128	23	4.135	23	2160
1250	4.137	23	4.144	23	4.151	22	4.158	21	2250
1300	4.160	21	4.167	20	4.173	19	4.179	19	2340
1350	4.181	20	4.187	19	4.192	19	4.198	18	2430
1400	4.201	19	4.206	19	4.211	18	4.216	18	2520
1450	4.220	18	4.225	17	4.229	18	4.234	17	2610
1500	4.238	15	4.242	16	4.247	15	4.251	15	2700
1550	4.253	15	4.258	14	4.262	14	4.266	14	2790
1600	4.268	14	4.272	14	4.276	13	4.280	13	2880
1650	4.282	13	4.286	12	4.289	13	4.293	12	2970
1700	4.295	13	4.298	13	4.302	12	4.305	12	3060
1750	4.308	12	4.311	12	4.314	12	4.317	11	3150
1800	4.320	11	4.323	11	4.326	10	4.328	11	3240
1850	4.331	10	4.334	9	4.336	10	4.339	9	3330
1900	4.341	10	4.343	10	4.346	9	4.348	10	3420
1950	4.351	9	4.353	9	4.355	9	4.358	8	3510
2000	4.360	9	4.362	9	4.364	9	4.366	9	3600
2050	4.369	8	4.371	8	4.373	7	4.375	7	3690
2100	4.377	8	4.379	7	4.380	8	4.382	8	3780
2150	4.385	7	4.386	7	4.388	7	4.390	6	3870
2200	4.392	7	4.393	7	4.395	7	4.396	7	3960
2250	4.399	6	4.400	7	4.402	6	4.403	7	4050
2300	4.405	7	4.407	7	4.408	7	4.410	6	4140
2350	4.412	6	4.414	6	4.415	6	4.416	6	4230
2400	4.418	6	4.420	6	4.421	6	4.422	6	4320
2450	4.424	5	4.426	5	4.427	5	4.428	5	4410
2500	4.429	6	4.431	5	4.432	5	4.433	6	4500
2550	4.435	5	4.436	5	4.437	5	4.439	4	4590
2600	4.440	5	4.441	5	4.442	5	4.443	5	4680
2650	4.445	5	4.446	5	4.447	5	4.448	5	4770
2700	4.450	5	4.451	5	4.452	5	4.453	5	4860
2750	4.455	5	4.456	5	4.457	5	4.458	5	4950
2800	4.460	4	4.461	4	4.462	4	4.463	3	5040
2850	4.464	4	4.465	4	4.466	4	4.466	4	5130
2900	4.468	4	4.469	4	4.470	4	4.470	4	5220
2950	4.472	4	4.473	4	4.474	3	4.474	4	5310
3000	4.476		4.477		4.477		4.478		5400

Table 5-4. ENTHALPY OF CARBON MONOXIDE* $(H-E_0^o)/RT_0$

°K	.01 atm		.1 atm		1 atm		10 atm		°R
200	2.5595	1281	2.5589	1281	2.5525	1287	2.4886	1340	360
210	2.6876	1282	2.6870	1283	2.6812	1287	2.6226	1333	378
220	2.8158	1282	2.8153	1282	2.8099	1286	2.7559	1328	396
230	2.9440	1282	2.9435	1283	2.9385	1286	2.8887	1324	414
240	3.0722	1283	3.0718	1282	3.0671	1286	3.0211	1319	432
250	3.2005	1282	3.2000	1283	3.1957	1285	3.1530	1315	450
260	3.3287	1282	3.3283	1282	3.3242	1286	3.2845	1313	468
270	3.4569	1282	3.4565	1282	3.4528	1284	3.4158	1310	486
280	3.5851	1283	3.5847	1283	3.5812	1286	3.5468	1309	504
290	3.7134	1283	3.7130	1284	3.7098	1285	3.6777	1307	522
300	3.8417	1283	3.8414	1283	3.8383	1285	3.8084	1304	540
310	3.9700	1284	3.9697	1284	3.9668	1287	3.9388	1305	558
320	4.0984	1284	4.0981	1284	4.0955	1285	4.0693	1303	576
330	4.2268	1285	4.2265	1285	4.2240	1287	4.1996	1302	594
340	4.3553	1286	4.3550	1287	4.3527	1288	4.3298	1303	612
350	4.4839	1287	4.4837	1287	4.4815	1288	4.4601	1302	630
360	4.6126	1287	4.6124	1287	4.6103	1289	4.5903	1302	648
370	4.7413	1289	4.7411	1289	4.7392	1290	4.7205	1302	666
380	4.8702	1290	4.8700	1290	4.8682	1292	4.8507	1303	684
390	4.9992	1291	4.9990	1291	4.9974	1292	4.9810	1303	702
400	5.1283	1293	5.1281	1293	5.1266	1294	5.1113	1305	720
410	5.2576	1294	5.2574	1295	5.2560	1295	5.2418	1305	738
420	5.3870	1296	5.3869	1296	5.3855	1297	5.3723	1306	756
430	5.5166	1297	5.5165	1297	5.5152	1298	5.5029	1307	774
440	5.6463	1300	5.6462	1300	5.6450	1301	5.6336	1309	792
450	5.7763	1301	5.7762	1301	5.7751	1302	5.7645	1310	810
460	5.9064	1304	5.9063	1304	5.9053	1305	5.8955	1312	828
470	6.0368	1306	6.0367	1306	6.0358	1307	6.0267	1314	846
480	6.1674	1308	6.1673	1308	6.1665	1308	6.1581	1316	864
490	6.2982	1310	6.2981	1310	6.2973	1311	6.2897	1317	882
500	6.4292	1314	6.4291	1314	6.4284	1315	6.4214	1321	900
510	6.5606	1315	6.5605	1315	6.5599	1315	6.5535	1322	918
520	6.6921	1319	6.6920	1319	6.6914	1320	6.6857	1325	936
530	6.8240	1321	6.8239	1321	6.8234	1322	6.8182	1328	954
540	6.9561	1323	6.9560	1324	6.9556	1323	6.9510	1328	972
550	7.0884	1327	7.0884	1327	7.0879	1328	7.0838	1333	990
560	7.2211	1330	7.2211	1330	7.2207	1330	7.2171	1335	1008
570	7.3541	1333	7.3541	1333	7.3537	1334	7.3506	1338	1026
580	7.4874	1335	7.4874	1335	7.4871	1335	7.4844	1341	1044
590	7.6209	1339	7.6209	1339	7.6206	1340	7.6185	1343	1062
600	7.7548	1342	7.7548	1342	7.7546	1342	7.7528	1347	1080
610	7.8890	1345	7.8890	1345	7.8888	1346	7.8875	1349	1098
620	8.0235	1348	8.0235	1348	8.0234	1348	8.0224	1353	1116
630	8.1583	1352	8.1583	1352	8.1582	1353	8.1577	1356	1134
640	8.2935	1355	8.2935	1355	8.2935	1355	8.2933	1359	1152
650	8.4290	1357	8.4290	1357	8.4290	1357	8.4292	1361	1170
660	8.5647	1361	8.5647	1361	8.5647	1362	8.5653	1365	1188
670	8.7008	1365	8.7008	1365	8.7009	1365	8.7018	1368	1206
680	8.8373	1368	8.8373	1368	8.8374	1369	8.8386	1372	1224
690	8.9741	1371	8.9741	1371	8.9743	1371	8.9758	1374	1242
700	9.1112	1373	9.1112	1373	9.1114	1373	9.1132	1376	1260
710	9.2485	1378	9.2485	1378	9.2487	1379	9.2508	1382	1278
720	9.3863	1381	9.3863	1381	9.3866	1381	9.3890	1384	1296
730	9.5244	1384	9.5244	1384	9.5247	1384	9.5274	1387	1314
740	9.6628	1387	9.6628	1387	9.6631	1387	9.6661	1390	1332
750	9.8015	1390	9.8015	1390	9.8018	1391	9.8051	1392	1350
760	9.9405	139	9.9405	139	9.9409	139	9.9443	140	1368
770	10.080	140	10.080	140	10.080	140	10.084	140	1386
780	10.220	140	10.220	140	10.220	140	10.224	141	1404
790	10.360	140	10.360	140	10.360	140	10.365	140	1422
800	10.500		10.500		10.500		10.505		1440

At higher temperatures in the .01, .1, and 1 atmosphere pressure range, the values for the enthalpy are equal to that for the ideal gas (see table 5-12). In the 10 atmosphere range, values at higher temperatures may be found on page 230.

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	10 atm		40 atm		70 atm		100 atm		°R
250	3.1530	1315	3.0145	1420					450
260	3.2845	1313	3.1565	1407					468
270	3.4158	1310	3.2972	1395	3.1857	1480			486
280	3.5468	1309	3.4367	1386	3.3337	1462	3.2379	1538	504
290	3.6777	1307	3.5753	1377	3.4799	1447	3.3917	1514	522
300	3.8084	1304	3.7130	1369	3.6246	1430	3.5431	1491	540
310	3.9388	1305	3.8499	1364	3.7676	1422	3.6922	1477	558
320	4.0693	1303	3.9863	1358	3.9098	1411	3.8399	1461	576
330	4.1996	1302	4.1221	1353	4.0509	1402	3.9860	1448	594
340	4.3298	1303	4.2574	1351	4.1911	1396	4.1308	1439	612
350	4.4601	1302	4.3925	1347	4.3307	1390	4.2747	1430	630
360	4.5903	1302	4.5272	1343	4.4697	1382	4.4177	1419	648
370	4.7205	1302	4.6615	1342	4.6079	1380	4.5596	1415	666
380	4.8507	1303	4.7957	1341	4.7459	1376	4.7011	1410	684
390	4.9810	1303	4.9298	1337	4.8835	1370	4.8421	1401	702
400	5.1113	1305	5.0635	1339	5.0205	1370	4.9822	1400	720
410	5.2418	1305	5.1974	1335	5.1575	1365	5.1222	1393	738
420	5.3723	1306	5.3309	1337	5.2940	1365	5.2615	1392	756
430	5.5029	1307	5.4646	1335	5.4305	1363	5.4007	1389	774
440	5.6336	1309	5.5981	1336	5.5668	1361	5.5396	1385	792
450	5.7645	1310	5.7317	1336	5.7029	1361	5.6781	1385	810
460	5.8955	1312	5.8653	1337	5.8390	1360	5.8166	1382	828
470	6.0267	1314	5.9990	1337	5.9750	1360	5.9548	1381	846
480	6.1581	1316	6.1327	1338	6.1110	1359	6.0929	1380	864
490	6.2897	1317	6.2665	1339	6.2469	1359	6.2309	1378	882
500	6.4214	1321	6.4004	1341	6.3828	1360	6.3687	1378	900
510	6.5535	1322	6.5345	1341	6.5188	1359	6.5065	1377	918
520	6.6857	1325	6.6686	1344	6.6547	1363	6.6442	1379	936
530	6.8182	1328	6.8030	1346	6.7910	1362	6.7821	1378	954
540	6.9510	1328	6.9376	1345	6.9272	1362	6.9199	1377	972
550	7.0838	1333	7.0721	1349	7.0634	1363	7.0576	1377	990
560	7.2171	1335	7.2070	1350	7.1997	1365	7.1953	1378	1008
570	7.3506	1338	7.3420	1354	7.3362	1368	7.3331	1381	1026
580	7.4844	1341	7.4774	1354	7.4730	1368	7.4712	1382	1044
590	7.6185	1343	7.6128	1358	7.6098	1371	7.6094	1383	1062
600	7.7528	1347	7.7486	1360	7.7469	1373	7.7477	1385	1080
610	7.8875	1349	7.8846	1362	7.8842	1374	7.8862	1384	1098
620	8.0224	1353	8.0208	1365	8.0216	1376	8.0246	1388	1116
630	8.1577	1356	8.1573	1368	8.1592	1380	8.1634	1390	1134
640	8.2933	1359	8.2941	1371	8.2972	1381	8.3024	1392	1152
650	8.4292	1361	8.4312	1372	8.4353	1383	8.4416	1392	1170
660	8.5653	1365	8.5684	1376	8.5736	1386	8.5808	1396	1188
670	8.7018	1368	8.7060	1379	8.7122	1388	8.7204	1397	1206
680	8.8386	1372	8.8439	1381	8.8510	1391	8.8601	1400	1224
690	8.9758	1374	8.9820	1384	8.9901	1393	9.0001	1402	1242
700	9.1132	1376	9.1204	1386	9.1294	1396	9.1403	1403	1260
710	9.2508	1382	9.2590	1391	9.2690	1399	9.2806	1408	1278
720	9.3890	1384	9.3981	1393	9.4089	1401	9.4214	1409	1296
730	9.5274	1387	9.5374	1395	9.5490	1404	9.5623	1411	1314
740	9.6661	1390	9.6769	1399	9.6894	1406	9.7034	1414	1332
750	9.8051	1392	9.8168	1400	9.8300	1408	9.8448	1415	1350
760	9.9443	140	9.9568	140	9.9708	141	9.9863	142	1368
770	10.084	140	10.097	141	10.112	142	10.128	143	1386
780	10.224	141	10.238	141	10.254	142	10.271	142	1404
790	10.365	140	10.379	141	10.396	141	10.413	142	1422
800	10.505		10.520		10.537		10.555		1440

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 5-4. ENTHALPY OF CARBON MONOXIDE - Cont.* $(H-E^o_0)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
800	10.505	707	10.520	711	10.537	714	10.555	717	1440
850	11.212	715	11.231	718	11.251	721	11.272	723	1530
900	11.927	721	11.949	723	11.972	725	11.995	728	1620
950	12.648	729	12.672	731	12.697	734	12.723	736	1710
1000	13.377	733	13.403	736	13.431	737	13.459	739	1800
1050	14.110	740	14.139	742	14.168	744	14.198	745	1890
1100	14.850	746	14.881	747	14.912	748	14.943	750	1980
1150	15.596	750	15.628	752	15.660	754	15.693	755	2070
1200	16.346	756	16.380	757	16.414	758	16.448	759	2160
1250	17.102	759	17.137	760	17.172	762	17.207	763	2250
1300	17.861	763	17.897	765	17.934	765	17.970	767	2340
1350	18.624	768	18.662	768	18.699	770	18.737	770	2430
1400	19.392	770	19.430	771	19.469	772	19.507	773	2520
1450	20.162	775	20.201	775	20.241	776	20.280	777	2610
1500	20.937	776	20.976	778	21.017	778	21.057	779	2700
1550	21.713	780	21.754	781	21.795	781	21.836	782	2790
1600	22.493	782	22.535	782	22.576	784	22.618	784	2880
1650	23.275	785	23.317	786	23.360	786	23.402	787	2970
1700	24.060	788	24.103	788	24.146	789	24.189	789	3060
1750	24.848	790	24.891	791	24.935	791	24.978	792	3150
1800	25.638	792	25.682	792	25.726	793	25.770	794	3240
1850	26.430	793	26.474	794	26.519	794	26.564	794	3330
1900	27.223	795	27.268	796	27.313	796	27.358	797	3420
1950	28.018	797	28.064	797	28.109	798	28.155	798	3510
2000	28.815	799	28.861	800	28.907	800	28.953	800	3600
2050	29.614	801	29.661	800	29.707	801	29.753	801	3690
2100	30.415	802	30.461	803	30.508	803	30.554	803	3780
2150	31.217	803	31.264	803	31.311	803	31.357	804	3870
2200	32.020	805	32.067	805	32.114	806	32.161	806	3960
2250	32.825	805	32.872	806	32.920	806	32.967	806	4050
2300	33.630	807	33.678	807	33.726	807	33.773	808	4140
2350	34.437	809	34.485	809	34.533	810	34.581	810	4230
2400	35.246	809	35.294	810	35.343	809	35.391	810	4320
2450	36.055	810	36.104	810	36.152	811	36.201	810	4410
2500	36.865	811	36.914	811	36.963	811	37.011	812	4500
2550	37.676	812	37.725	813	37.774	813	37.823	813	4590
2600	38.488	814	38.538	814	38.587	814	38.636	814	4680
2650	39.302	815	39.352	814	39.401	814	39.450	815	4770
2700	40.117	815	40.166	815	40.215	816	40.265	815	4860
2750	40.932	817	40.981	817	41.031	816	41.080	816	4950
2800	41.749	817	41.798	817	41.847	816	41.896	816	5040
2850	42.566	818	42.615	817	42.663	816	42.712	816	5130
2900	43.384	818	43.432	817	43.479	818	43.528	816	5220
2950	44.202	819	44.249	819	44.297	818	44.344	818	5310
3000	45.021		45.068		45.115		45.162		5400

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
200	26.967	170	24.665	170	23.275	171	22.714	171	360
210	27.137	163	24.835	163	23.446	163	22.885	163	378
220	27.300	156	24.998	156	23.609	156	23.048	156	396
230	27.456	149	25.154	149	23.765	149	23.204	150	414
240	27.605	143	25.303	143	23.914	143	23.354	143	432
250	27.748	137	25.446	137	24.057	138	23.497	137	450
260	27.885	132	25.583	132	24.195	132	23.634	133	468
270	28.017	128	25.715	128	24.327	128	23.767	128	486
280	28.145	123	25.843	123	24.455	123	23.895	123	504
290	28.268	119	25.966	119	24.578	119	24.018	119	522
300	28.387	115	26.085	115	24.697	115	24.137	115	540
310	28.502	111	26.200	111	24.812	111	24.252	111	558
320	28.613	108	26.311	108	24.923	108	24.363	108	576
330	28.721	105	26.419	105	25.031	105	24.471	106	594
340	28.826	101	26.524	101	25.136	101	24.577	101	612
350	28.927	99	26.625	99	25.237	99	24.678	99	630
360	29.026	97	26.724	97	25.336	97	24.777	97	648
370	29.123	94	26.821	94	25.433	94	24.874	94	666
380	29.217	91	26.915	91	25.527	91	24.968	91	684
390	29.308	89	27.006	89	25.618	89	25.059	89	702
400	29.397	88	27.095	88	25.707	88	25.148	88	720
410	29.485	85	27.183	85	25.795	85	25.236	85	738
420	29.570	83	27.268	83	25.880	84	25.321	83	756
430	29.653	82	27.351	82	25.964	82	25.404	82	774
440	29.735	79	27.433	79	26.046	79	25.486	79	792
450	29.814	79	27.512	79	26.125	79	25.565	79	810
460	29.893	76	27.591	76	26.204	76	25.644	76	828
470	29.969	75	27.667	75	26.280	75	25.720	75	846
480	30.044	73	27.742	73	26.355	73	25.795	73	864
490	30.117	73	27.815	73	26.428	73	25.868	73	882
500	30.190	71	27.888	71	26.501	71	25.941	71	900
510	30.261	71	27.959	71	26.572	71	26.012	71	918
520	30.332	68	28.030	68	26.643	68	26.083	68	936
530	30.400	67	28.098	67	26.711	67	26.151	68	954
540	30.467	66	28.165	66	26.778	66	26.219	66	972
550	30.533	66	28.231	66	26.844	66	26.285	66	990
560	30.599	64	28.297	64	26.910	64	26.351	64	1008
570	30.663	63	28.361	63	26.974	63	26.415	63	1026
580	30.726	63	28.424	63	27.037	63	26.478	63	1044
590	30.789	61	28.487	61	27.100	61	26.541	61	1062
600	30.850	61	28.548	61	27.161	61	26.602	61	1080
610	30.911	60	28.609	60	27.222	60	26.663	60	1098
620	30.971	58	28.669	58	27.282	58	26.723	58	1116
630	31.029	59	28.727	59	27.340	59	26.781	59	1134
640	31.088	57	28.786	57	27.399	57	26.840	57	1152
650	31.145	57	28.843	57	27.456	57	26.897	57	1170
660	31.202	55	28.900	55	27.513	55	26.954	55	1188
670	31.257	56	28.955	56	27.568	56	27.009	56	1206
680	31.313	54	29.011	54	27.624	54	27.065	54	1224
690	31.367	54	29.065	54	27.678	54	27.119	54	1242
700	31.421	53	29.119	53	27.732	53	27.173	53	1260
710	31.474	53	29.172	53	27.785	53	27.226	53	1278
720	31.527	52	29.225	52	27.838	52	27.279	52	1296
730	31.579	51	29.277	51	27.890	51	27.331	51	1314
740	31.630	51	29.328	51	27.941	51	27.382	51	1332
750	31.681	51	29.379	51	27.992	51	27.433	51	1350
760	31.732	49	29.430	49	28.043	49	27.484	49	1368
770	31.781	50	29.479	50	28.092	50	27.533	50	1386
780	31.831	48	29.529	48	28.142	48	27.583	48	1404
790	31.879	49	29.577	49	28.190	49	27.631	49	1422
800	31.928		29.626		28.239		27.680		1440

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
800	31.928	233	29.626	233	28.239	233	27.680	233	1440
850	32.161	223	29.859	223	28.472	223	27.913	223	1530
900	32.384	213	30.082	213	28.695	213	28.136	213	1620
950	32.597	204	30.295	204	28.908	204	28.349	204	1710
1000	32.801	195	30.499	195	29.112	195	28.553	195	1800
1050	32.996	188	30.694	188	29.307	188	28.748	188	1890
1100	33.184	181	30.882	181	29.495	181	28.936	181	1980
1150	33.365	174	31.063	174	29.676	174	29.117	174	2070
1200	33.539	169	31.237	169	29.850	169	29.291	169	2160
1250	33.708	162	31.406	162	30.019	162	29.460	162	2250
1300	33.870	158	31.568	158	30.181	158	29.622	158	2340
1350	34.028	152	31.726	152	30.339	152	29.780	152	2430
1400	34.180	148	31.878	148	30.491	148	29.932	148	2520
1450	34.328	143	32.026	143	30.639	143	30.080	143	2610
1500	34.471	139	32.169	139	30.782	139	30.223	139	2700
1550	34.610	135	32.308	135	30.921	135	30.362	135	2790
1600	34.745	132	32.443	132	31.056	132	30.497	132	2880
1650	34.877	128	32.575	128	31.188	128	30.629	128	2970
1700	35.005	125	32.703	125	31.316	125	30.757	125	3060
1750	35.130	121	32.828	121	31.441	121	30.882	121	3150
1800	35.251	119	32.949	119	31.562	119	31.003	119	3240
1850	35.370	115	33.068	115	31.681	115	31.122	115	3330
1900	35.485	113	33.183	113	31.796	113	31.237	113	3420
1950	35.598	110	33.296	110	31.909	110	31.350	110	3510
2000	35.708	108	33.406	108	32.019	108	31.460	108	3600
2050	35.816	105	33.514	105	32.127	105	31.568	105	3690
2100	35.921	103	33.619	103	32.232	103	31.673	103	3780
2150	36.024	101	33.722	101	32.335	101	31.776	101	3870
2200	36.125	99	33.823	99	32.436	99	31.877	99	3960
2250	36.224	97	33.922	97	32.535	97	31.976	97	4050
2300	36.321	95	34.019	95	32.632	95	32.073	95	4140
2350	36.416	93	34.114	93	32.727	93	32.168	93	4230
2400	36.509	91	34.207	91	32.820	91	32.261	91	4320
2450	36.600	89	34.298	89	32.911	89	32.352	89	4410
2500	36.689	88	34.387	88	33.000	88	32.441	88	4500
2550	36.777	86	34.475	86	33.088	86	32.529	86	4590
2600	36.863	85	34.561	85	33.174	85	32.615	85	4680
2650	36.948	83	34.646	83	33.259	83	32.700	83	4770
2700	37.031	82	34.729	82	33.342	82	32.783	82	4860
2750	37.113	80	34.811	80	33.424	80	32.865	80	4950
2800	37.193		34.891		33.504		32.945		5040

°K	1 atm		4 atm		7 atm		10 atm		°R
200	22.355	171	20.948	173	20.367	176	19.989	178	360
210	22.526	163	21.121	166	20.543	167	20.167	169	378
220	22.689	157	21.287	158	20.710	160	20.336	162	396
230	22.846	149	21.445	151	20.870	152	20.498	154	414
240	22.995	144	21.596	144	21.022	146	20.652	147	432
250	23.139	137	21.740	139	21.168	139	20.799	140	450
260	23.276	133	21.879	133	21.307	135	20.939	135	468
270	23.409	128	22.012	129	21.442	130	21.074	131	486
280	23.537	123	22.141	124	21.572	124	21.205	126	504
290	23.660	119	22.265	120	21.696	121	21.331	121	522
300	23.779	115	22.385	116	21.817	116	21.452	116	540
310	23.894	112	22.501	112	21.933	113	21.568	113	558
320	24.006	108	22.613	108	22.046	109	21.681	110	576
330	24.114	105	22.721	106	22.155	106	21.791	107	594
340	24.219	101	22.827	101	22.261	102	21.898	102	612
350	24.320	99	22.928	100	22.363	99	22.000	100	630
360	24.419	97	23.028	97	22.462	98	22.100	98	648
370	24.516	94	23.125	95	22.560	95	22.198	95	666
380	24.610	92	23.220	91	22.655	92	22.293	92	684
390	24.702	89	23.311	89	22.747	89	22.385	90	702
400	24.791	88	23.400	88	22.836	89	22.475	89	720
410	24.879	85	23.488	85	22.925	85	22.564	85	738
420	24.964	83	23.573	84	23.010	84	22.649	84	756
430	25.047	82	23.657	82	23.094	82	22.733	83	774
440	25.129	79	23.739	80	23.176	79	22.816	79	792
450	25.208	79	23.819	79	23.255	80	22.895	80	810
460	25.287	76	23.898	76	23.335	76	22.975	76	828
470	25.363	75	23.974	75	23.411	76	23.051	76	846
480	25.438	73	24.049	73	23.487	73	23.127	73	864
490	25.511	73	24.122	74	23.560	73	23.200	74	882
500	25.584	71	24.196	71	23.633	71	23.274	71	900
510	25.655	71	24.267	71	23.704	72	23.345	71	918
520	25.726	68	24.338	68	23.776	68	23.416	69	936
530	25.794	67	24.406	67	23.844	67	23.485	67	954
540	25.861	66	24.473	66	23.911	66	23.552	66	972
550	25.927	66	24.539	66	23.977	66	23.618	67	990
560	25.993	64	24.605	65	24.043	65	23.685	64	1008
570	26.057	63	24.670	63	24.108	63	23.749	63	1026
580	26.120	63	24.733	63	24.171	63	23.812	63	1044
590	26.183	61	24.796	61	24.234	61	23.875	62	1062
600	26.244	61	24.857	61	24.295	61	23.937	61	1080
610	26.305	60	24.918	60	24.356	60	23.998	60	1098
620	26.365	59	24.978	58	24.416	59	24.058	58	1116
630	26.424	59	25.036	59	24.475	59	24.116	59	1134
640	26.483	57	25.095	57	24.534	57	24.175	57	1152
650	26.540	57	25.152	57	24.591	57	24.232	58	1170
660	26.597	55	25.209	55	24.648	55	24.290	55	1188
670	26.652	56	25.264	56	24.703	56	24.345	56	1206
680	26.708	54	25.320	54	24.759	54	24.401	54	1224
690	26.762	54	25.374	54	24.813	54	24.455	54	1242
700	26.816	53	25.428	54	24.867	54	24.509	53	1260
710	26.869	53	25.482	53	24.921	53	24.562	53	1278
720	26.922	52	25.535	52	24.974	52	24.615	53	1296
730	26.974	51	25.587	51	25.026	51	24.668	51	1314
740	27.025	51	25.638	51	25.077	51	24.719	51	1332
750	27.076	51	25.689	51	25.128	51	24.770	51	1350
760	27.127	49	25.740	49	25.179	49	24.821	49	1368
770	27.176	50	25.789	49	25.228	50	24.870	50	1386
780	27.226	48	25.838	49	25.278	48	24.920	48	1404
790	27.274	49	25.887	49	25.326	49	24.968	49	1422
800	27.323		25.936		25.375		25.017		1440

°K	1 atm		4 atm		7 atm		10 atm		°R
800	27.323	233	25.936	233	25.375	233	25.017	234	1440
850	27.556	223	26.169	223	25.608	224	25.251	223	1530
900	27.779	213	26.392	213	25.832	213	25.474	213	1620
950	27.992	204	26.605	204	26.045	204	25.687	204	1710
1000	28.196	195	26.809	195	26.249	195	25.891	195	1800
1050	28.391	188	27.004	189	26.444	188	26.086	189	1890
1100	28.579	181	27.193	181	26.632	181	26.275	181	1980
1150	28.760	174	27.374	174	26.813	174	26.456	174	2070
1200	28.934	169	27.548	169	26.987	169	26.630	169	2160
1250	29.103	162	27.717	162	27.156	163	26.799	162	2250
1300	29.265	158	27.879	158	27.319	158	26.961	158	2340
1350	29.423	152	28.037	152	27.477	152	27.119	153	2430
1400	29.575	148	28.189	148	27.629	148	27.272	148	2520
1450	29.723	143	28.337	143	27.777	143	27.420	143	2610
1500	29.866	139	28.480	139	27.920	139	27.563	139	2700
1550	30.005	135	28.619	135	28.059	135	27.702	135	2790
1600	30.140	132	28.754	132	28.194	132	27.837	132	2880
1650	30.272	128	28.886	128	28.326	128	27.969	128	2970
1700	30.400	125	29.014	125	28.454	125	28.097	125	3060
1750	30.525	121	29.139	121	28.579	121	28.222	121	3150
1800	30.646	119	29.260	119	28.700	119	28.343	119	3240
1850	30.765	115	29.379	115	28.819	115	28.462	115	3330
1900	30.880	113	29.494	113	28.934	113	28.577	113	3420
1950	30.993	110	29.607	110	29.047	110	28.690	110	3510
2000	31.103	108	29.717	108	29.157	108	28.800	108	3600
2050	31.211	105	29.825	105	29.265	105	28.908	105	3690
2100	31.316	103	29.930	103	29.370	103	29.013	103	3780
2150	31.419	101	30.033	101	29.473	101	29.116	101	3870
2200	31.520	99	30.134	99	29.574	99	29.217	99	3960
2250	31.619	97	30.233	97	29.673	97	29.316	97	4050
2300	31.716	95	30.330	95	29.770	95	29.413	95	4140
2350	31.811	93	30.425	93	29.865	93	29.508	93	4230
2400	31.904	91	30.518	91	29.958	91	29.601	91	4320
2450	31.995	89	30.609	89	30.049	89	29.692	89	4410
2500	32.084	88	30.698	88	30.138	88	29.781	88	4500
2550	32.172	86	30.786	86	30.226	86	29.869	86	4590
2600	32.258	85	30.872	85	30.312	85	29.955	85	4680
2650	32.343	83	30.957	83	30.397	83	30.040	83	4770
2700	32.426	82	31.040	82	30.480	82	30.123	82	4860
2750	32.508	80	31.122	80	30.562	80	30.205	80	4950
2800	32.588		31.202		30.642		30.285		5040

°K	10 atm		40 atm		70 atm		100 atm		°R
250	20.799	140	19.291	152					450
260	20.939	135	19.443	145					468
270	21.074	131	19.588	139	18.932	147			486
280	21.205	126	19.727	133	19.079	140	18.638	147	504
290	21.331	121	19.860	127	19.219	135	18.785	141	522
300	21.452	116	19.987	123	19.354	128	18.926	133	540
310	21.568	113	20.110	118	19.482	123	19.059	128	558
320	21.681	110	20.228	114	19.605	118	19.187	123	576
330	21.791	107	20.342	111	19.723	115	19.310	118	594
340	21.898	102	30.453	106	19.838	110	19.428	113	612
350	22.000	100	20.559	104	19.948	107	19.541	110	630
360	22.100	98	20.663	101	20.055	104	19.651	107	648
370	22.198	95	20.764	98	20.159	100	19.758	103	666
380	22.293	92	20.862	94	20.259	98	19.861	100	684
390	22.385	90	20.956	92	20.357	94	19.961	97	702
400	22.475	89	21.048	92	20.451	93	20.058	95	720
410	22.564	85	21.140	87	20.544	90	20.153	91	738
420	22.649	84	21.227	86	20.634	87	20.244	90	756
430	22.733	83	21.313	82	20.721	86	20.334	87	774
440	22.816	79	21.395	83	20.807	83	20.421	85	792
450	22.895	80	21.478	82	20.890	83	20.506	84	810
460	22.975	76	21.560	78	20.973	79	20.590	80	828
470	23.051	76	21.638	76	21.052	78	20.670	79	846
480	23.127	73	21.714	75	21.130	76	20.749	77	864
490	23.200	74	21.789	75	21.206	76	20.826	77	882
500	23.274	71	21.864	72	21.282	73	20.903	75	900
510	23.345	71	21.936	72	21.355	74	20.978	74	918
520	23.416	69	22.008	70	21.429	70	21.052	71	936
530	23.485	67	22.078	68	21.499	69	21.123	70	954
540	23.552	66	22.146	67	21.568	68	21.193	69	972
550	23.618	67	22.213	67	21.636	68	21.262	68	990
560	23.685	64	22.280	65	21.704	65	21.330	67	1008
570	23.749	63	22.345	64	21.769	65	21.397	65	1026
580	23.812	63	22.409	64	21.834	65	21.462	65	1044
590	23.875	62	22.473	62	21.899	62	21.527	63	1062
600	23.937	61	22.535	61	21.961	62	21.590	63	1080
610	23.998	60	22.596	61	22.023	62	21.653	62	1098
620	24.058	58	22.657	59	22.085	59	21.715	59	1116
630	24.116	59	22.716	60	22.144	60	21.774	61	1134
640	24.175	57	22.776	58	22.204	58	21.835	59	1152
650	24.232	58	22.834	57	22.262	58	21.894	58	1170
660	24.290	55	22.891	56	22.320	56	21.952	57	1188
670	24.345	56	22.947	56	22.376	57	22.009	57	1206
680	24.401	54	23.003	55	22.433	55	22.066	55	1224
690	24.455	54	23.058	54	22.488	55	22.121	55	1242
700	24.509	53	23.112	54	22.543	54	22.176	55	1260
710	24.562	53	23.166	53	22.597	54	22.231	54	1278
720	24.615	53	23.219	52	22.651	53	22.285	53	1296
730	24.668	51	23.271	52	22.704	51	22.338	52	1314
740	24.719	51	23.323	51	22.755	52	22.390	52	1332
750	24.770	51	23.374	52	22.807	52	22.442	52	1350
760	24.821	49	23.426	49	22.859	49	22.494	50	1368
770	24.870	50	23.475	51	22.908	51	22.544	50	1386
780	24.920	48	23.526	48	22.959	49	22.594	49	1404
790	24.968	49	23.574	49	23.008	49	22.643	50	1422
800	25.017		23.623		23.057		22.693		1440

°K	10 atm		40 atm		70 atm		100 atm		°R
800	25.017	234	23.623	235	23.057	235	22.693	236	1440
850	25.251	223	23.858	224	23.292	226	22.929	227	1530
900	25.474	213	24.082	214	23.518	214	23.156	215	1620
950	25.687	204	24.296	205	23.732	206	23.371	206	1710
1000	25.891	195	24.501	196	23.938	196	23.577	197	1800
1050	26.086	189	24.697	188	24.134	190	23.744	189	1890
1100	26.275	181	24.885	182	24.324	181	23.963	182	1980
1150	26.456	174	25.067	174	24.505	175	24.145	175	2070
1200	26.630	169	25.241	170	24.680	169	24.320	170	2160
1250	26.799	162	25.411	162	24.849	163	24.490	163	2250
1300	26.961	158	25.573	158	25.012	159	24.653	159	2340
1350	27.119	153	25.731	153	25.171	152	24.812	152	2430
1400	27.272	148	25.884	148	25.323	149	24.964	149	2520
1450	27.420	143	26.032	143	25.472	143	25.113	144	2610
1500	27.563	139	26.175	139	25.615	139	25.257	139	2700
1550	27.702	135	26.314	136	25.754	136	25.396	136	2790
1600	27.837	132	26.450	132	25.890	132	25.532	132	2880
1650	27.969	128	26.582	128	26.022	128	25.664	128	2970
1700	28.097	125	26.710	125	26.150	125	25.792	126	3060
1750	28.222	121	26.835	121	26.275	122	25.918	121	3150
1800	28.343	119	26.956	119	26.397	119	26.039	119	3240
1850	28.462	115	27.075	115	26.516	115	26.158	115	3330
1900	28.577	113	27.190	113	26.631	113	26.273	114	3420
1950	28.690	110	27.303	110	26.744	110	26.387	110	3510
2000	28.800	108	27.413	109	26.854	108	26.497	108	3600
2050	28.908	105	27.522	105	26.962	105	26.605	105	3690
2100	29.013	103	27.627	103	27.067	103	26.710	103	3780
2150	29.116	101	27.730	101	27.170	102	26.813	101	3870
2200	29.217	99	27.831	99	27.272	99	26.914	99	3960
2250	29.316	97	27.930	97	27.371	97	27.013	97	4050
2300	29.413	95	28.027	95	27.468	95	27.110	96	4140
2350	29.508	93	28.122	93	27.563	93	27.206	93	4230
2400	29.601	91	28.215	91	27.656	91	27.299	91	4320
2450	29.692	89	28.306	89	27.747	89	27.390	89	4410
2500	29.781	88	28.395	88	27.836	88	27.479	88	4500
2550	29.869	86	28.483	86	27.924	86	27.567	86	4590
2600	29.955	85	28.569	85	28.010	85	27.653	85	4680
2650	30.040	83	28.654	83	28.095	83	27.738	83	4770
2700	30.123	82	28.737	82	28.178	82	27.821	82	4860
2750	30.205	80	28.819	80	28.260	80	27.903	80	4950
2800	30.285		28.899		28.340		27.983		5040

Table 5-6. SPECIFIC-HEAT RATIO OF CARBON MONOXIDE $\gamma = C_p/C_v$

°K	.01 atm		.1 atm		1 atm		10 atm		°R
200	1.400		1.400		1.405	-1	1.456	-8	360
210	1.400		1.400		1.404		1.448	-4	378
220	1.400		1.400		1.404		1.444	-5	396
230	1.400		1.400		1.404	-1	1.439	-4	414
240	1.400		1.400		1.403		1.435	-3	432
250	1.400		1.400		1.403	-1	1.432	-3	450
260	1.400		1.400		1.402		1.429	-3	468
270	1.400		1.400		1.402		1.426	-2	486
280	1.400	-1	1.400	-1	1.402		1.424	-2	504
290	1.399		1.399		1.402	-1	1.422	-2	522
300	1.399		1.399		1.401		1.420	-2	540
310	1.399		1.399		1.401		1.418	-2	558
320	1.399		1.399		1.401		1.416	-1	576
330	1.399	-1	1.399	-1	1.401	-1	1.415	-1	594
340	1.398		1.398		1.400	-1	1.414	-2	612
350	1.398	-1	1.398		1.399		1.412	-1	630
360	1.397		1.398	-1	1.399	-1	1.411	-2	648
370	1.397		1.397		1.398		1.409	-1	666
380	1.397	-1	1.397	-1	1.398	-1	1.408	-1	684
390	1.396	-1	1.396	-1	1.397	-1	1.407	-1	702
400	1.395		1.395		1.396		1.406	-1	720
410	1.395	-1	1.395	-1	1.396	-1	1.405	-2	738
420	1.394	-1	1.394	-1	1.395	-1	1.403	-1	756
430	1.393		1.393		1.394	-1	1.402	-1	774
440	1.393	-1	1.393	-1	1.393	-1	1.401	-1	792
450	1.392	-1	1.392	-1	1.392	-1	1.400	-2	810
460	1.391	-1	1.391	-1	1.391	-1	1.398	-1	828
470	1.390	-1	1.390	-1	1.390	-1	1.397	-1	846
480	1.389	-1	1.389	-1	1.389	-1	1.396	-2	864
490	1.388	-1	1.388	-1	1.388	-1	1.394	-1	882
500	1.387	-1	1.387	-1	1.387	-1	1.393	-1	900
510	1.386	-1	1.386	-1	1.386	-1	1.392	-2	918
520	1.385	-1	1.385	-1	1.385	-1	1.390	-1	936
530	1.384	-1	1.384	-1	1.384	-1	1.389	-1	954
540	1.383	-1	1.383	-1	1.383	-1	1.388	-1	972
550	1.382	-1	1.382	-1	1.382	-1	1.387	-1	990
560	1.381	-2	1.381	-2	1.381	-1	1.386	-1	1008
570	1.379	-1	1.379	-1	1.380	-2	1.385	-1	1026
580	1.378	-1	1.378	-1	1.378	-1	1.384	-2	1044
590	1.377	-1	1.377	-1	1.377	-1	1.382	-1	1062
600	1.376	-1	1.376	-1	1.376	-1	1.381	-2	1080
610	1.375	-2	1.375	-2	1.375	-1	1.379	-2	1098
620	1.373	-1	1.373	-1	1.374	-2	1.377	-2	1116
630	1.372	-1	1.372	-1	1.372	-1	1.375	-1	1134
640	1.371	-1	1.371	-1	1.371	-1	1.374	-1	1152
650	1.370	-2	1.370	-2	1.370	-1	1.373	-2	1170
660	1.368	-1	1.368	-1	1.369	-2	1.371	-1	1188
670	1.367	-1	1.367	-1	1.367	-1	1.370	-1	1206
680	1.366	-1	1.366	-1	1.366	-1	1.369	-1	1224
690	1.365	-1	1.365	-1	1.365	-1	1.368	-2	1242
700	1.364	-1	1.364	-1	1.364	-1	1.366	-1	1260
710	1.363	-2	1.363	-2	1.363	-2	1.365	-1	1278
720	1.361	-1	1.361	-1	1.361	-1	1.364	-2	1296
730	1.360	-1	1.360	-1	1.360	-1	1.362	-1	1314
740	1.359	-1	1.359	-1	1.359	-1	1.361	-1	1332
750	1.358	-1	1.358	-1	1.358	-1	1.360	-1	1350
760	1.357	-1	1.357	-1	1.357	-1	1.359	-1	1368
770	1.356	-1	1.356	-1	1.356	-1	1.358	-2	1386
780	1.355	-1	1.355	-1	1.355	-1	1.356	-1	1404
790	1.354	-2	1.354	-2	1.354	-2	1.355	-1	1422
800	1.352		1.352		1.352		1.354		1440

°K	.01 atm		.1 atm		1 atm		10 atm		°R
800	1.352	-5	1.352	-5	1.352	-5	1.354	-5	1440
850	1.347	-4	1.347	-4	1.347	-4	1.349	-5	1530
900	1.343	-5	1.343	-5	1.343	-5	1.344	-5	1620
950	1.338	-4	1.338	-4	1.338	-4	1.339	-4	1710
1000	1.334	-3	1.334	-3	1.334	-3	1.335	-4	1800
1050	1.331	-4	1.331	-4	1.331	-4	1.331	-3	1890
1100	1.327	-3	1.327	-3	1.327	-3	1.328	-3	1980
1150	1.324	-2	1.324	-2	1.324	-2	1.325	-3	2070
1200	1.322	-3	1.322	-3	1.322	-3	1.322	-3	2160
1250	1.319	-2	1.319	-2	1.319	-2	1.319	-2	2250
1300	1.317	-2	1.317	-2	1.317	-2	1.317	-2	2340
1350	1.315	-2	1.315	-2	1.315	-2	1.315	-2	2430
1400	1.313	-2	1.313	-2	1.313	-2	1.313	-2	2520
1450	1.311	-2	1.311	-2	1.311	-2	1.311	-2	2610
1500	1.309	-1	1.309	-1	1.309	-1	1.309	-1	2700
1550	1.308	-2	1.308	-2	1.308	-2	1.308	-2	2790
1600	1.306	-1	1.306	-1	1.306	-1	1.306	-1	2880
1650	1.305	-1	1.305	-1	1.305	-1	1.305	-1	2970
1700	1.304	-2	1.304	-2	1.304	-2	1.304	-2	3060
1750	1.302	-1	1.302	-1	1.302	-1	1.302	-1	3150
1800	1.301	-1	1.301	-1	1.301	-1	1.301	-1	3240
1850	1.300	-1	1.300	-1	1.300	-1	1.300	-1	3330
1900	1.299		1.299		1.299		1.299	-1	3420
1950	1.299	-1	1.299	-1	1.299	-1	1.298		3510
2000	1.298	-3	1.298	-3	1.298	-3	1.298	-3	3600
2200	1.295	-3	1.295	-3	1.295	-3	1.295	-3	3960
2400	1.292	-1	1.292	-1	1.292	-1	1.292	-1	4320
2600	1.291	-2	1.291	-2	1.291	-2	1.291	-2	4680
2800	1.289	-1	1.289	-1	1.289	-1	1.289	-1	5040
3000	1.288		1.288		1.288		1.288		5400

Table 5-6. SPECIFIC-HEAT RATIO OF CARBON MONOXIDE - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
250	1.432	-3	1.543	-16					450
260	1.429	-3	1.527	-13					468
270	1.426	-2	1.514	-11	1.617	-24			486
280	1.424	-2	1.503	- 9	1.593	-20	1.698	-35	504
290	1.422	-2	1.494	- 9	1.573	-18	1.663	-30	522
300	1.420	-2	1.485	- 7	1.555	-14	1.633	-24	540
310	1.418	-2	1.478	- 7	1.541	-13	1.609	-21	558
320	1.416	-1	1.471	- 6	1.528	-11	1.588	-17	576
330	1.415	-1	1.465	- 5	1.517	-10	1.571	-15	594
340	1.414	-2	1.460	- 5	1.507	- 8	1.556	-14	612
350	1.412	-1	1.455	- 4	1.499	- 8	1.542	-12	630
360	1.411	-2	1.451	- 4	1.491	- 7	1.530	-10	648
370	1.409	-1	1.447	- 4	1.484	- 7	1.520	-10	666
380	1.408	-1	1.443	- 3	1.477	- 6	1.510	- 8	684
390	1.407	-1	1.440	- 4	1.471	- 5	1.502	- 8	702
400	1.406	-1	1.436	- 3	1.466	- 5	1.494	- 7	720
410	1.405	-2	1.433	- 3	1.461	- 5	1.487	- 7	738
420	1.403	-1	1.430	- 2	1.456	- 4	1.480	- 6	756
430	1.402	-1	1.428	- 3	1.452	- 4	1.474	- 5	774
440	1.401	-1	1.425	- 3	1.448	- 4	1.469	- 6	792
450	1.400	-2	1.422	- 2	1.444	- 4	1.463	- 5	810
460	1.398	-1	1.420	- 3	1.440	- 4	1.458	- 4	828
470	1.397	-1	1.417	- 2	1.436	- 3	1.454	- 5	846
480	1.396	-2	1.415	- 2	1.433	- 4	1.449	- 4	864
490	1.394	-1	1.413	- 3	1.429	- 3	1.445	- 4	882
500	1.393	-1	1.410	- 2	1.426	- 3	1.441	- 4	900
510	1.392	-2	1.408	- 2	1.423	- 3	1.437	- 4	918
520	1.390	-1	1.406	- 2	1.420	- 2	1.433	- 3	936
530	1.389	-1	1.404	- 2	1.418	- 3	1.430	- 4	954
540	1.388	-1	1.402	- 2	1.415	- 3	1.426	- 3	972
550	1.387	-1	1.400	- 2	1.412	- 2	1.423	- 3	990
560	1.386	-1	1.398	- 2	1.410	- 3	1.420	- 3	1008
570	1.385	-1	1.396	- 2	1.407	- 2	1.417	- 3	1026
580	1.384	-2	1.394	- 2	1.405	- 3	1.414	- 3	1044
590	1.382	-1	1.392	- 2	1.402	- 2	1.411	- 2	1062
600	1.381	-2	1.390	- 2	1.400	- 2	1.409	- 3	1080
610	1.379	-2	1.388	- 1	1.398	- 3	1.406	- 2	1098
620	1.377	-2	1.387	- 2	1.395	- 2	1.404	- 3	1116
630	1.375	-1	1.385	- 2	1.393	- 2	1.401	- 2	1134
640	1.374	-1	1.383	- 2	1.391	- 2	1.399	- 3	1152
650	1.373	-2	1.381	- 1	1.389	- 2	1.396	- 2	1170
660	1.371	-1	1.380	- 2	1.387	- 2	1.394	- 2	1188
670	1.370	-1	1.378	- 2	1.385	- 2	1.392	- 2	1206
680	1.369	-1	1.376	- 1	1.383	- 1	1.390	- 2	1224
690	1.368	-2	1.375	- 2	1.382	- 2	1.388	- 2	1242
700	1.366	-1	1.373	- 1	1.380	- 2	1.386	- 2	1260
710	1.365	-1	1.372	- 2	1.378	- 2	1.384	- 3	1278
720	1.364	-2	1.370	- 1	1.376	- 2	1.381	- 1	1296
730	1.362	-1	1.369	- 2	1.374	- 1	1.380	- 2	1314
740	1.361	-1	1.367	- 1	1.373	- 2	1.378	- 2	1332
750	1.360	-1	1.366	- 2	1.371	- 1	1.376	- 2	1350
760	1.359	-1	1.364	- 1	1.370	- 2	1.374	- 2	1368
770	1.358	-2	1.363	- 1	1.368	- 2	1.372	- 1	1386
780	1.356	-1	1.362	- 2	1.366	- 1	1.371	- 2	1404
790	1.355	-1	1.360	- 1	1.365	- 2	1.369	- 1	1422
800	1.354	-5	1.359	- 6	1.363	- 6	1.368	- 8	1440
850	1.349	-5	1.353	- 6	1.357	- 6	1.360	- 7	1530
900	1.344	-5	1.347	- 5	1.351	- 6	1.353	- 6	1620
950	1.339	-4	1.342	- 4	1.345	- 5	1.347	- 5	1710
1000	1.335	-4	1.338	- 4	1.340	- 4	1.342	- 5	1800
1050	1.331		1.334		1.336		1.337		1890

Table 5-6. SPECIFIC-HEAT RATIO OF CARBON MONOXIDE - Cont. $\gamma = C_p/C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
1050	1.331	-3	1.334	-4	1.336	-4	1.337	-4	1890
1100	1.328	-3	1.330	-3	1.332	-4	1.333	-4	1980
1150	1.325	-3	1.327	-4	1.328	-3	1.329	-3	2070
1200	1.322	-3	1.323	-2	1.325	-3	1.326	-3	2160
1250	1.319	-2	1.321	-3	1.322	-3	1.323	-3	2250
1300	1.317	-2	1.318	-2	1.319	-2	1.320	-3	2340
1350	1.315	-2	1.316	-2	1.317	-3	1.317	-2	2430
1400	1.313	-2	1.314	-2	1.314	-2	1.315	-2	2520
1450	1.311	-2	1.312	-2	1.312	-2	1.313	-2	2610
1500	1.309	-1	1.310	-2	1.310	-1	1.311	-2	2700
1550	1.308	-2	1.308	-1	1.309	-2	1.309	-2	2790
1600	1.306	-1	1.307	-2	1.307	-1	1.307	-1	2880
1650	1.305	-1	1.305	-1	1.306	-2	1.306	-1	2970
1700	1.304	-2	1.304	-1	1.304	-1	1.305	-2	3060
1750	1.302	-1	1.303	-1	1.303	-1	1.303	-1	3150
1800	1.301	-1	1.302	-1	1.302	-1	1.302	-1	3240
1850	1.300	-1	1.301	-1	1.301	-1	1.301	-1	3330
1900	1.299	-1	1.300	-1	1.300	-1	1.300	-1	3420
1950	1.298		1.299	-1	1.299	-1	1.299	-1	3510
2000	1.298		1.298		1.298		1.298		3600
2200	1.295	-3	1.295	-3	1.295	-3	1.295	-3	3960
2400	1.292	-1	1.292	-1	1.292	-1	1.292	-1	4320
2600	1.291	-2	1.291	-2	1.291	-2	1.291	-2	4680
2800	1.289	-1	1.289	-1	1.289	-1	1.289	-1	5040
3000	1.288		1.288		1.288		1.288		5400

Table 5-7. SOUND VELOCITY AT LOW FREQUENCY IN CARBON MONOXIDE a/a_0

°K	.01 atm		.1 atm		1 atm		10 atm		°R
200	.856	21	.856	21	.855	21	.850	22	360
210	.877	20	.877	20	.876	21	.872	22	378
220	.897	20	.897	20	.897	20	.894	22	396
230	.917	20	.917	20	.917	20	.916	21	414
240	.937	20	.937	20	.937	20	.937	21	432
250	.957	19	.957	19	.957	19	.958	19	450
260	.976	18	.976	18	.976	18	.977	20	468
270	.994	18	.994	18	.994	19	.997	19	486
280	1.012	18	1.012	18	1.013	18	1.016	18	504
290	1.030	18	1.030	18	1.031	17	1.034	18	522
300	1.048	17	1.048	17	1.048	18	1.052	18	540
310	1.065	17	1.065	17	1.066	17	1.070	17	558
320	1.082	17	1.082	17	1.083	16	1.087	17	576
330	1.099	16	1.099	16	1.099	17	1.104	17	594
340	1.115	16	1.115	16	1.116	16	1.121	17	612
350	1.131	16	1.131	16	1.132	16	1.138	16	630
360	1.147	16	1.147	16	1.148	15	1.154	15	648
370	1.163	15	1.163	15	1.163	16	1.169	16	666
380	1.178	15	1.178	15	1.179	15	1.185	15	684
390	1.193	15	1.193	15	1.194	15	1.200	16	702
400	1.208	15	1.208	14	1.209	15	1.216	15	720
410	1.223	14	1.222	15	1.224	14	1.231	14	738
420	1.237	15	1.237	15	1.238	14	1.245	15	756
430	1.252	14	1.252	14	1.252	14	1.260	14	774
440	1.266	14	1.266	14	1.266	14	1.274	14	792
450	1.280	14	1.280	14	1.280	14	1.288	14	810
460	1.294	13	1.294	13	1.294	14	1.302	13	828
470	1.307	13	1.307	13	1.308	13	1.315	14	846
480	1.320	14	1.320	14	1.321	13	1.329	13	864
490	1.334	13	1.334	13	1.334	13	1.342	13	882
500	1.347	13	1.347	13	1.347	13	1.355	13	900
510	1.360	12	1.360	12	1.360	13	1.368	13	918
520	1.372	13	1.372	13	1.373	13	1.381	12	936
530	1.385	12	1.385	12	1.386	12	1.393	13	954
540	1.397	13	1.397	13	1.398	13	1.406	13	972
550	1.410	12	1.410	12	1.411	12	1.419	12	990
560	1.422	12	1.422	12	1.423	12	1.431	12	1008
570	1.434	12	1.434	12	1.435	12	1.443	12	1026
580	1.446	12	1.446	12	1.447	11	1.455	12	1044
590	1.458	12	1.458	12	1.458	12	1.467	12	1062
600	1.470	11	1.470	11	1.470	12	1.479	11	1080
610	1.481	11	1.481	11	1.482	11	1.490	11	1098
620	1.492	11	1.492	11	1.493	11	1.501	11	1116
630	1.503	12	1.503	12	1.504	12	1.512	11	1134
640	1.515	11	1.515	11	1.516	11	1.523	11	1152
650	1.526	11	1.526	11	1.527	11	1.534	11	1170
660	1.537	11	1.537	11	1.538	10	1.545	11	1188
670	1.548	11	1.548	11	1.548	11	1.556	11	1206
680	1.559	10	1.559	10	1.559	11	1.567	11	1224
690	1.569	11	1.569	11	1.570	11	1.578	10	1242
700	1.580	11	1.580	11	1.581	11	1.588	11	1260
710	1.591	10	1.591	10	1.592	10	1.599	11	1278
720	1.601	10	1.601	10	1.602	10	1.610	10	1296
730	1.611	11	1.611	11	1.612	11	1.620	10	1314
740	1.622	10	1.622	10	1.623	10	1.630	10	1332
750	1.632	10	1.632	10	1.633	10	1.640	11	1350
760	1.642	10	1.642	10	1.643	10	1.651	10	1368
770	1.652	10	1.652	10	1.653	10	1.661	9	1386
780	1.662	10	1.662	10	1.663	10	1.670	10	1404
790	1.672	10	1.672	10	1.673	10	1.680	10	1422
800	1.682		1.682		1.683		1.690		1440

°K	.01 atm		.1 atm		1 atm		10 atm		°R
800	1.682	48	1.682	48	1.683	48	1.690	52	1440
850	1.730	47	1.730	47	1.731	47	1.742	44	1530
900	1.777	46	1.777	46	1.778	46	1.786	45	1620
950	1.823	45	1.823	45	1.824	45	1.831	44	1710
1000	1.868	44	1.868	44	1.869	43	1.875	44	1800
1050	1.912	42	1.912	42	1.912	42	1.919	43	1890
1100	1.954	41	1.954	41	1.954	42	1.962	41	1980
1150	1.995	41	1.995	41	1.996	41	2.003	40	2070
1200	2.036	40	2.036	40	2.037	40	2.043	40	2160
1250	2.076	40	2.076	40	2.077	39	2.083	39	2250
1300	2.116	39	2.116	39	2.116	39	2.122	39	2340
1350	2.155	38	2.155	38	2.155	38	2.161	38	2430
1400	2.193	37	2.193	37	2.193	37	2.199	37	2520
1450	2.230	36	2.230	36	2.230	36	2.236	37	2610
1500	2.266	36	2.266	37	2.266	37	2.273	36	2700
1550	2.302	36	2.303	35	2.303	35	2.309	35	2790
1600	2.338	35	2.338	35	2.338	35	2.344	35	2880
1650	2.373	34	2.373	34	2.373	34	2.379	35	2970
1700	2.407	34	2.407	34	2.407	34	2.414	33	3060
1750	2.441	34	2.441	34	2.441	34	2.447	33	3150
1800	2.475	33	2.475	33	2.475	33	2.480	33	3240
1850	2.508	32	2.508	33	2.508	33	2.513	33	3330
1900	2.540	33	2.541	33	2.541	33	2.546	33	3420
1950	2.573	32	2.574	32	2.574	32	2.579	32	3510
2000	2.605	32	2.606	31	2.606	31	2.611	32	3600
2050	2.637	31	2.637	31	2.637	31	2.643	31	3690
2100	2.668	31	2.668	31	2.668	31	2.674	30	3780
2150	2.699	30	2.699	30	2.699	31	2.704	31	3870
2200	2.729	30	2.729	30	2.730	30	2.735	30	3960
2250	2.759	31	2.759	30	2.760	30	2.765	30	4050
2300	2.790	29	2.789	30	2.790	29	2.795	29	4140
2350	2.819	29	2.819	30	2.819	29	2.824	29	4230
2400	2.848	29	2.849	28	2.848	29	2.853	29	4320
2450	2.877	29	2.877	29	2.877	29	2.882	29	4410
2500	2.906	28	2.906	28	2.906	28	2.911	28	4500
2550	2.934	28	2.934	28	2.934	28	2.939	28	4590
2600	2.962	28	2.962	28	2.962	28	2.967	28	4680
2650	2.990	28	2.990	28	2.990	28	2.995	28	4770
2700	3.018	27	3.018	27	3.018	27	3.023	27	4860
2750	3.045	27	3.045	27	3.045	27	3.050	27	4950
2800	3.072	27	3.072	27	3.072	27	3.077	26	5040
2850	3.099	27	3.099	27	3.099	27	3.103	27	5130
2900	3.126	26	3.126	26	3.126	27	3.130	27	5220
2950	3.152	26	3.152	26	3.153	26	3.157	26	5310
3000	3.178		3.178		3.179		3.183		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
250	.958	19	.971	21					450
260	.977	20	.992	21					468
270	.997	19	1.013	20	1.042	20			486
280	1.016	18	1.033	20	1.062	20	1.106	18	504
290	1.034	18	1.053	19	1.082	19	1.124	17	522
300	1.052	18	1.072	18	1.101	18	1.141	17	540
310	1.070	17	1.090	18	1.119	18	1.158	17	558
320	1.087	17	1.108	18	1.137	18	1.175	17	576
330	1.104	17	1.126	17	1.155	17	1.192	17	594
340	1.121	17	1.143	17	1.172	18	1.209	16	612
350	1.138	16	1.160	17	1.190	17	1.225	16	630
360	1.154	15	1.177	17	1.207	16	1.241	16	648
370	1.169	16	1.194	16	1.223	16	1.257	15	666
380	1.185	15	1.210	16	1.239	16	1.272	16	684
390	1.200	16	1.226	15	1.255	15	1.288	15	702
400	1.216	15	1.241	15	1.270	15	1.303	15	720
410	1.231	14	1.256	15	1.285	15	1.318	15	738
420	1.245	15	1.271	15	1.300	15	1.333	14	756
430	1.260	14	1.286	14	1.315	14	1.347	14	774
440	1.274	14	1.300	14	1.329	15	1.361	14	792
450	1.288	14	1.314	14	1.344	13	1.375	14	810
460	1.302	13	1.328	14	1.357	14	1.389	14	828
470	1.315	14	1.342	14	1.371	14	1.403	13	846
480	1.329	13	1.356	13	1.385	12	1.416	13	864
490	1.342	13	1.369	13	1.397	14	1.429	12	882
500	1.355	13	1.382	13	1.411	13	1.441	12	900
510	1.368	13	1.395	13	1.424	13	1.453	14	918
520	1.381	12	1.408	12	1.437	12	1.467	12	936
530	1.393	13	1.420	13	1.449	13	1.479	12	954
540	1.406	13	1.433	13	1.462	12	1.491	12	972
550	1.419	12	1.446	12	1.474	12	1.503	12	990
560	1.431	12	1.458	12	1.486	11	1.515	12	1008
570	1.443	12	1.470	12	1.497	12	1.527	11	1026
580	1.455	12	1.482	11	1.509	12	1.538	12	1044
590	1.467	12	1.493	12	1.521	12	1.550	12	1062
600	1.479	11	1.505	11	1.533	11	1.562	11	1080
610	1.490	11	1.516	12	1.544	11	1.573	11	1098
620	1.501	11	1.528	11	1.555	11	1.584	11	1116
630	1.512	11	1.539	11	1.566	11	1.595	11	1134
640	1.523	11	1.550	11	1.577	11	1.606	10	1152
650	1.534	11	1.561	11	1.588	11	1.616	11	1170
660	1.545	11	1.572	11	1.599	11	1.627	11	1188
670	1.556	11	1.583	10	1.610	10	1.638	10	1206
680	1.567	11	1.593	11	1.620	11	1.648	11	1224
690	1.578	10	1.604	11	1.631	11	1.659	10	1242
700	1.588	11	1.615	10	1.642	10	1.669	10	1260
710	1.599	11	1.625	10	1.652	10	1.679	10	1278
720	1.610	10	1.635	11	1.662	10	1.689	10	1296
730	1.620	10	1.646	10	1.672	10	1.699	10	1314
740	1.630	10	1.656	10	1.682	10	1.709	10	1332
750	1.640	11	1.666	10	1.692	10	1.719	10	1350
760	1.651	10	1.676	10	1.702	10	1.729	10	1368
770	1.661	9	1.686	10	1.712	10	1.739	10	1386
780	1.670	10	1.696	10	1.722	10	1.749	9	1404
790	1.680	10	1.706	10	1.732	9	1.758	10	1422
800	1.690		1.716		1.741		1.768		1440

Table 5-7. SOUND VELOCITY AT LOW FREQUENCY IN CARBON MONOXIDE - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
800	1.690	52	1.716	48	1.741	48	1.768	46	1440
850	1.742	44	1.764	46	1.789	46	1.814	45	1530
900	1.786	45	1.810	46	1.835	44	1.859	45	1620
950	1.831	44	1.856	44	1.879	44	1.904	43	1710
1000	1.875	44	1.900	43	1.923	43	1.947	42	1800
1050	1.919	43	1.943	41	1.966	41	1.989	41	1890
1100	1.962	41	1.984	41	2.007	41	2.030	40	1980
1150	2.003	40	2.025	40	2.048	40	2.070	40	2070
1200	2.043	40	2.065	40	2.088	39	2.110	39	2160
1250	2.083	39	2.105	39	2.127	39	2.149	38	2250
1300	2.122	39	2.144	38	2.166	38	2.187	37	2340
1350	2.161	38	2.182	38	2.204	36	2.224	37	2430
1400	2.199	37	2.220	36	2.240	36	2.261	36	2520
1450	2.236	37	2.256	37	2.276	36	2.297	35	2610
1500	2.273	36	2.293	35	2.312	36	2.332	35	2700
1550	2.309	35	2.328	36	2.348	35	2.367	34	2790
1600	2.344	35	2.364	34	2.383	35	2.401	35	2880
1650	2.379	35	2.398	34	2.418	33	2.436	34	2970
1700	2.414	33	2.432	34	2.451	34	2.470	32	3060
1750	2.447	33	2.466	34	2.485	33	2.502	34	3150
1800	2.480	33	2.500	32	2.518	33	2.536	32	3240
1850	2.513	33	2.532	33	2.551	32	2.568	32	3330
1900	2.546	33	2.565	32	2.583	31	2.600	31	3420
1950	2.579	32	2.597	31	2.614	32	2.631	31	3510
2000	2.611	32	2.628	31	2.646	31	2.662	31	3600
2050	2.643	31	2.659	31	2.677	31	2.693	31	3690
2100	2.674	30	2.690	31	2.708	31	2.724	30	3780
2150	2.704	31	2.721	30	2.739	29	2.754	30	3870
2200	2.735	30	2.751	30	2.768	29	2.784	30	3960
2250	2.765	30	2.781	30	2.797	30	2.814	30	4050
2300	2.795	29	2.811	29	2.827	29	2.844	28	4140
2350	2.824	29	2.840	29	2.856	29	2.872	28	4230
2400	2.853	29	2.869	29	2.885	28	2.900	29	4320
2450	2.882	29	2.898	28	2.913	28	2.929	28	4410
2500	2.911	28	2.926	28	2.941	29	2.957	28	4500
2550	2.939	28	2.954	28	2.970	28	2.985	27	4590
2600	2.967	28	2.982	28	2.998	27	3.012	28	4680
2650	2.995	28	3.010	28	3.025	28	3.040	26	4770
2700	3.023	27	3.038	26	3.053	26	3.066	28	4860
2750	3.050	27	3.064	27	3.079	27	3.094	26	4950
2800	3.077	26	3.091	27	3.106	27	3.120	27	5040
2850	3.103	27	3.118	27	3.133	26	3.147	26	5130
2900	3.130	27	3.145	26	3.159	26	3.173	26	5220
2950	3.157	26	3.171	26	3.185	26	3.199	27	5310
3000	3.183		3.197		3.211		3.226		5400

Table 5-8. VISCOSITY OF CARBON MONOXIDE AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R	°K	η/η_0		°R	°K	η/η_0		°R
50	.1982	383	90	550	1.683	21	990	1050	2.601	17	1890
60	.2365	393	108	560	1.704	21	1008	1060	2.618	16	1908
70	.2758	401	126	570	1.725	21	1026	1070	2.634	16	1926
80	.3159	404	144	580	1.746	20	1044	1080	2.650	16	1944
90	.3563	403	162	590	1.766	21	1062	1090	2.666	16	1962
100	.3966	401	180	600	1.787	20	1080	1100	2.682	16	1980
110	.4367	395	198	610	1.807	21	1098	1110	2.698	16	1998
120	.4762	389	216	620	1.828	20	1116	1120	2.714	16	2016
130	.5151	384	234	630	1.848	20	1134	1130	2.730	16	2034
140	.5535	376	252	640	1.868	20	1152	1140	2.746	16	2052
150	.5911	370	270	650	1.888	20	1170	1150	2.762	15	2070
160	.6281	363	288	660	1.908	20	1188	1160	2.777	16	2088
170	.6644	356	306	670	1.928	19	1206	1170	2.793	16	2106
180	.7000	350	324	680	1.947	20	1224	1180	2.809	16	2124
190	.7350	342	342	690	1.967	19	1242	1190	2.825	17	2142
200	.7692	334	360	700	1.986	19	1260	1200	2.842	17	2160
210	.8026	327	378	710	2.005	18	1278	1210	2.859	16	2178
220	.8353	321	396	720	2.023	19	1296	1220	2.875	15	2196
230	.8674	316	414	730	2.042	19	1314	1230	2.890	15	2214
240	.8990	310	432	740	2.061	19	1332	1240	2.905	16	2232
250	.9300	305	450	750	2.080	19	1350	1250	2.921	15	2250
260	.9605	301	468	760	2.099	18	1368	1260	2.936	15	2268
270	.9906	294	486	770	2.117	19	1386	1270	2.951	15	2286
280	1.0200	290	504	780	2.136	18	1404	1280	2.966	14	2304
290	1.0490	286	522	790	2.154	18	1422	1290	2.980	15	2322
300	1.0776	277	540	800	2.172	19	1440	1300	2.995	15	2340
310	1.1053	276	558	810	2.191	18	1458	1310	3.010	15	2358
320	1.1329	271	576	820	2.209	17	1476	1320	3.025	14	2376
330	1.1600	269	594	830	2.226	18	1494	1330	3.039	15	2394
340	1.1869	26	612	840	2.244	18	1512	1340	3.054	15	2412
350	1.213	26	630	850	2.262	17	1530	1350	3.069	15	2430
360	1.239	26	648	860	2.279	18	1548	1360	3.084	14	2448
370	1.265	25	666	870	2.297	18	1566	1370	3.098	15	2466
380	1.290	25	684	880	2.315	17	1584	1380	3.113	14	2484
390	1.315	25	702	890	2.332	17	1602	1390	3.127	15	2502
400	1.340	25	720	900	2.349	17	1620	1400	3.142	14	2520
410	1.365	24	738	910	2.366	17	1638	1410	3.156	15	2538
420	1.389	24	756	920	2.383	17	1656	1420	3.171	14	2556
430	1.413	24	774	930	2.400	17	1674	1430	3.185	15	2574
440	1.437	23	792	940	2.417	17	1692	1440	3.200	14	2592
450	1.460	24	810	950	2.434	17	1710	1450	3.214	14	2610
460	1.484	23	828	960	2.451	17	1728	1460	3.228	15	2628
470	1.507	22	846	970	2.468	17	1746	1470	3.243	14	2646
480	1.529	23	864	980	2.485	17	1764	1480	3.257	14	2664
490	1.552	22	882	990	2.502	17	1782	1490	3.271	14	2682
500	1.574	22	900	1000	2.519	17	1800	1500	3.285		2700
510	1.596	22	918	1010	2.536	16	1818				
520	1.618	22	936	1020	2.552	16	1836				
530	1.640	22	954	1030	2.568	16	1854				
540	1.662	21	972	1040	2.584	17	1872				
550	1.683		990	1050	2.601		1890				

Table 5-9. THERMAL CONDUCTIVITY OF CARBON MONOXIDE AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
70	.260	37	126
80	.297	38	144
90	.335	39	162
100	.374	39	180
110	.413	39	198
120	.452	38	216
130	.490	38	234
140	.528	38	252
150	.566	37	270
160	.603	37	288
170	.640	37	306
180	.677	37	324
190	.714	36	342
200	.750	35	360
210	.785	35	378
220	.820	34	396
230	.854	34	414
240	.888	35	432
250	.923	33	450
260	.956	33	468
270	.989	33	486
280	1.022	32	504
290	1.054	33	522
300	1.087	32	540
310	1.119	31	558
320	1.150	31	576
330	1.181	31	594
340	1.212	30	612
350	1.242		630

°K	k/k_0		°R
350	1.242	30	630
360	1.272	30	648
370	1.302	29	666
380	1.331	29	684
390	1.360	29	702
400	1.389	29	720
410	1.418	28	738
420	1.446	28	756
430	1.474	28	774
440	1.502	28	792
450	1.530	27	810
460	1.557	27	828
470	1.584	27	846
480	1.611	27	864
490	1.638	26	882
500	1.664	26	900
510	1.690	26	918
520	1.716	25	936
530	1.741	25	954
540	1.766	25	972
550	1.791	25	990
560	1.816	25	1008
570	1.841	24	1026
580	1.865	25	1044
590	1.890	24	1062
600	1.914		1080

Table 5-10. PRANDTL NUMBER OF CARBON MONOXIDE AT ATMOSPHERIC PRESSURE $\eta C_p/k$

° K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		° R
200	.764	-3	.836	-2	.914	-1	.874	-2	360
210	.761	-3	.834	-3	.913	-1	.872	-1	378
220	.758	-2	.831	-1	.912	-1	.871	-1	396
230	.756	-3	.830	-2	.911	-1	.870	-2	414
240	.753	-3	.828	-2	.910	-1	.868	-2	432
250	.750	-3	.826	-3	.909	-2	.866	-2	450
260	.747	-2	.823	-1	.907		.864	-1	468
270	.745	-3	.822	-2	.907	-2	.863	-2	486
280	.742	-2	.820	-2	.905		.861	-1	504
290	.740	-3	.818	-2	.905	-2	.860	-2	522
300	.737	-2	.816	-2	.903	-1	.858	-1	540
310	.735	-2	.814	-1	.902		.857	-1	558
320	.733	-2	.813	-2	.902	-1	.856	-1	576
330	.731	-2	.811	-1	.901	-1	.855	-1	594
340	.729	-1	.810	-1	.900		.854	-1	612
350	.728	-2	.809	-1	.900	-1	.853	-1	630
360	.726	-1	.808	-1	.899	-1	.852	-1	648
370	.725	-1	.807	-1	.898		.851		666
380	.724	-1	.806		.898		.851	-1	684
390	.723	-1	.806	-1	.898	-1	.850		702
400	.722	-1	.805	-1	.897		.850	-1	720
410	.721	-1	.804	-1	.897	-1	.849		738
420	.720		.803		.896		.849		756
430	.720	-1	.803		.896		.849	-1	774
440	.719	-1	.803	-1	.896	-1	.848	-1	792
450	.718	1	.802	1	.895	1	.847	1	810
460	.719		.803		.896		.848		828
470	.719	-1	.803	-1	.896	-1	.848	-1	846
480	.718		.802		.895		.847		864
490	.718		.802		.895		.847		882
500	.718		.802	1	.895	1	.847	1	900
510	.718	1	.803		.896		.848		918
520	.719	1	.803		.896		.848	1	936
530	.720		.803		.896		.849		954
540	.720	1	.803	1	.896	1	.849	1	972
550	.721	1	.804	1	.897		.850		990
560	.722		.805		.897		.850		1008
570	.722	1	.805	1	.897	1	.850		1026
580	.723		.806		.898		.850		1044
590	.723	1	.806		.898		.850	1	1062
600	.724		.806		.898		.851		1080

Table 5-11. VAPOR PRESSURE OF CARBON MONOXIDE

Remarks	T	P	P	P	T
	°K	m Hg	atm	psia	°R
Transition	61.5_7	.0281	.0370	.543	110.8_3
Triple point	68.0_9	.1153	.1517	2.230	122.5_6
Normal boiling point	81.6_2	.7600	1.000	14.696	146.9_2
Critical point	132.8_8	26.2_{42}	34.5_{29}	$507._4$	239.1_8
Solid below transition	55	.0042	.0055	.081	99
	60	.0186	.0244	.359	108
Solid above transition	65	.061	.081	1.183	117
Liquid	70	.158	.208	3.06	126
	75	.332	.437	6.42	135
	80	.629	.828	12.16	144
	85	1.098	1.445	21.2	153
	90	1.796	2.36	34.7	162
	95	2.78	3.66	53.8	171
	100	4.11	5.41	79.5	180
	105	5.84	7.68	112.9	189
	110	8.04	10.57	155.4	198
	115	10.77	14.17	208.	207
	120	14.11	18.57	273.	216
	125	18.14	23.87	351.	225
	130	22.99	30.25	445.	234

Table 5-11/a. VAPOR PRESSURE OF LIQUID CARBON MONOXIDE

40/T	T	$Log_{10}P$ (atm)*		P	T	72/T
$^oK^{-1}$	^oK			atm	^oR	$^oR^{-1}$
.59	67.80	(9.1591 -10)	859	(.144)	122.03	.59
.58	68.97	9.2450 -10	855	.176	124.14	.58
.57	70.18	9.3305 -10	851	.214	126.32	.57
.56	71.43	9.4156 -10	846	.260	128.57	.56
.55	72.73	9.5002 -10	842	.316	130.91	.55
.54	74.07	9.5844 -10	838	.384	133.33	.54
.53	75.47	9.6682 -10	835	.466	135.85	.53
.52	76.92	9.7517 -10	832	.565	138.46	.52
.51	78.43	9.8349 -10	830	.684	141.18	.51
.50	80.00	9.9179 -10	826	.828	144.00	.50
.49	81.63	.0005	823	1.001	146.94	.49
.48	83.33	.0828	820	1.210	150.00	.48
.47	85.11	.1648	818	1.462	153.19	.47
.46	86.96	.2466	816	1.76	156.52	.46
.45	88.89	.3282	816	2.13	160.00	.45
.44	90.91	.4098	814	2.57	163.64	.44
.43	93.02	.4912	810	3.10	167.44	.43
.42	95.24	.5722	807	3.73	171.43	.42
.41	97.56	.6529	802	4.50	175.61	.41
.40	100.00	.7331	800	5.41	180.00	.40
.39	102.53	.8131	800	6.50	184.62	.39
.38	105.26	.8931	801	7.82	189.47	.38
.37	108.11	.9732	802	9.40	194.59	.37
.36	111.11	1.0534	805	11.31	200.00	.36
.35	114.29	1.1339	808	13.61	205.71	.35
.34	117.65	1.2147	812	16.40	211.76	.34
.33	121.21	1.2959	819	19.77	218.18	.33
.32	125.00	1.3778	834	23.87	225.00	.32
.31	129.03	1.4612	859	28.92	232.26	.31
.30	133.33	(1.5471)	896	(35.25)	240.00	.30
.29	137.93	(1.6367)		(43.32)	248.28	.29

*Tabulated values in this column are for interpolation in terms of reciprocal temperature.

' Figures in parentheses are extrapolated to permit interpolation to the critical point and triple point.

Table 5-11/b. CONSTANTS FOR $LOG_{10}P$ (SOLID) = A - B/T

	Units of P	A	Units of T	B
Below the transition	mm Hg	8.3509	^oK	424.94
	atm	5.4701	^oR	764.89
	psia	6.6373		
Above the transition	mm Hg	7.8469	^oK	393.91
	atm	4.9661	^oR	709.04
	psia	6.1333		

Table 5-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR CARBON MONOXIDE

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
60	3.500		.76543	12814	18.147	540	14.662	538	108
70	3.500		.89357	1281	18.687	467	15.200	465	126
80	3.500		1.0217	1281	19.154	412	15.665	412	144
90	3.500		1.1498	1282	19.566	369	16.077	367	162
100	3.500	1	1.2780	1282	19.935	334	16.444	333	180
110	3.501		1.4062	1281	20.269	304	16.777	304	198
120	3.501		1.5343	1282	20.573	281	17.081	279	216
130	3.501		1.6625	1281	20.854	259	17.360	259	234
140	3.501		1.7906	1282	21.113	241	17.619	241	252
150	3.501		1.9188	1281	21.354	226	17.860	226	270
160	3.501		2.0469	1282	21.580	213	18.086	212	288
170	3.501		2.1751	1281	21.793	200	18.298	199	306
180	3.501		2.3032	1282	21.993	189	18.497	189	324
190	3.501		2.4314	1282	22.182	180	18.686	180	342
200	3.501		2.5596	1281	22.362	170	18.866	170	360
210	3.501		2.6877	1282	22.532	163	19.036	163	378
220	3.501		2.8159	1282	22.695	156	19.199	155	396
230	3.501	1	2.9441	1282	22.851	149	19.354	149	414
240	3.502		3.0723	1282	23.000	143	19.503	143	432
250	3.502		3.2005	1282	23.143	137	19.646	137	450
260	3.502	1	3.3287	1282	23.280	132	19.783	132	468
270	3.503		3.4569	1282	23.412	128	19.915	127	486
280	3.503	1	3.5851	1283	23.540	123	20.042	123	504
290	3.504	1	3.7134	1283	23.663	119	20.165	119	522
300	3.505	1	3.8417	1283	23.782	115	20.284	114	540
310	3.506	2	3.9700	1284	23.897	111	20.398	111	558
320	3.508	1	4.0984	1284	24.008	108	20.509	108	576
330	3.509	2	4.2268	1285	24.116	105	20.617	104	594
340	3.511	2	4.3553	1286	24.221	101	20.721	102	612
350	3.513	3	4.4839	1287	24.322	99	20.823	98	630
360	3.516	3	4.6126	1287	24.421	97	20.921	96	648
370	3.519	3	4.7413	1289	24.518	94	21.017	94	666
380	3.522	3	4.8702	1290	24.612	91	21.111	91	684
390	3.525	4	4.9992	1291	24.703	89	21.202	88	702
400	3.529	4	5.1283	1293	24.792	88	21.290	87	720
410	3.533	4	5.2576	1294	24.880	85	21.377	84	738
420	3.537	5	5.3870	1296	24.965	83	21.461	83	756
430	3.542	5	5.5166	1297	25.048	82	21.544	80	774
440	3.547	5	5.6463	1300	25.130	79	21.624	79	792
450	3.552	6	5.7763	1301	25.209	79	21.703	77	810
460	3.558	6	5.9064	1304	25.288	76	21.780	76	828
470	3.564	6	6.0368	1306	25.364	75	21.856	73	846
480	3.570	7	6.1674	1308	25.439	73	21.929	72	864
490	3.577	6	6.2982	1310	25.512	73	22.001	72	882
500	3.583	7	6.4292	1314	25.585	71	22.073	69	900
510	3.590	7	6.5606	1315	25.656	71	22.142	69	918
520	3.597	8	6.6921	1319	25.727	68	22.211	67	936
530	3.605	7	6.8240	1321	25.795	67	22.278	65	954
540	3.612	8	6.9561	1323	25.862	66	22.343	65	972
550	3.620	8	7.0884	1327	25.928	66	22.408	63	990
560	3.628	8	7.2211	1330	25.994	64	22.471	63	1008
570	3.636	8	7.3541	1333	26.058	63	22.534	61	1026
580	3.644	9	7.4874	1335	26.121	63	22.595	60	1044
590	3.653	8	7.6209	1339	26.184	61	22.655	60	1062
600	3.661		7.7548		26.245		22.715		1080

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 5-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR CARBON MONOXIDE - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	3.661	9	7.7548	1342	26.245	61	22.715	58	1080
610	3.670	8	7.8890	1345	26.306	60	22.773	57	1098
620	3.678	9	8.0235	1348	26.366	58	22.830	57	1116
630	3.687	9	8.1583	1352	26.424	59	22.887	56	1134
640	3.696	9	8.2935	1355	26.483	57	22.943	55	1152
650	3.705	9	8.4290	1357	26.540	57	22.998	54	1170
660	3.714	8	8.5647	1361	26.597	55	23.052	53	1188
670	3.722	9	8.7008	1365	26.652	56	23.105	53	1206
680	3.731	9	8.8373	1368	26.708	54	23.158	52	1224
690	3.740	9	8.9741	1371	26.762	54	23.210	51	1242
700	3.749	9	9.1112	1373	26.816	53	23.261	50	1260
710	3.758	9	9.2485	1378	26.869	53	23.311	50	1278
720	3.767	9	9.3863	1381	26.922	52	23.361	49	1296
730	3.776	9	9.5244	1384	26.974	51	23.410	49	1314
740	3.785	9	9.6628	1387	27.025	51	23.459	47	1332
750	3.794	8	9.8015	1390	27.076	51	23.506	48	1350
760	3.802	9	9.9405	139	27.127	49	23.554	46	1368
770	3.811	9	10.080	140	27.176	50	23.600	47	1386
780	3.820	8	10.220	140	27.226	48	23.647	45	1404
790	3.828	9	10.360	140	27.274	49	23.692	45	1422
800	3.837	41	10.500	706	27.323	233	23.737	218	1440
850	3.878	40	11.206	714	27.556	223	23.955	207	1530
900	3.918	38	11.920	720	27.779	213	24.162	196	1620
950	3.956	35	12.640	728	27.992	204	24.358	186	1710
1000	3.991	33	13.368	733	28.196	195	24.544	179	1800
1050	4.024	30	14.101	739	28.391	188	24.723	171	1890
1100	4.054	29	14.840	745	28.579	181	24.894	164	1980
1150	4.083	27	15.585	750	28.760	174	25.058	158	2070
1200	4.110	25	16.335	755	28.934	169	25.216	153	2160
1250	4.135	23	17.090	759	29.103	162	25.369	146	2250
1300	4.158	21	17.849	763	29.265	158	25.515	142	2340
1350	4.179	20	18.612	767	29.423	152	25.657	137	2430
1400	4.199	19	19.379	770	29.575	148	25.794	133	2520
1450	4.218	18	20.149	774	29.723	143	25.927	129	2610
1500	4.236	16	20.923	776	29.866	139	26.056	125	2700
1550	4.252	15	21.699	780	30.005	135	26.181	122	2790
1600	4.267	14	22.479	782	30.140	132	26.303	118	2880
1650	4.281	13	23.261	785	30.272	128	26.421	115	2970
1700	4.294	13	24.046	787	30.400	125	26.536	112	3060
1750	4.307	12	24.833	790	30.525	121	26.648	110	3150
1800	4.319	11	25.623	792	30.646	119	26.758	106	3240
1850	4.330	10	26.415	793	30.765	115	26.864	105	3330
1900	4.340	10	27.208	795	30.880	113	26.969	101	3420
1950	4.350	9	28.003	798	30.993	110	27.070	100	3510
2000	4.359	9	28.801	799	31.103	108	27.170	97	3600
2050	4.368	8	29.600	801	31.211	105	27.267	95	3690
2100	4.376	8	30.401	802	31.316	103	27.362	93	3780
2150	4.384	7	31.203	803	31.419	101	27.455	92	3870
2200	4.391	7	32.006	804	31.520	99	27.547	89	3960
2250	4.398	7	32.810	806	31.619	97	27.636	88	4050
2300	4.405	7	33.616	807	31.716	95	27.724	86	4140
2350	4.412	6	34.423	809	31.811	93	27.810	84	4230
2400	4.418	6	35.232	809	31.904	91	27.894	83	4320
2450	4.424	5	36.041	810	31.995	89	27.977	81	4410
2500	4.429	6	36.851	812	32.084	88	28.058	80	4500
2550	4.435	5	37.663	812	32.172	86	28.138	78	4590
2600	4.440	5	38.475	814	32.258	85	28.216	77	4680
2650	4.445	5	39.289	814	32.343	83	28.293	76	4770
2700	4.450	4	40.103	815	32.426	82	28.369	75	4860
2750	4.454	5	40.918	816	32.508	80	28.444	73	4950
2800	4.459		41.734		32.588		28.517		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2800	4.459	5	41.734	817	32.588	79	28.517	71	5040
2850	4.464	4	42.551	817	32.667	77	28.588	71	5130
2900	4.468	4	43.368	818	32.744	77	28.659	70	5220
2950	4.472	4	44.186	819	32.821	75	28.729	69	5310
3000	4.476	4	45.005	820	32.896	74	28.798	68	5400
3050	4.480	4	45.825	820	32.970	73	28.866	67	5490
3100	4.484	3	46.645	821	33.043	72	28.933	65	5580
3150	4.487	4	47.466	822	33.115	70	28.998	65	5670
3200	4.491	3	48.288	822	33.185	70	29.063	64	5760
3250	4.494	3	49.110	823	33.255	69	29.127	63	5850
3300	4.497	3	49.933	824	33.324	67	29.190	62	5940
3350	4.500	4	50.757	824	33.391	67	29.252	62	6030
3400	4.504	3	51.581	824	33.458	66	29.314	60	6120
3450	4.507	3	52.405	826	33.524	65	29.374	60	6210
3500	4.510	2	53.231	825	33.589	64	29.434	59	6300
3550	4.512	3	54.056	827	33.653	63	29.493	58	6390
3600	4.515	3	54.883	826	33.716	62	29.551	58	6480
3650	4.518	3	55.709	828	33.778	61	29.609	57	6570
3700	4.521	2	56.537	827	33.839	61	29.666	56	6660
3750	4.523	3	57.364	828	33.900	60	29.722	55	6750
3800	4.526	3	58.192	829	33.960	59	29.777	55	6840
3850	4.529	2	59.021	829	34.019	59	29.832	54	6930
3900	4.531	3	59.850	830	34.078	57	29.886	53	7020
3950	4.534	2	60.680	830	34.135	57	29.939	53	7110
4000	4.536	3	61.510	830	34.192	57	29.992	52	7200
4050	4.539	2	62.340	831	34.249	56	30.044	52	7290
4100	4.541	2	63.171	832	34.305	55	30.096	51	7380
4150	4.543	3	64.003	832	34.360	54	30.147	50	7470
4200	4.546	2	64.835	832	34.414	54	30.197	50	7560
4250	4.548	2	65.667	832	34.468	53	30.247	50	7650
4300	4.550	2	66.499	834	34.521	53	30.297	48	7740
4350	4.552	2	67.333	833	34.574	52	30.345	49	7830
4400	4.554	3	68.166	834	34.626	51	30.394	48	7920
4450	4.557	2	69.000	834	34.677	51	30.442	47	8010
4500	4.559	2	69.834	835	34.728	50	30.489	47	8100
4550	4.561	2	70.669	835	34.778	50	30.536	46	8190
4600	4.563	2	71.504	835	34.828	50	30.582	46	8280
4650	4.565	2	72.339	836	34.878	49	30.628	46	8370
4700	4.567	2	73.175	836	34.927	48	30.674	45	8460
4750	4.569	2	74.011	837	34.975	48	30.719	44	8550
4800	4.571	2	74.848	837	35.023	47	30.763	44	8640
4850	4.573	2	75.685	837	35.070	47	30.807	44	8730
4900	4.575	2	76.522	838	35.117	46	30.851	43	8820
4950	4.577	2	77.360	837	35.163	46	30.894	43	8910
5000	4.579		78.197		35.209		30.937		9000

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 5-13. COEFFICIENTS FOR THE EQUATION OF STATE FOR CARBON MONOXIDE

$$Z = 1 + B_1 P + C_1 P^2$$

T °K	B_1 atm^{-1} *	C_1 atm^{-2} *	T °K	B_1 atm^{-1} *	C_1 atm^{-2} *
200	-.(2)2701	+ .(5)4485	800	+ .(3)434	+ .(6)111
210	-.(2)2260	.(5)4873	810	.(3)432	.(6)105
220	-.(2)1890	.(5)4851	820	.(3)430	.(7)99
230	-.(2)1578	.(5)4714	830	.(3)427	.(7)94
240	-.(2)1313	.(5)4480	840	.(3)425	.(7)89
250	-.(2)1087	.(5)4200	850	.(3)423	.(7)84
260	-.(3)893	.(5)3904	860	.(3)421	.(7)79
270	-.(3)725	.(5)3608	870	.(3)418	.(7)75
280	-.(3)580	.(5)3323	880	.(3)416	.(7)71
290	-.(3)455	.(5)3053	890	.(3)414	.(7)67
300	-.(3)345	.(5)2803	900	.(3)411	.(7)64
310	-.(3)249	.(5)2574	910	.(3)409	.(7)60
320	-.(3)165	.(5)2365	920	.(3)406	.(7)57
330	-.(4)92	.(5)2174	930	.(3)404	.(7)54
340	-.(4)26	.(5)2002	940	.(3)402	.(7)51
350	+.(4)31	.(5)1847	950	.(3)399	.(7)48
360	.(4)82	.(5)1706	960	.(3)397	.(7)45
370	.(3)126	.(5)1581	970	.(3)394	.(7)43
380	.(3)166	.(5)1466	980	.(3)392	.(7)40
390	.(3)201	.(5)1362	990	.(3)390	.(7)38
400	.(3)232	.(5)1269	1000	.(3)387	.(7)36
410	.(3)260	.(5)1182	1050	.(3)376	.(7)26
420	.(3)285	.(5)1104	1100	.(3)364	.(7)19
430	.(3)307	.(5)1031	1150	.(3)353	.(7)13
440	.(3)326	.(6)965	1200	.(3)342	.(8)9
450	.(3)343	.(6)903	1250	.(3)332	.(8)6
460	.(3)359	.(6)846	1300	.(3)322	.(8)3
470	.(3)372	.(6)792	1350	.(3)313	
480	.(3)384	.(6)742	1400	.(3)304	
490	.(3)395	.(6)696	1450	.(3)295	
500	.(3)404	.(6)652	1500	.(3)287	
510	.(3)412	.(6)612	1550	.(3)279	
520	.(3)419	.(6)574	1600	.(3)271	
530	.(3)426	.(6)538	1650	.(3)264	
540	.(3)432	.(6)505	1700	.(3)257	
550	.(3)437	.(6)474	1750	.(3)250	
560	.(3)440	.(6)447	1800	.(3)244	
570	.(3)443	.(6)420	1850	.(3)238	
580	.(3)446	.(6)395	1900	.(3)232	
590	.(3)448	.(6)372	1950	.(3)227	
600	.(3)450	.(6)350	2000	.(3)221	
610	.(3)451	.(6)330	2050	.(3)216	
620	.(3)452	.(6)311	2100	.(3)211	
630	.(3)453	.(6)293	2150	.(3)207	
640	.(3)453	.(6)276	2200	.(3)202	
650	.(3)453	.(6)260	2250	.(3)198	
660	.(3)453	.(6)245	2300	.(3)194	
670	.(3)453	.(6)231	2350	.(3)190	
680	.(3)452	.(6)218	2400	.(3)186	
690	.(3)451	.(6)206	2450	.(3)182	
700	.(3)450	.(6)195	2500	.(3)178	
710	.(3)449	.(6)184	2550	.(3)175	
720	.(3)448	.(6)174	2600	.(3)171	
730	.(3)446	.(6)164	2650	.(3)168	
740	.(3)445	.(6)155	2700	.(3)165	
750	.(3)443	.(6)146	2750	.(3)162	
760	.(3)442	.(6)139	2800	.(3)159	
770	.(3)440	.(6)131	2850	.(3)156	
780	.(3)438	.(6)124	2900	.(3)153	
790	.(3)436	.(6)117	2950	.(3)151	
			3000	.(3)148	

*Numbers in parentheses indicate the number of zeros immediately to the right of the decimal point.

CHAPTER 6

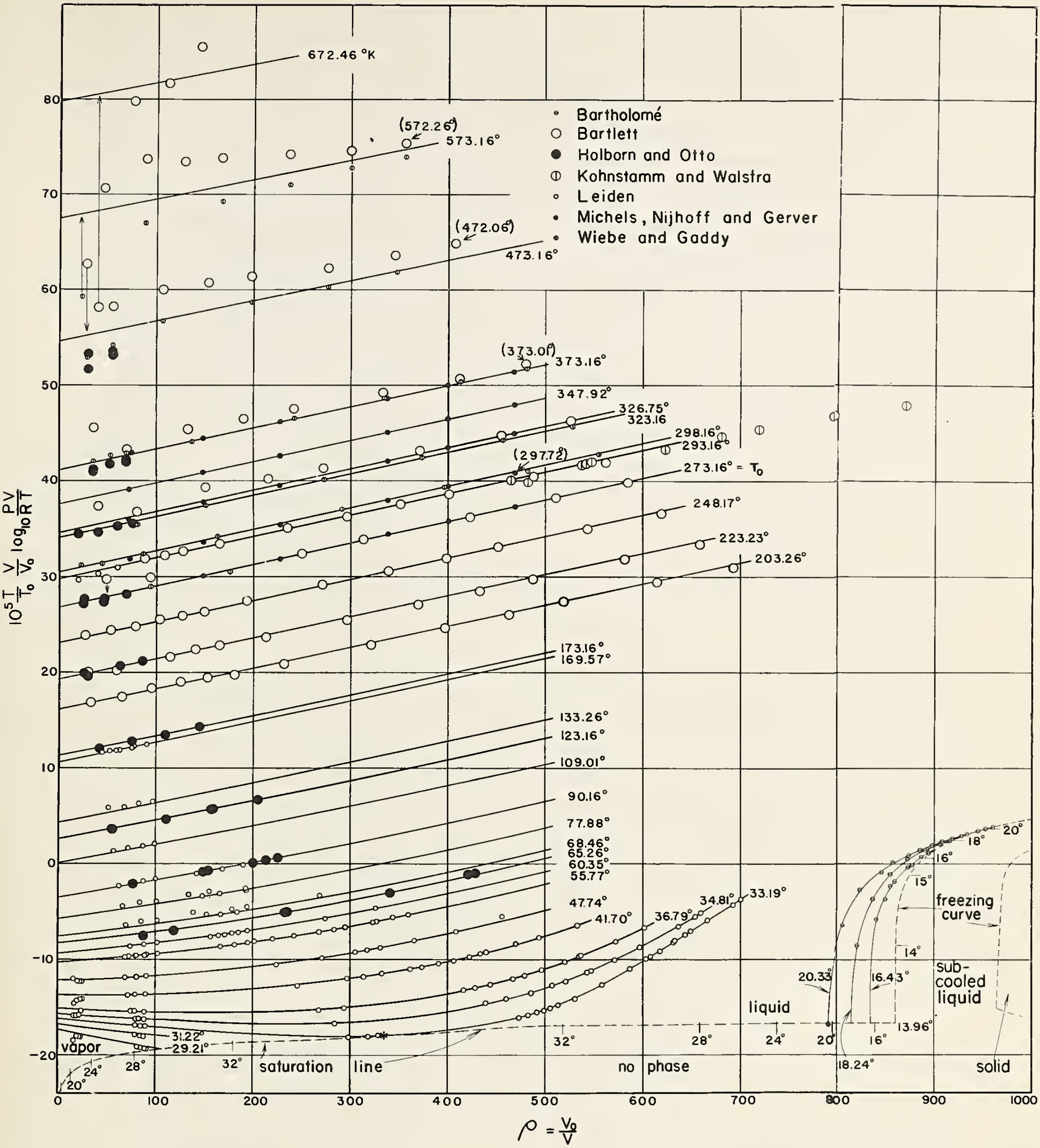
THE THERMODYNAMIC PROPERTIES OF HYDROGEN

The Correlation of the Experimental Data

The most extensive correlation of the thermodynamic properties of hydrogen available is contained in the publication by Woolley, Scott, and Brickwedde [1]. That correlation, partly analytical and partly graphical, treated the region from near condensation to 600°K to a density of 500 Amagats. A full discussion of the experimental data and of the method of correlation is to be found in the above-cited work, where the properties are tabulated as a function of density in Amagat units. Figure 6a, which is taken from this work, shows the extent and distribution of the PVT data employed in this correlation. The deviations of the correlation from the data are shown by the comparison between the solid curves and the plotted experimental points. The calculations in reference 1 of the real-gas corrections or the thermodynamic effects of the deviation from ideality of the gas were carried out by numerical integration and differentiation, with smoothing, of the tabulated compressibility factors. The thermodynamic properties have been calculated for the real gas by combining thermodynamic functions for the ideal gas with the real-gas corrections. The ideal-gas values for the thermodynamic functions for molecular hydrogen are from reference 1. The effect of mixing of the ortho and para forms has been included in the values of the entropy and of the free energy function in tables 6-5 and 6-12; the effect of nuclear spin is not included. The values for atomic hydrogen (table 6-12/a) were calculated by standard methods of statistical mechanics.

The present tabulation of the properties of hydrogen was obtained by interpolation from the values tabulated in reference 1. The tables given below (except for tables 6-11, 6-11/a, and 6-12/a) are for normal hydrogen (75 percent ortho and 25 percent para). The variation of the thermodynamic properties with ortho-para composition is negligible in tables 6-1 and 6-2. For tables 6-3 through 6-6, the influence is essentially dependent on the variation of the ideal-gas thermodynamic properties with composition. The ideal-gas properties for ortho and para hydrogen are given by Woolley, Scott, and Brickwedde [1]. The change in the sound velocity can be computed from the changes in the specific-heat ratio.

The directly determined experimental data include: specific heat by Scheel and Heuse [19], Eucken [20], and Workman [21]; isentropic cooling by expansion in the Lummer-Pringsheim method by Brinkworth [22], Eucken and Mücke [23], and Partington and Howe [24]; apparent values of C_V from the heat required for increases in gas pressure by Giacomini [25]; isentropic heating by compression of mixtures to ignition by Crofts [26]; the ratio of specific heats or the isentropic expansion coefficient in the resonance method of Clark and Katz [27, 28] and Koehler [29]; and the velocity of sound by Cornish and Eastman [30], Van Itterbeek and Mariens [31], Van Itterbeek and Van Doninck [32, 33], and Hodge [34]. Joule-Thomson data by Johnston, et al., [35, 36] are in fair agreement with this correlation.



V_0 is the molar volume of gas at 1 - atm. pressure and the ice point.

Figure 6a. PVT data for hydrogen available in 1948

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density, the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0, result, in general, from the correlating equations which were fitted to represent the experimental data over as wide a range as possible. Values for these quantities are given in various units in table 6-b. The value of ρ_0 for hydrogen, as given, 0.0898879 $g\ell^{-1}$, is slightly higher than the experimental measurements [74 - 78] averaging 0.08985 $g\ell^{-1}$, though they may be of lower accuracy than for some gases because of the smaller mass of gas involved. The most recent determination listed here was published in 1918. The value of η_0 for hydrogen as given, 8.411×10^{-5} poise, is well within the range of measured values [49, 51, 79 - 87], for which an average is 8.4522×10^{-5} poise, and near to the latest of these, 8.416×10^{-5} poise [49]. The value of k_0 for hydrogen as given, 4.021×10^{-4} cal $cm^{-1} sec^{-1} {}^\circ K^{-1}$, is well within the range of measured values [64 - 66, 69, 70, 73, 88 - 101] for which an average is 3.998×10^{-4} cal cm^{-1} $sec^{-1} {}^\circ K^{-1}$, with one recent value of 3.965×10^{-4} cal cm^{-1} $sec^{-1} {}^\circ K^{-1}$ [70] and another of 4.21×10^{-4} cal cm^{-1} $sec^{-1} {}^\circ K^{-1}$ [102]. The value of a_0 for hydrogen as given, 1261.1 m sec^{-1}, is within the range of experimental values [19, 30, 43, 103 - 108], for which an average is 1269.9 m sec^{-1}, and quite close to some of them such as 1260.9 m sec^{-1} [30], though the most recent determination listed here is 1286 m sec^{-1} [108].

The tables of viscosity and thermal conductivity were computed from the equations given in summary tables 1-B and 1-C, and the Prandtl numbers were computed from these and the tabulated specific heats.

The tables and equations selected to represent the vapor pressures of liquid $e - H_2$ are based on the work of Hoge and Arnold [37]; the critical points are those of Hoge and Lassiter [38]; and the vapor pressures of the solid and the triple point are taken from Woolley, Scott, and Brickwedde [1]. The prefix "e-" indicates an ortho-para composition corresponding to equilibrium at 20.4°K (0.21 percent ortho and 99.79 percent para). When approximate values of vapor pressures of normal hydrogen ($n - H_2$: 75 percent ortho, 25 percent para) are desired, they may be obtained by computing the values for $e - H_2$ at the same temperatures and multiplying by 0.96. More accurate values of vapor pressure for any mixture of para and ortho hydrogen in the range from the triple point to the boiling point may be computed from equations in reference 39.

The Reliability of the Tables

The tables are thought to be more reliable in the region from 0°C to 100°C than at temperatures considerably higher or lower where experimental difficulties are considerably greater. Inspection of figure 6a indicates that the best data have been fitted so closely in the good experimental region that the uncertainty here is of the order of a percent or two of Z-1 and probably somewhat better over most of the range of densities. For temperatures considerably higher or lower, the uncertainties are much greater. Although the fitting of virial coefficients with functions based on a suitable model would have been appropriate, the calculation of the present tables has not been based on such a procedure. Rather, the tables are a more direct representation of the data, though with some similarity to the results obtained using the Lennard-Jones 6-12 potential in the treatment for the region above 0°C. There is considerable uncertainty in the extrapolation

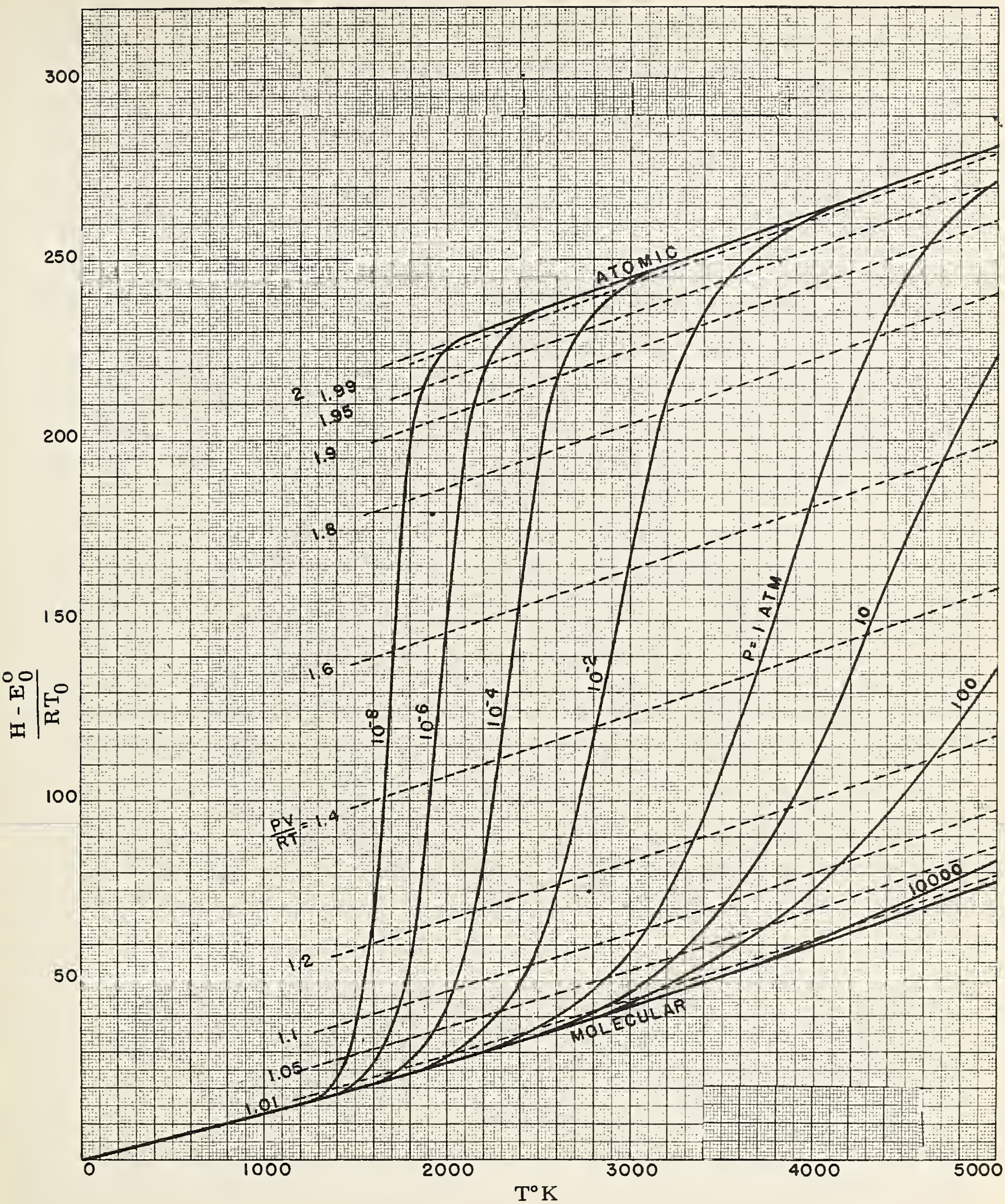


Figure 6b. The effect of dissociation on the enthalpy of hydrogen

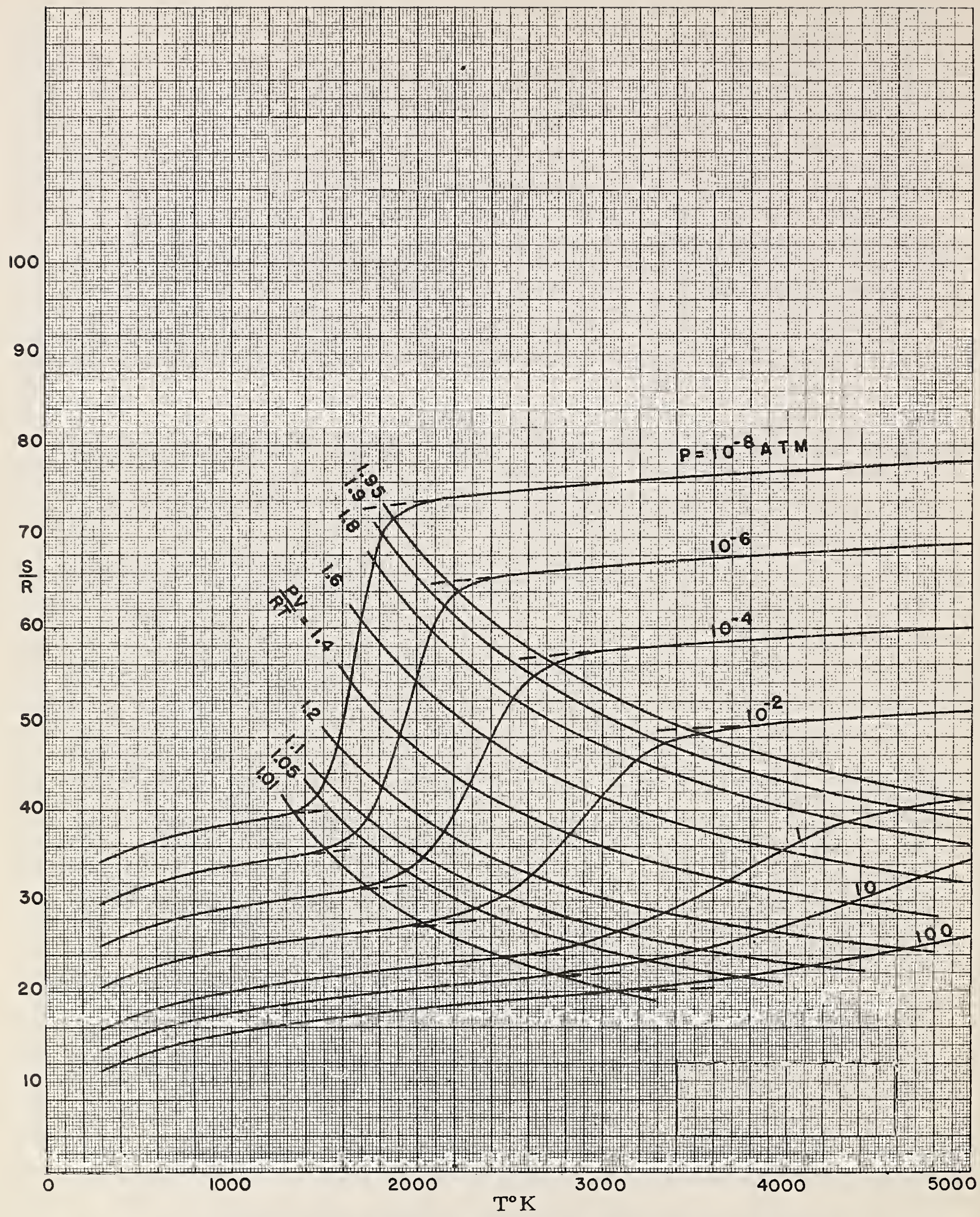


Figure 6c. The effect of dissociation on the entropy of hydrogen

to 600°K, the highest temperature covered, probably more than if the calculation had been based on a definite, reasonably acceptable intermolecular potential function. The derived corrections to the thermodynamic properties are, in the main, uncertain by amounts much greater than the 1 or 2 percent of $Z-1$, because of the increase in uncertainty in differentiation.

The accuracy of the specific-heat values (table 6-3) is doubtless not uniform throughout the table. The error in $(C_p - C_p^o)/R$ may possibly be about 10 percent, and may be considerably larger than this at low and at high temperatures. The effect of dissociation is not included here, but its magnitude may be estimated in the way indicated in reference 40. The effect on entropy and enthalpy can be estimated from figures 6b and 6c. The uncertainty in the tabulated values of enthalpy for the real gas has been very roughly estimated as 5 percent of the difference between the values of the function for the real and for the ideal gas. At 400°K and 100 atmospheres, the uncertainty in $(H - E_0^o)/RT_0$ amounts to about 0.003. The numerical uncertainty is probably considerably greater at higher temperatures and at quite low temperatures at this pressure, but is less at lower pressures. The values of S/R at 100 atmospheres appear to be uncertain by about 0.003 near 200°K with values less certain at lower temperature and possibly at the highest temperatures tabulated. At lower pressures, the values are thought to be more reliable.

On the basis of the reliabilities estimated for specific heats and compressibility factors, the values of γ (table 6-6) are considered to be reliable to within 10 percent of the departure from values for the ideal gas. A comparison with indirect experimental determinations of γ is shown in figure 6d.

The values of sound velocity at low frequency are thought to be quite reliable except at the lowest temperatures and at elevated pressures. The uncertainty is probably less than 0.001 for pressures of 10 atmospheres or less. For 100 atmospheres, it is probably less than 0.006 up to 100°K, 0.002 up to 200°K, and 0.001 at higher temperatures. Figure 6e shows the departure between the experimental data and the tabulated values.

The values of viscosity (table 6-8) were computed from the empirical equations given in summary table 1-B. Below 100°K, small corrections were applied to take into account the effect of density below the boiling point. Figure 6f is a comparison of the experimental results with those obtained from the empirical formula. The solid curve below the zero line represents the Sutherland equation fitted to the best data at 300°K and shows the inapplicability of this formula to the data for hydrogen. It is thought that the values of viscosity are reliable to within 0. 4 percent between 200°K and 400°K. Below 100°K, the uncertainty is probably as great as 1 percent.

The values of thermal conductivity (table 6-9) were computed from the empirical formula given in table 1-C. The estimated accuracy of the tabulated thermal conductivity is about 5 percent as is illustrated by figure 6g.

Figure 6h shows the experimental vapor pressure data of [37] plotted as deviations from table 6-11. The pressures given for e-H_2 are believed to be accurate to 0.2 or 0.3 mm Hg up to about 1 atmosphere. Above 1 atmosphere, the uncertainty gradually increases, reaching perhaps ± 8 mm Hg near the critical points. Uncertainty in the temperature scale is perhaps ±.020 degree, which is greater than the scatter of the data.

The reliability of the ideal-gas properties is indicated in summary table 1-D.

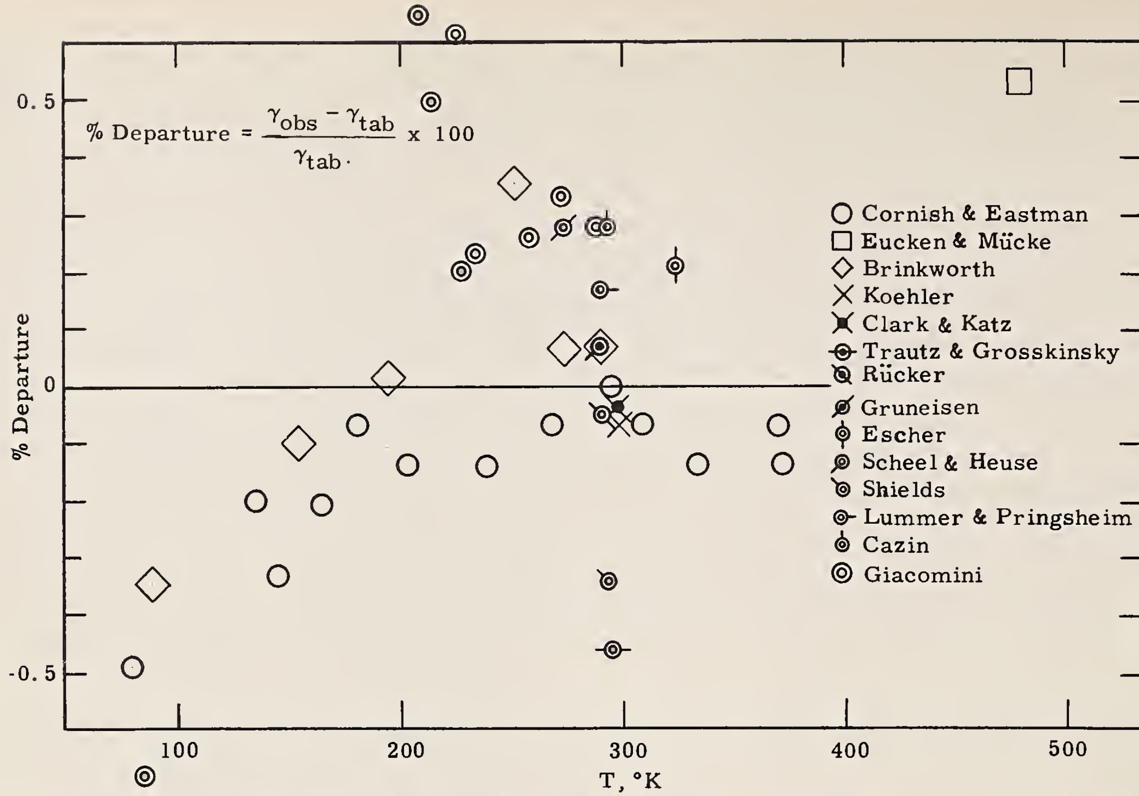


Figure 6d. Departures of experimental values of γ from the tabulated values for hydrogen (table 6-6)

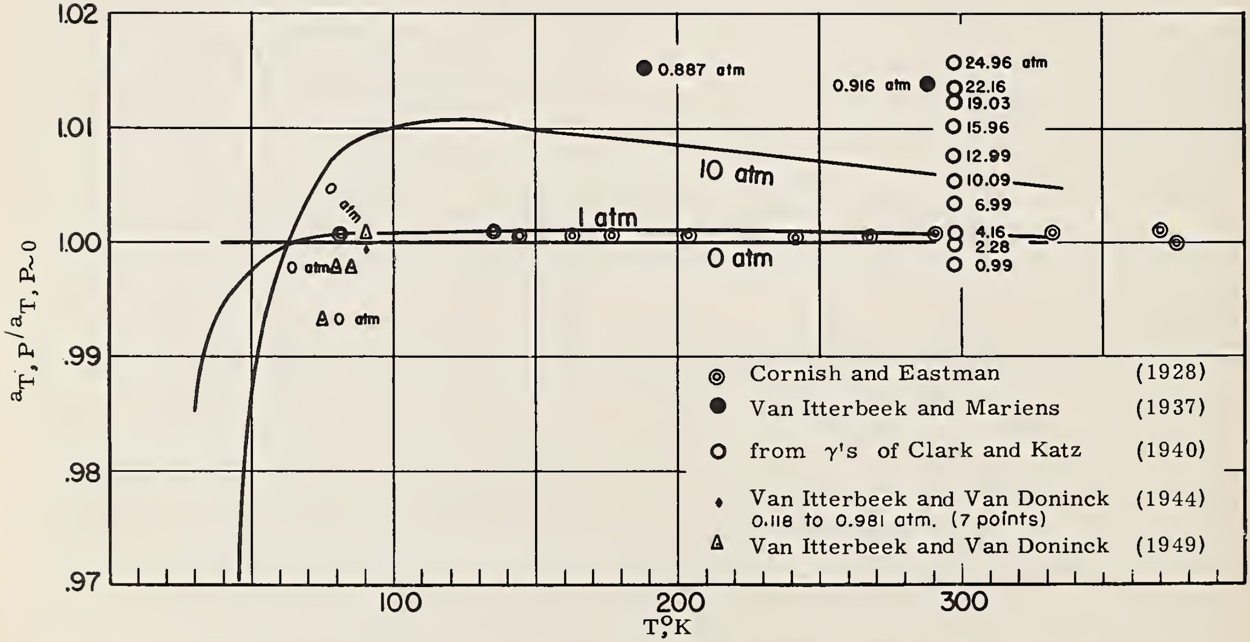


Figure 6e. Ratios of tabulated and experimental sound velocities to the calculated low-pressure values

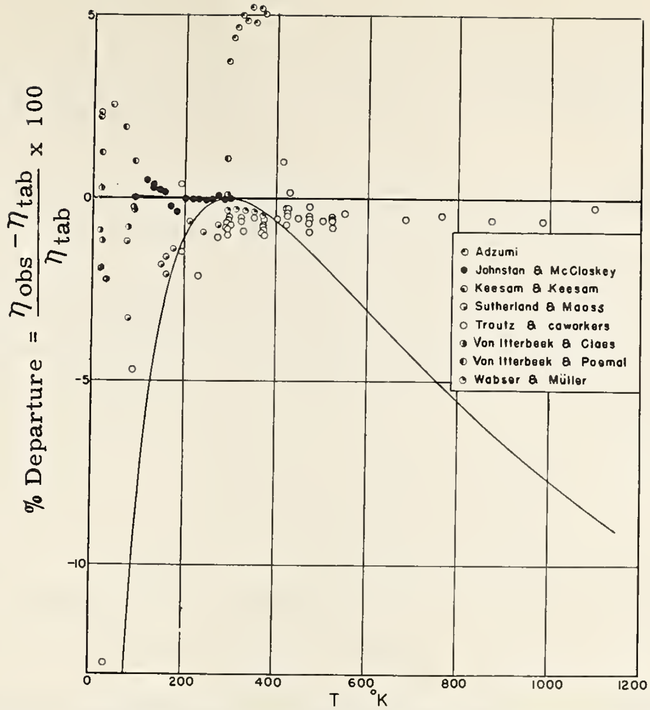


Figure 6f. Departures of experimental viscosities from the tabulated values for hydrogen (table 6-8)

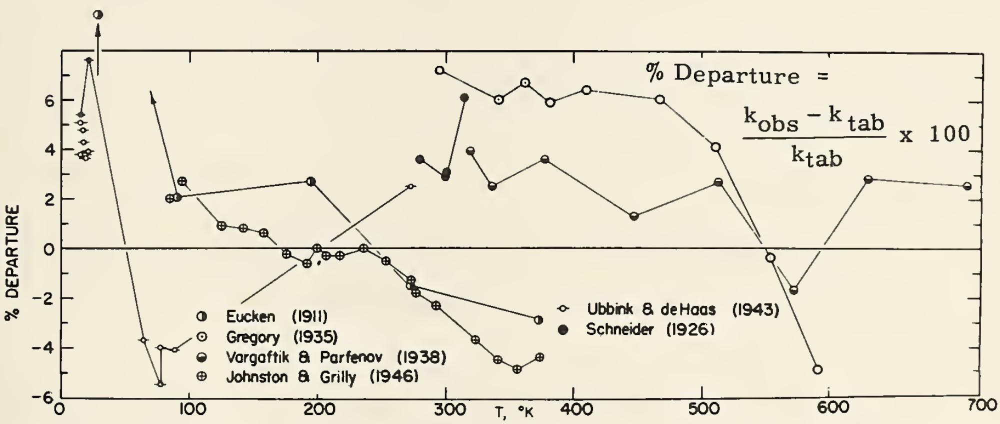


Figure 6g. Departures of experimental thermal conductivities from the tabulated values for hydrogen (table 6-9)

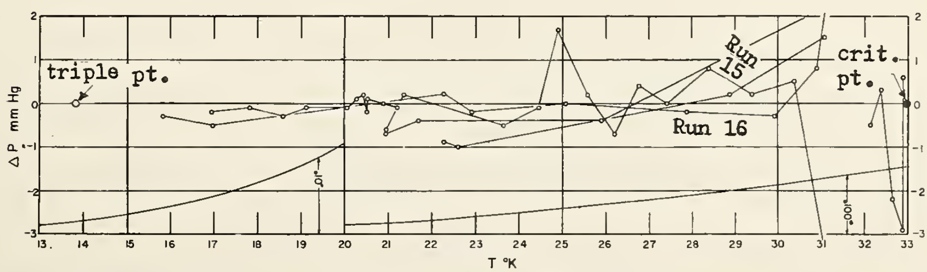


Figure 6h. Departures of experimental vapor pressures from the tabulated values for hydrogen (table 6-11)

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Table 6-a. VALUES OF THE GAS CONSTANT, R, FOR MOLECULAR HYDROGEN

Values of R for Molecular Hydrogen for Temperatures in Degrees Kelvin

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	40.7027	42.0551	30934.1	598.169
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.651989	0.673653	495.512	9.58163
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Molecular Hydrogen for Temperatures in Degrees Rankine

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	22.6126	23.3639	17185.6	332.316
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.362216	0.374252	275.284	5.32313
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 6-b. CONVERSION FACTORS FOR THE MOLECULAR HYDROGEN TABLES

Conversion Factors for Table 6-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	8.98854×10^{-5}
		mole cm^{-3}	4.45860×10^{-5}
		g $liter^{-1}$	8.98879×10^{-2}
		lb in^{-3}	3.24734×10^{-6}
		lb ft^{-3}	5.61140×10^{-3}

Conversion Factors for Tables 6-4 and 6-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	cal $mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	cal g^{-1}	269.256
		joules g^{-1}	1126.57
		Btu $(lb\ mole)^{-1}$	976.437
		Btu lb^{-1}	484.344

Conversion Factors for Tables 6-3, 6-5, and 6-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R,	C_p, S,	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.985709
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	4.12422
		Btu $(lb\ mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.985060

The molecular weight of hydrogen is 2.016 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 6-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	1261.1
		ft sec^{-1}	4137.5

Conversion Factors for Table 6-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	8.411×10^{-5}
		kg hr^{-1} m^{-1}	3.028×10^{-2}
		slug hr^{-1} ft^{-1}	6.324×10^{-4}
		lb sec^{-1} ft^{-1}	5.652×10^{-6}
		lb hr^{-1} ft^{-1}	2.035×10^{-2}

Conversion Factors for Table 6-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^{o}K^{-1}$	4.021×10^{-4}
		Btu ft^{-1} hr^{-1} $^{o}R^{-1}$	9.724×10^{-2}
		watts cm^{-1} $^{o}K^{-1}$	1.682×10^{-3}

Table 6-c. CONVERSION FACTORS FOR THE ATOMIC HYDROGEN TABLES

Conversion Factors for Table 6-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$	$(H^o - E_0^o)$	cal $mole^{-1}$	542.821
		cal g^{-1}	538.512
		joules g^{-1}	2253.14
		Btu $(lb\ mole)^{-1}$	976.437
		Btu lb^{-1}	968.688

Conversion Factors for Table 6-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
		cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	1.97142
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	8.24844
		Btu $(lb\ mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	1.97012

Table 6-1. COMPRESSIBILITY FACTOR FOR HYDROGEN $Z = PV/RT$

°K	.01 atm		.1 atm		1 atm		°R
20	.9991	6	.9909	58			36
30	.9997	1	.9967	18	.9662	183	54
40	.9998	1	.9985	7	.9845	74	72
50	.9999	1	.9992	3	.9919	36	90
60	1.0000		.9995	2	.9955	20	108
70	1.0000		.9997	2	.9975	11	126
80	1.0000		.9999		.9986	7	144
90	1.0000		.9999	1	.9993	5	162
100	1.0000		1.0000		.9998	3	180
110	1.0000		1.0000		1.0001	2	198
120	1.0000		1.0000		1.0003	1	216
130	1.0000		1.0000		1.0004	1	234
140	1.0000		1.0000	1	1.0005	1	252
150	1.0000		1.0001		1.0006		270
160	1.0000		1.0001		1.0006		288
170	1.0000		1.0001		1.0006	1	306
180	1.0000		1.0001		1.0007		324
190	1.0000		1.0001		1.0007		342
200	1.0000		1.0001		1.0007		360
210	1.0000		1.0001		1.0007		378
220	1.0000		1.0001		1.0007		396
230	1.0000		1.0001		1.0007		414
240	1.0000		1.0001		1.0007	− 1	432
250	1.0000		1.0001		1.0006		450
260	1.0000		1.0001		1.0006		468
270	1.0000		1.0001		1.0006		486
280	1.0000		1.0001		1.0006		504
290	1.0000		1.0001		1.0006		522
300	1.0000		1.0001		1.0006		540
310	1.0000		1.0001		1.0006		558
320	1.0000		1.0001		1.0006		576
330	1.0000		1.0001		1.0006	− 1	594
340	1.0000		1.0001		1.0005		612
350	1.0000		1.0001		1.0005		630
360	1.0000		1.0001		1.0005		648
370	1.0000		1.0001		1.0005		666
380	1.0000		1.0001		1.0005		684
390	1.0000		1.0001	− 1	1.0005		702
400	1.0000		1.0000		1.0005		720
410	1.0000		1.0000		1.0005		738
420	1.0000		1.0000		1.0005		756
430	1.0000		1.0000		1.0005	− 1	774
440	1.0000		1.0000		1.0004		792
450	1.0000		1.0000		1.0004		810
460	1.0000		1.0000		1.0004		828
470	1.0000		1.0000		1.0004		846
480	1.0000		1.0000		1.0004		864
490	1.0000		1.0000		1.0004		882
500	1.0000		1.0000		1.0004		900
510	1.0000		1.0000		1.0004		918
520	1.0000		1.0000		1.0004		936
530	1.0000		1.0000		1.0004		954
540	1.0000		1.0000		1.0004		972
550	1.0000		1.0000		1.0004		990
560	1.0000		1.0000		1.0004		1008
570	1.0000		1.0000		1.0004	− 1	1026
580	1.0000		1.0000		1.0003		1044
590	1.0000		1.0000		1.0003		1062
600	1.0000		1.0000		1.0003		1080

°K	1 atm		4 atm		7 atm		10 atm		°R
30	.9662	183							54
40	.9845	74	.9362	313	.8853	578	.8317	869	72
50	.9919	36	.9675	147	.9431	260	.9186	378	90
60	.9955	20	.9822	79	.9691	139	.9564	196	108
70	.9975	11	.9901	45	.9830	78	.9760	112	126
80	.9986	7	.9946	27	.9908	48	.9872	68	144
90	.9993	5	.9973	19	.9956	31	.9940	43	162
100	.9998	3	.9992	9	.9987	18	.9983	28	180
110	1.0001	2	1.0001	11	1.0005	16	1.0011	19	198
120	1.0003	1	1.0012	4	1.0021	8	1.0030	13	216
130	1.0004	1	1.0016	4	1.0029	7	1.0043	9	234
140	1.0005	1	1.0020	4	1.0036	5	1.0052	6	252
150	1.0006		1.0024		1.0041	2	1.0058	4	270
160	1.0006		1.0024	1	1.0043	1	1.0062	3	288
170	1.0006	1	1.0025	3	1.0044	4	1.0065	2	306
180	1.0007		1.0028		1.0048		1.0067	1	324
190	1.0007		1.0028		1.0048		1.0068		342
200	1.0007		1.0028		1.0048		1.0068		360
210	1.0007		1.0028		1.0048		1.0068	- 1	378
220	1.0007		1.0028		1.0048		1.0067		396
230	1.0007		1.0028	- 1	1.0048	- 1	1.0067	- 1	414
240	1.0007	- 1	1.0027	- 2	1.0047	- 3	1.0066	- 1	432
250	1.0006		1.0025	- 1	1.0044		1.0065	- 1	450
260	1.0006		1.0024		1.0044	- 1	1.0064	- 1	468
270	1.0006		1.0024		1.0043	- 1	1.0063	- 2	486
280	1.0006		1.0024		1.0042		1.0061	- 1	504
290	1.0006		1.0024		1.0042		1.0060	- 1	522
300	1.0006		1.0024		1.0042	- 1	1.0059	- 1	540
310	1.0006		1.0024		1.0041		1.0058	- 1	558
320	1.0006		1.0024	- 1	1.0041	- 1	1.0057	- 1	576
330	1.0006	- 1	1.0023	- 2	1.0040	- 3	1.0056	- 2	594
340	1.0005		1.0021	- 1	1.0037	- 1	1.0054	- 1	612
350	1.0005		1.0020		1.0036		1.0053	- 1	630
360	1.0005		1.0020		1.0036	- 1	1.0052	- 1	648
370	1.0005		1.0020		1.0035		1.0051	- 1	666
380	1.0005		1.0020		1.0035	- 1	1.0050	- 1	684
390	1.0005		1.0020		1.0034		1.0049	- 1	702
400	1.0005		1.0020		1.0034		1.0048	- 1	720
410	1.0005		1.0020	- 1	1.0034	- 1	1.0047	- 1	738
420	1.0005		1.0019		1.0033		1.0046		756
430	1.0005	- 1	1.0019	- 2	1.0033	- 3	1.0046	- 1	774
440	1.0004		1.0017	- 1	1.0030		1.0045	- 1	792
450	1.0004		1.0016		1.0030	- 1	1.0044	- 1	810
460	1.0004		1.0016		1.0029		1.0043	- 1	828
470	1.0004		1.0016		1.0029	- 1	1.0042	- 1	846
480	1.0004		1.0016		1.0028		1.0041	- 1	864
490	1.0004		1.0016		1.0028		1.0040		882
500	1.0004		1.0016		1.0028		1.0040		900
510	1.0004		1.0016		1.0028		1.0040	- 1	918
520	1.0004		1.0016		1.0028	- 1	1.0039	- 1	936
530	1.0004		1.0016		1.0027	- 1	1.0038	- 1	954
540	1.0004		1.0016	- 1	1.0026		1.0037	- 1	972
550	1.0004		1.0015		1.0026		1.0036		990
560	1.0004		1.0015		1.0026		1.0036		1008
570	1.0004	- 1	1.0015	- 2	1.0025	- 1	1.0036	- 1	1026
580	1.0003		1.0013		1.0024		1.0035		1044
590	1.0003		1.0013	- 1	1.0023		1.0035	- 1	1062
600	1.0003		1.0012		1.0023		1.0034		1080

Table 6-1. COMPRESSIBILITY FACTOR FOR HYDROGEN - Cont. Z = PV/RT

°K	10 atm		40 atm		70 atm		100 atm		°R
40	.8317	869							72
50	.9186	378							90
60	.9564	196	.8757	581	.8700	661	.9395	436	108
70	.9760	112	.9338	344	.9361	421	.9831	343	126
80	.9872	68	.9682	212	.9782	268	1.0174	233	144
90	.9940	43	.9894	135	1.0050	172	1.0407	153	162
100	.9983	28	1.0029	88	1.0222	110	1.0560	103	180
110	1.0011	19	1.0117	59	1.0332	73	1.0663	63	198
120	1.0030	13	1.0176	40	1.0405	52	1.0726	39	216
130	1.0043	9	1.0216	27	1.0457	31	1.0765	21	234
140	1.0052	6	1.0243	17	1.0488	19	1.0786	10	252
150	1.0058	4	1.0260	11	1.0507	9	1.0796	2	270
160	1.0062	3	1.0271	8	1.0516	6	1.0798	- 4	288
170	1.0065	2	1.0279	4	1.0522	1	1.0794	- 9	306
180	1.0067	1	1.0283	1	1.0523	- 4	1.0785	- 12	324
190	1.0068		1.0284	- 1	1.0519	- 6	1.0773	- 13	342
200	1.0068		1.0283	- 2	1.0513	- 7	1.0760	- 15	360
210	1.0068	- 1	1.0281	- 5	1.0506	- 9	1.0745	- 15	378
220	1.0067		1.0276	- 2	1.0497	- 8	1.0730	- 16	396
230	1.0067	- 1	1.0274	- 5	1.0489	- 9	1.0714	- 16	414
240	1.0066	- 1	1.0269	- 5	1.0480	- 11	1.0698	- 16	432
250	1.0065	- 1	1.0264	- 5	1.0469	- 10	1.0682	- 15	450
260	1.0064	- 1	1.0259	- 4	1.0459	- 9	1.0667	- 16	468
270	1.0063	- 2	1.0255	- 8	1.0450	- 11	1.0651	- 15	486
280	1.0061	- 1	1.0247	- 5	1.0439	- 10	1.0636	- 15	504
290	1.0060	- 1	1.0242	- 4	1.0429	- 9	1.0621	- 14	522
300	1.0059	- 1	1.0238	- 4	1.0420	- 8	1.0607	- 13	540
310	1.0058	- 1	1.0234	- 5	1.0412	- 10	1.0594	- 15	558
320	1.0057	- 1	1.0229	- 4	1.0402	- 7	1.0579	- 13	576
330	1.0056	- 2	1.0225	- 8	1.0395	- 11	1.0566	- 13	594
340	1.0054	- 1	1.0217	- 4	1.0384	- 8	1.0553	- 12	612
350	1.0053	- 1	1.0213	- 4	1.0376	- 9	1.0541	- 12	630
360	1.0052	- 1	1.0209	- 4	1.0367	- 6	1.0529	- 11	648
370	1.0051	- 1	1.0205	- 4	1.0361	- 8	1.0518	- 11	666
380	1.0050	- 1	1.0201	- 4	1.0353	- 7	1.0507	- 11	684
390	1.0049	- 1	1.0197	- 4	1.0346	- 7	1.0496	- 10	702
400	1.0048	- 1	1.0193	- 3	1.0339	- 7	1.0486	- 10	720
410	1.0047	- 1	1.0190	- 5	1.0332	- 7	1.0476	- 10	738
420	1.0046		1.0185	- 1	1.0325	- 4	1.0466	- 9	756
430	1.0046	- 1	1.0184	- 4	1.0321	- 7	1.0457	- 9	774
440	1.0045	- 1	1.0180	- 4	1.0314	- 7	1.0448	- 9	792
450	1.0044	- 1	1.0176	- 4	1.0307	- 6	1.0439	- 8	810
460	1.0043	- 1	1.0172	- 4	1.0301	- 6	1.0431	- 8	828
470	1.0042	- 1	1.0168	- 3	1.0295	- 6	1.0423	- 8	846
480	1.0041	- 1	1.0165	- 4	1.0289	- 6	1.0415	- 8	864
490	1.0040		1.0161	- 1	1.0283	- 3	1.0407	- 7	882
500	1.0040		1.0160	- 1	1.0280	- 4	1.0400	- 8	900
510	1.0040	- 1	1.0159	- 4	1.0276	- 5	1.0392	- 7	918
520	1.0039	- 1	1.0155	- 3	1.0271	- 6	1.0385	- 7	936
530	1.0038	- 1	1.0152	- 4	1.0265	- 5	1.0378	- 6	954
540	1.0037	- 1	1.0148	- 3	1.0260	- 5	1.0372	- 6	972
550	1.0036		1.0145	- 1	1.0255	- 3	1.0366	- 6	990
560	1.0036		1.0144	- 1	1.0252	- 3	1.0360	- 6	1008
570	1.0036	- 1	1.0143	- 3	1.0249	- 5	1.0354	- 6	1026
580	1.0035		1.0140	- 1	1.0244	- 3	1.0348	- 6	1044
590	1.0035	- 1	1.0139	- 3	1.0241	- 4	1.0342	- 5	1062
600	1.0034		1.0136		1.0237		1.0337		1080

°K	.01 atm		.1 atm		1 atm		°R
20	.13679	−4565	1.3792	−4651			36
30	.091137	−22791	.91411	−22976	9.4297	−24889	54
40	.068346	−13675	.68435	−13725	6.9408	−14296	72
50	.054671	− 9116	.54710	− 9132	5.5112	− 9351	90
60	.045555	− 6508	.45578	− 6519	4.5761	− 6616	108
70	.039047	− 4881	.39059	− 4889	3.9145	− 4931	126
80	.034166	− 3796	.34170	− 3797	3.4214	− 3823	144
90	.030370	− 3037	.30373	− 3040	3.0391	− 3053	162
100	.027333	− 2485	.27333	− 2485	2.7338	− 2492	180
110	.024848	− 2071	.24848	− 2071	2.4846	− 2075	198
120	.022777	− 1752	.22777	− 1752	2.2771	− 1754	216
130	.021025	− 1502	.21025	− 1502	2.1017	− 1503	234
140	.019523	− 1301	.19523	− 1303	1.9514	− 1303	252
150	.018222	− 1139	.18220	− 1139	1.8211	− 1138	270
160	.017083	− 1005	.17081	− 1004	1.7073	− 1004	288
170	.016078	− 893	.16077	− 894	1.6069	− 895	306
180	.015185	− 799	.15183	− 799	1.5174	− 798	324
190	.014386	− 720	.14384	− 719	1.4376	− 719	342
200	.013666	− 650	.13665	− 651	1.3657	− 650	360
210	.013016	− 592	.13014	− 591	1.3007	− 592	378
220	.012424	− 540	.12423	− 540	1.2415	− 539	396
230	.011884	− 495	.11883	− 495	1.1876	− 495	414
240	.011389	− 456	.11388	− 456	1.1381	− 454	432
250	.010933	− 420	.10932	− 420	1.0927	− 421	450
260	.010513	− 390	.10512	− 390	1.0506	− 389	468
270	.010123	− 361	.10122	− 361	1.0117	− 361	486
280	.009762	− 337	.09761	− 337	.9756	− 336	504
290	.009425	− 314	.09424	− 314	.9420	− 314	522
300	.009111	− 294	.09110	− 294	.9106	− 294	540
310	.008817	− 275	.08816	− 275	.8812	− 276	558
320	.008542	− 259	.08541	− 259	.8536	− 258	576
330	.008283	− 244	.08282	− 244	.8278	− 243	594
340	.008039	− 230	.08038	− 229	.8035	− 229	612
350	.007809	− 216	.07809	− 217	.7806	− 217	630
360	.007593	− 206	.07592	− 205	.7589	− 205	648
370	.007387	− 194	.07387	− 195	.7384	− 195	666
380	.007193	− 185	.07192	− 184	.7189	− 184	684
390	.007008	− 175	.07008	− 175	.7005	− 175	702
400	.006833	− 166	.06833	− 166	.6830	− 167	720
410	.006667	− 159	.06667	− 159	.6663	− 158	738
420	.006508	− 151	.06508	− 151	.6505	− 149	756
430	.006357	− 145	.06357	− 145	.6356	− 146	774
440	.006212	− 138	.06212	− 138	.6210	− 138	792
450	.006074	− 132	.06074	− 132	.6072	− 132	810
460	.005942	− 126	.05942	− 126	.5940	− 127	828
470	.005816	− 122	.05816	− 122	.5813	− 121	846
480	.005694	− 116	.05694	− 116	.5692	− 116	864
490	.005578	− 111	.05578	− 111	.5576	− 112	882
500	.005467	− 108	.05467	− 108	.5464	− 107	900
510	.005359	− 103	.05359	− 103	.5357	− 103	918
520	.005256	− 99	.05256	− 99	.5254	− 99	936
530	.005157	− 95	.05157	− 95	.5155	− 95	954
540	.005062	− 92	.05062	− 92	.5060	− 92	972
550	.004970	− 89	.04970	− 89	.4968	− 89	990
560	.004881	− 86	.04881	− 86	.4879	− 86	1008
570	.004795	− 82	.04795	− 82	.4793	− 82	1026
580	.004713	− 80	.04713	− 80	.4711	− 80	1044
590	.004633	− 77	.04633	− 77	.4631	− 77	1062
600	.004556		.04556		.4554		1080

°K	1 atm		4 atm		7 atm		10 atm		°R
30	9.4297	-24889							54
40	6.9408	-14296	29.195	-6595	54.029	-13455	82.16	-2265	72
50	5.5112	- 9351	22.600	-4048	40.574	- 7669	59.51	-1188	90
60	4.5761	- 6616	18.552	-2777	32.905	- 5100	47.632	- 7625	108
70	3.9145	- 4931	15.775	-2035	27.805	- 3667	40.007	- 5398	126
80	3.4214	- 3823	13.740	-1559	24.138	- 2816	34.609	- 4056	144
90	3.0391	- 3053	12.181	-1239	21.352	- 2194	30.553	- 3174	162
100	2.7338	- 2492	10.942	-1004	19.158	- 1773	27.379	- 2558	180
110	2.4846	- 2075	9.938	- 838	17.385	- 1475	24.821	- 2112	198
120	2.2771	- 1754	9.100	- 703	15.910	- 1235	22.709	- 1774	216
130	2.1017	- 1503	8.397	- 603	14.675	- 1058	20.935	- 1513	234
140	1.9514	- 1303	7.794	- 523	13.617	- 914	19.422	- 1305	252
150	1.8211	- 1138	7.271	- 454	12.703	- 796	18.117	- 1139	270
160	1.7073	- 1004	6.817	- 402	11.907	- 702	16.978	- 1004	288
170	1.6069	- 895	6.415	- 358	11.205	- 627	15.974	- 890	306
180	1.5174	- 798	6.057	- 319	10.578	- 556	15.084	- 795	324
190	1.4376	- 719	5.738	- 287	10.022	- 501	14.289	- 715	342
200	1.3657	- 650	5.451	- 259	9.521	- 454	13.574	- 646	360
210	1.3007	- 592	5.192	- 236	9.067	- 412	12.928	- 587	378
220	1.2415	- 539	4.956	- 216	8.655	- 376	12.341	- 536	396
230	1.1876	- 495	4.740	- 197	8.279	- 344	11.805	- 491	414
240	1.1381	- 454	4.543	- 181	7.935	- 315	11.314	- 451	432
250	1.0927	- 421	4.362	- 167	7.620	- 293	10.863	- 417	450
260	1.0506	- 389	4.195	- 155	7.327	- 271	10.446	- 386	468
270	1.0117	- 361	4.040	- 145	7.056	- 251	10.060	- 357	486
280	.9756	- 336	3.895	- 134	6.805	- 235	9.703	- 334	504
290	.9420	- 314	3.761	- 125	6.570	- 219	9.369	- 311	522
300	.9106	- 294	3.6356	- 1173	6.351	- 204	9.058	- 292	540
310	.8812	- 276	3.5183	- 1099	6.147	- 192	8.766	- 273	558
320	.8536	- 258	3.4084	- 1030	5.955	- 180	8.493	- 256	576
330	.8278	- 243	3.3054	- 966	5.775	- 168	8.237	- 241	594
340	.8035	- 229	3.2088	- 913	5.607	- 160	7.996	- 228	612
350	.7806	- 217	3.1175	- 866	5.447	- 151	7.768	- 215	630
360	.7589	- 205	3.0309	- 819	5.296	- 143	7.553	- 203	648
370	.7384	- 195	2.9490	- 776	5.153	- 136	7.350	- 193	666
380	.7189	- 184	2.8714	- 737	5.017	- 128	7.157	- 183	684
390	.7005	- 175	2.7977	- 699	4.889	- 122	6.974	- 173	702
400	.6830	- 167	2.7278	- 665	4.767	- 116	6.801	- 166	720
410	.6663	- 158	2.6613	- 631	4.651	- 111	6.635	- 157	738
420	.6505	- 149	2.5982	- 605	4.540	- 105	6.478	- 151	756
430	.6356	- 146	2.5377	- 571	4.435	- 100	6.327	- 143	774
440	.6210	- 138	2.4806	- 549	4.335	- 96	6.184	- 137	792
450	.6072	- 132	2.4257	- 528	4.239	- 92	6.047	- 130	810
460	.5940	- 127	2.3729	- 504	4.147	- 88	5.917	- 126	828
470	.5813	- 121	2.3225	- 484	4.059	- 84	5.791	- 120	846
480	.5692	- 116	2.2741	- 464	3.975	- 81	5.671	- 115	864
490	.5576	- 112	2.2277	- 446	3.894	- 78	5.556	- 111	882
500	.5464	- 107	2.1831	- 428	3.8159	- 749	5.445	- 107	900
510	.5357	- 103	2.1403	- 412	3.7410	- 719	5.338	- 102	918
520	.5254	- 99	2.0991	- 396	3.6691	- 689	5.236	- 98	936
530	.5155	- 95	2.0595	- 381	3.6002	- 663	5.138	- 95	954
540	.5060	- 92	2.0214	- 366	3.5339	- 642	5.043	- 91	972
550	.4968	- 89	1.9848	- 354	3.4697	- 620	4.952	- 89	990
560	.4879	- 86	1.9494	- 342	3.4077	- 595	4.863	- 85	1008
570	.4793	- 82	1.9152	- 326	3.3482	- 574	4.778	- 82	1026
580	.4711	- 80	1.8826	- 320	3.2908	- 554	4.696	- 79	1044
590	.4631	- 77	1.8506	- 306	3.2354	- 539	4.617	- 77	1062
600	.4554		1.8200		3.1815		4.540		1080

°K	10 atm		40 atm		70 atm		100 atm		°R
40	82.16	-2265							72
50	59.51	-1188							90
60	47.632	- 7625	208.08	-4082	366.53	-7455	484.88	-8770	108
70	40.007	- 5398	167.26	-2611	291.98	-4749	397.18	-6136	126
80	34.609	- 4056	141.15	-1837	244.49	-3296	335.82	-4400	144
90	30.553	- 3174	122.78	-1377	211.53	-2436	291.82	-3299	162
100	27.379	- 2558	109.01	-1077	187.17	-1883	258.83	-2580	180
110	24.821	- 2112	98.24	- 871	168.34	-1511	233.03	-2067	198
120	22.709	- 1774	89.53	- 721	153.23	-1249	212.36	-1705	216
130	20.935	- 1513	82.32	- 608	140.74	-1044	195.31	-1430	234
140	19.422	- 1305	76.24	- 520	130.30	- 890	181.01	-1223	252
150	18.117	- 1139	71.04	- 451	121.40	- 769	168.78	-1057	270
160	16.978	- 1004	66.53	- 396	113.71	- 675	158.21	- 926	288
170	15.974	- 890	62.57	- 350	106.96	- 595	148.95	- 815	306
180	15.084	- 795	59.07	- 312	101.01	- 528	140.80	- 726	324
190	14.289	- 715	55.95	- 279	95.73	- 473	133.54	- 653	342
200	13.574	- 646	53.16	- 252	91.00	- 428	127.01	- 588	360
210	12.928	- 587	50.64	- 228	86.72	- 387	121.13	- 534	378
220	12.341	- 536	48.36	- 209	82.85	- 354	115.79	- 487	396
230	11.805	- 491	46.27	- 191	79.31	- 324	110.92	- 446	414
240	11.314	- 451	44.36	- 175	76.07	- 297	106.46	- 411	432
250	10.863	- 417	42.61	- 162	73.10	- 274	102.35	- 380	450
260	10.446	- 386	40.99	- 150	70.36	- 255	98.55	- 350	468
270	10.060	- 357	39.49	- 138	67.81	- 235	95.05	- 327	486
280	9.703	- 334	38.11	- 130	65.46	- 220	91.78	- 304	504
290	9.369	- 311	36.81	- 121	63.26	- 205	88.74	- 284	522
300	9.058	- 292	35.596	- 1135	61.21	- 193	85.90	- 267	540
310	8.766	- 273	34.461	- 1060	59.28	- 180	83.23	- 249	558
320	8.493	- 256	33.401	- 1000	57.48	- 170	80.74	- 235	576
330	8.237	- 241	32.401	- 928	55.78	- 159	78.39	- 221	594
340	7.996	- 228	31.473	- 887	54.19	- 151	76.18	- 209	612
350	7.768	- 215	30.586	- 838	52.68	- 141	74.09	- 198	630
360	7.553	- 203	29.748	- 793	51.27	- 136	72.11	- 187	648
370	7.350	- 193	28.955	- 751	49.91	- 128	70.24	- 178	666
380	7.157	- 183	28.204	- 712	48.63	- 121	68.46	- 169	684
390	6.974	- 173	27.492	- 677	47.42	- 113	66.77	- 160	702
400	6.801	- 166	26.815	- 646	46.29	- 112	65.17	- 153	720
410	6.635	- 157	26.169	- 611	45.17	- 105	63.64	- 146	738
420	6.478	- 151	25.558	- 592	44.12	- 101	62.18	- 139	756
430	6.327	- 143	24.966	- 558	43.11	- 95	60.79	- 133	774
440	6.184	- 137	24.408	- 533	42.16	- 91	59.46	- 127	792
450	6.047	- 130	23.875	- 510	41.25	- 87	58.19	- 123	810
460	5.917	- 126	23.365	- 488	40.38	- 84	56.96	- 116	828
470	5.791	- 120	22.877	- 470	39.54	- 80	55.80	- 112	846
480	5.671	- 115	22.407	- 448	38.74	- 77	54.68	- 108	864
490	5.556	- 111	21.959	- 437	37.97	- 75	53.60	- 104	882
500	5.445	- 107	21.522	- 420	37.223	- 716	52.56	- 99	900
510	5.338	- 102	21.102	- 398	36.507	- 684	51.57	- 95	918
520	5.236	- 98	20.704	- 385	35.823	- 656	50.62	- 93	936
530	5.138	- 95	20.319	- 368	35.167	- 634	49.69	- 89	954
540	5.043	- 91	19.951	- 357	34.533	- 611	48.80	- 86	972
550	4.952	- 89	19.594	- 348	33.922	- 596	47.94	- 83	990
560	4.863	- 85	19.246	- 336	33.326	- 575	47.11	- 80	1008
570	4.778	- 82	18.910	- 320	32.751	- 549	46.31	- 77	1026
580	4.696	- 79	18.590	- 314	32.202	- 537	45.54	- 74	1044
590	4.617	- 77	18.276	- 299	31.665	- 515	44.80	- 73	1062
600	4.540		17.977		31.150		44.07		1080

°K	0 atm		1 atm		10 atm		100 atm		°R
20	2.500								36
30	2.500	1	2.628	-64					54
40	2.501	4	2.564	-21	3.463	-516			72
50	2.505	14	2.543	1	2.947	-167			90
60	2.519	28	2.544	21	2.780	- 48	3.957	-171	108
70	2.547	44	2.565	40	2.732	- 9	3.786	-222	126
80	2.591	57	2.605	53	2.723	24	3.564	-198	144
90	2.648	66	2.658	64	2.747	43	3.366	- 71	162
100	2.714	71	2.722	69	2.790	55	3.295	- 44	180
110	2.785	72	2.791	71	2.845	60	3.251	- 9	198
120	2.857	70	2.862	69	2.905	62	3.242	2	216
130	2.927	66	2.931	65	2.967	59	3.244	20	234
140	2.993	60	2.996	60	3.026	57	3.264	29	252
150	3.053	55	3.056	55	3.083	52	3.293	33	270
160	3.108	50	3.111	50	3.135	48	3.326	29	288
170	3.158	46	3.161	45	3.183	43	3.355	22	306
180	3.204	40	3.206	40	3.226	37	3.377	19	324
190	3.244	36	3.246	36	3.263	33	3.396	17	342
200	3.280	32	3.282	31	3.296	31	3.413	20	360
210	3.312	28	3.313	28	3.327	28	3.433	21	378
220	3.340	26	3.341	26	3.355	24	3.454	18	396
230	3.366	21	3.367	21	3.379	20	3.472	14	414
240	3.387	20	3.388	20	3.399	18	3.486	10	432
250	3.407	17	3.408	17	3.417	16	3.496	8	450
260	3.424	14	3.425	14	3.433	13	3.504	6	468
270	3.438	12	3.439	12	3.446	12	3.510	6	486
280	3.450	10	3.451	11	3.458	10	3.516	5	504
290	3.460	9	3.462	8	3.468	8	3.521	5	522
300	3.469	14	3.470	14	3.476	13	3.526	6	540
320	3.483	11	3.484	11	3.489	10	3.532	4	576
340	3.494	7	3.495	7	3.499	7	3.536	3	612
360	3.501	6	3.502	6	3.506	4	3.539		648
380	3.507	3	3.508	3	3.510	4	3.539		684
400	3.510	3	3.511	3	3.514	2	3.539		720
420	3.513	2	3.514	2	3.516	2	3.539	- 1	756
440	3.515	1	3.516	1	3.518	1	3.538		792
460	3.516	2	3.517	1	3.519	1	3.538	- 1	828
480	3.518	1	3.518	1	3.520	1	3.537	- 1	864
500	3.519	2	3.519	2	3.521	2	3.536		900
520	3.521	1	3.521	1	3.523	1	3.536		936
540	3.522	2	3.522	2	3.524	2	3.536		972
560	3.524	1	3.524	1	3.526	1	3.536		1008
580	3.525	2	3.525	2	3.527	2	3.536		1044
600	3.527		3.527		3.529		3.536		1080

Table 6-4. ENTHALPY OF HYDROGEN* $(H-E_0^0)/RT_0$

°K	.01 atm		.1 atm		1 atm		°R
60	1.0175	927	1.0172	927	1.0142	934	108
70	1.1102	940	1.1099	941	1.1076	945	126
80	1.2042	958	1.2040	959	1.2021	963	144
90	1.3000	981	1.2999	981	1.2984	984	162
100	1.3981	1007	1.3980	1007	1.3968	1009	180
110	1.4988	1032	1.4987	1033	1.4977	1035	198
120	1.6020	1059	1.6020	1059	1.6012	1060	216
130	1.7079	1084	1.7079	1084	1.7072	1086	234
140	1.8163	1107	1.8163	1107	1.8158	1108	252
150	1.9270	1128	1.9270	1128	1.9266	1128	270
160	2.0398	1147	2.0398	1147	2.0394	1149	288
170	2.1545	1165	2.1545	1165	2.1543	1165	306
180	2.2710	1180	2.2710	1180	2.2708	1181	324
190	2.3890	1195	2.3890	1195	2.3889	1195	342
200	2.5085	1206	2.5085	1206	2.5084	1207	360
210	2.6291	1218	2.6291	1218	2.6291	1219	378
220	2.7509	1228	2.7509	1228	2.7510	1228	396
230	2.8737	1236	2.8737	1236	2.8738	1237	414
240	2.9973	1244	2.9973	1243	2.9975	1244	432
250	3.1217	1250	3.1216	1251	3.1219	1251	450
260	3.2467	1256	3.2467	1255	3.2470	1256	468
270	3.3723	1260	3.3722	1262	3.3726	1260	486
280	3.4983	1265	3.4984	1265	3.4986	1266	504
290	3.6248	1269	3.6249	1268	3.6252	1269	522
300	3.7517	1272	3.7517	1272	3.7521	1272	540
310	3.8789	1274	3.8789	1274	3.8793	1274	558
320	4.0063	1276	4.0063	1276	4.0067	1276	576
330	4.1339	1278	4.1339	1278	4.1343	1279	594
340	4.2617	1280	4.2617	1280	4.2622	1279	612
350	4.3897	1281	4.3897	1281	4.3901	1282	630
360	4.5178	1282	4.5178	1282	4.5183	1282	648
370	4.6460	1283	4.6460	1284	4.6465	1283	666
380	4.7743	1284	4.7744	1283	4.7748	1284	684
390	4.9027	1285	4.9027	1285	4.9032	1285	702
400	5.0312	1285	5.0312	1285	5.0317	1286	720
410	5.1597	1286	5.1597	1286	5.1603	1286	738
420	5.2883	1286	5.2883	1286	5.2889	1286	756
430	5.4169	1286	5.4169	1287	5.4175	1286	774
440	5.5455	1287	5.5456	1286	5.5461	1287	792
450	5.6742	1287	5.6742	1288	5.6748	1287	810
460	5.8029	1287	5.8030	1287	5.8035	1288	828
470	5.9316	1288	5.9317	1288	5.9323	1287	846
480	6.0604	1288	6.0605	1288	6.0610	1288	864
490	6.1892	1288	6.1893	1288	6.1898	1289	882
500	6.3180	1288	6.3181	1288	6.3187	1288	900
510	6.4468	1289	6.4469	1289	6.4475	1289	918
520	6.5757	1289	6.5758	1288	6.5764	1289	936
530	6.7046	1289	6.7046	1290	6.7053	1289	954
540	6.8335	1290	6.8336	1289	6.8342	1289	972
550	6.9625	1290	6.9625	1290	6.9631	1290	990
560	7.0915	1290	7.0915	1290	7.0921	1291	1008
570	7.2205	1290	7.2205	1291	7.2212	1290	1026
580	7.3495	1291	7.3496	1290	7.3502	1291	1044
590	7.4786	1291	7.4786	1292	7.4793	1291	1062
600	7.6077		7.6078		7.6084		1080

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		10 atm		100 atm		°R
60	1.0142	934	.9833	1008	.7818	1416	108
70	1.1076	945	1.0841	996	.9234	1343	126
80	1.2021	963	1.1837	1001	1.0577	1263	144
90	1.2984	984	1.2838	1014	1.1840	1219	162
100	1.3968	1009	1.3852	1035	1.3059	1200	180
110	1.4977	1035	1.4887	1049	1.4259	1190	198
120	1.6012	1060	1.5936	1074	1.5449	1183	216
130	1.7072	1086	1.7010	1098	1.6632	1193	234
140	1.8158	1108	1.8108	1119	1.7825	1203	252
150	1.9266	1128	1.9227	1138	1.9028	1206	270
160	2.0394	1149	2.0365	1157	2.0234	1224	288
170	2.1543	1165	2.1522	1173	2.1458	1232	306
180	2.2708	1181	2.2695	1187	2.2690	1249	324
190	2.3889	1195	2.3882	1201	2.3939	1239	342
200	2.5084	1207	2.5083	1212	2.5178	1251	360
210	2.6291	1219	2.6295	1224	2.6429	1263	378
220	2.7510	1228	2.7519	1232	2.7692	1270	396
230	2.8738	1237	2.8751	1242	2.8962	1274	414
240	2.9975	1244	2.9993	1247	3.0236	1277	432
250	3.1219	1251	3.1240	1255	3.1513	1279	450
260	3.2470	1256	3.2495	1257	3.2792	1284	468
270	3.3726	1260	3.3752	1265	3.4076	1287	486
280	3.4986	1266	3.5017	1268	3.5363	1288	504
290	3.6252	1269	3.6285	1271	3.6651	1290	522
300	3.7521	1272	3.7556	1274	3.7941	1291	540
310	3.8793	1274	3.8830	1276	3.9232	1293	558
320	4.0067	1276	4.0106	1278	4.0525	1294	576
330	4.1343	1279	4.1384	1280	4.1819	1295	594
340	4.2622	1279	4.2664	1282	4.3114	1295	612
350	4.3901	1282	4.3946	1283	4.4409	1296	630
360	4.5183	1282	4.5229	1284	4.5705	1296	648
370	4.6465	1283	4.6513	1284	4.7001	1295	666
380	4.7748	1284	4.7797	1285	4.8296	1296	684
390	4.9032	1285	4.9082	1286	4.9592	1295	702
400	5.0317	1286	5.0368	1286	5.0887	1296	720
410	5.1603	1286	5.1654	1287	5.2183	1295	738
420	5.2889	1286	5.2941	1287	5.3478	1295	756
430	5.4175	1286	5.4228	1288	5.4773	1294	774
440	5.5461	1287	5.5516	1288	5.6067	1296	792
450	5.6748	1287	5.6804	1287	5.7363	1296	810
460	5.8035	1288	5.8091	1289	5.8659	1295	828
470	5.9323	1287	5.9380	1289	5.9954	1295	846
480	6.0610	1288	6.0669	1289	6.1249	1295	864
490	6.1898	1289	6.1958	1288	6.2544	1295	882
500	6.3187	1288	6.3246	1289	6.3839	1294	900
510	6.4475	1289	6.4535	1289	6.5133	1294	918
520	6.5764	1289	6.5824	1290	6.6427	1294	936
530	6.7053	1289	6.7114	1290	6.7721	1294	954
540	6.8342	1289	6.8404	1290	6.9015	1295	972
550	6.9631	1290	6.9694	1290	7.0310	1296	990
560	7.0921	1291	7.0984	1290	7.1606	1294	1008
570	7.2212	1290	7.2274	1291	7.2900	1294	1026
580	7.3502	1291	7.3565	1291	7.4194	1295	1044
590	7.4793	1291	7.4856	1291	7.5489	1295	1062
600	7.6084		7.6147		7.6784		1080

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		1 atm		°R
60	15.554	391	13.251	390	10.938	394	108
70	15.945	342	13.641	343	11.332	344	126
80	16.287	308	13.984	308	11.676	310	144
90	16.595	283	14.292	283	11.986	283	162
100	16.878	263	14.575	263	12.269	263	180
110	17.141	245	14.838	245	12.532	246	198
120	17.386	231	15.083	231	12.778	231	216
130	17.617	219	15.314	219	13.009	220	234
140	17.836	209	15.533	209	13.229	209	252
150	18.045	199	15.742	199	13.438	199	270
160	18.244	190	15.941	190	13.637	190	288
170	18.434	182	16.131	182	13.827	182	306
180	18.616	174	16.313	174	14.009	175	324
190	18.790	168	16.487	168	14.184	168	342
200	18.958	160	16.655	160	14.352	160	360
210	19.118	155	16.815	155	14.512	155	378
220	19.273	148	16.970	149	14.667	149	396
230	19.421	145	17.119	144	14.816	144	414
240	19.566	138	17.263	138	14.960	138	432
250	19.704	134	17.401	134	15.098	134	450
260	19.838	129	17.535	130	15.232	130	468
270	19.967	126	17.665	125	15.362	125	486
280	20.093	121	17.790	121	15.487	121	504
290	20.214	117	17.911	118	15.608	118	522
300	20.331	114	18.029	114	15.726	114	540
310	20.445	111	18.143	111	15.840	111	558
320	20.556	108	18.254	107	15.951	107	576
330	20.664	104	18.361	104	16.058	104	594
340	20.768	101	18.465	101	16.162	101	612
350	20.869	98	18.566	99	16.263	99	630
360	20.967	96	18.665	96	16.362	96	648
370	21.063	94	18.761	93	16.458	94	666
380	21.157	91	18.854	91	16.552	91	684
390	21.248	89	18.945	89	16.643	88	702
400	21.337	87	19.034	87	16.731	87	720
410	21.424	84	19.121	85	16.818	85	738
420	21.508	83	19.206	83	16.903	83	756
430	21.591	80	19.289	80	16.986	80	774
440	21.671	79	19.369	79	17.066	79	792
450	21.750	78	19.448	77	17.145	78	810
460	21.828	76	19.525	76	17.223	76	828
470	21.904	73	19.601	74	17.299	73	846
480	21.977	73	19.675	72	17.372	72	864
490	22.050	71	19.747	71	17.444	71	882
500	22.121	70	19.818	70	17.515	70	900
510	22.191	69	19.888	69	17.585	70	918
520	22.260	67	19.957	67	17.655	67	936
530	22.327	65	20.024	66	17.722	65	954
540	22.392	65	20.090	65	17.787	65	972
550	22.457	63	20.155	63	17.852	63	990
560	22.520	63	20.218	62	17.915	62	1008
570	22.583	61	20.280	61	17.977	61	1026
580	22.644	60	20.341	60	18.038	60	1044
590	22.704	60	20.401	60	18.098	60	1062
600	22.764		20.461		18.158		1080

Table 6-5. ENTROPY OF HYDROGEN - Cont. S/R

°K	1 atm		10 atm		100 atm		°R
60	10.938	394	8.535	425	5.557	601	108
70	11.332	344	8.960	364	6.158	484	126
80	11.676	310	9.324	321	6.642	407	144
90	11.986	283	9.645	292	7.049	351	162
100	12.269	263	9.937	269	7.400	313	180
110	12.532	246	10.206	250	7.713	283	198
120	12.778	231	10.456	234	7.996	258	216
130	13.009	220	10.690	223	8.254	242	234
140	13.229	209	10.913	210	8.496	225	252
150	13.438	199	11.123	201	8.721	214	270
160	13.637	190	11.324	192	8.935	203	288
170	13.827	182	11.516	183	9.138	193	306
180	14.009	175	11.699	175	9.331	183	324
190	14.184	168	11.874	169	9.514	174	342
200	14.352	160	12.043	161	9.688	167	360
210	14.512	155	12.204	155	9.855	160	378
220	14.667	149	12.359	150	10.015	154	396
230	14.816	144	12.509	144	10.169	148	414
240	14.960	138	12.653	139	10.317	142	432
250	15.098	134	12.792	134	10.459	137	450
260	15.232	130	12.926	130	10.596	133	468
270	15.362	125	13.056	126	10.729	128	486
280	15.487	121	13.182	121	10.857	124	504
290	15.608	118	13.303	118	10.981	119	522
300	15.726	114	13.421	114	11.100	116	540
310	15.840	111	13.535	111	11.216	112	558
320	15.951	107	13.646	108	11.328	109	576
330	16.058	104	13.754	104	11.437	105	594
340	16.162	101	13.858	102	11.542	103	612
350	16.263	99	13.960	98	11.645	99	630
360	16.362	96	14.058	96	11.744	97	648
370	16.458	94	14.154	94	11.841	95	666
380	16.552	91	14.248	91	11.936	92	684
390	16.643	88	14.339	89	12.028	89	702
400	16.731	87	14.428	87	12.117	88	720
410	16.818	85	14.515	85	12.205	85	738
420	16.903	83	14.600	83	12.290	83	756
430	16.986	80	14.683	80	12.373	81	774
440	17.066	79	14.763	79	12.454	80	792
450	17.145	78	14.842	77	12.534	78	810
460	17.223	76	14.919	76	12.612	76	828
470	17.299	73	14.995	74	12.688	74	846
480	17.372	72	15.069	73	12.762	73	864
490	17.444	71	15.142	71	12.835	71	882
500	17.515	70	15.213	70	12.906	71	900
510	17.585	70	15.283	69	12.977	69	918
520	17.655	67	15.352	67	13.046	67	936
530	17.722	65	15.419	65	13.113	66	954
540	17.787	65	15.484	65	13.179	65	972
550	17.852	63	15.549	63	13.244	64	990
560	17.915	62	15.612	63	13.308	62	1008
570	17.977	61	15.675	61	13.370	61	1026
580	18.038	60	15.736	61	13.431	61	1044
590	18.098	60	15.797	59	13.492	60	1062
600	18.158		15.856		13.552		1080

Table 6-6. SPECIFIC-HEAT RATIO OF HYDROGEN $\gamma = C_p/C_v$

°K	0 atm		1 atm		10 atm		100 atm		°R
20	1.667								36
30	1.667	-1	1.736	-36					54
40	1.666	-2	1.700	-16	2.205	-292			72
50	1.664	-6	1.684	-12	1.913	-109			90
60	1.658	-12	1.672	-17	1.804	-66	2.497	-241	108
70	1.646	-18	1.655	-21	1.738	-44	2.256	-190	126
80	1.628	-21	1.634	-23	1.694	-39	2.066	-121	144
90	1.607	-24	1.611	-24	1.655	-38	1.945	-101	162
100	1.583	-23	1.587	-24	1.617	-31	1.844	-76	180
110	1.560	-21	1.563	-22	1.586	-28	1.768	-64	198
120	1.539	-20	1.541	-20	1.558	-22	1.704	-50	216
130	1.519	-17	1.521	-18	1.536	-19	1.654	-41	234
140	1.502	-15	1.503	-15	1.517	-17	1.613	-34	252
150	1.487	-13	1.488	-13	1.500	-16	1.579	-30	270
160	1.474	-11	1.475	-11	1.484	-12	1.549	-24	288
170	1.463	-9	1.464	-9	1.472	-11	1.525	-18	306
180	1.454	-8	1.455	-9	1.461	-9	1.507	-16	324
190	1.446	-7	1.446	-7	1.452	-8	1.491	-12	342
200	1.439	-6	1.439	-6	1.444	-7	1.479	-11	360
210	1.433	-6	1.433	-5	1.437	-6	1.468	-9	378
220	1.427	-4	1.428	-5	1.431	-5	1.459	-9	396
230	1.423	-4	1.423	-4	1.426	-4	1.450	-8	414
240	1.419	-4	1.419	-3	1.422	-4	1.442	-6	432
250	1.415	-2	1.416	-3	1.418	-2	1.436	-5	450
260	1.413	-3	1.413	-3	1.416	-3	1.431	-4	468
270	1.410	-2	1.410	-2	1.413	-3	1.427	-4	486
280	1.408	-2	1.408	-2	1.410	-2	1.423	-3	504
290	1.406	-1	1.406	-1	1.408	-2	1.420	-3	522
300	1.405	-3	1.405	-3	1.406	-3	1.417	-4	540
320	1.402	-1	1.402	-1	1.403	-2	1.413	-4	576
340	1.401	-1	1.401	-1	1.401	-1	1.409	-2	612
360	1.400	-1	1.400	-1	1.400	-1	1.407	-3	648
380	1.399	-1	1.399	-1	1.399	-1	1.404	-1	684
400	1.398		1.398		1.398		1.403	-1	720
420	1.398		1.398	-1	1.398		1.402	-1	756
440	1.398	-1	1.397		1.398		1.401	-1	792
460	1.397		1.397		1.398	-1	1.400	-1	828
480	1.397		1.397		1.397		1.399	-1	864
500	1.397		1.397		1.397		1.398		900
520	1.397		1.397		1.397		1.398	-1	936
540	1.397	-1	1.397	-1	1.397		1.397		972
560	1.396		1.396		1.397	-1	1.397	-1	1008
580	1.396		1.396		1.396		1.396		1044
600	1.396		1.396		1.396		1.396		1080

Table 6-7. SOUND VELOCITY AT LOW FREQUENCY IN HYDROGEN a/a_0

°K	0 atm		1 atm		10 atm		100 atm		°R
20	.2940	661							36
30	.3601	556	.3549	585					54
40	.4157	489	.4134	501	.3942	632			72
50	.4646	433	.4635	444	.4574	505			90
60	.5079	388	.5079	389	.5079	408	.742	-19	108
70	.5467	345	.5468	347	.5487	365	.723	2	126
80	.5812	312	.5815	313	.5852	323	.725	18	144
90	.6124	284	.6128	285	.6175	296	.743	17	162
100	.6408	263	.6413	265	.6471	272	.760	19	180
110	.6671	248	.6678	248	.6743	252	.779	19	198
120	.6919	237	.6926	237	.6995	237	.798	19	216
130	.7156	228	.7163	228	.7232	226	.817	19	234
140	.7384	222	.7391	222	.7458	222	.836	19	252
150	.7606	215	.7613	216	.7680	217	.855	18	270
160	.7821	211	.7829	210	.7897	210	.873	18	288
170	.8032	205	.8039	206	.8107	203	.891	19	306
180	.8237	202	.8245	202	.8310	201	.910	18	324
190	.8439	199	.8447	198	.8511	200	.928	18	342
200	.8638	194	.8645	195	.8711	196	.946	18	360
210	.8832	192	.8840	192	.8907	190	.964	17	378
220	.9024	188	.9032	187	.9097	186	.981	18	396
230	.9212	185	.9219	186	.9283	182	.999	16	414
240	.9397	182	.9405	181	.9465	182	1.015	17	432
250	.9579	180	.9586	180	.9647	177	1.032	17	450
260	.9759	178	.9766	177	.9824	18	1.049	17	468
270	.9937	175	.9943	175	1.000	18	1.066	16	486
280	1.0112	172	1.0118	17	1.018	17	1.082	16	504
290	1.0284	171	1.029	17	1.035	16	1.098	16	522
300	1.0455	334	1.046	34	1.051	35	1.114	32	540
320	1.0789	325	1.080	32	1.086	31	1.146	31	576
340	1.1114	317	1.112	32	1.117	31	1.177	30	612
360	1.1431	310	1.144	31	1.148	32	1.207	29	648
380	1.1741	303	1.175	30	1.180	30	1.236	29	684
400	1.2044	295	1.205	30	1.210	30	1.265	28	720
420	1.2339	289	1.235	28	1.240	28	1.293	28	756
440	1.2628	283	1.263	29	1.268	28	1.321	27	792
460	1.2911	276	1.292	27	1.296	28	1.348	26	828
480	1.3187	272	1.319	27	1.324	27	1.374	26	864
500	1.3459	265	1.346	27	1.351	26	1.400	26	900
520	1.3724	260	1.373	26	1.377	26	1.426	24	936
540	1.3984	255	1.399	25	1.403	25	1.450	25	972
560	1.4239	251	1.424	25	1.428	25	1.475	24	1008
580	1.4490	246	1.449	25	1.453	25	1.499	24	1044
600	1.4736		1.474		1.478		1.523		1080

Table 6-8. VISCOSITY OF HYDROGEN AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R
10	.0606	693	18
20	.1299	611	36
30	.1910	548	54
40	.2458	501	72
50	.2959	460	90
60	.3419	430	108
70	.3849	406	126
80	.4255	385	144
90	.4640	366	162
100	.5006	353	180
110	.5359	339	198
120	.5698	329	216
130	.6027	319	234
140	.6346	309	252
150	.6655	302	270
160	.6957	295	288
170	.7252	289	306
180	.7541	282	324
190	.7823	277	342
200	.8100	273	360
210	.8373	268	378
220	.8641	263	396
230	.8904	260	414
240	.9164	256	432
250	.9420	252	450
260	.9672	250	468
270	.9922	246	486
280	1.0168	243	504
290	1.0411	241	522
300	1.0652	237	540
310	1.0889	236	558
320	1.1125	233	576
330	1.1358	230	594
340	1.1588	229	612
350	1.1817	22	630
360	1.204	23	648
370	1.227	22	666
380	1.249	22	684
390	1.271	21	702
400	1.292		720

°K	η/η_0		°R
400	1.292	22	720
410	1.314	22	738
420	1.336	22	756
430	1.358	21	774
440	1.379	21	792
450	1.400	21	810
460	1.421	21	828
470	1.442	20	846
480	1.462	20	864
490	1.482	21	882
500	1.503	20	900
510	1.523	20	918
520	1.543	21	936
530	1.562	20	954
540	1.582	20	972
550	1.602	20	990
560	1.622	20	1008
570	1.642	19	1026
580	1.661	19	1044
590	1.680	19	1062
600	1.699	19	1080
610	1.718	19	1098
620	1.737	19	1116
630	1.756	19	1134
640	1.775	19	1152
650	1.794	18	1170
660	1.812	18	1188
670	1.830	19	1206
680	1.849	17	1224
690	1.866	18	1242
700	1.884	18	1260
710	1.902	19	1278
720	1.921	18	1296
730	1.939	18	1314
740	1.957	17	1332
750	1.974	17	1350
760	1.991	18	1368
770	2.009	18	1386
780	2.027	17	1404
790	2.044	17	1422
800	2.061		1440

°K	η/η_0		°R
800	2.061	17	1440
810	2.078	18	1458
820	2.096	17	1476
830	2.113	17	1494
840	2.130	17	1512
850	2.147	17	1530
860	2.164	16	1548
870	2.180	17	1566
880	2.197	17	1584
890	2.214	16	1602
900	2.230	16	1620
910	2.246	17	1638
920	2.263	17	1656
930	2.280	17	1674
940	2.297	17	1692
950	2.313	16	1710
960	2.329	16	1728
970	2.345	16	1746
980	2.361	16	1764
990	2.377	16	1782
1000	2.393	16	1800
1010	2.409	16	1818
1020	2.425	15	1836
1030	2.440	16	1854
1040	2.456	16	1872
1050	2.472	15	1890
1060	2.487	15	1908
1070	2.502	16	1926
1080	2.518	16	1944
1090	2.534	15	1962
1100	2.549		1980

Table 6-9. THERMAL CONDUCTIVITY OF HYDROGEN AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
10	.044	48	18
20	.092	44	36
30	.136	41	54
40	.177	38	72
50	.215	36	90
60	.251	35	108
70	.286	36	126
80	.322	36	144
90	.358	37	162
100	.395	37	180
110	.432	38	198
120	.470	38	216
130	.508	38	234
140	.546	37	252
150	.583	37	270
160	.620	36	288
170	.656	37	306
180	.693	35	324
190	.728	34	342
200	.762	35	360
210	.797	34	378
220	.831	32	396
230	.863	33	414
240	.896	32	432
250	.928	31	450
260	.959	31	468
270	.990	31	486
280	1.021	30	504
290	1.051	29	522
300	1.080	29	540
310	1.109	29	558
320	1.138	28	576
330	1.166	28	594
340	1.194	28	612
350	1.222		630

°K	k/k_0		°R
350	1.222	27	630
360	1.249	27	648
370	1.276	27	666
380	1.303	27	684
390	1.330	26	702
400	1.356	27	720
410	1.383	26	738
420	1.409	27	756
430	1.436	26	774
440	1.462	26	792
450	1.488	26	810
460	1.514	26	828
470	1.540	26	846
480	1.566	25	864
490	1.591	25	882
500	1.616	26	900
510	1.642	26	918
520	1.668	25	936
530	1.693	25	954
540	1.718	25	972
550	1.743	26	990
560	1.769	26	1008
570	1.795	25	1026
580	1.820	25	1044
590	1.845	26	1062
600	1.871	26	1080
610	1.897	26	1098
620	1.923	26	1116
630	1.949	26	1134
640	1.975	26	1152
650	2.001	26	1170
660	2.027	26	1188
670	2.053	25	1206
680	2.078	25	1224
690	2.103	25	1242
700	2.128		1260

Table 6-10. PRANDTL NUMBER OF HYDROGEN AT ATMOSPHERIC PRESSURE $\eta C_p/k$

°K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/2}$		$(N_{Pr})^{1/3}$		°R
60	.713	-2	.798	-1	.844	-1	.893	-1	108
80	.711	1	.797		.843	1	.892	1	144
100	.712	3	.797	3	.844	2	.893	1	180
120	.715	3	.800	2	.846	1	.894	1	216
140	.718	1	.802		.847	1	.895	1	252
160	.719	1	.802	1	.848	1	.896		288
180	.720	-1	.803	-1	.849	-1	.896		324
200	.719	-2	.802	-1	.848	-1	.896	-1	360
220	.717	-2	.801	-1	.847	-1	.895	-1	396
240	.715	-3	.800	-3	.846	-2	.894	-1	432
260	.712	-3	.797	-2	.844	-2	.893	-1	468
280	.709	-3	.795	-2	.842	-2	.892	-2	504
300	.706	-3	.793	-2	.840	-2	.890	-1	540
320	.703	-4	.791	-3	.838	-2	.889	-2	576
340	.699	-3	.788	-2	.836	-2	.887	-1	612
360	.696	-3	.786	-3	.834	-1	.886	-1	648
380	.693	-3	.783	-2	.833	-2	.885	-1	684
400	.690	-3	.781	-2	.831	-2	.884	-2	720
420	.687	-3	.779	-3	.829	-2	.882	-1	756
440	.684	-3	.776	-2	.827	-2	.881	-1	792
460	.681	-3	.774	-2	.825	-1	.880	-2	828
480	.678	-3	.772	-2	.824	-2	.878	-1	864
500	.675	-4	.770	-3	.822	-3	.877	-2	900
520	.671	-2	.767	-2	.819	-1	.875		936
540	.669	-2	.765	-2	.818	-1	.875	-1	972
560	.667	-2	.763	-1	.817	-2	.874	-1	1008
580	.665	-1	.762	-1	.815		.873	-1	1044
600	.664	-1	.761	-1	.815	-1	.872		1080
620	.663		.760		.814		.872		1116
640	.663	-1	.760	-1	.814	-1	.872		1152
660	.662	-1	.759		.813		.872	-1	1188
680	.661		.759		.813		.871		1224
700	.661		.759		.813		.871		1260
720	.661	-1	.759	-1	.813	-1	.871		1296
740	.660		.758		.812		.871		1332
760	.660		.758		.812		.871		1368
780	.660		.758		.812		.871		1404
800	.660		.758		.812		.871		1440

Table 6-11. VAPOR PRESSURE OF e - H_2 (.21% ortho and 99.79 % para at 20.4°K)

Remarks	T	P	P	P	T
	°K	mm Hg	atm	psia	°R
Triple point- - - - - - - -	13.81_3	52.8	.0695	1.02	24.86_3
Normal boiling point- - -	20.27_8	760.0	1.000	14.696	36.50_0
Critical point- - - - - - -	32.9_{94}	9705	12.7_{70}	$187._{67}$	59.3_{89}
Solid- - - - - - - - - - - -	10	1.93	.00254	.0373	18.0
	11	5.62	.00739	.109	19.8
	12	13.9	.0183	.269	21.6
	13	30.2	.0397	.584	23.4
Liquid- - - - - - - - - - -	14	58.8	.0774	1.137	25.2
	15	100.3	.1320	1.939	27.0
	16	161.1	.2120	3.115	28.8
	17	246.0	.3237	4.757	30.6
	18	360.3	.4741	6.967	32.4
	19	509.5	.6704	9.852	34.2
	20	699.2	.9200	13.520	36.0
	21	935.3	1.2307	18.086	37.8
	22	1223.7	1.6101	23.663	39.6
	23	1570.5	2.0664	30.369	41.4
	24	1981.8	2.6076	38.322	43.2
	25	2463.8	3.2418	47.642	45.0
	26	3022.9	3.9775	58.45	46.8
	27	3665.1	4.8225	70.87	48.6
	28	4396.8	5.785	85.02	50.4
	29	5227.	6.877	101.07	52.2
	30	6162.	8.108	119.16	54.0
	31	7210.	9.486	139.41	55.8
	32	8383.	11.031	162.10	57.6

Table 6-11/a. VAPOR PRESSURE OF LIQUID e-H_2 (.21% ortho and 99.79% para at 20.4°K)

200/T	T	$Log_{10}P$ (atm)**		P	T	360/T
°K^{-1}	°K			atm	°R	°R^{-1}
14.5	13.793	(8.8368-10)'	242	(.0687)	24.828	14.5
14.4	13.889	8.8610-10	242	.0726	25.000	14.4
14.3	13.986	8.8852-10	242	.0768	25.175	14.3
14.2	14.085	8.9094-10	242	.0812	25.352	14.2
14.1	14.184	8.9336-10	243	.0858	25.532	14.1
14.0	14.286	8.9579-10	243	.0908	25.714	14.0
13.9	14.388	8.9822-10	244	.0960	25.899	13.9
13.8	14.493	9.0066-10	244	.1015	26.087	13.8
13.7	14.599	9.0310-10	244	.1074	26.277	13.7
13.6	14.706	9.0554-10	244	.1136	26.471	13.6
13.5	14.815	9.0798-10	245	.1202	26.667	13.5
13.4	14.925	9.1043-10	245	.1272	26.866	13.4
13.3	15.038	9.1288-10	245	.1345	27.068	13.3
13.2	15.152	9.1533-10	246	.1423	27.273	13.2
13.1	15.267	9.1779-10	247	.1506	27.481	13.1
13.0	15.385	9.2026-10	246	.1594	27.692	13.0
12.9	15.504	9.2272-10	247	.1687	27.907	12.9
12.8	15.625	9.2519-10	247	.1786	28.125	12.8
12.7	15.748	9.2766-10	248	.1891	28.346	12.7
12.6	15.873	9.3014-10	248	.2002	28.571	12.6
12.5	16.000	9.3262-10	249	.2119	28.800	12.5
12.4	16.129	9.3511-10	249	.2244	29.032	12.4
12.3	16.260	9.3760-10	250	.2377	29.268	12.3
12.2	16.393	9.4010-10	250	.2518	29.507	12.2
12.1	16.529	9.4260-10	250	.2667	29.572	12.1
12.0	16.667	9.4510-10	251	.2825	30.001	12.0
11.9	16.807	9.4761-10	251	.2993	30.253	11.9
11.8	16.949	9.5012-10	252	.3171	30.508	11.8
11.7	17.094	9.5264-10	252	.3361	30.769	11.7
11.6	17.241	9.5516-10	253	.3561	31.034	11.6
11.5	17.391	9.5769-10	254	.3775	31.304	11.5
11.4	17.544	9.6023-10	254	.4002	31.579	11.4
11.3	17.699	9.6277-10	255	.4243	31.867	11.3
11.2	17.857	9.6532-10	255	.4500	32.143	11.2
11.1	18.018	9.6787-10	256	.4772	32.432	11.1
11.0	18.182	9.70425-10	2564	.5061	32.728	11.0
10.9	18.349	9.72989-10	2571	.5369	33.028	10.9
10.8	18.519	9.75560-10	2578	.5696	33.334	10.8
10.7	18.692	9.78138-10	2585	.6045	33.646	10.7
10.6	18.868	9.80723-10	2591	.6416	33.962	10.6
10.5	19.048	9.83314-10	2598	.6810	34.286	10.5
10.4	19.231	9.85912-10	2606	.7230	34.616	10.4
10.3	19.417	9.88518-10	2613	.7677	34.951	10.3
10.2	19.608	9.91131-10	2621	.8153	35.294	10.2
10.1	19.802	9.93752-10	2628	.8660	35.644	10.1
10.0	20.000	9.96380-10	2637	.9200	36.000	10.0
9.9	20.202	9.99017-10	2646	.9776	36.364	9.9
9.8	20.408	.01663	2654	1.0390	36.734	9.8
9.7	20.619	.04317	2663	1.1045	37.114	9.7
9.6	20.833	.06980	2672	1.1744	37.499	9.6

' Figures in parentheses are extrapolated to permit interpolation to the critical point and triple point.

** Tabulated values in this column are for interpolation with respect to reciprocal temperature.

Table 6-11/a. VAPOR PRESSURE OF LIQUID e-H_2 (.21% ortho and 99.79% para at 20.4°K) - Cont.

200/T	T	$Log_{10}P$(atm)**		P	T	360/T
$°K^{-1}$	°K			atm	°R	$°R^{-1}$
9.5	21.053	.09652	2682	1.2489	37.895	9.5
9.4	21.277	.12334	2692	1.3284	38.299	9.4
9.3	21.505	.15026	2702	1.4134	38.709	9.3
9.2	21.739	.17728	2712	1.5041	39.130	9.2
9.1	21.978	.20440	2723	1.6010	39.560	9.1
9.0	22.222	.23163	2735	1.7046	40.000	9.0
8.9	22.472	.25898	2746	1.8154	40.450	8.9
8.8	22.727	.28644	2758	1.9339	40.909	8.8
8.7	22.989	.31402	2770	2.0607	41.380	8.7
8.6	23.256	.34172	2783	2.1964	41.861	8.6
8.5	23.529	.36955	2797	2.3418	42.352	8.5
8.4	23.810	.39752	2810	2.4976	42.858	8.4
8.3	24.096	.42562	2825	2.6645	43.373	8.3
8.2	24.390	.45387	2839	2.8436	43.902	8.2
8.1	24.691	.48226	2854	3.0357	44.444	8.1
8.0	25.000	.51080	2869	3.2419	45.000	8.0
7.9	25.316	.53949	2886	3.4633	45.569	7.9
7.8	25.641	.56835	2903	3.7013	46.154	7.8
7.7	25.974	.59738	2919	3.9571	46.753	7.7
7.6	26.316	.62657	2936	4.2322	47.369	7.6
7.5	26.667	.65593	2954	4.5282	48.001	7.5
7.4	27.027	.68547	2973	4.8470	48.649	7.4
7.3	27.397	.71520	2993	5.1904	49.315	7.3
7.2	27.778	.74513	3016	5.5607	50.000	7.2
7.1	28.169	.77529	3040	5.961	50.704	7.1
7.0	28.571	.80569	3066	6.393	51.428	7.0
6.9	28.986	.83635	3092	6.860	52.175	6.9
6.8	29.412	.86727	3119	7.367	52.942	6.8
6.7	29.851	.89846	3146	7.915	53.732	6.7
6.6	30.303	.92992	3173	8.510	54.545	6.6
6.5	30.769	.96165	3205	9.155	55.384	6.5
6.4	31.250	.99370	3247	9.856	56.250	6.4
6.3	31.746	1.02617	3303	10.621	57.143	6.3
6.2	32.258	1.05920	3381	11.460	58.064	6.2
6.1	32.787	1.09301	3487	12.388	59.017	6.1
6.0	33.333	(1.12788)'	3629	(13.424)	60.000	6.0
5.9	33.898	(1.16417)		(14.594)	61.016	5.9

' Figures in parentheses are extrapolated to permit interpolation to the critical point and triple point.

**Tabulated values in this column are for interpolation with respect to reciprocal temperature.

Table 6-11/b. CONSTANTS FOR $LOG_{10}P$ (SOLID) = A - B/T + CT

Units of P	A	Units of T	B	C
mm Hg	4.62438	°K	47.0172	0.03635
atm	1.74357	°R	84.6310	0.02019
psia	2.91076			

Table 6-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR HYDROGEN**

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
10	2.500		.55943	9153	6.468	1732	− 8.813	8122	18
20	2.500		.65096	9152	8.200	1014	− .691	3144	36
30	2.500	1	.74248	9153	9.214	719	2.453	1785	54
40	2.501	4	.83401	9160	9.933	558	4.238	1196	72
50	2.505	14	.92561	919	10.491	458	5.434	883	90
60	2.519	28	1.0175	927	10.949	390	6.317	690	108
70	2.547	44	1.1102	940	11.339	343	7.007	563	126
80	2.591	57	1.2042	958	11.682	308	7.570	474	144
90	2.648	66	1.3000	981	11.990	282	8.044	409	162
100	2.714	71	1.3981	1007	12.272	263	8.453	360	180
110	2.785	72	1.4988	1033	12.535	245	8.813	320	198
120	2.857	70	1.6021	1058	12.780	231	9.133	289	216
130	2.927	66	1.7079	1084	13.011	220	9.422	265	234
140	2.993	60	1.8163	1107	13.231	208	9.687	243	252
150	3.053	55	1.9270	1128	13.439	199	9.930	226	270
160	3.108	50	2.0398	1147	13.638	190	10.156	210	288
170	3.158	46	2.1545	1165	13.828	182	10.366	198	306
180	3.204	40	2.2710	1180	14.010	175	10.564	186	324
190	3.244	36	2.3890	1195	14.185	167	10.750	176	342
200	3.280	32	2.5085	1206	14.352	161	10.926	167	360
210	3.312	28	2.6291	1218	14.513	154	11.093	158	378
220	3.340	26	2.7509	1228	14.667	149	11.251	152	396
230	3.366	21	2.8737	1236	14.816	144	11.403	146	414
240	3.387	20	2.9973	1244	14.960	139	11.549	139	432
250	3.407	17	3.1217	1250	15.099	133	11.688	133	450
260	3.424	14	3.2467	1256	15.232	130	11.821	129	468
270	3.438	12	3.3723	1260	15.362	126	11.950	125	486
280	3.450	11	3.4983	1265	15.488	121	12.075	120	504
290	3.461	8	3.6248	1269	15.609	117	12.195	115	522
300	3.469	8	3.7517	1271	15.726	114	12.310	112	540
310	3.477	6	3.8788	1275	15.840	111	12.422	109	558
320	3.483	6	4.0063	1276	15.951	107	12.531	105	576
330	3.489	5	4.1339	1278	16.058	104	12.636	102	594
340	3.494	4	4.2617	1280	16.162	102	12.738	100	612
350	3.498	3	4.3897	1281	16.264	98	12.838	96	630
360	3.501	3	4.5178	1282	16.362	96	12.934	94	648
370	3.504	3	4.6460	1283	16.458	94	13.028	92	666
380	3.507	2	4.7743	1284	16.552	91	13.120	89	684
390	3.509	1	4.9027	1285	16.643	89	13.209	87	702
400	3.510	2	5.0312	1285	16.732	87	13.296	85	720
410	3.512	1	5.1597	1286	16.819	84	13.381	83	738
420	3.513	1	5.2883	1286	16.903	83	13.464	81	756
430	3.514	1	5.4169	1286	16.986	80	13.545	78	774
440	3.515	1	5.5455	1287	17.066	79	13.623	78	792
450	3.516		5.6742	1287	17.145	78	13.701	76	810
460	3.516	1	5.8029	1287	17.223	75	13.777	74	828
470	3.517	1	5.9316	1288	17.298	74	13.851	72	846
480	3.518	1	6.0604	1288	17.372	73	13.923	72	864
490	3.519		6.1892	1288	17.445	71	13.995	69	882
500	3.519	1	6.3180	1288	17.516	70	14.064	69	900
510	3.520	1	6.4468	1289	17.586	69	14.133	68	918
520	3.521	1	6.5757	1289	17.655	66	14.201	64	936
530	3.522		6.7046	1289	17.721	66	14.265	65	954
540	3.522	1	6.8335	1290	17.787	65	14.330	64	972
550	3.523		6.9625		17.852		14.394		990

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

°K	C_p° / R		$(H^\circ - E_0^\circ)/RT_0$ *		S° / R		$-(F^\circ - E_0^\circ)/RT$		°R
550	3.523	1	6.9625	1290	17.852	63	14.394	62	990
560	3.524	1	7.0915	1290	17.915	63	14.456	62	1008
570	3.525		7.2205	1290	17.978	60	14.518	59	1026
580	3.525	1	7.3495	1291	18.038	61	14.577	60	1044
590	3.526	1	7.4786	1291	18.099	59	14.637	57	1062
600	3.527	1	7.6077	1291	18.158	59	14.694	58	1080
610	3.528	1	7.7368	1292	18.217	57	14.752	56	1098
620	3.529	2	7.8660	1292	18.274	56	14.808	55	1116
630	3.531	1	7.9952	1292	18.330	56	14.863	55	1134
640	3.532	1	8.1244	1293	18.386	55	14.918	54	1152
650	3.533	2	8.2537	1294	18.441	53	14.972	52	1170
660	3.535	1	8.3831	1294	18.494	54	15.024	53	1188
670	3.536	2	8.5125	1295	18.548	52	15.077	51	1206
680	3.538	1	8.6420	1296	18.600	52	15.128	51	1224
690	3.539	2	8.7716	1296	18.652	51	15.179	51	1242
700	3.541	2	8.9012	1297	18.703	50	15.230	49	1260
710	3.543	2	9.0309	1297	18.753	49	15.279	48	1278
720	3.545	2	9.1606	1298	18.802	49	15.327	48	1296
730	3.547	2	9.2904	1299	18.851	49	15.375	48	1314
740	3.549	2	9.4203	1300	18.900	47	15.423	46	1332
750	3.551	2	9.5503	1300	18.947	47	15.469	46	1350
760	3.553	3	9.6803	1301	18.994	47	15.515	46	1368
770	3.556	2	9.8104	1303	19.041	46	15.561	45	1386
780	3.558	3	9.9407	130	19.087	45	15.606	44	1404
790	3.561	2	10.071	130	19.132	45	15.650	44	1422
800	3.563	15	10.201	654	19.177	216	15.694	211	1440
850	3.578	16	10.855	656	19.393	205	15.905	199	1530
900	3.594	19	11.511	660	19.598	195	16.104	189	1620
950	3.613	20	12.171	663	19.793	185	16.293	179	1710
1000	3.633	21	12.834	667	19.978	178	16.472	172	1800
1050	3.654	24	13.501	671	20.156	171	16.644	164	1890
1100	3.678	24	14.172	675	20.327	164	16.808	156	1980
1150	3.702	25	14.847	680	20.491	158	16.964	151	2070
1200	3.727	26	15.527	684	20.649	152	17.115	143	2160
1250	3.753	27	16.211	690	20.801	148	17.258	140	2250
1300	3.780	26	16.901	694	20.949	144	17.398	135	2340
1350	3.806	27	17.595	699	21.093	139	17.533	130	2430
1400	3.833	26	18.294	704	21.232	134	17.663	124	2520
1450	3.859	26	18.998	709	21.366	132	17.787	122	2610
1500	3.885	26	19.707	714	21.498	128	17.909	118	2700
1550	3.911	25	20.421	718	21.626	124	18.027	114	2790
1600	3.936	24	21.139	723	21.750	121	18.141	111	2880
1650	3.960	25	21.862	727	21.871	119	18.252	108	2970
1700	3.985	24	22.589	731	21.990	116	18.360	106	3060
1750	4.009	24	23.320	736	22.106	113	18.466	102	3150
1800	4.033	24	24.056	741	22.219	111	18.568	101	3240
1850	4.057	23	24.797	744	22.330	108	18.669	97	3330
1900	4.080	22	25.541	749	22.438	107	18.766	96	3420
1950	4.102	22	26.290	753	22.545	104	18.862	93	3510
2000	4.124	21	27.043	757	22.649	102	18.955	92	3600
2050	4.145	20	27.800	760	22.751	100	19.047	89	3690
2100	4.165	20	28.560	765	22.851	98	19.136	87	3780
2150	4.185	19	29.325	767	22.949	97	19.223	87	3870
2200	4.204	19	30.092	772	23.046	94	19.310	83	3960
2250	4.223	18	30.864	774	23.140	93	19.393	83	4050
2300	4.241		31.638		23.233		19.476		4140

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.699°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

Table 6-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR HYDROGEN - Cont.**

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2300	4.241	17	31.638	778	23.233	92	19.476	81	4140
2350	4.258	18	32.416	781	23.325	90	19.557	80	4230
2400	4.276	17	33.197	785	23.415	88	19.637	77	4320
2450	4.293	17	33.982	787	23.503	87	19.714	77	4410
2500	4.310	16	34.769	790	23.590	86	19.791	76	4500
2550	4.326	16	35.559	794	23.676	84	19.867	74	4590
2600	4.342	16	36.353	796	23.760	83	19.941	73	4680
2650	4.358	15	37.149	799	23.843	81	20.014	71	4770
2700	4.373	14	37.948	802	23.924	81	20.085	71	4860
2750	4.387	15	38.750	804	24.005	79	20.156	69	4950
2800	4.402	14	39.554	807	24.084	78	20.225	69	5040
2850	4.416	14	40.361	810	24.162	77	20.294	67	5130
2900	4.430	15	41.171	812	24.239	76	20.361	67	5220
2950	4.445	13	41.983	815	24.315	74	20.428	64	5310
3000	4.458	14	42.798	817	24.389	74	20.492	65	5400
3050	4.472	14	43.615	821	24.463	73	20.557	63	5490
3100	4.486	13	44.436	821	24.536	72	20.620	63	5580
3150	4.499	14	45.257	826	24.608	71	20.683	62	5670
3200	4.513	14	46.083	827	24.679	70	20.745	61	5760
3250	4.527	13	46.910	829	24.749	69	20.806	60	5850
3300	4.540	13	47.739	833	24.818	69	20.866	60	5940
3350	4.553	13	48.572	834	24.887	67	20.926	59	6030
3400	4.566	12	49.406	837	24.954	67	20.985	58	6120
3450	4.578	13	50.243	840	25.021	66	21.043	57	6210
3500	4.591	12	51.083	840	25.087	65	21.100	57	6300
3550	4.603	11	51.923	843	25.152	64	21.157	55	6390
3600	4.614	12	52.766	846	25.216	64	21.212	56	6480
3650	4.626	11	53.612	847	25.280	63	21.268	54	6570
3700	4.637	11	54.459	850	25.343	62	21.322	54	6660
3750	4.648	10	55.309	853	25.405	62	21.376	54	6750
3800	4.658	11	56.162	855	25.467	61	21.430	53	6840
3850	4.669	11	57.017	854	25.528	61	21.483	53	6930
3900	4.680	10	57.871	859	25.589	59	21.536	51	7020
3950	4.690	11	58.730	858	25.648	59	21.587	51	7110
4000	4.701	11	59.588	861	25.707	59	21.638	51	7200
4050	4.712	11	60.449	864	25.766	58	21.689	50	7290
4100	4.723	10	61.313	866	25.824	57	21.739	49	7380
4150	4.733	11	62.179	867	25.881	56	21.788	49	7470
4200	4.744	11	63.046	870	25.937	57	21.837	49	7560
4250	4.755	11	63.916	871	25.994	55	21.886	47	7650
4300	4.766	10	64.787	874	26.049	56	21.933	49	7740
4350	4.776	10	65.661	875	26.105	54	21.982	46	7830
4400	4.786	11	66.536	877	26.159	55	22.028	48	7920
4450	4.797	10	67.413	878	26.214	53	22.076	46	8010
4500	4.807	10	68.291	881	26.267	53	22.122	45	8100
4550	4.817	11	69.172	882	26.320	53	22.167	46	8190
4600	4.828	10	70.054	885	26.373	52	22.213	45	8280
4650	4.838	10	70.939	886	26.425	52	22.258	45	8370
4700	4.848	10	71.825	888	26.477	51	22.303	43	8460
4750	4.858	9	72.713	891	26.528	51	22.346	44	8550
4800	4.867	10	73.604	892	26.579	50	22.390	43	8640
4850	4.877	10	74.496	894	26.629	51	22.433	44	8730
4900	4.887	9	75.390	895	26.680	49	22.477	42	8820
4950	4.896	10	76.285	897	26.729	50	22.519	43	8910
5000	4.906		77.182		26.779		22.562		9000

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

Table 6-12/a. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR ATOMIC HYDROGEN **

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
10	2.5000	.0915	915	5.2972	17328	2.7972	17328	18
20		.1830	916	7.0300	10137	4.5300	10137	36
30		.2746	915	8.0437	7192	5.5437	7192	54
40		.3661	915	8.7629	5579	6.2629	5579	72
50		.4576	915	9.3208	4558	6.8208	4558	90
60		.5491	916	9.7766	3853	7.2766	3853	108
70		.6407	915	10.1619	3339	7.6619	3339	126
80		.7322	915	10.4958	2944	7.9958	2944	144
90		.8237	915	10.7902	2634	8.2902	2634	162
100		.9152	915	11.0536	2383	8.5536	2383	180
110		1.0067	916	11.2919	2175	8.7919	2175	198
120		1.0983	915	11.5094	2001	9.0094	2001	216
130		1.1898	915	11.7095	1853	9.2095	1853	234
140		1.2813	915	11.8948	1725	9.3948	1725	252
150		1.3728	915	12.0673	1613	9.5673	1613	270
160		1.4643	916	12.2286	1516	9.7286	1516	288
170		1.5559	915	12.3802	1429	9.8802	1429	306
180		1.6474	915	12.5231	1352	10.0231	1352	324
190		1.7389	915	12.6583	1282	10.1583	1282	342
200		1.8304	916	12.7865	1220	10.2865	1220	360
210		1.9220	915	12.9085	1163	10.4085	1163	378
220		2.0135	915	13.0248	1111	10.5248	1111	396
230		2.1050	915	13.1359	1064	10.6359	1064	414
240		2.1965	915	13.2423	1020	10.7423	1020	432
250		2.2880	916	13.3443	981	10.8443	981	450
260		2.3796	915	13.4424	944	10.9424	944	468
270		2.4711	915	13.5368	909	11.0368	909	486
280		2.5626	915	13.6277	877	11.1277	877	504
290		2.6541	915	13.7154	848	11.2154	848	522
300		2.7456	916	13.8002	819	11.3002	819	540
310		2.8372	915	13.8821	794	11.3821	794	558
320		2.9287	915	13.9615	769	11.4615	769	576
330		3.0202	915	14.0384	747	11.5384	747	594
340		3.1117	916	14.1131	724	11.6131	724	612
350		3.2033	915	14.1855	705	11.6855	705	630
360		3.2948	915	14.2560	685	11.7560	685	648
370		3.3863	915	14.3245	666	11.8245	666	666
380		3.4778	915	14.3911	650	11.8911	650	684
390		3.5693	916	14.4561	633	11.9561	633	702
400		3.6609	915	14.5194	617	12.0194	617	720
410		3.7524	915	14.5811	602	12.0811	602	738
420		3.8439	915	14.6413	589	12.1413	589	756
430		3.9354	915	14.7002	574	12.2002	574	774
440		4.0269	916	14.7576	562	12.2576	562	792
450		4.1185	915	14.8138	550	12.3138	550	810
460		4.2100	915	14.8688	537	12.3688	537	828
470		4.3015	915	14.9225	527	12.4225	527	846
480		4.3930	916	14.9752	515	12.4752	515	864
490		4.4846	915	15.0267	505	12.5267	505	882
500		4.5761	915	15.0772	495	12.5772	495	900
510		4.6676	915	15.1267	486	12.6267	486	918
520		4.7591	915	15.1753	476	12.6753	476	936
530		4.8506	916	15.2229	467	12.7229	467	954
540		4.9422	915	15.2696	459	12.7696	459	972
550	2.5000	5.0337		15.3155		12.8155		990

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)}{RT_0}$*		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
550	2.5000	5.0337	915	15.3155	450	12.8155	450	990
560		5.1252	915	15.3605	443	12.8605	443	1008
570		5.2167	915	15.4048	435	12.9048	435	1026
580		5.3082	916	15.4483	427	12.9483	427	1044
590		5.3998	915	15.4910	420	12.9910	420	1062
600		5.4913	915	15.5330	413	13.0330	413	1080
610		5.5828	915	15.5743	407	13.0743	407	1098
620		5.6743	916	15.6150	400	13.1150	400	1116
630		5.7659	915	15.6550	394	13.1550	394	1134
640		5.8574	915	15.6944	387	13.1944	387	1152
650		5.9489	915	15.7331	382	13.2331	382	1170
660		6.0404	915	15.7713	376	13.2713	376	1188
670		6.1319	916	15.8089	370	13.3089	370	1206
680		6.2235	915	15.8459	365	13.3459	365	1224
690		6.3150	915	15.8824	360	13.3824	360	1242
700		6.4065	915	15.9184	355	13.4184	355	1260
710		6.4980	915	15.9539	349	13.4539	349	1278
720		6.5895	916	15.9888	345	13.4888	345	1296
730		6.6811	915	16.0233	340	13.5233	340	1314
740		6.7726	915	16.0573	336	13.5573	336	1332
750		6.8641	915	16.0909	331	13.5909	331	1350
760		6.9556	916	16.1240	327	13.6240	327	1368
770		7.0472	915	16.1567	322	13.6567	322	1386
780		7.1387	915	16.1889	319	13.6889	319	1404
790		7.2302	915	16.2208	314	13.7208	314	1422
800		7.3217	4576	16.2522	1516	13.7522	1516	1440
850		7.7793	4576	16.4038	1429	13.9038	1429	1530
900		8.2369	4576	16.5467	1352	14.0467	1352	1620
950		8.6945	4576	16.6819	1282	14.1819	1282	1710
1000		9.1521	4577	16.8101	1220	14.3101	1220	1800
1050		9.6098	4576	16.9321	1163	14.4321	1163	1890
1100		10.0674	4576	17.0484	1111	14.5484	1111	1980
1150		10.5250	4576	17.1595	1064	14.6595	1064	2070
1200		10.9826	4576	17.2659	1020	14.7659	1020	2160
1250		11.4402	4576	17.3679	981	14.8679	981	2250
1300		11.8978	4576	17.4660	943	14.9660	943	2340
1350		12.3554	4576	17.5603	910	15.0603	910	2430
1400		12.8130	4576	17.6513	877	15.1513	877	2520
1450		13.2706	4576	17.7390	847	15.2390	847	2610
1500		13.7282	4576	17.8237	820	15.3237	820	2700
1550		14.1858	4576	17.9057	794	15.4057	794	2790
1600		14.6434	4576	17.9851	769	15.4851	769	2880
1650		15.1010	4576	18.0620	747	15.5620	747	2970
1700		15.5586	4577	18.1367	724	15.6367	724	3060
1750		16.0163	4576	18.2091	705	15.7091	705	3150
1800		16.4739	4576	18.2796	684	15.7796	684	3240
1850		16.9315	4576	18.3480	667	15.8480	667	3330
1900		17.3891	4576	18.4147	650	15.9147	650	3420
1950		17.8467	4576	18.4797	633	15.9797	633	3510
2000		18.3043	4576	18.5430	617	16.0430	617	3600
2050		18.7619	4576	18.6047	602	16.1047	602	3690
2100		19.2195	4576	18.6649	589	16.1649	589	3780
2150		19.6771	4576	18.7238	574	16.2238	574	3870
2200		20.1347	4576	18.7812	562	16.2812	562	3960
2250		20.5923	4576	18.8374	550	16.3374	550	4050
2300	2.5000	21.0499		18.8924		16.3924		4140

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2300	2.5000	21.0499	4576	18.8924	537	16.3924	537	4140
2350		21.5075	4576	18.9461	527	16.4461	527	4230
2400		21.9651	4577	18.9988	515	16.4988	515	4320
2450		22.4228	4576	19.0503	505	16.5503	505	4410
2500		22.8804	4576	19.1008	495	16.6008	495	4500
2550		23.3380	4576	19.1503	486	16.6503	486	4590
2600		23.7956	4576	19.1989	476	16.6989	476	4680
2650		24.2532	4576	19.2465	467	16.7465	467	4770
2700		24.7108	4576	19.2932	459	16.7932	459	4860
2750		25.1684	4576	19.3391	450	16.8391	450	4950
2800		25.6260	4576	19.3841	443	16.8841	443	5040
2850		26.0836	4576	19.4284	435	16.9284	435	5130
2900		26.5412	4576	19.4719	427	16.9719	427	5220
2950		26.9988	4576	19.5146	420	17.0146	420	5310
3000		27.4564	4576	19.5566	413	17.0566	413	5400
3050		27.9140	4577	19.5979	407	17.0979	407	5490
3100		28.3717	4576	19.6386	400	17.1386	400	5580
3150		28.8293	4576	19.6786	394	17.1786	394	5670
3200		29.2869	4576	19.7180	387	17.2180	387	5760
3250		29.7445	4576	19.7567	382	17.2567	382	5850
3300		30.2021	4576	19.7949	376	17.2949	376	5940
3350		30.6597	4576	19.8325	370	17.3325	370	6030
3400		31.1173	4576	19.8695	365	17.3695	365	6120
3450		31.5749	4576	19.9060	360	17.4060	360	6210
3500		32.0325	4576	19.9420	355	17.4420	355	6300
3550		32.4901	4576	19.9775	349	17.4775	349	6390
3600		32.9477	4576	20.0124	345	17.5124	345	6480
3650		33.4053	4576	20.0469	340	17.5469	340	6570
3700		33.8629	4576	20.0809	336	17.5809	336	6660
3750		34.3205	4577	20.1145	331	17.6145	331	6750
3800		34.7782	4576	20.1476	327	17.6476	327	6840
3850		35.2358	4576	20.1803	322	17.6803	322	6930
3900		35.6934	4576	20.2125	319	17.7125	319	7020
3950		36.1510	4576	20.2444	314	17.7444	314	7110
4000		36.6086	4576	20.2758	311	17.7758	311	7200
4050		37.0662	4576	20.3069	307	17.8069	307	7290
4100		37.5238	4576	20.3376	303	17.8376	303	7380
4150		37.9814	4576	20.3679	299	17.8679	299	7470
4200		38.4390	4576	20.3978	296	17.8978	296	7560
4250		38.8966	4576	20.4274	292	17.9274	292	7650
4300		39.3542	4576	20.4566	289	17.9566	289	7740
4350		39.8118	4576	20.4855	286	17.9855	286	7830
4400		40.2694	4576	20.5141	282	18.0141	282	7920
4450		40.7270	4577	20.5423	280	18.0423	280	8010
4500		41.1847	4576	20.5703	276	18.0703	276	8100
4550		41.6423	4576	20.5979	273	18.0979	273	8190
4600		42.0999	4576	20.6252	271	18.1252	271	8280
4650		42.5575	4576	20.6523	267	18.1523	267	8370
4700		43.0151	4576	20.6790	264	18.1790	264	8460
4750		43.4727	4576	20.7054	262	18.2054	262	8550
4800		43.9303	4576	20.7316	259	18.2316	259	8640
4850		44.3879	4576	20.7575	257	18.2575	257	8730
4900		44.8455	4576	20.7832	254	18.2832	254	8820
4950		45.3031	4576	20.8086	251	18.3086	251	8910
5000		45.7607		20.8337		18.3337		9000

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

**These tables are calculated for normal hydrogen (75% ortho - 25% para).

Table 6-13. COEFFICIENTS (AND TEMPERATURE DERIVATIVES) FOR THE EQUATION OF STATE FOR HYDROGEN*

$$T^{3/2} \frac{V}{V_0}\left(1 - \frac{PV}{RT}\right) = A + C\rho$$

T	A	C	dA/dT	dC/dT	T	A	C	dA/dT	dC/dT
°K	$°K^{3/2}$	$°K^{3/2}$	$°K^{1/2}$	$°K^{1/2}$	°K	$°K^{3/2}$	$°K^{3/2}$	$°K^{1/2}$	$°K^{1/2}$
14	0.5754	$-5{,}621 \times 10^{-7}$	0.00388	-75×10^{-8}	36	.5805	$-5{,}943 \times 10^{-7}$	-.00280	-282×10^{-8}
16	.5827	-5,636	.00330	-82	38	.5746	-6,003	-.00317	-320
18	.5887	-5,653	.00264	-90	40	.5679	-6,071	-.00356	-358
20	.5933	-5,672	.00192	-100	42	.5604	-6,146	-.00397	-396
22	.5965	-5,693	.00116	-112	44	.5521	-6,229	-.00438	-436
24	.5981	-5,716	.00040	-127	46	.5429	-6,320	-.00476	-478
26	.5981	-5,743	-.00032	-145	48	.5330	-6,420	-.00509	-522
28	.5966	-5,774	-.00097	-165	50	.5225	-6,529	-.00540	-565
30	.5940	-5,809	-.00154	-187	52	.5114	-6,646	-.00572	-603
32	.5904	-5,848	-.00202	-213	54	.4996	-6,770	-.00608	-636
34	.5858	-5,892	-.00243	-245	56	.4871	-6,900	-.00650	-664

*A discussion of this equation, which is applicable at Amagat densities, ρ, less than 200, is in reference 1.

CHAPTER 7

THE THERMODYNAMIC PROPERTIES OF NITROGEN

The Correlation of the Experimental Data

The data of state for nitrogen have been investigated extensively in the last 25 years. The early data have been reviewed and correlated graphically by Deming and Shupe in 1930 [1]. In 1949, Claitor and Crawford [2] recorrelated the low-temperature data using a virial equation in density involving second and third virial coefficients. A similar treatment extending to higher temperatures (5000°R) was carried out by Hall and Ibele [3] through the use of the Lennard-Jones 6-12 intermolecular potential. The most recent correlation of the data for nitrogen is that of Bloomer and Rao [4] extending to 500°F.

The tables presented here have been obtained from a new correlation of the existing data via the equation $Z = PV/RT = 1 + B_1P + C_1P^2 + D_1P^3$. The virial coefficients, B_1 and C_1, were obtained through the use of the Lennard-Jones 6-12 potential, by a method devised for fitting several properties jointly [5]. The coefficient, D_1, was represented by an empirical equation fitted to the data of state. It was not possible to obtain an exact fit of the second virial coefficient to all the good data using an unmodified 6-12 Lennard-Jones function. Nevertheless, such a function was used even though the results departed considerably from the data at the lower temperatures [13, 14, 15], because the tables were intended primarily for moderate and elevated temperatures. The parameters used to obtain C_1 and the function for D_1 were so chosen as to compensate partially for the failure to fit B_1 for the actual PVT data at moderately low temperatures. Further discussion on the fitting of the nitrogen data is to be found in a report by H. W. Woolley [16]. The coefficients are given in table 7-13. Since the experimental data on heat capacity, entropy, enthalpy, sound velocity, etc., are not abundant enough to provide tables over large ranges of temperature and pressure, the tabulated values were computed from the virial coefficients and the ideal-gas thermodynamic properties based on previously published work [6, 7].

The experimental PVT data for nitrogen which extend to elevated pressure are indicated in figure 7a. Here the direct experimental values of Z are represented by $V[(PV/RT) - 1]$ plotted as a function of density, with values for temperatures in degrees Kelvin adjoining the plotted points. The deviations of the correlation adopted for the present tables are indicated by the comparison between the solid curves, which represent this correlation, and the plotted experimental points. In determining the parameters for the Lennard-Jones potential, the PVT data of Michels and coworkers [8, 9] have been weighted heavily. The isotherm data of Holborn and Otto [11] have been adjusted slightly for the effect of deformation of the container at elevated pressure and for individual pressures and temperatures occurring in their evaluation of the amount of substance present for individual measurements somewhat as suggested by Cragoe [12]. Also, the data of Michels, et al., [8, 9] at the highest temperatures have been adjusted slightly for the vapor pressure of the mercury confining the gas.

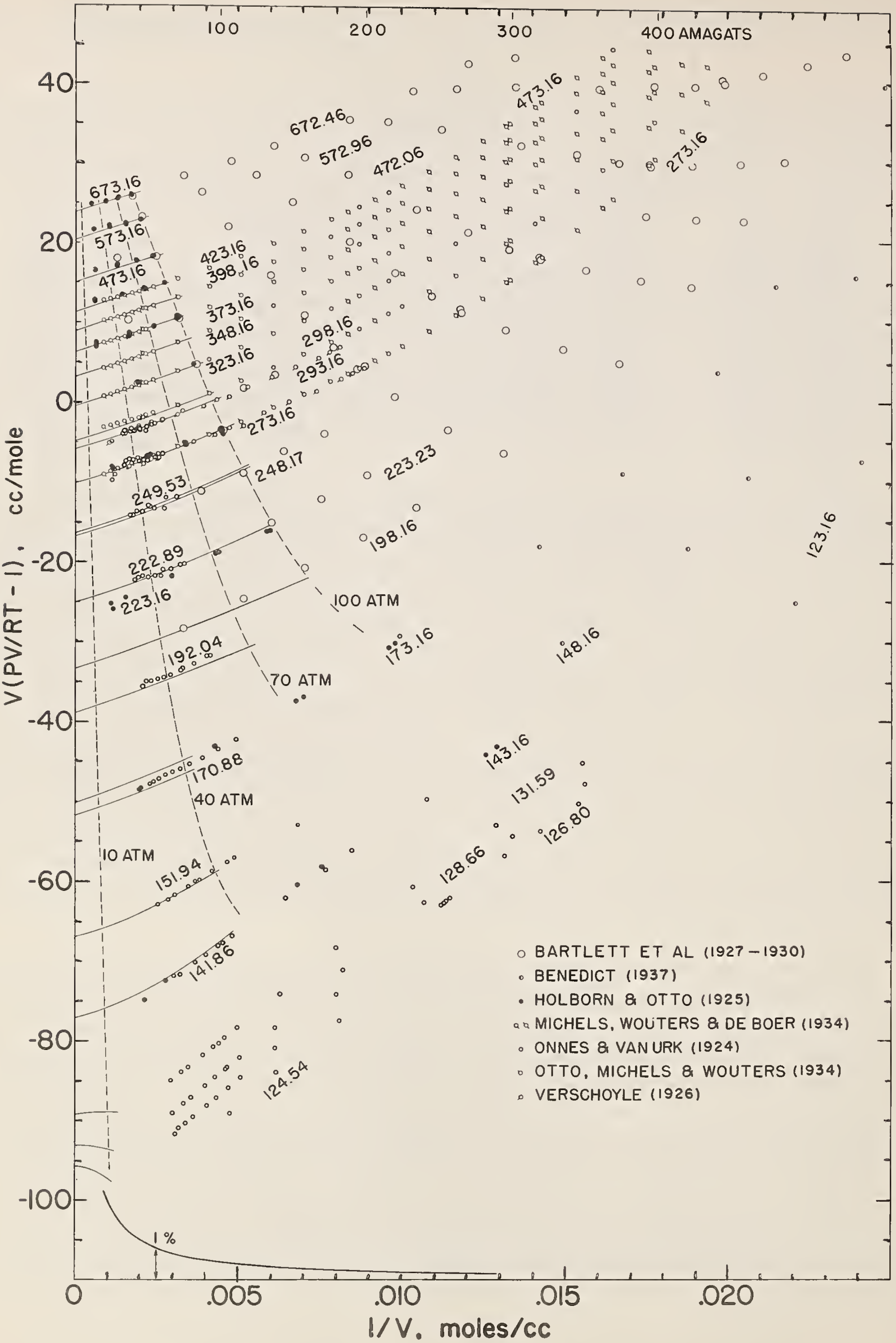

Figure 7a. PVT data for gaseous nitrogen. (The hyperbola at the bottom of the figure shows the vertical displacement due to a 1 percent error in PV/RT)

Experimental data of various kinds are compared in figures 7b, 7c, 7d, 7g, and 7h with the tabulated values. The experimental data in their direct form include measurements of specific heat by Henry [17] and by Workman [18]; the isentropic cooling in expansion in the Lummer-Pringsheim method by Brinkworth [19] and by Eucken and V. Lüde [20]; the ratio of specific heats or the isentropic expansion coefficient, in the resonance method, of Clark and Katz [21]; and the velocity of sound by Shilling and Partington [22], by Dixon, Campbell, and Parker [23], by Hubbard and Hodge [24, 75], and by Keesom and Van Lammeren [25]. Low-temperature measurements on the velocity of sound have also been made [25, 95, 96] but are below the temperature range of the present tables. Data on the Joule-Thomson effect by Roebuck and Osterberg [26] have also been omitted, though they agree well except below about 250°K, where the present representation of the PVT data becomes progressively less satisfactory.

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density, the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0, result, in general, from the correlating equations which were fitted to represent the experimental data over as wide a range as possible. Values for these quantities are given in various units in table 7-b. The value of ρ_0 for nitrogen as given, 1.2505 $g\ell^{-1}$, is in agreement with the mean of direct experimental determinations at standard conditions, 1.2505 $g\ell^{-1}$ [76 - 82]. The value of η_0 for nitrogen, 1.6625×10^{-4} poise, is within the range of the experimental determinations at standard conditions [41, 43, 47, 83 - 85], though slightly below their mean of 1.6645×10^{-4} poise and the latest value listed of 1.6649×10^{-4} poise [47]. The value of k_0 for nitrogen as given, 5.77×10^{-6} cal cm^{-1} sec^{-1}°K^{-1}, is within the range of the data [55 - 58, 74, 86 - 89] though slightly above the average value, 5.669×10^{-6} cal cm^{-1} sec^{-1}°K^{-1}, and the latest determination of 5.71×10^{-6} cal cm^{-1} sec^{-1}°K^{-1} [89]. The value of a_0 for nitrogen as given, 336.96 m sec^{-1}, is appreciably below 337.65 m sec^{-1}, the average of observational values [23, 90 - 94], and slightly below the latest measurement included 337.12 m sec^{-1} [94].

The Reliability of the Tables

In general, the uncertainties of the tabulated values are smallest in the region from about 0° to 150°C where the most accurate experimental determinations have been made. Since a semi-theoretical representation was closely fitted to the data in this region, it appears that the uncertainty here does not exceed 0.1 percent in PV/RT and may be as low as 3 percent of the difference between the real and ideal values of the compressibility factor in this region, increasing considerably both at higher and lower temperatures. This increase is due to the limitations of the theory and of the fitting process, and also to limitations in the ranges and reliability of the experimental data. The derived pressure corrections to thermodynamic properties are, in general, less accurate, because errors are increased relatively in differentiation. The tabulated values of the compressibility factor (table 7-1) are reliable to approximately 1 unit in the next to last tabulated place at temperatures below 300°K and within 2 or 3 units in the last place at higher temperatures. Uncertainties in the density (table 7-2) are of corresponding magnitude. These tables are in essential agreement with the recent correlations of Hall and Ibele [3] and Michels, et al., [10].

The specific-heat values (table 7-3) were obtained by combining the ideal-gas specific-heat values from table 7-12 with differences between the values of the real and ideal gas. The effect of dissociation is not included in this table, but its magnitude may be estimated with the formulas discussed by Damköhler [34]. The accuracy of the tabulated values varies with temperature and pressure. The error in $(C_p - C_p^o)/R$ may approach 5 percent in the range of moderate pressure and 10 percent for the high-pressure entries, and may be still greater at the lowest temperatures. At 40 atmospheres, this 5 percent means 0.03 at 200°K and 0.005 at 400°K, for example. The points in figure 7b, designated as "Dixon, Campbell, and Parker" and "Shilling and Partington," represent values derived from sound velocity measurements. These do not provide reliable values of specific heat at elevated temperatures, due to the effect of dispersion related to vibrational excitation. The departures shown in figure 7b are approximately as large as the entire contribution to the specific heat. Comparisons with the experimental data are shown in figures 7b and 7c. The estimated uncertainties in the ideal-gas functions are given in summary table 1-D.

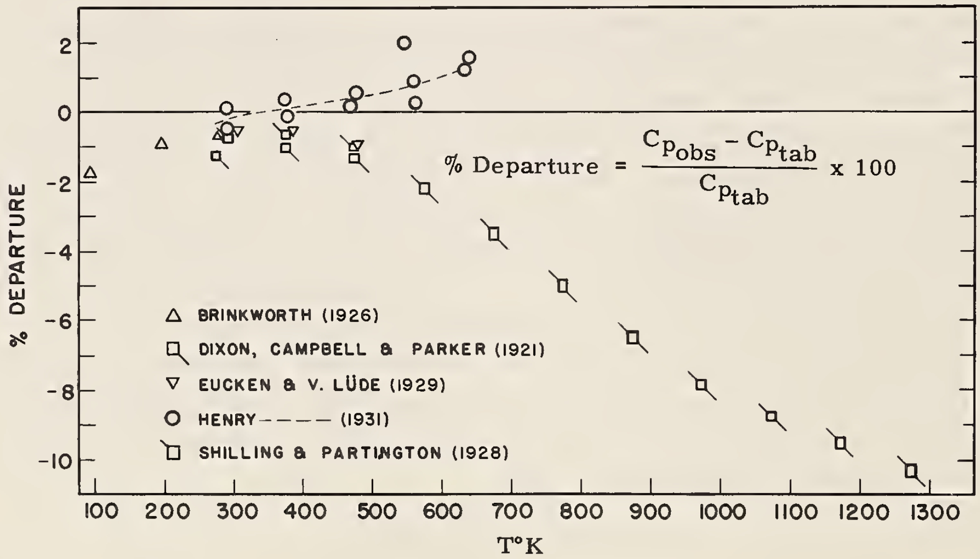

Figure 7b. Departure of experimental specific heats at atmospheric pressure from the tabulated values for nitrogen (table 7-3)

The accuracy of the tabulated values of enthalpy (table 7-4) and entropy (table 7-5) varies with temperature and pressure. If one disregards the small effect of dissociation at the most elevated temperatures, the uncertainty in the difference between real and ideal properties is thought to be somewhat less than 5 percent in the range of moderate pressure but may be as great as 10 percent at the highest pressure. These estimates may need to be increased appreciably for the lowest temperatures. The effect of dissociation on these properties is shown in figures 7e and 7f based on the dissociation energy of 9.756 e.v. At 40 atmospheres, the 5 percent error is about 0.01 at 200°K and 0.002 at 400°K.

On the basis of the reliabilities estimated for specific heats (table 7-3) and compressibility factors (table 7-1), the values of γ (table 7-6) are considered to be reliable to within 5 percent of their departures from values for the ideal gas at pressures below 40 atmospheres and possibly only to within 10 percent of this difference at the highest pressure of 100 atmospheres , and more than 10 percent at the lowest temperatures. At 40 atmospheres, 5 percent is about 0.01 at 200°K and 0.002 at 400°K. Comparisons with direct and indirect experimental determinations of γ are shown in figures 7d and 7g.

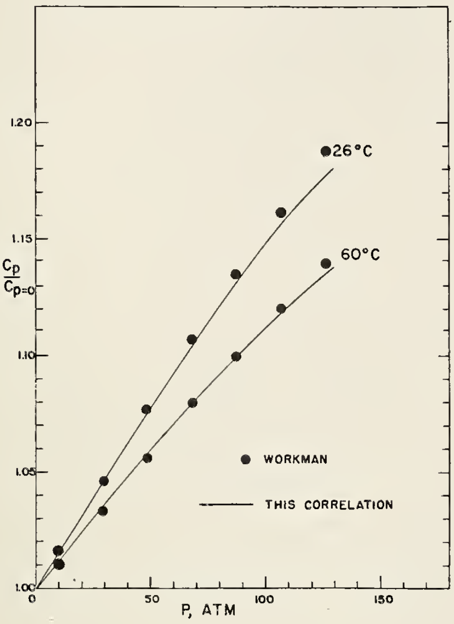

Figure 7c. Dependence of specific heat upon pressure

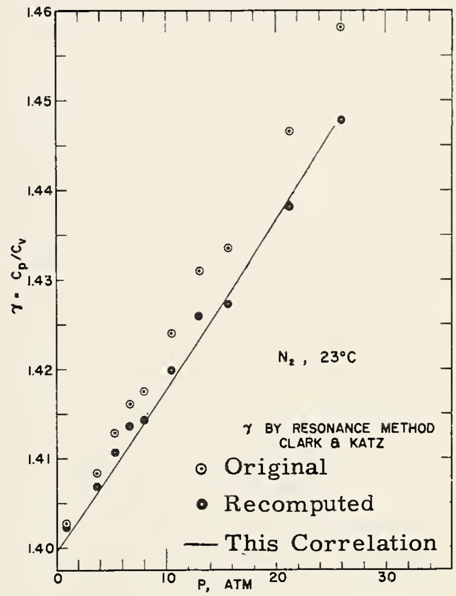

Figure 7d. Ratio of specific heats by the resonance method

The accuracy of the tabulated values of the sound velocity at low frequency (table 7-7) varies with temperature and pressure. Numerically, the reliability is roughly that indicated for the values of γ in terms of departures from ideal-gas values. At 200°K, the values are believed to be reliable to within about 0.002 at 10 atmospheres, 0.01 at 40 atmospheres, 0.03 at 70 atmospheres, and 0.07 at 100 atmospheres. At 400°K, these limits might be reduced by factors between 5 and 10. At higher temperatures, the values for 100 atmospheres are probably reliable to within 0.005. The effect of dissociation is probably quite small except for the low pressures at the highest temperatures covered. Below the very high temperatures at which dissociation is appreciable, the values become more precise with increasing temperature, because the gas becomes more ideal. Figure 7h shows the departures of experimental values for the velocity of

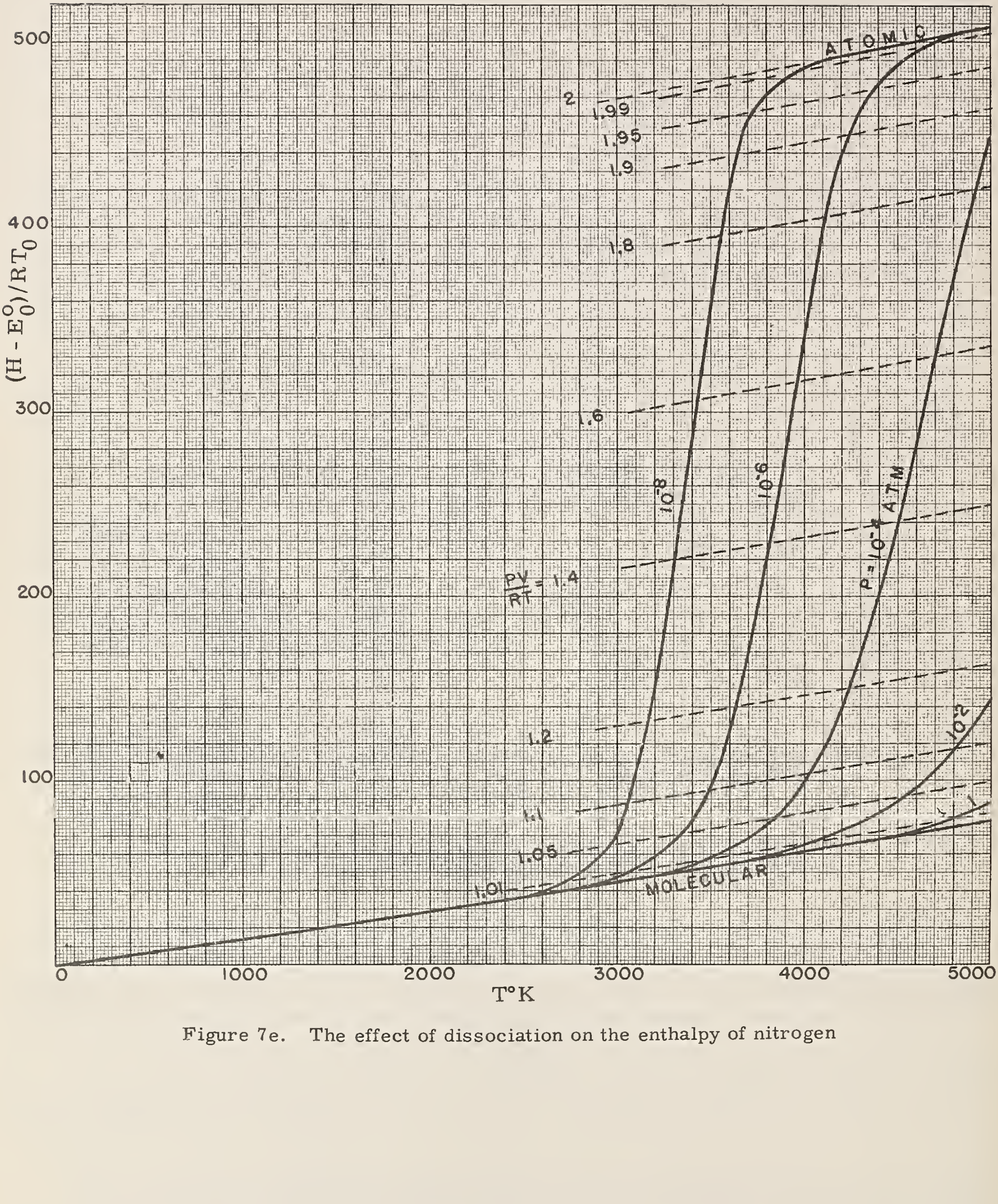

Figure 7e. The effect of dissociation on the enthalpy of nitrogen

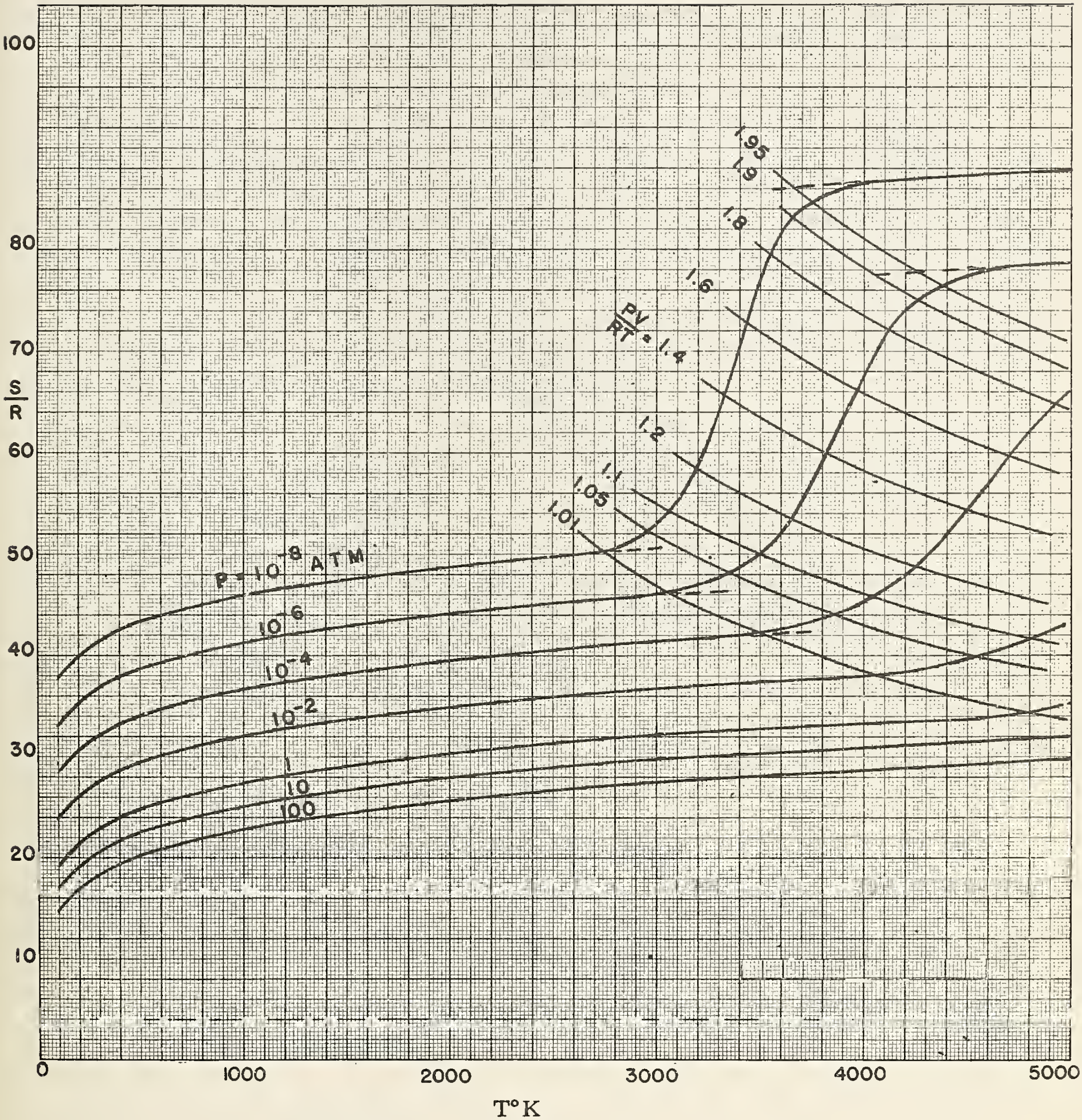

Figure 7f. The effect of dissociation on the entropy of nitrogen

sound from the values in this table. The large deviations of sound velocity data at elevated temperatures are due to dispersion effects. The experimental frequencies were not sufficiently low to allow the molecules to adjust their vibrational excitations appreciably for the change in temperature during the sound vibration.

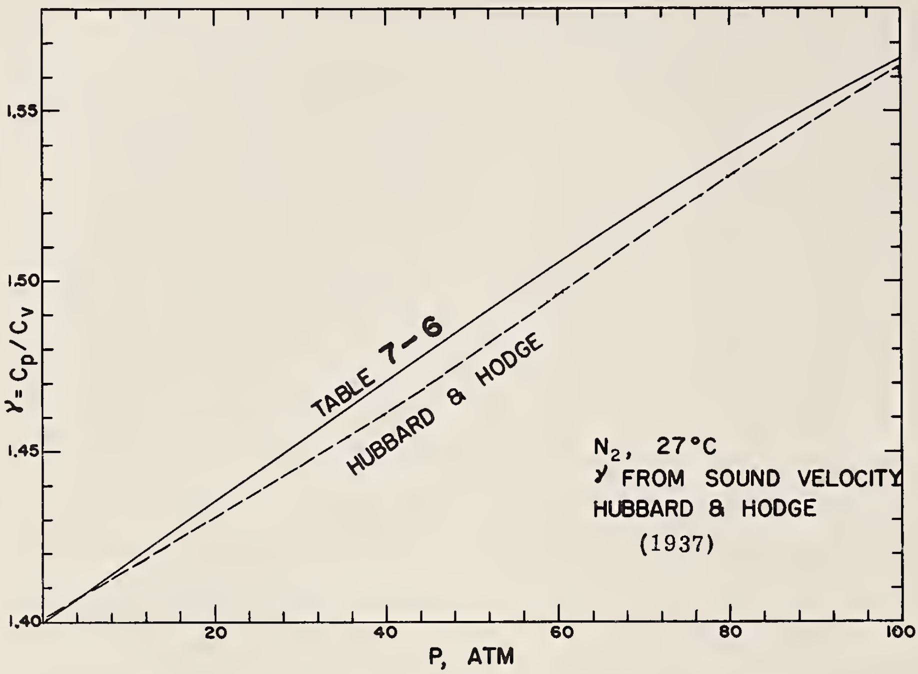

Figure 7g. Ratio of specific heats derived from the velocity of sound

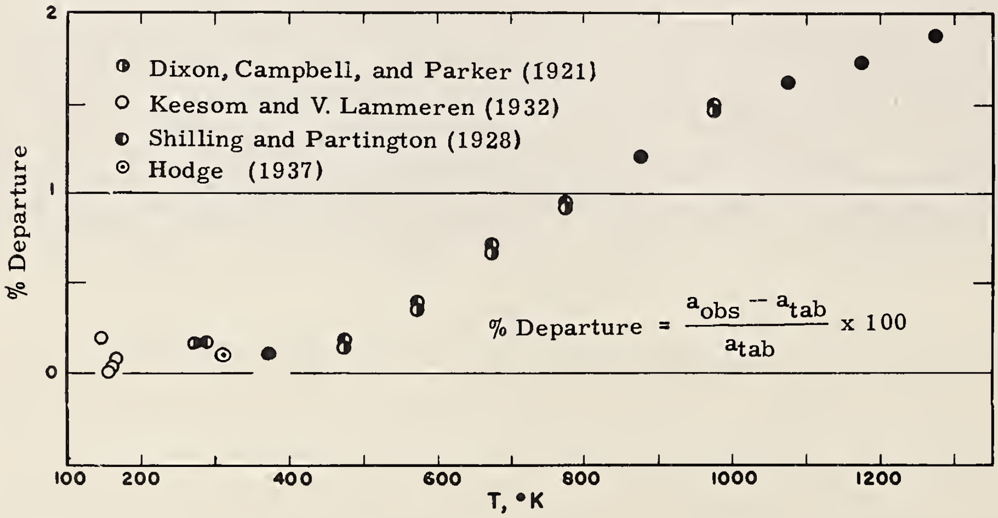

Figure 7h. Departures of experimental velocity of sound from the tabulated values for nitrogen (table 7-7)

The tabulated viscosities (table 7-8) were computed from formulas given in summary table 1-B. The low-pressure values were calculated via the Lennard-Jones 6-12 intermolecular potential using the force constants $\epsilon/k = 91.46°K$ and $r_0 = 3.681\ \mathring{A}$, chosen to fit the viscosity data in the low-temperature region. Above 600°K, the values thus computed were reduced by an amount $\Delta = 0.0055(T - 600)\eta$ to correct for the systematic departure of the Lennard-Jones fit from the experimental data at high temperatures. A graphical comparison of the tabulated values with the experimental values is shown in figure 7i and figure 7j. The recent data of Kestin and Pilarczyk [59] at room temperature are in agreement with this correlation to well within 0.7 percent over the pressure range of 1 to 70 atmospheres. Figure 7k shows the departures of the experimental thermal conductivity data from table 7-9 which was computed from the formulas given in summary table 1-C. These formulas are based on the work of Keyes below 300°K [53] and of Stops above 300°K [74]. The trend of the data away from the data of Keyes is also indicated by the unpublished data of Nuttall [97] which are shown in figure 7k. The tabulated thermal conductivity values appear to be reliable to about 2 percent. The uncertainty in the table of Prandtl numbers (table 7-10) is due essentially to that of the viscosity.

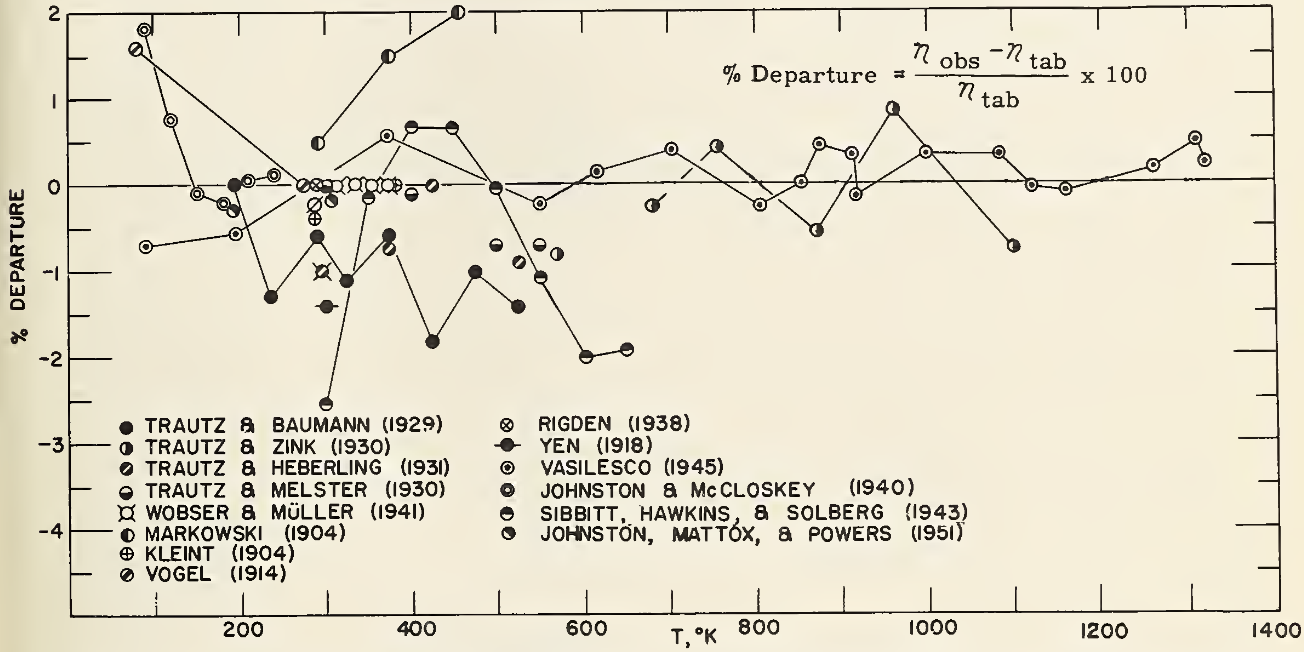

Figure 7i. Departures of experimental viscosities at 1 atmosphere from the tabulated values for nitrogen (table 7-8)

The tables of vapor pressure are based on an analysis of the data in references 60 - 72, which are arranged roughly in the order of the weight given to the data taken from them. Deviations of the experimental data from the adopted relations are shown in figure 7ℓ. A substantial improvement in consistency was effected by adjusting the temperatures of some of the reported data. A recent study [72] showed differences in reported vapor pressures of oxygen that were attributed to the difference in temperature scales. Many laboratories have published data on the vapor pressure of both oxygen and nitrogen. Where the data were precise enough [60, 62, 63, 68, and 69], the reported temperatures were adjusted so that the oxygen data were brought into

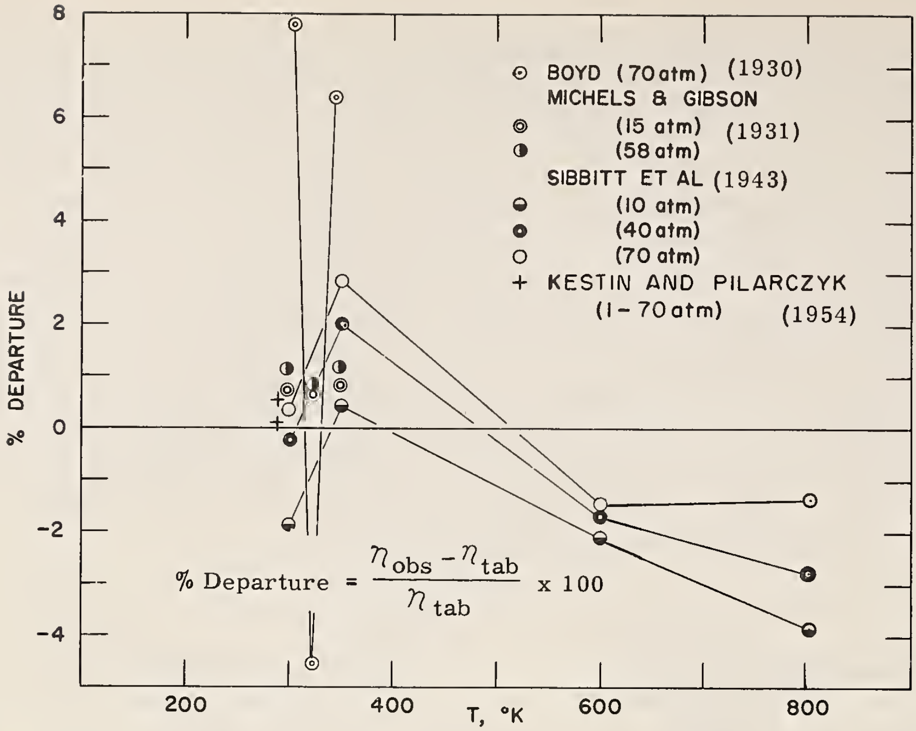

Figure 7j. Departures of high-pressure viscosity measurements from the tabulated values for nitrogen (table 7-8)

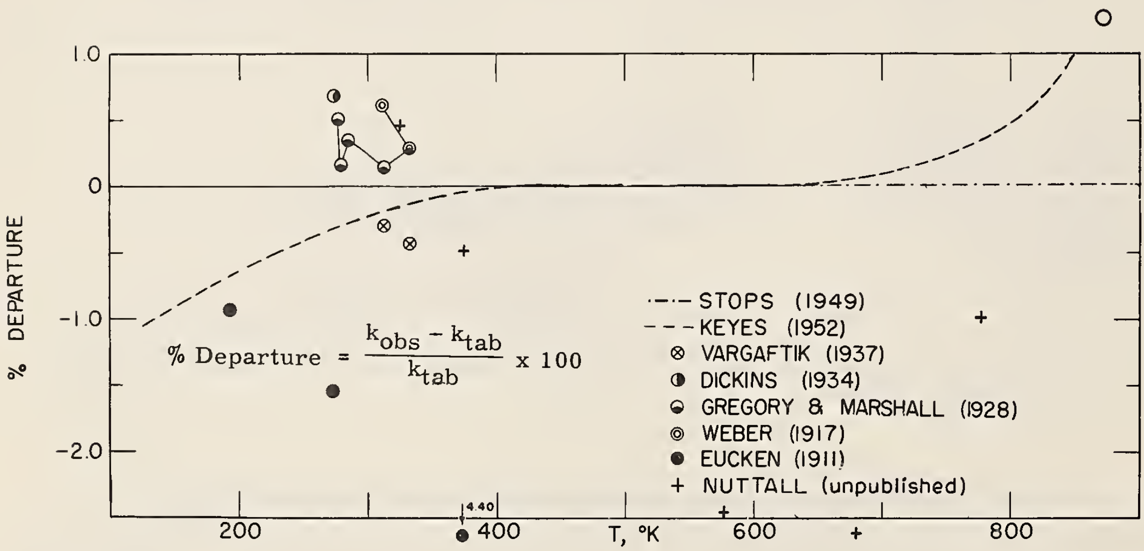

Figure 7k. Departures of experimental thermal conductivities from the tabulated values for nitrogen (table 7-9)

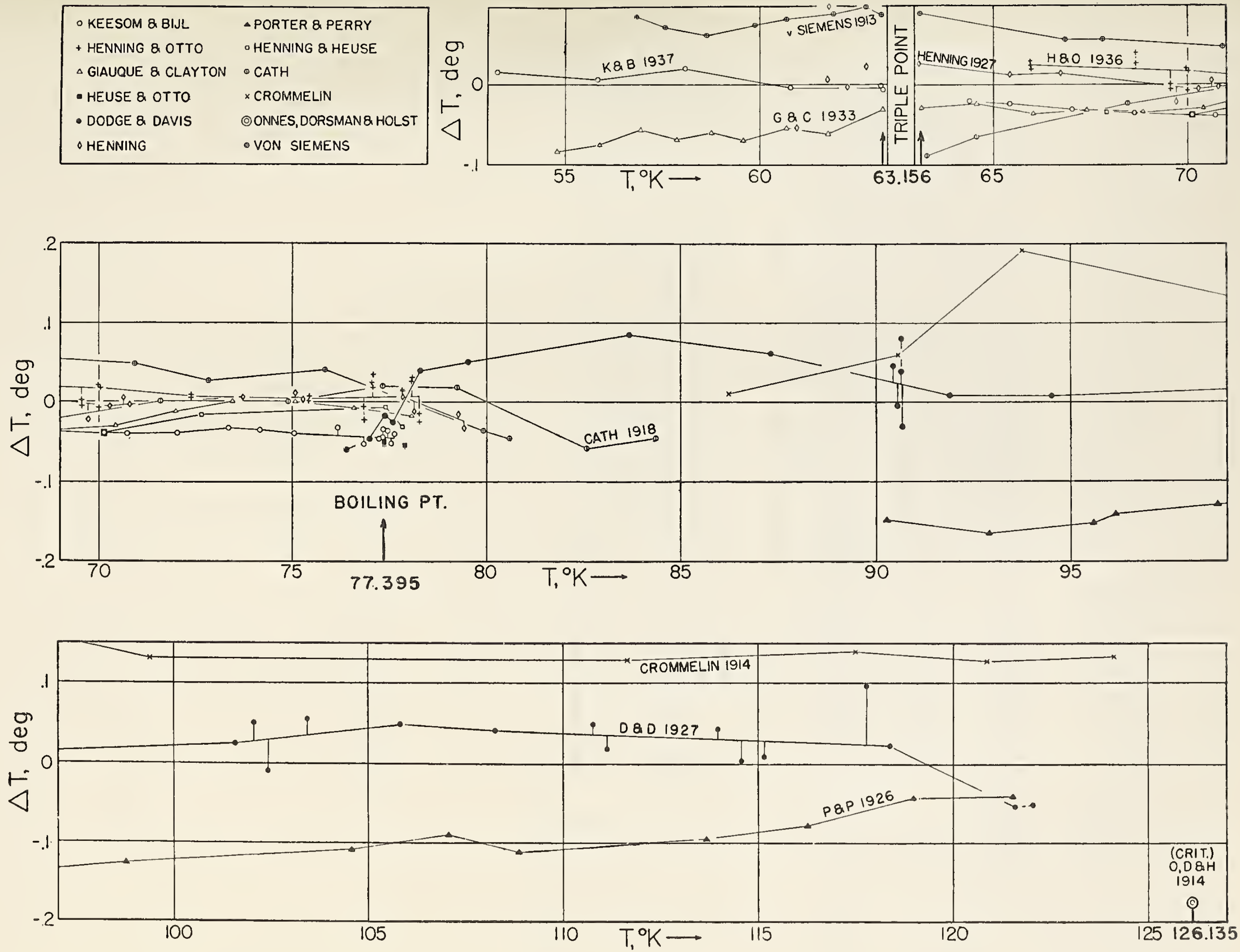

Figure 7*l*. Departures of experimental vapor pressures from the tabulated values for nitrogen (table 7-11)

agreement with the values reported [72] on the NBS provisional temperature scale below 90°K and on the International Temperature Scale above that point. The temperature scale corrections so obtained were applied to the nitrogen vapor-pressure data, and a much better agreement among the various sets of measurements was obtained. In other cases, there was inadequate information to warrant an adjustment. Where an adjustment was made, figure 7ℓ shows the adjusted rather than the unadjusted values.

The accuracy of the tables may be estimated from figure 7ℓ. The spread of the data is somewhat less than ±0.10 degree below 90°K and approximately ±0.15 degree at higher temperatures. These temperature spreads correspond to pressure spreads of ±0.2 mm Hg at 53°K, ±1 mm Hg at 60°K, ±7 mm Hg at 75°K, ±60 mm Hg at 100°K, and ±175 mm Hg near the critical point at 126.135°K. The probable error of the accepted values is perhaps half of the spreads just quoted. The equation for the solid (given in table 7-11/b) may be used for order-of-magnitude calculations below the range of the experimental data, but not below the transition at 35.6°K. The value of the critical point shown is due to Onnes, Dorsman, and Holst [65]. A more recent determination by White, Friedman, and Johnston [73] gives 126.26°K as the critical point.

The values of the thermodynamic properties of undissociated molecular nitrogen in the ideal-gas state from 60°K to 2800°K are based largely on the calculations of Goff and Gratch [6], but are for the normal isotopic mixture. These values have been extended to the greater temperature range of the present table at the National Bureau of Standards, using the same fundamental spectroscopic data. The estimated uncertainty of these tables is given in summary table 1-D. The thermodynamic functions for atomic nitrogen were obtained by conversion and subtabulation of values in reference 7.

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Table 7-a. VALUES OF THE GAS CONSTANT, R, FOR MOLECULAR NITROGEN

Values of R for Molecular Nitrogen for Temperatures in Degrees Kelvin

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.92892	3.02624	2225.98	43.0434
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0469164	0.0484753	35.6565	0.689484
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Molecular Nitrogen for Temperatures in Degrees Rankine

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.62718	1.68124	1236.66	23.9130
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0260647	0.0269307	19.8092	0.383047
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 7-b. CONVERSION FACTORS FOR THE MOLECULAR NITROGEN TABLES

Conversion Factors for Table 7-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	1.25046×10^{-3}
		mole cm^{-3}	4.46338×10^{-5}
		g $liter^{-1}$	1.25050
		lb in^{-3}	4.51760×10^{-5}
		lb ft^{-3}	7.80641×10^{-2}

Conversion Factors for Tables 7-4, and 7-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	cal $mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	cal g^{-1}	19.3754
		joules g^{-1}	81.0669
		Btu $(lb\ mole)^{-1}$	976.437
		Btu lb^{-1}	34.8528

Conversion Factors for Tables 7-3, 7-5, and 7-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R,	C_p, S,	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.0709305
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.296774
		Btu $(lb\ mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.0708838

The molecular weight of nitrogen is 28.016 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 7-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	336.96
		ft sec^{-1}	1105.5

Conversion Factors for Table 7-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	$1.6625x10^{-4}$
		kg hr^{-1} m^{-1}	5.985×10^{-2}
		slug hr^{-1} ft^{-1}	1.2500×10^{-3}
		lb sec^{-1} ft^{-1}	1.1172×10^{-5}
		lb hr^{-1} ft^{-1}	4.0218×10^{-2}

Conversion Factors for Table 7-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^oK^{-1}$	5.77×10^{-5}
		Btu ft^{-1} hr^{-1} $^oR^{-1}$	1.40×10^{-2}
		watts cm^{-1} $^oK^{-1}$	2.41×10^{-4}

Table 7-c. CONVERSION FACTORS FOR THE ATOMIC NITROGEN TABLES

Conversion Factors for Table 7-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$	$(H^o - E_0^o)$	cal $mole^{-1}$	542.821
		cal g^{-1}	38.7508
		joules g^{-1}	162.134
		Btu (lb mole)$^{-1}$	976.437
		Btu lb^{-1}	69.7056

Conversion Factors for Table 7-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R	C_p^o, S^o	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
		cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.141861
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.593548
		Btu (lb mole)$^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.141768

Table 7-1. COMPRESSIBILITY FACTOR FOR NITROGEN Z = PV/RT

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	.99982	4	.99820	42	.9927	17	.987	3	180
110	.99986	3	.99862	30	.9944	13	.990	2	198
120	.99989	2	.99892	22	.9957	9	.992	2	216
130	.99991	2	.99914	17	.9966	6	.994	1	234
140	.99993	1	.99931	13	.9972	6	.995	1	252
150	.99994	1	.99944	10	.99776	41	.9961	7	270
160	.99995	1	.99954	8	.99817	33	.9968	6	288
170	.99996	1	.99962	7	.99850	26	.9974	4	306
180	.99997		.99969	5	.99876	21	.9978	4	324
190	.99997	1	.99974	5	.99897	18	.9982	3	342
200	.99998		.99979	3	.99915	15	.99851	26	360
210	.99998	1	.99982	3	.99930	12	.99877	21	378
220	.99999		.99985	3	.99942	10	.99898	18	396
230	.99999		.99988	2	.99952	9	.99916	16	414
240	.99999		.99990	2	.99961	7	.99932	13	432
250	.99999		.99992	2	.99968	7	.99945	11	450
260	.99999	1	.99994	1	.99975	5	.99956	10	468
270	1.00000		.99995	1	.99980	5	.99966	8	486
280	1.00000		.99996	1	.99985	4	.99974	7	504
290	1.00000		.99997	1	.99989	4	.99981	6	522
300	1.00000		.99998	1	.99993	3	.99987	6	540
310	1.00000		.99999	1	.99996	3	.99993	4	558
320	1.00000		1.00000		.99999	2	.99997	5	576
330	1.00000		1.00000	1	1.00001	2	1.00002	3	594
340	1.00000		1.00001		1.00003	2	1.00005	3	612
350	1.00000		1.00001	1	1.00005	1	1.00008	3	630
360	1.00000		1.00002		1.00006	2	1.00011	3	648
370	1.00000		1.00002		1.00008	1	1.00014	2	666
380	1.00000		1.00002	1	1.00009	1	1.00016	2	684
390	1.00000		1.00003		1.00010	1	1.00018	2	702
400	1.00000		1.00003		1.00011	1	1.00020	1	720
410	1.00000		1.00003		1.00012	1	1.00021	1	738
420	1.00000		1.00003		1.00013		1.00022	2	756
430	1.00000		1.00003	1	1.00013	1	1.00024	1	774
440	1.00000		1.00004		1.00014	1	1.00025		792
450	1.00000		1.00004		1.00015		1.00025	1	810
460	1.00000		1.00004		1.00015		1.00026	1	828
470	1.00000		1.00004		1.00015	1	1.00027	1	846
480	1.00000		1.00004		1.00016		1.00028		864
490	1.00000		1.00004		1.00016		1.00028	1	882
500	1.00000		1.00004		1.00016	1	1.00029		900
510	1.00000		1.00004		1.00017		1.00029		918
520	1.00000		1.00004		1.00017		1.00029	1	936
530	1.00000		1.00004		1.00017		1.00030		954
540	1.00000		1.00004		1.00017		1.00030		972
550	1.00000		1.00004		1.00017		1.00030		990
560	1.00000		1.00004		1.00017		1.00030		1008
570	1.00000		1.00004		1.00017		1.00030		1026
580	1.00000		1.00004		1.00017		1.00030		1044
590	1.00000		1.00004		1.00017		1.00030		1062
600	1.00000		1.00004		1.00017		1.00030	1	1080
610	1.00000		1.00004		1.00017		1.00031		1098
620	1.00000		1.00004		1.00017		1.00031	– 1	1116
630	1.00000		1.00004		1.00017		1.00030		1134
640	1.00000		1.00004		1.00017		1.00030		1152
650	1.00000		1.00004		1.00017		1.00030		1170
660	1.00000		1.00004		1.00017		1.00030		1188
670	1.00000		1.00004		1.00017		1.00030		1206
680	1.00000		1.00004		1.00017		1.00030		1224
690	1.00000		1.00004		1.00017		1.00030		1242
700	1.00000		1.00004		1.00017		1.00030		1260

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
700	1.00000	1.00004		1.00017		1.00030		1260
710	1.00000	1.00004		1.00017		1.00030		1278
720	1.00000	1.00004		1.00017		1.00030		1296
730	1.00000	1.00004		1.00017		1.00030	- 1	1314
740	1.00000	1.00004		1.00017		1.00029		1332
750	1.00000	1.00004		1.00017		1.00029		1350
760	1.00000	1.00004		1.00017		1.00029		1368
770	1.00000	1.00004		1.00017	- 1	1.00029		1386
780	1.00000	1.00004		1.00016		1.00029		1404
790	1.00000	1.00004		1.00016		1.00029		1422
800	1.00000	1.00004		1.00016		1.00029	- 1	1440
850	1.00000	1.00004		1.00016	- 1	1.00028	- 1	1530
900	1.00000	1.00004		1.00015		1.00027	- 1	1620
950	1.00000	1.00004		1.00015	- 1	1.00026	- 1	1710
1000	1.00000	1.00004	- 1	1.00014		1.00025	- 1	1800
1050	1.00000	1.00003		1.00014	- 1	1.00024		1890
1100	1.00000	1.00003		1.00013		1.00024	- 1	1980
1150	1.00000	1.00003		1.00013		1.00023	- 1	2070
1200	1.00000	1.00003		1.00013	- 1	1.00022	- 1	2160
1250	1.00000	1.00003		1.00012		1.00021		2250
1300	1.00000	1.00003		1.00012		1.00021	- 1	2340
1350	1.00000	1.00003		1.00012	- 1	1.00020		2430
1400	1.00000	1.00003		1.00011		1.00020	- 1	2520
1450	1.00000	1.00003		1.00011		1.00019	- 1	2610
1500	1.00000	1.00003		1.00011	- 1	1.00018		2700
1550	1.00000	1.00003	- 1	1.00010		1.00018	- 1	2790
1600	1.00000	1.00002		1.00010		1.00017		2880
1650	1.00000	1.00002		1.00010	- 1	1.00017	- 1	2970
1700	1.00000	1.00002		1.00009		1.00016		3060
1750	1.00000	1.00002		1.00009		1.00016		3150
1800	1.00000	1.00002		1.00009		1.00016	- 1	3240
1850	1.00000	1.00002		1.00009	- 1	1.00015		3330
1900	1.00000	1.00002		1.00008		1.00015	- 1	3420
1950	1.00000	1.00002		1.00008		1.00014		3510
2000	1.00000	1.00002		1.00008		1.00014		3600
2050	1.00000	1.00002		1.00008		1.00014		3690
2100	1.00000	1.00002		1.00008		1.00014	- 1	3780
2150	1.00000	1.00002		1.00008	- 1	1.00013		3870
2200	1.00000	1.00002		1.00007		1.00013		3960
2250	1.00000	1.00002		1.00007		1.00013	- 1	4050
2300	1.00000	1.00002		1.00007		1.00012		4140
2350	1.00000	1.00002		1.00007		1.00012		4230
2400	1.00000	1.00002		1.00007		1.00012		4320
2450	1.00000	1.00002		1.00007	- 1	1.00012	- 1	4410
2500	1.00000	1.00002		1.00006		1.00011		4500
2550	1.00000	1.00002		1.00006		1.00011		4590
2600	1.00000	1.00002		1.00006		1.00011		4680
2650	1.00000	1.00002		1.00006		1.00011		4770
2700	1.00000	1.00002	- 1	1.00006		1.00011	- 1	4860
2750	1.00000	1.00001		1.00006		1.00010		4950
2800	1.00000	1.00001		1.00006		1.00010		5040
2850	1.00000	1.00001		1.00006		1.00010		5130
2900	1.00000	1.00001		1.00006	- 1	1.00010		5220
2950	1.00000	1.00001		1.00005		1.00010	- 1	5310
3000	1.00000	1.00001		1.00005		1.00009		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.981	5	.909	30	.783	98			180
110	.986	3	.939	15	.881	35	.805	68	198
120	.989	2	.954	10	.916	20	.873	33	216
130	.991	2	.964	8	.936	14	.906	21	234
140	.993	1	.972	5	.950	10	.927	15	252
150	.9944	10	.9773	42	.9597	76	.9416	113	270
160	.9954	8	.9815	33	.9673	60	.9529	88	288
170	.9962	7	.9848	27	.9733	48	.9617	68	306
180	.9969	5	.9875	22	.9781	39	.9685	57	324
190	.9974	5	.9897	18	.9820	31	.9742	46	342
200	.99788	36	.99150	148	.98514	261	.9788	37	360
210	.99824	31	.99298	124	.98775	217	.9825	32	378
220	.99855	26	.99422	103	.98992	182	.9857	26	396
230	.99881	21	.99525	88	.99174	154	.9883	22	414
240	.99902	19	.99613	75	.99328	131	.9905	19	432
250	.99921	16	.99688	63	.99459	111	.99235	159	450
260	.99937	14	.99751	56	.99570	96	.99394	137	468
270	.99951	12	.99807	47	.99666	83	.99531	117	486
280	.99963	10	.99854	41	.99749	71	.99648	102	504
290	.99973	9	.99895	35	.99820	62	.99750	88	522
300	.99982	8	.99930	31	.99882	54	.99838	77	540
310	.99990	6	.99961	27	.99936	47	.99915	66	558
320	.99996	6	.99988	24	.99983	41	.99981	59	576
330	1.00002	5	1.00012	20	1.00024	36	1.00040	51	594
340	1.00007	5	1.00032	18	1.00060	32	1.00091	45	612
350	1.00012	4	1.00050	16	1.00092	27	1.00136	39	630
360	1.00016	4	1.00066	15	1.00119	25	1.00175	35	648
370	1.00020	3	1.00081	12	1.00144	21	1.00210	30	666
380	1.00023	3	1.00093	11	1.00165	19	1.00240	27	684
390	1.00026	2	1.00104	9	1.00184	17	1.00267	23	702
400	1.00028	2	1.00113	9	1.00201	15	1.00290	22	720
410	1.00030	2	1.00122	8	1.00216	13	1.00312	18	738
420	1.00032	2	1.00130	6	1.00229	11	1.00330	15	756
430	1.00034	1	1.00136	6	1.00240	11	1.00345	15	774
440	1.00035	1	1.00142	5	1.00251	8	1.00360	12	792
450	1.00036	2	1.00147	4	1.00259	7	1.00372	11	810
460	1.00038	1	1.00151	4	1.00266	7	1.00383	9	828
470	1.00039		1.00155	4	1.00273	6	1.00392	9	846
480	1.00039	1	1.00159	2	1.00279	5	1.00401	7	864
490	1.00040	1	1.00161	3	1.00284	5	1.00408	6	882
500	1.00041		1.00164	3	1.00289	4	1.00414	6	900
510	1.00041	1	1.00167	1	1.00293	2	1.00420	4	918
520	1.00042		1.00168	2	1.00295	3	1.00424	3	936
530	1.00042	1	1.00170	1	1.00298	3	1.00427	4	954
540	1.00043		1.00171	1	1.00301	2	1.00431	3	972
550	1.00043		1.00172	1	1.00303	1	1.00434	1	990
560	1.00043		1.00173	1	1.00304	1	1.00435	2	1008
570	1.00043		1.00174		1.00305	1	1.00437	1	1026
580	1.00043	1	1.00174		1.00306		1.00438	1	1044
590	1.00044		1.00174		1.00306		1.00439		1062
600	1.00044		1.00174		1.00306		1.00439		1080
610	1.00044		1.00174		1.00306	1	1.00439		1098
620	1.00044		1.00174		1.00307		1.00439	− 1	1116
630	1.00044		1.00174		1.00307	− 1	1.00438		1134
640	1.00044	− 1	1.00174		1.00306	− 1	1.00438	− 1	1152
650	1.00043		1.00174	− 1	1.00305	− 1	1.00437	− 1	1170
660	1.00043		1.00173		1.00304		1.00436	− 1	1188
670	1.00043		1.00173	− 1	1.00304	− 1	1.00435	− 2	1206
680	1.00043		1.00172		1.00303	− 2	1.00433	− 2	1224
690	1.00043		1.00172	− 1	1.00301		1.00431	− 1	1242
700	1.00043		1.00171		1.00301		1.00430		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	1.00043		1.00171	-1	1.00301	-2	1.00430	-2	1260
710	1.00043	-1	1.00170		1.00299	-1	1.00428	-2	1278
720	1.00042		1.00170	-1	1.00298	-1	1.00426	-1	1296
730	1.00042		1.00169	-1	1.00297	-1	1.00425	-2	1314
740	1.00042		1.00168		1.00296	-2	1.00423	-2	1332
750	1.00042		1.00168	-1	1.00294	-1	1.00421	-2	1350
760	1.00042	-1	1.00167	-1	1.00293	-2	1.00419	-3	1368
770	1.00041		1.00166	-1	1.00291	-2	1.00416	-2	1386
780	1.00041		1.00165	-1	1.00289	-1	1.00414	-3	1404
790	1.00041		1.00164	-1	1.00288	-2	1.00411	-2	1422
800	1.00041	-1	1.00163	-5	1.00286	-9	1.00409	-13	1440
850	1.00040	-2	1.00158	-4	1.00277	-8	1.00396	-12	1530
900	1.00038	-1	1.00154	-5	1.00269	-9	1.00384	-12	1620
950	1.00037	-1	1.00149	-5	1.00260	-8	1.00372	-12	1710
1000	1.00036	-1	1.00144	-5	1.00252	-8	1.00360	-12	1800
1050	1.00035	-1	1.00139	-4	1.00244	-8	1.00348	-11	1890
1100	1.00034	-1	1.00135	-5	1.00236	-8	1.00337	-11	1980
1150	1.00033	-1	1.00130	-4	1.00228	-7	1.00326	-10	2070
1200	1.00032	-1	1.00126	-4	1.00221	-7	1.00316	-10	2160
1250	1.00031	-1	1.00122	-3	1.00214	-6	1.00306	-9	2250
1300	1.00030	-1	1.00119	-4	1.00208	-6	1.00297	-9	2340
1350	1.00029	-1	1.00115	-3	1.00202	-7	1.00288	-9	2430
1400	1.00028	-1	1.00112	-4	1.00195	-5	1.00279	-8	2520
1450	1.00027	-1	1.00108	-3	1.00190	-6	1.00271	-8	2610
1500	1.00026		1.00105	-3	1.00184	-5	1.00263	-7	2700
1550	1.00026	-1	1.00102	-2	1.00179	-5	1.00256	-7	2790
1600	1.00025	-1	1.00100	-3	1.00174	-5	1.00249	-7	2880
1650	1.00024		1.00097	-3	1.00169	-4	1.00242	-7	2970
1700	1.00024	-1	1.00094	-2	1.00165	-5	1.00235	-6	3060
1750	1.00023	-1	1.00092	-3	1.00160	-4	1.00229	-6	3150
1800	1.00022		1.00089	-2	1.00156	-3	1.00223	-5	3240
1850	1.00022	-1	1.00087	-2	1.00153	-5	1.00218	-6	3330
1900	1.00021		1.00085	-2	1.00148	-3	1.00212	-5	3420
1950	1.00021	-1	1.00083	-2	1.00145	-4	1.00207	-5	3510
2000	1.00020		1.00081	-2	1.00141	-3	1.00202	-5	3600
2050	1.00020	-1	1.00079	-2	1.00138	-3	1.00197	-4	3690
2100	1.00019		1.00077	-2	1.00135	-3	1.00193	-5	3780
2150	1.00019	-1	1.00075	-1	1.00132	-3	1.00188	-4	3870
2200	1.00018		1.00074	-2	1.00129	-3	1.00184	-4	3960
2250	1.00018		1.00072	-2	1.00126	-3	1.00180	-4	4050
2300	1.00018	-1	1.00070	-1	1.00123	-2	1.00176	-3	4140
2350	1.00017		1.00069	-1	1.00121	-3	1.00173	-4	4230
2400	1.00017		1.00068	-2	1.00118	-2	1.00169	-3	4320
2450	1.00017	-1	1.00066	-1	1.00116	-3	1.00166	-4	4410
2500	1.00016		1.00065	-1	1.00113	-2	1.00162	-3	4500
2550	1.00016		1.00064	-2	1.00111	-2	1.00159	-3	4590
2600	1.00016	-1	1.00062	-1	1.00109	-2	1.00156	-3	4680
2650	1.00015		1.00061	-1	1.00107	-2	1.00153	-3	4770
2700	1.00015		1.00060	-1	1.00105	-2	1.00150	-3	4860
2750	1.00015		1.00059	-1	1.00103	-1	1.00147	-2	4950
2800	1.00015	-1	1.00058	-1	1.00102	-3	1.00145	-3	5040
2850	1.00014		1.00057	-1	1.00099	-2	1.00142	-3	5130
2900	1.00014		1.00056	-1	1.00097	-1	1.00139	-2	5220
2950	1.00014		1.00055	-1	1.00096	-1	1.00137	-2	5310
3000	1.00014		1.00054		1.00095		1.00135		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
110	.805	68							198
120	.873	33							216
130	.906	21							234
140	.927	15							252
150	.9416	113	.736	63					270
160	.9529	88	.799	44					288
170	.9617	68	.843	30					306
180	.9685	57	.873	26	.787	50			324
190	.9742	46	.899	20	.837	34			342
200	.9788	37	.9185	156	.8705	264	.844	34	360
210	.9825	32	.9341	126	.8969	211	.878	27	378
220	.9857	26	.9467	104	.9180	172	.905	22	396
230	.9883	22	.9571	87	.9352	142	.9268	177	414
240	.9905	19	.9658	73	.9494	119	.9445	148	432
250	.99235	159	.97311	614	.9613	99	.9593	123	450
260	.99394	137	.97925	528	.9712	85	.9716	106	468
270	.99531	117	.98453	447	.9797	71	.9822	89	486
280	.99648	102	.98900	384	.9868	61	.9911	75	504
290	.99750	88	.99284	336	.9929	55	.9986	68	522
300	.99838	77	.99620	288	.9984	45	1.0054	57	540
310	.99915	66	.99908	249	1.0029	41	1.0111	50	558
320	.99981	59	1.00157	216	1.0070	34	1.0161	43	576
330	1.00040	51	1.00373	190	1.0104	30	1.0204	38	594
340	1.00091	45	1.00563	165	1.0134	26	1.0242	32	612
350	1.00136	39	1.00728	144	1.0160	22	1.0274	28	630
360	1.00175	35	1.00872	128	1.0182	20	1.0302	25	648
370	1.00210	30	1.01000	111	1.0202	18	1.0327	22	666
380	1.00240	27	1.01111	98	1.0220	15	1.0349	19	684
390	1.00267	23	1.01209	83	1.0235	13	1.0368	15	702
400	1.00290	22	1.01292	77	1.0248	12	1.0383	15	720
410	1.00312	18	1.01369	66	1.0260	10	1.0398	13	738
420	1.00330	15	1.01435	54	1.0270	8	1.0411	10	756
430	1.00345	15	1.01489	51	1.0278	8	1.0421	9	774
440	1.00360	12	1.01540	44	1.0286	6	1.0430	8	792
450	1.00372	11	1.01584	36	1.0292	6	1.0438	6	810
460	1.00383	9	1.01620	32	1.0298	4	1.0444	5	828
470	1.00392	9	1.01652	30	1.0302	5	1.0449	5	846
480	1.00401	7	1.01682	22	1.0307	3	1.0454	4	864
490	1.00408	6	1.01704	22	1.0310	3	1.0458	3	882
500	1.00414	6	1.01726	18	1.0313	3	1.0461	3	900
510	1.00420	4	1.01744	12	1.0316	1	1.0464	2	918
520	1.00424	3	1.01756	11	1.0317	1	1.0466	1	936
530	1.00427	4	1.01767	11	1.0318	2	1.0467	1	954
540	1.00431	3	1.01778	9	1.0320	1	1.0468	1	972
550	1.00434	1	1.01787	4	1.0321		1.0469		990
560	1.00435	2	1.01791	4	1.0321		1.0469	-1	1008
570	1.00437	1	1.01795	1	1.0321		1.0468		1026
580	1.00438	1	1.01796	1	1.0321		1.0468	-1	1044
590	1.00439		1.01797	-2	1.0321	-1	1.0467	-2	1062
600	1.00439		1.01795		1.0320		1.0465	-1	1080
610	1.00439		1.01795	-3	1.0320	-1	1.0464	-1	1098
620	1.00439	-1	1.01792	-5	1.0319	-1	1.0463	-2	1116
630	1.00438		1.01787	-3	1.0318	-1	1.0461	-2	1134
640	1.00438	-1	1.01784	-6	1.0317	-1	1.0459	-2	1152
650	1.00437	-1	1.01778	-6	1.0316	-1	1.0457	-1	1170
660	1.00436	-1	1.01772	-6	1.0315	-2	1.0456	-3	1188
670	1.00435	-2	1.01766	-6	1.0313	-1	1.0453	-2	1206
680	1.00433	-2	1.01760	-10	1.0312	-2	1.0451	-3	1224
690	1.00431	-1	1.01750	-6	1.0310	-1	1.0448	-2	1242
700	1.00430		1.01744		1.0309		1.0446		1260

Table 7-1. COMPRESSIBILITY FACTOR FOR NITROGEN - Cont. Z = PV/RT

°K	10 atm		40 atm		70 atm		100 atm		°R
700	1.00430	- 2	1.01744	- 9	1.0309	- 2	1.0446	- 2	1260
710	1.00428	- 2	1.01735	- 9	1.0307	- 1	1.0444	- 3	1278
720	1.00426	- 1	1.01726	- 6	1.0306	- 2	1.0441	- 2	1296
730	1.00425	- 2	1.01720	- 9	1.0304	- 1	1.0439	- 3	1314
740	1.00423	- 2	1.01711	- 9	1.0303	- 2	1.0436	- 3	1332
750	1.00421	- 2	1.01702	- 9	1.0301	- 2	1.0433	- 2	1350
760	1.00419	- 3	1.01693	- 13	1.0299	- 2	1.0431	- 4	1368
770	1.00416	- 2	1.01680	- 10	1.0297	- 2	1.0427	- 3	1386
780	1.00414	- 3	1.01670	- 8	1.0295	- 2	1.0424	- 1	1404
790	1.00411		1.01662	- 1	1.0293	- 1	1.0423	- 3	1422
800	1.0041	- 1	1.0165	- 5	1.0292	- 10	1.0420	- 15	1440
850	1.0040	- 2	1.0160	- 5	1.0282	- 9	1.0405	- 14	1530
900	1.0038	- 1	1.0155	- 5	1.0273	- 9	1.0391	- 13	1620
950	1.0037	- 1	1.0150	- 5	1.0264	- 9	1.0378	- 13	1710
1000	1.0036	- 1	1.0145	- 5	1.0255	- 8	1.0365	- 13	1800
1050	1.0035	- 1	1.0140	- 5	1.0247	- 9	1.0352	- 11	1890
1100	1.0034	- 1	1.0135	- 4	1.0238	- 8	1.0341	- 11	1980
1150	1.0033	- 1	1.0131	- 4	1.0230	- 7	1.0330	- 11	2070
1200	1.0032	- 1	1.0127	- 4	1.0223	- 7	1.0319	- 10	2160
1250	1.0031	- 1	1.0123	- 4	1.0216	- 7	1.0309	- 10	2250
1300	1.0030	- 1	1.0119	- 3	1.0209	- 6	1.0299	- 9	2340
1350	1.0029	- 1	1.0116	- 4	1.0203	- 7	1.0290	- 10	2430
1400	1.0028	- 1	1.0112	- 3	1.0196	- 6	1.0280	- 9	2520
1450	1.0027	- 1	1.0109	- 4	1.0190	- 5	1.0271	- 7	2610
1500	1.0026		1.0105	- 3	1.0185	- 5	1.0264	- 7	2700
1550	1.0026	- 1	1.0102	- 2	1.0180	- 5	1.0257	- 7	2790
1600	1.0025	- 1	1.0100	- 3	1.0175	- 5	1.0250	- 7	2880
1650	1.0024		1.0097	- 3	1.0170	- 5	1.0243	- 7	2970
1700	1.0024	- 1	1.0094	- 2	1.0165	- 5	1.0236	- 7	3060
1750	1.0023	- 1	1.0092	- 3	1.0160	- 4	1.0229	- 6	3150
1800	1.0022		1.0089	- 2	1.0156	- 3	1.0223	- 5	3240
1850	1.0022	- 1	1.0087	- 2	1.0153	- 5	1.0218	- 6	3330
1900	1.0021		1.0085	- 2	1.0148	- 3	1.0212	- 5	3420
1950	1.0021	- 1	1.0083	- 2	1.0145	- 4	1.0207	- 5	3510
2000	1.0020		1.0081	- 2	1.0141	- 3	1.0202	- 5	3600
2050	1.0020	- 1	1.0079	- 2	1.0138	- 3	1.0197	- 4	3690
2100	1.0019		1.0077	- 2	1.0135	- 3	1.0193	- 5	3780
2150	1.0019	- 1	1.0075	- 1	1.0132	- 3	1.0188	- 4	3870
2200	1.0018		1.0074	- 2	1.0129	- 3	1.0184	- 4	3960
2250	1.0018		1.0072	- 2	1.0126	- 3	1.0180	- 4	4050
2300	1.0018	- 1	1.0070	- 1	1.0123	- 2	1.0176	- 3	4140
2350	1.0017		1.0069	- 1	1.0121	- 3	1.0173	- 4	4230
2400	1.0017		1.0068	- 2	1.0118	- 2	1.0169	- 3	4320
2450	1.0017	- 1	1.0066	- 1	1.0116	- 3	1.0166	- 4	4410
2500	1.0016		1.0065	- 1	1.0113	- 2	1.0162	- 3	4500
2550	1.0016		1.0064	- 2	1.0111	- 2	1.0159	- 3	4590
2600	1.0016	- 1	1.0062	- 1	1.0109	- 2	1.0156	- 3	4680
2650	1.0015		1.0061	- 1	1.0107	- 2	1.0153	- 3	4770
2700	1.0015		1.0060	- 1	1.0105	- 2	1.0150	- 3	4860
2750	1.0015		1.0059	- 1	1.0103	- 1	1.0147	- 2	4950
2800	1.0015	- 1	1.0058	- 1	1.0102	- 3	1.0145	- 3	5040
2850	1.0014		1.0057	- 1	1.0099	- 2	1.0142	- 3	5130
2900	1.0014		1.0056	- 1	1.0097	- 1	1.0139	- 2	5220
2950	1.0014		1.0055	- 1	1.0096	- 1	1.0137	- 2	5310
3000	1.0014		1.0054		1.0095		1.0135		5400

Table 7-2. DENSITY OF NITROGEN ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	.02731	-249	.27353	-2497	1.1000	-1015	1.936	-181	180
110	.02482	-206	.24856	-2078	.9985	- 844	1.755	-149	198
120	.02276	-176	.22778	-1757	.9141	- 711	1.606	-127	216
130	.02100	-150	.21021	-1505	.8430	- 607	1.479	-107	234
140	.01950	-130	.19516	-1303	.7823	- 526	1.372	- 93	252
150	.01820	-113	.18213	-1140	.72973	- 4589	1.2792	- 808	270
160	.01707	-101	.17073	-1006	.68384	- 4043	1.1984	- 712	288
170	.01606	- 89	.16067	- 894	.64341	- 3591	1.1272	- 630	306
180	.01517	- 80	.15173	- 799	.60750	- 3209	1.0642	- 565	324
190	.01437	- 72	.14374	- 719	.57541	- 2887	1.0077	- 506	342
200	.01365	- 65	.13655	- 651	.54654	- 2611	.95706	- 4582	360
210	.01300	- 59	.13004	- 591	.52043	- 2371	.91124	- 4160	378
220	.01241	- 54	.12413	- 540	.49672	- 2165	.86964	- 3796	396
230	.01187	- 49	.11873	- 495	.47507	- 1983	.83168	- 3478	414
240	.01138	- 46	.11378	- 456	.45524	- 1824	.79690	- 3198	432
250	.01092	- 42	.10922	- 420	.43700	- 1684	.76492	- 2950	450
260	.01050	- 39	.10502	- 389	.42016	- 1558	.73542	- 2731	468
270	.01011	- 36	.10113	- 361	.40458	- 1447	.70811	- 2534	486
280	.00975	- 34	.09752	- 337	.39011	- 1347	.68277	- 2359	504
290	.00941	- 31	.09415	- 314	.37664	- 1257	.65918	- 2201	522
300	.00910	- 29	.09101	- 293	.36407	- 1175	.63717	- 2059	540
310	.00881	- 28	.08808	- 276	.35232	- 1102	.61658	- 1929	558
320	.00853	- 26	.08532	- 258	.34130	- 1035	.59729	- 1813	576
330	.00827	- 24	.08274	- 244	.33095	- 974	.57916	- 1705	594
340	.00803	- 23	.08030	- 229	.32121	- 918	.56211	- 1608	612
350	.00780	- 22	.07801	- 217	.31203	- 867	.54603	- 1518	630
360	.00758	- 20	.07584	- 205	.30336	- 821	.53085	- 1437	648
370	.00738	- 20	.07379	- 194	.29515	- 777	.51648	- 1360	666
380	.00718	- 18	.07185	- 184	.28738	- 737	.50288	- 1290	684
390	.00700	- 17	.07001	- 175	.28001	- 700	.48998	- 1226	702
400	.00683	- 17	.06826	- 167	.27301	- 666	.47772	- 1166	720
410	.00666	- 16	.06659	- 158	.26635	- 635	.46606	- 1110	738
420	.00650	- 15	.06501	- 151	.26000	- 605	.45496	- 1059	756
430	.00635	- 14	.06350	- 145	.25395	- 577	.44437	- 1010	774
440	.00621	- 14	.06205	- 138	.24818	- 552	.43427	- 965	792
450	.00607	- 13	.06067	- 132	.24266	- 527	.42462	- 924	810
460	.00594	- 13	.05935	- 126	.23739	- 505	.41538	- 884	828
470	.00581	- 12	.05809	- 121	.23234	- 485	.40654	- 847	846
480	.00569	- 12	.05688	- 116	.22749	- 464	.39807	- 813	864
490	.00557	- 11	.05572	- 111	.22285	- 446	.38994	- 780	882
500	.00546	- 11	.05461	- 108	.21839	- 428	.38214	- 749	900
510	.00535	- 10	.05353	- 103	.21411	- 412	.37465	- 721	918
520	.00525	- 10	.05250	- 99	.20999	- 396	.36744	- 693	936
530	.00515	- 9	.05151	- 95	.20603	- 381	.36051	- 668	954
540	.00506	- 10	.05056	- 92	.20222	- 368	.35383	- 643	972
550	.00496	- 8	.04964	- 89	.19854	- 355	.34740	- 621	990
560	.00488	- 9	.04875	- 85	.19499	- 342	.34119	- 598	1008
570	.00479	- 8	.04790	- 83	.19157	- 330	.33521	- 578	1026
580	.00471	- 8	.04707	- 79	.18827	- 319	.32943	- 559	1044
590	.00463	- 8	.04628	- 78	.18508	- 309	.32384	- 539	1062
600	.00455	- 7	.04550	- 74	.18199	- 298	.31845	- 523	1080
610	.00448	- 8	.04476	- 72	.17901	- 289	.31322	- 505	1098
620	.00440	- 7	.04404	- 70	.17612	- 279	.30817	- 489	1116
630	.00433	- 6	.04334	- 68	.17333	- 271	.30328	- 474	1134
640	.00427	- 7	.04266	- 66	.17062	- 263	.29854	- 459	1152
650	.00420	- 6	.04200	- 63	.16799	- 254	.29395	- 445	1170
660	.00414	- 6	.04137	- 62	.16545	- 247	.28950	- 432	1188
670	.00408	- 6	.04075	- 60	.16298	- 240	.28518	- 420	1206
680	.00402	- 6	.04015	- 58	.16058	- 232	.28098	- 407	1224
690	.00396	- 6	.03957	- 57	.15826	- 227	.27691	- 395	1242
700	.00390		.03900		.15599		.27296		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	.00390	- 5	.03900	- 55	.15599	- 219	.27296	- 385	1260
710	.00385	- 6	.03845	- 53	.15380	- 214	.26911	- 374	1278
720	.00379	- 5	.03792	- 52	.15166	- 208	.26537	- 363	1296
730	.00374	- 5	.03740	- 50	.14958	- 202	.26174	- 354	1314
740	.00369	- 5	.03690	- 50	.14756	- 197	.25820	- 344	1332
750	.00364	- 5	.03640	- 48	.14559	- 191	.25476	- 335	1350
760	.00359	- 4	.03592	- 46	.14368	- 187	.25141	- 327	1368
770	.00355	- 5	.03546	- 46	.14181	- 181	.24814	- 318	1386
780	.00350	- 4	.03500	- 44	.14000	- 178	.24496	- 310	1404
790	.00346	- 5	.03456	- 43	.13822	- 172	.24186	- 302	1422
800	.00341	- 20	.03413	- 201	.13650	- 803	.23884	- 1405	1440
850	.00321	- 18	.03212	- 178	.12847	- 714	.22479	- 1249	1530
900	.00303	- 16	.03034	- 160	.12133	- 638	.21230	- 1117	1620
950	.00287	- 14	.02874	- 144	.11495	- 575	.20113	- 1005	1710
1000	.00273	- 13	.02730	- 130	.10920	- 520	.19108	- 910	1800
1050	.00260	- 12	.02600	- 118	.10400	- 473	.18198	- 827	1890
1100	.00248	- 11	.02482	- 108	.09927	- 431	.17371	- 755	1980
1150	.00237	- 9	.02374	- 99	.09496	- 396	.16616	- 692	2070
1200	.00228	- 10	.02275	- 91	.09100	- 364	.15924	- 637	2160
1250	.00218	- 8	.02184	- 84	.08736	- 336	.15287	- 588	2250
1300	.00210	- 8	.02100	- 78	.08400	- 311	.14699	- 544	2340
1350	.00202	- 7	.02022	- 72	.08089	- 289	.14155	- 506	2430
1400	.00195	- 7	.01950	- 67	.07800	- 269	.13649	- 470	2520
1450	.00188	- 6	.01883	- 63	.07531	- 251	.13179	- 440	2610
1500	.00182	- 6	.01820	- 59	.07280	- 235	.12739	- 411	2700
1550	.00176	- 5	.01761	- 55	.07045	- 220	.12328	- 385	2790
1600	.00171	- 6	.01706	- 51	.06825	- 207	.11943	- 362	2880
1650	.00165	- 4	.01655	- 49	.06618	- 194	.11581	- 340	2970
1700	.00161	- 5	.01606	- 46	.06424	- 184	.11241	- 321	3060
1750	.00156	- 4	.01560	- 43	.06240	- 173	.10920	- 304	3150
1800	.00152	- 4	.01517	- 41	.06067	- 164	.10616	- 286	3240
1850	.00148	- 4	.01476	- 39	.05903	- 155	.10330	- 272	3330
1900	.00144	- 4	.01437	- 37	.05748	- 148	.10058	- 258	3420
1950	.00140	- 3	.01400	- 35	.05600	- 140	.09800	- 245	3510
2000	.00137	- 4	.01365	- 33	.05460	- 133	.09555	- 233	3600
2050	.00133	- 3	.01332	- 32	.05327	- 127	.09322	- 222	3690
2100	.00130	- 3	.01300	- 30	.05200	- 121	.09100	- 212	3780
2150	.00127	- 3	.01270	- 29	.05079	- 115	.08888	- 202	3870
2200	.00124	- 3	.01241	- 28	.04964	- 110	.08686	- 193	3960
2250	.00121	- 2	.01213	- 26	.04854	- 106	.08493	- 184	4050
2300	.00119	- 3	.01187	- 25	.04748	- 101	.08309	- 177	4140
2350	.00116	- 2	.01162	- 24	.04647	- 97	.08132	- 169	4230
2400	.00114	- 3	.01138	- 24	.04550	- 93	.07963	- 163	4320
2450	.00111	- 2	.01114	- 22	.04457	- 89	.07800	- 156	4410
2500	.00109	- 2	.01092	- 21	.04368	- 85	.07644	- 150	4500
2550	.00107	- 2	.01071	- 21	.04283	- 83	.07494	- 144	4590
2600	.00105	- 2	.01050	- 20	.04200	- 79	.07350	- 139	4680
2650	.00103	- 2	.01030	- 19	.04121	- 76	.07211	- 133	4770
2700	.00101	- 2	.01011	- 18	.04045	- 74	.07078	- 129	4860
2750	.00099	- 1	.00993	- 18	.03971	- 71	.06949	- 124	4950
2800	.00098	- 2	.00975	- 17	.03900	- 68	.06825	- 119	5040
2850	.00096	- 2	.00958	- 17	.03832	- 66	.06706	- 116	5130
2900	.00094	- 1	.00941	- 15	.03766	- 64	.06590	- 112	5220
2950	.00093	- 2	.00926	- 16	.03702	- 62	.06478	- 108	5310
3000	.00091		.00910		.03640		.06370		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	2.783	-266	12.010	-1440	24.40	-468			180
110	2.517	-216	10.570	-1030	19.72	-234	30.83	-477	198
120	2.301	-182	9.540	-825	17.38	-168	26.06	-288	216
130	2.119	-155	8.715	-689	15.70	-133	23.18	-215	234
140	1.964	-134	8.026	-576	14.37	-109	21.03	-170	252
150	1.8305	-1161	7.4501	-4955	13.276	-927	19.331	-1423	270
160	1.7144	-1022	6.9546	-4310	12.349	-798	17.908	-1208	288
170	1.6122	-906	6.5236	-3793	11.551	-696	16.700	-1038	306
180	1.5216	-808	6.1443	-3363	10.855	-612	15.662	-912	324
190	1.4408	-727	5.8080	-3004	10.243	-543	14.750	-803	342
200	1.36809	-6562	5.50755	-27008	9.7004	-4863	13.947	-714	360
210	1.30247	-5959	5.23747	-24430	9.2141	-4381	13.233	-643	378
220	1.24288	-5435	4.99317	-22204	8.7760	-3970	12.590	-579	396
230	1.18853	-4976	4.77113	-20283	8.3790	-3616	12.011	-526	414
240	1.13877	-4576	4.56830	-18604	8.0174	-3308	11.485	-480	432
250	1.09301	-4221	4.38226	-17121	7.6866	-3039	11.005	-440	450
260	1.05080	-3906	4.21105	-15824	7.3827	-2803	10.565	-405	468
270	1.01174	-3625	4.05281	-14658	7.1024	-2593	10.160	-375	486
280	.97549	-3373	3.90623	-13624	6.8431	-2407	9.785	-347	504
290	.94176	-3147	3.76999	-12695	6.6024	-2241	9.438	-322	522
300	.91029	-2944	3.64304	-11861	6.3783	-2090	9.1160	-3009	540
310	.88085	-2758	3.52443	-11106	6.1693	-1956	8.8151	-2811	558
320	.85327	-2590	3.41337	-10423	5.9737	-1834	8.5340	-2635	576
330	.82737	-2438	3.30914	-9797	5.7903	-1724	8.2705	-2473	594
340	.80299	-2298	3.21117	-9231	5.6179	-1622	8.0232	-2328	612
350	.78001	-2170	3.11886	-8712	5.45572	-15298	7.7904	-2193	630
360	.75831	-2052	3.03174	-8238	5.30274	-14460	7.5711	-2072	648
370	.73779	-1944	2.94936	-7796	5.15814	-13680	7.3639	-1960	666
380	.71835	-1844	2.87140	-7393	5.02134	-12968	7.1679	-1856	684
390	.69991	-1751	2.79747	-7018	4.89166	-12310	6.9823	-1762	702
400	.68240	-1666	2.72729	-6676	4.76856	-11700	6.8061	-1674	720
410	.66574	-1586	2.66053	-6355	4.65156	-11134	6.6387	-1592	738
420	.64988	-1513	2.59698	-6055	4.54022	-10607	6.4795	-1517	756
430	.63475	-1443	2.53643	-5780	4.43415	-10126	6.3278	-1447	774
440	.62032	-1379	2.47863	-5520	4.33289	-9662	6.1831	-1381	792
450	.60653	-1320	2.42343	-5277	4.23627	-9238	6.0450	-1321	810
460	.59333	-1263	2.37066	-5054	4.14389	-8845	5.9129	-1263	828
470	.58070	-1209	2.32012	-4842	4.05544	-8473	5.7866	-1211	846
480	.56861	-1161	2.27170	-4641	3.97071	-8123	5.6655	-1160	864
490	.55700	-1115	2.22529	-4457	3.88948	-7798	5.5495	-1113	882
500	.54585	-1070	2.18072	-4282	3.81150	-7488	5.4382	-1070	900
510	.53515	-1030	2.13790	-4114	3.73662	-7193	5.3312	-1027	918
520	.52485	-990	2.09676	-3960	3.66469	-6926	5.2285	-988	936
530	.51495	-954	2.05716	-3812	3.59543	-6668	5.1297	-952	954
540	.50541	-919	2.01904	-3673	3.52875	-6423	5.0345	-917	972
550	.49622	-886	1.98231	-3541	3.46452	-6190	4.9428	-883	990
560	.48736	-855	1.94690	-3418	3.40262	-5973	4.8545	-853	1008
570	.47881	-826	1.91272	-3298	3.34289	-5767	4.7692	-822	1026
580	.47055	-798	1.87974	-3186	3.28522	-5568	4.6870	-795	1044
590	.46257	-771	1.84788	-3080	3.22954	-5383	4.6075	-768	1062
600	.45486	-746	1.81708	-2978	3.17571	-5206	4.5307	-743	1080
610	.44740	-721	1.78730	-2883	3.12365	-5041	4.4564	-719	1098
620	.44019	-699	1.75847	-2791	3.07324	-4878	4.3845	-695	1116
630	.43320	-677	1.73056	-2704	3.02446	-4723	4.3150	-674	1134
640	.42643	-655	1.70352	-2621	2.97723	-4577	4.2476	-654	1152
650	.41988	-637	1.67731	-2540	2.93146	-4439	4.1822	-633	1170
660	.41351	-617	1.65191	-2465	2.88707	-4309	4.1189	-614	1188
670	.40734	-599	1.62726	-2392	2.84398	-4180	4.0575	-596	1206
680	.40135	-581	1.60334	-2323	2.80218	-4055	3.9979	-579	1224
690	.39554	-565	1.58011	-2256	2.76163	-3945	3.9400	-562	1242
700	.38989		1.55755		2.72218		3.8838		1260

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700	.38989	- 550	1.55755	- 2192	2.72218	- 3829	3.8838	- 546	1260
710	.38439	- 533	1.53563	- 2133	2.68389	- 3725	3.8292	- 532	1278
720	.37906	- 519	1.51430	- 2073	2.64664	- 3623	3.7760	- 516	1296
730	.37387	- 506	1.49357	- 2017	2.61041	- 3525	3.7244	- 503	1314
740	.36881	- 491	1.47340	- 1965	2.57516	- 3428	3.6741	- 489	1332
750	.36390	- 479	1.45375	- 1911	2.54088	- 3341	3.6252	- 476	1350
760	.35911	- 466	1.43464	- 1862	2.50747	- 3252	3.5776	- 464	1368
770	.35445	- 455	1.41602	- 1814	2.47495	- 3168	3.5312	- 452	1386
780	.34990	- 443	1.39788	- 1768	2.44327	- 3090	3.4860	- 440	1404
790	.34547	- 431	1.38020	- 1724	2.41237	- 3011	3.4420	- 430	1422
800	.34116	- 2007	1.36296	- 8011	2.38226	- 13993	3.3990	- 1996	1440
850	.32109	- 1783	1.28285	- 7122	2.24233	- 12441	3.1994	- 1771	1530
900	.30326	- 1596	1.21163	- 6371	2.11792	- 11129	3.0223	- 1588	1620
950	.28730	- 1436	1.14792	- 5734	2.00663	- 10018	2.8635	- 1429	1710
1000	.27294	- 1300	1.09058	- 5188	1.90645	- 9063	2.7206	- 1293	1800
1050	.25994	- 1181	1.03870	- 4718	1.81582	- 8240	2.5913	- 1176	1890
1100	.24813	- 1078	.99152	- 4306	1.73342	- 7524	2.4737	- 1073	1980
1150	.23735	- 989	.94846	- 3948	1.65818	- 6898	2.3664	- 983	2070
1200	.22746	- 910	.90898	- 3633	1.58920	- 6346	2.2681	- 906	2160
1250	.21836	- 839	.87265	- 3353	1.52574	- 5859	2.1775	- 835	2250
1300	.20997	- 778	.83912	- 3105	1.46715	- 5426	2.0940	- 774	2340
1350	.20219	- 722	.80807	- 2884	1.41289	- 5036	2.0166	- 718	2430
1400	.19497	- 672	.77923	- 2684	1.36253	- 4692	1.9448	- 669	2520
1450	.18825	- 627	.75239	- 2506	1.31561	- 4378	1.8779	- 624	2610
1500	.18198	- 587	.72733	- 2344	1.27183	- 4096	1.8155	- 585	2700
1550	.17611	- 550	.70389	- 2198	1.23087	- 3841	1.7570	- 548	2790
1600	.17061	- 517	.68191	- 2064	1.19246	- 3608	1.7022	- 514	2880
1650	.16544	- 487	.66127	- 1943	1.15638	- 3396	1.6508	- 485	2970
1700	.16057	- 458	.64184	- 1833	1.12242	- 3202	1.6023	- 457	3060
1750	.15599	- 434	.62351	- 1730	1.09040	- 3024	1.5566	- 431	3150
1800	.15165	- 410	.60621	- 1637	1.06016	- 2863	1.5135	- 409	3240
1850	.14755	- 388	.58984	- 1551	1.03153	- 2709	1.4726	- 386	3330
1900	.14367	- 368	.57433	- 1472	1.00444	- 2573	1.4340	- 367	3420
1950	.13999	- 350	.55961	- 1398	.97871	- 2443	1.3973	- 348	3510
2000	.13649	- 333	.54563	- 1330	.95428	- 2324	1.3625	- 333	3600
2050	.13316	- 317	.53233	- 1266	.93104	- 2214	1.3292	- 315	3690
2100	.12999	- 302	.51967	- 1207	.90890	- 2111	1.2977	- 302	3780
2150	.12697	- 288	.50760	- 1154	.88779	- 2016	1.2675	- 287	3870
2200	.12409	- 276	.49606	- 1101	.86763	- 1925	1.2388	- 275	3960
2250	.12133	- 264	.48505	- 1054	.84838	- 1842	1.2113	- 263	4050
2300	.11869	- 252	.47451	- 1009	.82996	- 1764	1.1850	- 251	4140
2350	.11617	- 242	.46442	- 967	.81232	- 1690	1.1599	- 242	4230
2400	.11375	- 233	.45475	- 927	.79542	- 1622	1.1357	- 232	4320
2450	.11142	- 222	.44548	- 890	.77920	- 1556	1.1125	- 221	4410
2500	.10920	- 214	.43658	- 856	.76364	- 1496	1.0904	- 214	4500
2550	.10706	- 206	.42802	- 822	.74868	- 1438	1.0690	- 205	4590
2600	.10500	- 198	.41980	- 792	.73430	- 1384	1.0485	- 197	4680
2650	.10302	- 191	.41188	- 762	.72046	- 1333	1.0288	- 191	4770
2700	.10111	- 184	.40426	- 735	.70713	- 1284	1.0097	- 183	4860
2750	.09927	- 177	.39691	- 708	.69429	- 1239	.9914	- 177	4950
2800	.09750	- 171	.38983	- 684	.68190	- 1195	.9737	- 170	5040
2850	.09579	- 165	.38299	- 660	.66995	- 1153	.9567	- 165	5130
2900	.09414	- 160	.37639	- 637	.65842	- 1116	.9402	- 159	5220
2950	.09254	- 154	.37002	- 617	.64726	- 1078	.9243	- 154	5310
3000	.09100		.36385		.63648		.9089		5400

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110	30.83	-477							198
120	26.06	-288							216
130	23.18	-215							234
140	21.03	-170							252
150	19.331	-1423	98.9	-135					270
160	17.908	-1208	85.4	- 92					288
170	16.700	-1038	76.2	- 67					306
180	15.662	- 912	69.5	- 56	134.9	-148			324
190	14.750	- 803	63.9	- 45	120.1	-103			342
200	13.947	- 714	59.45	- 378	109.77	- 830	161.7	-137	360
210	13.233	- 643	55.67	- 324	101.47	- 683	148.0	-109	378
220	12.590	- 579	52.43	- 282	94.635	- 5779	137.1	- 90	396
230	12.011	- 526	49.61	- 250	88.856	- 4976	128.08	- 763	414
240	11.485	- 480	47.11	- 222	83.880	- 4352	120.45	- 661	432
250	11.005	- 440	44.893	- 1998	79.528	- 3839	113.84	- 576	450
260	10.565	- 405	42.895	- 1810	75.689	- 3435	108.08	- 513	468
270	10.160	- 375	41.085	- 1646	72.254	- 3082	102.95	- 457	486
280	9.785	- 347	39.439	- 1508	69.172	- 2796	98.38	- 410	504
290	9.438	- 322	37.931	- 1388	66.376	- 2566	94.28	- 376	522
300	9.1160	- 3009	36.543	- 1280	63.810	- 2335	90.523	- 3414	540
310	8.8151	- 2811	35.263	- 1187	61.475	- 2164	87.109	- 3137	558
320	8.5340	- 2635	34.076	- 1104	59.311	- 1991	83.972	- 2888	576
330	8.2705	- 2473	32.972	- 1030	57.320	- 1850	81.084	- 2677	594
340	8.0232	- 2328	31.942	- 964	55.470	- 1723	78.407	- 2477	612
350	7.7904	- 2193	30.978	- 903	53.747	- 1606	75.930	- 2310	630
360	7.5711	- 2072	30.075	- 850	52.141	- 1509	73.620	- 2163	648
370	7.3639	- 1960	29.225	- 801	50.632	- 1419	71.457	- 2029	666
380	7.1679	- 1856	28.424	- 755	49.213	- 1332	69.428	- 1904	684
390	6.9823	- 1762	27.669	- 714	47.881	- 1256	67.524	- 1783	702
400	6.8061	- 1674	26.955	- 677	46.625	- 1191	65.741	- 1696	720
410	6.6387	- 1592	26.278	- 643	45.434	- 1125	64.045	- 1603	738
420	6.4795	- 1517	25.635	- 609	44.309	- 1064	62.442	- 1511	756
430	6.3278	- 1447	25.026	- 581	43.245	- 1016	60.931	- 1436	774
440	6.1831	- 1381	24.445	- 554	42.229	- 962	59.495	- 1367	792
450	6.0450	- 1321	23.891	- 528	41.267	- 921	58.128	- 1296	810
460	5.9129	- 1263	23.363	- 504	40.346	- 873	56.832	- 1236	828
470	5.7866	- 1211	22.859	- 483	39.473	- 842	55.596	- 1184	846
480	5.6655	- 1160	22.376	- 461	38.631	- 799	54.412	- 1131	864
490	5.5495	- 1113	21.915	- 443	37.832	- 767	53.281	- 1081	882
500	5.4382	- 1070	21.472	- 425	37.065	- 738	52.200	- 1038	900
510	5.3312	- 1027	21.047	- 407	36.327	- 702	51.162	- 993	918
520	5.2285	- 988	20.640	- 392	35.625	- 675	50.169	- 952	936
530	5.1297	- 952	20.248	- 377	34.950	- 654	49.217	- 916	954
540	5.0345	- 917	19.871	- 363	34.296	- 627	48.301	- 882	972
550	4.9428	- 883	19.508	- 349	33.669	- 601	47.419	- 847	990
560	4.8545	- 853	19.159	- 337	33.068	- 580	46.572	- 813	1008
570	4.7692	- 822	18.822	- 325	32.488	- 561	45.759	- 789	1026
580	4.6870	- 795	18.497	- 313	31.927	- 541	44.970	- 758	1044
590	4.6075	- 768	18.184	- 303	31.386	- 520	44.212	- 728	1062
600	4.5307	- 743	17.881	- 293	30.866	- 506	43.484	- 709	1080
610	4.4564	- 719	17.588	- 283	30.360	- 487	42.775	- 686	1098
620	4.3845	- 695	17.305	- 274	29.873	- 471	42.089	- 660	1116
630	4.3150	- 674	17.031	- 266	29.402	- 457	41.429	- 640	1134
640	4.2476	- 654	16.765	- 257	28.945	- 442	40.789	- 620	1152
650	4.1822	- 633	16.508	- 249	28.503	- 429	40.169	- 604	1170
660	4.1189	- 614	16.259	- 242	28.074	- 414	39.565	- 580	1188
670	4.0575	- 596	16.017	- 234	27.660	- 404	38.985	- 566	1206
680	3.9979	- 579	15.783	- 227	27.256	- 390	38.419	- 546	1224
690	3.9400	- 562	15.556	- 222	26.866	- 381	37.873	- 534	1242
700	3.8838		15.334		26.485		37.339		1260

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700	3.8838	- 546	15.334	- 214	26.485	- 368	37.339	- 518	1260
710	3.8292	- 532	15.120	- 209	26.117	- 360	36.821	- 501	1278
720	3.7760	- 516	14.911	- 204	25.757	- 348	36.320	- 491	1296
730	3.7244	- 503	14.707	- 197	25.409	- 341	35.829	- 474	1314
740	3.6741	- 489	14.510	- 192	25.068	- 330	35.355	- 461	1332
750	3.6252	- 476	14.318	- 187	24.738	- 320	34.894	- 453	1350
760	3.5776	- 464	14.131	- 182	24.418	- 313	34.441	- 434	1368
770	3.5312	- 452	13.949	- 178	24.105	- 304	34.007	- 427	1386
780	3.4860	- 440	13.771	- 173	23.801	- 297	33.580	- 421	1404
790	3.4420	- 430	13.598	- 169	23.504	- 292	33.159	- 405	1422
800	3.3990	- 1996	13.429	- 783	23.212	- 1346	32.754	- 1883	1440
850	3.1994	- 1771	12.646	- 697	21.866	- 1193	30.871	- 1676	1530
900	3.0223	- 1588	11.949	- 623	20.673	- 1070	29.195	- 1502	1620
950	2.8635	- 1429	11.326	- 561	19.603	- 972	27.693	- 1351	1710
1000	2.7206	- 1293	10.765	- 508	18.631	- 868	26.342	- 1223	1800
1050	2.5913	- 1176	10.257	- 461	17.763	- 792	25.119	- 1116	1890
1100	2.4737	- 1073	9.796	- 422	16.971	- 725	24.003	- 1020	1980
1150	2.3664	- 983	9.374	- 387	16.246	- 667	22.983	- 934	2070
1200	2.2681	- 906	8.987	- 356	15.579	- 613	22.049	- 861	2160
1250	2.1775	- 835	8.631	- 329	14.966	- 565	21.188	- 795	2250
1300	2.0940	- 774	8.302	- 305	14.401	- 526	20.393	- 738	2340
1350	2.0166	- 718	7.997	- 283	13.875	- 486	19.655	- 684	2430
1400	1.9448	- 669	7.714	- 264	13.389	- 454	18.971	- 638	2520
1450	1.8779	- 624	7.450	- 245	12.935	- 425	18.333	- 599	2610
1500	1.8155	- 585	7.205	- 230	12.510	- 398	17.734	- 561	2700
1550	1.7570	- 548	6.975	- 217	12.112	- 373	17.173	- 525	2790
1600	1.7022	- 514	6.758	- 203	11.739	- 350	16.648	- 493	2880
1650	1.6508	- 485	6.555	- 191	11.389	- 329	16.155	- 465	2970
1700	1.6023	- 457	6.364	- 180	11.060	- 311	15.690	- 438	3060
1750	1.5566	- 431	6.184	- 170	10.749	- 294	15.252	- 415	3150
1800	1.5135	- 409	6.014	- 162	10.455	- 280	14.837	- 394	3240
1850	1.4726	- 386	5.852	- 153	10.175	- 263	14.443	- 371	3330
1900	1.4340	- 367	5.699	- 145	9.912	- 251	14.072	- 355	3420
1950	1.3973	- 348	5.554	- 138	9.661	- 238	13.717	- 336	3510
2000	1.3625	- 333	5.416	- 131	9.423	- 227	13.381	- 320	3600
2050	1.3292	- 315	5.285	- 124	9.196	- 216	13.061	- 306	3690
2100	1.2977	- 302	5.161	- 120	8.980	- 207	12.755	- 290	3780
2150	1.2675	- 287	5.041	- 114	8.773	- 197	12.465	- 279	3870
2200	1.2388	- 275	4.927	- 108	8.576	- 188	12.186	- 266	3960
2250	1.2113	- 263	4.819	- 104	8.388	- 180	11.920	- 255	4050
2300	1.1850	- 251	4.715	- 100	8.208	- 173	11.665	- 244	4140
2350	1.1599	- 242	4.615	- 96	8.035	- 165	11.421	- 234	4230
2400	1.1357	- 232	4.519	- 91	7.870	- 159	11.187	- 225	4320
2450	1.1125	- 221	4.428	- 88	7.711	- 152	10.962	- 215	4410
2500	1.0904	- 214	4.340	- 85	7.559	- 147	10.747	- 208	4500
2550	1.0690	- 205	4.255	- 81	7.412	- 141	10.539	- 199	4590
2600	1.0485	- 197	4.174	- 78	7.271	- 136	10.340	- 192	4680
2650	1.0288	- 191	4.096	- 76	7.135	- 130	10.148	- 185	4770
2700	1.0097	- 183	4.020	- 72	7.005	- 126	9.963	- 179	4860
2750	.9914	- 177	3.948	- 70	6.879	- 122	9.784	- 173	4950
2800	.9737	- 170	3.878	- 68	6.757	- 117	9.611	- 165	5040
2850	.9567	- 165	3.810	- 65	6.640	- 113	9.446	- 160	5130
2900	.9402	- 159	3.745	- 64	6.527	- 110	9.286	- 156	5220
2950	.9243	- 154	3.681	- 61	6.417	- 107	9.130	- 150	5310
3000	.9089		3.620		6.310		8.980		5400

Table 7-3. SPECIFIC HEAT OF NITROGEN C_p/R

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	3.5012	- 1	3.5086	- 19	3.5353	- 91	3.5687	-218	180
110	3.5011	- 1	3.5067	- 13	3.5262	- 57	3.5469	-107	198
120	3.5010	- 1	3.5054	- 9	3.5205	- 38	3.5362	- 69	216
130	3.5009		3.5045	- 6	3.5167	- 28	3.5293	- 52	234
140	3.5009		3.5039	- 5	3.5139	- 21	3.5241	- 39	252
150	3.5009		3.5034	- 3	3.5118	- 16	3.5202	- 28	270
160	3.5009		3.5031	- 4	3.5102	- 14	3.5174	- 24	288
170	3.5009		3.5027	- 2	3.5088	- 11	3.5150	- 19	306
180	3.5009	1	3.5025	- 2	3.5077	- 7	3.5131	- 14	324
190	3.5010		3.5023	- 1	3.5070	- 7	3.5117	- 13	342
200	3.5010		3.5022	- 1	3.5063	- 5	3.5104	- 10	360
210	3.5010	1	3.5021		3.5058	- 4	3.5094	- 8	378
220	3.5011		3.5021	- 1	3.5054	- 5	3.5086	- 7	396
230	3.5011	2	3.5020	1	3.5049	- 2	3.5079	- 5	414
240	3.5013	1	3.5021		3.5047	- 2	3.5074	- 5	432
250	3.5014	2	3.5021	1	3.5045	- 1	3.5069	- 2	450
260	3.5016	2	3.5022	2	3.5044		3.5067	- 3	468
270	3.5018	4	3.5024	3	3.5044	2	3.5064		486
280	3.5022	4	3.5027	4	3.5046	2	3.5064	1	504
290	3.5026	5	3.5031	4	3.5048	3	3.5065	2	522
300	3.5031	5	3.5035	6	3.5051	5	3.5067	3	540
310	3.5036	8	3.5041	8	3.5056	6	3.5070	6	558
320	3.5044	10	3.5049	9	3.5062	9	3.5076	8	576
330	3.5054	11	3.5058	11	3.5071	10	3.5084	9	594
340	3.5065	13	3.5069	13	3.5081	12	3.5093	11	612
350	3.5078	16	3.5082	15	3.5093	15	3.5104	14	630
360	3.5094	17	3.5097	17	3.5108	16	3.5118	16	648
370	3.5111	20	3.5114	20	3.5124	19	3.5134	19	666
380	3.5131	23	3.5134	23	3.5143	23	3.5153	21	684
390	3.5154	25	3.5157	25	3.5166	24	3.5174	24	702
400	3.5179	27	3.5182	27	3.5190	26	3.5198	26	720
410	3.5206	31	3.5209	30	3.5216	31	3.5224	30	738
420	3.5237	33	3.5239	33	3.5247	32	3.5254	32	756
430	3.5270	36	3.5272	36	3.5279	36	3.5286	36	774
440	3.5306	38	3.5308	38	3.5315	37	3.5322	37	792
450	3.5344	42	3.5346	42	3.5352	42	3.5359	41	810
460	3.5386	44	3.5388	44	3.5394	44	3.5400	43	828
470	3.5430	46	3.5432	46	3.5438	45	3.5443	46	846
480	3.5476	50	3.5478	50	3.5483	50	3.5489	49	864
490	3.5526	52	3.5528	52	3.5533	52	3.5538	52	882
500	3.5578	54	3.5580	54	3.5585	53	3.5590	53	900
510	3.5632	56	3.5634	56	3.5638	56	3.5643	56	918
520	3.5688	59	3.5690	58	3.5694	59	3.5699	58	936
530	3.5747	61	3.5748	61	3.5753	61	3.5757	61	954
540	3.5808	63	3.5809	63	3.5814	62	3.5818	62	972
550	3.5871	65	3.5872	65	3.5876	65	3.5880	65	990
560	3.5936	67	3.5937	67	3.5941	67	3.5945	67	1008
570	3.6003	69	3.6004	69	3.6008	69	3.6012	68	1026
580	3.6072	70	3.6073	70	3.6077	70	3.6080	70	1044
590	3.6142	72	3.6143	72	3.6147	71	3.6150	72	1062
600	3.6214	73	3.6215	73	3.6218	73	3.6222	72	1080
610	3.6287	75	3.6288	75	3.6291	75	3.6294	75	1098
620	3.6362	75	3.6363	75	3.6366	75	3.6369	75	1116
630	3.6437	77	3.6438	77	3.6441	77	3.6444	77	1134
640	3.6514	77	3.6515	77	3.6518	77	3.6521	76	1152
650	3.6591	79	3.6592	79	3.6595	79	3.6597	79	1170
660	3.6670	79	3.6671	79	3.6674	79	3.6676	79	1188
670	3.6749	80	3.6750	80	3.6753	79	3.6755	80	1206
680	3.6829	80	3.6830	80	3.6832	80	3.6835	80	1224
690	3.6909	81	3.6910	81	3.6912	81	3.6915	80	1242
700	3.6990		3.6991		3.6993		3.6995		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	3.6990	81	3.6991	81	3.6993	81	3.6995	81	1260
710	3.7071	81	3.7072	81	3.7074	81	3.7076	81	1278
720	3.7152	82	3.7153	82	3.7155	82	3.7157	82	1296
730	3.7234	82	3.7235	82	3.7237	82	3.7239	82	1314
740	3.7316	82	3.7317	82	3.7319	82	3.7321	82	1332
750	3.7398	82	3.7399	82	3.7401	82	3.7403	82	1350
760	3.7480	82	3.7481	82	3.7483	82	3.7485	81	1368
770	3.7562	81	3.7563	81	3.7565	80	3.7566	81	1386
780	3.7643	82	3.7644	82	3.7645	82	3.7647	82	1404
790	3.7725	81	3.7726	81	3.7727	81	3.7729	81	1422
800	3.7806	790	3.7807	789	3.7808	790	3.7810	789	1440
900	3.8596	730	3.8596	730	3.8598	729	3.8599	729	1620
1000	3.9326	656	3.9326	656	3.9327	656	3.9328	656	1800
1100	3.9982	580	3.9982	580	3.9983	580	3.9984	580	1980
1200	4.0562	510	4.0562	510	4.0563	510	4.0564	509	2160
1300	4.1072	446	4.1072	446	4.1073	446	4.1073	446	2340
1400	4.1518	391	4.1518	391	4.1519	391	4.1519	391	2520
1500	4.1909	343	4.1909	343	4.1910	342	4.1910	343	2700
1600	4.2252	302	4.2252	302	4.2252	302	4.2253	302	2880
1700	4.2554	267	4.2554	267	4.2554	267	4.2555	267	3060
1800	4.2821	236	4.2821	236	4.2821	236	4.2822	235	3240
1900	4.3057	211	4.3057	211	4.3057	211	4.3057	211	3420
2000	4.3268	189	4.3268	189	4.3268	189	4.3268	189	3600
2100	4.3457	170	4.3457	170	4.3457	170	4.3457	170	3780
2200	4.3627	153	4.3627	153	4.3627	153	4.3627	153	3960
2300	4.3780	140	4.3780	140	4.3780	140	4.3780	140	4140
2400	4.3920	127	4.3920	127	4.3920	127	4.3920	127	4320
2500	4.4047	116	4.4047	116	4.4047	116	4.4047	116	4500
2600	4.4163	107	4.4163	107	4.4163	107	4.4163	107	4680
2700	4.4270	99	4.4270	99	4.4270	99	4.4270	99	4860
2800	4.4369	91	4.4369	91	4.4369	91	4.4369	91	5040
2900	4.4460	85	4.4460	85	4.4460	85	4.4460	85	5220
3000	4.4545		4.4545		4.4545		4.4545		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	3.613	-43							180
110	3.5697	-172							198
120	3.5525	-104	3.775	-80					216
130	3.5421	- 77	3.695	-47	3.917	-131			234
140	3.5344	- 56	3.6477	-274	3.786	- 62	3.958	-114	252
150	3.5288	- 43	3.6203	-195	3.7245	- 402	3.844	- 68	270
160	3.5245	- 33	3.6008	-150	3.6843	- 293	3.7764	- 469	288
170	3.5212	- 27	3.5858	-118	3.6550	- 223	3.7295	- 342	306
180	3.5185	- 21	3.5740	- 94	3.6327	- 175	3.6953	- 273	324
190	3.5164	- 18	3.5646	- 77	3.6152	- 143	3.6680	- 214	342
200	3.5146	- 14	3.5569	- 63	3.6009	- 116	3.6466	- 173	360
210	3.5132	- 12	3.5506	- 53	3.5893	- 96	3.6293	- 143	378
220	3.5120	- 12	3.5453	- 45	3.5797	- 83	3.6150	- 122	396
230	3.5108	- 7	3.5408	- 36	3.5714	- 67	3.6028	- 101	414
240	3.5101	- 7	3.5372	- 32	3.5647	- 59	3.5927	- 86	432
250	3.5094	- 5	3.5340	- 27	3.5588	- 49	3.5841	- 74	450
260	3.5089	- 5	3.5313	- 24	3.5539	- 43	3.5767	- 63	468
270	3.5084	- 1	3.5289	- 18	3.5496	- 36	3.5704	- 53	486
280	3.5083	- 1	3.5271	- 16	3.5460	- 30	3.5651	- 46	504
290	3.5082	1	3.5255	- 12	3.5430	- 26	3.5605	- 40	522
300	3.5083	2	3.5243	- 9	3.5404	- 22	3.5565	- 34	540
310	3.5085	5	3.5234	- 7	3.5382	- 17	3.5531	- 27	558
320	3.5090	7	3.5227	- 3	3.5365	- 12	3.5504	- 22	576
330	3.5097	8	3.5224		3.5353	- 8	3.5482	- 18	594
340	3.5105	10	3.5224	3	3.5345	- 6	3.5464	- 12	612
350	3.5115	14	3.5227	7	3.5339		3.5452	- 8	630
360	3.5129	15	3.5234	9	3.5339	2	3.5444	- 4	648
370	3.5144	18	3.5243	12	3.5341	7	3.5440		666
380	3.5162	21	3.5255	16	3.5348	10	3.5440	5	684
390	3.5183	24	3.5271	18	3.5358	14	3.5445	9	702
400	3.5207	25	3.5289	21	3.5372	16	3.5454	12	720
410	3.5232	30	3.5310	26	3.5388	21	3.5466	17	738
420	3.5262	31	3.5336	28	3.5409	24	3.5483	21	756
430	3.5293	35	3.5364	31	3.5433	28	3.5504	24	774
440	3.5328	37	3.5395	34	3.5461	30	3.5528	27	792
450	3.5365	41	3.5429	38	3.5491	35	3.5555	32	810
460	3.5406	43	3.5467	40	3.5526	37	3.5587	34	828
470	3.5449	45	3.5507	42	3.5563	40	3.5621	37	846
480	3.5494	49	3.5549	47	3.5603	44	3.5658	42	864
490	3.5543	52	3.5596	49	3.5647	47	3.5700	44	882
500	3.5595	53	3.5645	51	3.5694	49	3.5744	47	900
510	3.5648	55	3.5696	53	3.5743	51	3.5791	49	918
520	3.5703	59	3.5749	57	3.5794	55	3.5840	53	936
530	3.5762	60	3.5806	58	3.5849	56	3.5893	55	954
540	3.5822	62	3.5864	61	3.5905	59	3.5948	57	972
550	3.5884	65	3.5925	63	3.5964	62	3.6005	60	990
560	3.5949	66	3.5988	65	3.6026	63	3.6065	62	1008
570	3.6015	69	3.6053	67	3.6089	66	3.6127	64	1026
580	3.6084	70	3.6120	68	3.6155	68	3.6191	65	1044
590	3.6154	71	3.6188	70	3.6223	69	3.6256	68	1062
600	3.6225	73	3.6258	72	3.6292	70	3.6324	69	1080
610	3.6298	74	3.6330	73	3.6362	72	3.6393	71	1098
620	3.6372	75	3.6403	74	3.6434	73	3.6464	72	1116
630	3.6447	77	3.6477	75	3.6507	74	3.6536	73	1134
640	3.6524	76	3.6552	76	3.6581	75	3.6609	74	1152
650	3.6600	79	3.6628	78	3.6656	77	3.6683	76	1170
660	3.6679	79	3.6706	78	3.6733	77	3.6759	76	1188
670	3.6758	79	3.6784	78	3.6810	78	3.6835	77	1206
680	3.6837	80	3.6862	79	3.6888	78	3.6912	77	1224
690	3.6917	81	3.6941	80	3.6966	79	3.6989	78	1242
700	3.6998		3.7021		3.7045		3.7067		1260

Table 7-3. SPECIFIC HEAT OF NITROGEN - Cont. C_p/R

°K	1 atm		4 atm		7 atm		10 atm		°R
700	3.6998	81	3.7021	80	3.7045	79	3.7067	79	1260
710	3.7079	80	3.7101	80	3.7124	79	3.7146	79	1278
720	3.7159	82	3.7181	81	3.7203	81	3.7225	79	1296
730	3.7241	82	3.7262	82	3.7284	80	3.7304	80	1314
740	3.7323	82	3.7344	81	3.7364	81	3.7384	80	1332
750	3.7405	82	3.7425	81	3.7445	81	3.7464	80	1350
760	3.7487	81	3.7506	81	3.7526	80	3.7544	80	1368
770	3.7568	81	3.7587	81	3.7606	80	3.7624	79	1386
780	3.7649	82	3.7668	81	3.7686	81	3.7703	81	1404
790	3.7731	81	3.7749	80	3.7767	79	3.7784	79	1422
800	3.7812	788	3.7829	785	3.7846	781	3.7863	777	1440
900	3.8600	729	3.8614	726	3.8627	723	3.8640	721	1620
1000	3.9329	656	3.9340	653	3.9350	651	3.9361	649	1800
1100	3.9985	579	3.9993	578	4.0001	577	4.0010	574	1980
1200	4.0564	510	4.0571	508	4.0578	507	4.0584	507	2160
1300	4.1074	446	4.1079	445	4.1085	444	4.1091	442	2340
1400	4.1520	390	4.1524	390	4.1529	389	4.1533	389	2520
1500	4.1910	343	4.1914	342	4.1918	342	4.1922	341	2700
1600	4.2253	302	4.2256	302	4.2260	301	4.2263	300	2880
1700	4.2555	267	4.2558	266	4.2561	266	4.2563	266	3060
1800	4.2822	236	4.2824	236	4.2827	235	4.2829	235	3240
1900	4.3058	211	4.3060	210	4.3062	210	4.3064	210	3420
2000	4.3269	189	4.3270	189	4.3272	189	4.3274	188	3600
2100	4.3458	169	4.3459	170	4.3461	169	4.3462	170	3780
2200	4.3627	153	4.3629	153	4.3630	153	4.3632	152	3960
2300	4.3780	140	4.3782	139	4.3783	139	4.3784	140	4140
2400	4.3920	127	4.3921	127	4.3922	127	4.3924	126	4320
2500	4.4047	116	4.4048	116	4.4049	116	4.4050	116	4500
2600	4.4163	107	4.4164	107	4.4165	107	4.4166	106	4680
2700	4.4270	99	4.4271	99	4.4272	98	4.4272	99	4860
2800	4.4369	91	4.4370	91	4.4370	91	4.4371	91	5040
2900	4.4460	85	4.4461	85	4.4461	85	4.4462	85	5220
3000	4.4545		4.4546		4.4546		4.4547		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
140	3.958	-114							252
150	3.844	-68							270
160	3.7764	-469							288
170	3.7295	-342							306
180	3.6953	-273	4.522	-198					324
190	3.6680	-214	4.3244	-1379	5.219	-359			342
200	3.6466	-173	4.1865	-1021	4.860	-243	5.64	-45	360
210	3.6293	-143	4.0844	-786	4.617	-175	5.19	-30	378
220	3.6150	-122	4.0058	-627	4.442	-132	4.89	-22	396
230	3.6028	-101	3.9431	-505	4.310	-103	4.67	-16	414
240	3.5927	-86	3.8926	-421	4.207	-83	4.51	-13	432
250	3.5841	-74	3.8505	-350	4.124	-68	4.38	-10	450
260	3.5767	-63	3.8155	-299	4.056	-56	4.28	-8	468
270	3.5704	-53	3.7856	-253	4.000	-47	4.20	-7	486
280	3.5651	-46	3.7603	-219	3.953	-40	4.128	-58	504
290	3.5605	-40	3.7384	-189	3.913	-35	4.070	-49	522
300	3.5565	-34	3.7195	-164	3.878	-30	4.021	-42	540
310	3.5531	-27	3.7031	-142	3.848	-26	3.979	-36	558
320	3.5504	-22	3.6889	-125	3.822	-23	3.943	-32	576
330	3.5482	-18	3.6764	-108	3.799	-20	3.911	-28	594
340	3.5464	-12	3.6656	-95	3.779	-17	3.883	-25	612
350	3.5452	-8	3.6561	-81	3.7619	-153	3.858	-21	630
360	3.5444	-4	3.6480	-70	3.7466	-135	3.837	-20	648
370	3.5440		3.6410	-59	3.7331	-116	3.817	-16	666
380	3.5440	5	3.6351	-50	3.7215	-102	3.801	-15	684
390	3.5445	9	3.6301	-41	3.7113	-90	3.786	-13	702
400	3.5454	12	3.6260	-33	3.7023	-75	3.773	-12	720
410	3.5466	17	3.6227	-24	3.6948	-66	3.761	-10	738
420	3.5483	21	3.6203	-19	3.6882	-53	3.7511	-88	756
430	3.5504	24	3.6184	-11	3.6829	-45	3.7423	-74	774
440	3.5528	27	3.6173	-5	3.6784	-38	3.7349	-65	792
450	3.5555	32	3.6168		3.6746	-26	3.7284	-53	810
460	3.5587	34	3.6168	7	3.6720	-22	3.7231	-45	828
470	3.5621	37	3.6175	10	3.6698	-13	3.7186	-36	846
480	3.5658	42	3.6185	20	3.6685	-6	3.7150	-25	864
490	3.5700	44	3.6205	20	3.6679	1	3.7125	-21	882
500	3.5744	47	3.6225	25	3.6680	5	3.7104	-13	900
510	3.5791	49	3.6250	29	3.6685	10	3.7091	-6	918
520	3.5840	53	3.6279	34	3.6695	17	3.7085	1	936
530	3.5893	55	3.6313	38	3.6712	21	3.7086	6	954
540	3.5948	57	3.6351	42	3.6733	26	3.7092	11	972
550	3.6005	60	3.6393	43	3.6759	29	3.7103	17	990
560	3.6065	62	3.6436	48	3.6788	35	3.7120	20	1008
570	3.6127	64	3.6484	50	3.6823	36	3.7140	25	1026
580	3.6191	65	3.6534	53	3.6859	41	3.7165	30	1044
590	3.6256	68	3.6587	55	3.6900	44	3.7195	34	1062
600	3.6324	69	3.6642	58	3.6944	45	3.7229	35	1080
610	3.6393	71	3.6700	59	3.6989	51	3.7264	41	1098
620	3.6464	72	3.6759	62	3.7040	50	3.7305	41	1116
630	3.6536	73	3.6821	63	3.7090	55	3.7346	46	1134
640	3.6609	74	3.6884	64	3.7145	55	3.7392	47	1152
650	3.6683	76	3.6948	67	3.7200	59	3.7439	50	1170
660	3.6759	76	3.7015	68	3.7259	60	3.7489	53	1188
670	3.6835	77	3.7083	69	3.7319	61	3.7542	55	1206
680	3.6912	77	3.7152	69	3.7380	61	3.7597	54	1224
690	3.6989	78	3.7221	72	3.7441	65	3.7651	58	1242
700	3.7067		3.7293		3.7506		3.7709		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	3.7067	79	3.7293	71	3.7506	65	3.7709	59	1260
710	3.7146	79	3.7364	71	3.7571	65	3.7768	58	1278
720	3.7225	79	3.7435	74	3.7636	67	3.7826	62	1296
730	3.7304	80	3.7509	73	3.7703	69	3.7888	63	1314
740	3.7384	80	3.7582	74	3.7772	68	3.7951	.63	1332
750	3.7464	80	3.7656	75	3.7840	69	3.8014	64	1350
760	3.7544	80	3.7731	74	3.7909	70	3.8078	65	1368
770	3.7624	79	3.7805	74	3.7979	69	3.8143	64	1386
780	3.7703	81	3.7879	76	3.8048	71	3.8207	66	1404
790	3.7784	79	3.7955	74	3.8119	69	3.8273	65	1422
800	3.7863	777	3.8029	737	3.8188	700	3.8338	666	1440
900	3.8640	721	3.8766	694	3.8888	668	3.9004	643	1620
1000	3.9361	649	3.9460	629	3.9556	610	3.9647	592	1800
1100	4.0010	574	4.0089	560	4.0166	546	4.0239	533	1980
1200	4.0584	507	4.0649	495	4.0712	485	4.0772	475	2160
1300	4.1091	442	4.1144	434	4.1197	424	4.1247	416	2340
1400	4.1533	389	4.1578	382	4.1621	374	4.1663	368	2520
1500	4.1922	341	4.1960	335	4.1995	331	4.2031	325	2700
1600	4.2263	300	4.2295	296	4.2326	292	4.2356	288	2880
1700	4.2563	266	4.2591	261	4.2618	257	4.2644	252	3060
1800	4.2829	235	4.2852	232	4.2875	228	4.2896	226	3240
1900	4.3064	210	4.3084	208	4.3103	206	4.3122	203	3420
2000	4.3274	188	4.3292	186	4.3309	183	4.3325	182	3600
2100	4.3462	170	4.3478	167	4.3492	166	4.3507	164	3780
2200	4.3632	152	4.3645	151	4.3658	149	4.3671	147	3960
2300	4.3784	140	4.3796	138	4.3807	137	4.3818	135	4140
2400	4.3924	126	4.3934	125	4.3944	124	4.3953	123	4320
2500	4.4050	116	4.4059	115	4.4068	114	4.4076	113	4500
2600	4.4166	106	4.4174	106	4.4182	105	4.4189	104	4680
2700	4.4272	99	4.4280	97	4.4287	97	4.4293	96	4860
2800	4.4371	91	4.4377	90	4.4384	89	4.4389	89	5040
2900	4.4462	85	4.4467	84	4.4473	83	4.4478	83	5220
3000	4.4547		4.4551		4.4556		4.4561		5400

Table 7-4. ENTHALPY OF NITROGEN* $(H-E_0^0)/RT_0$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	1.2777	1281	1.2761	1283	1.2706	1292	1.2650	1300	180
110	1.4058	1283	1.4044	1284	1.3998	1290	1.3950	1297	198
120	1.5341	1281	1.5328	1283	1.5288	1288	1.5247	1292	216
130	1.6622	1282	1.6611	1283	1.6576	1287	1.6539	1292	234
140	1.7904	1281	1.7894	1283	1.7863	1285	1.7831	1289	252
150	1.9185	1282	1.9177	1283	1.9148	1286	1.9120	1289	270
160	2.0467	1281	2.0460	1281	2.0434	1284	2.0409	1286	288
170	2.1748	1282	2.1741	1283	2.1718	1285	2.1695	1287	306
180	2.3030	1281	2.3024	1282	2.3003	1283	2.2982	1285	324
190	2.4311	1282	2.4306	1282	2.4286	1285	2.4267	1286	342
200	2.5593	1282	2.5588	1283	2.5571	1283	2.5553	1285	360
210	2.6875	1281	2.6871	1281	2.6854	1283	2.6838	1284	378
220	2.8156	1283	2.8152	1282	2.8137	1284	2.8122	1285	396
230	2.9439	1282	2.9434	1283	2.9421	1283	2.9407	1284	414
240	3.0721	1281	3.0717	1281	3.0704	1282	3.0691	1283	432
250	3.2002	1282	3.1998	1282	3.1986	1283	3.1974	1284	450
260	3.3284	1282	3.3280	1283	3.3269	1283	3.3258	1284	468
270	3.4566	1282	3.4563	1282	3.4552	1283	3.4542	1284	486
280	3.5848	1282	3.5845	1282	3.5835	1283	3.5826	1283	504
290	3.7130	1282	3.7127	1282	3.7118	1283	3.7109	1284	522
300	3.8412	1283	3.8409	1283	3.8401	1284	3.8393	1284	540
310	3.9695	1283	3.9692	1284	3.9685	1283	3.9677	1284	558
320	4.0978	1283	4.0976	1283	4.0968	1284	4.0961	1284	576
330	4.2261	1283	4.2259	1283	4.2252	1284	4.2245	1285	594
340	4.3544	1284	4.3542	1284	4.3536	1284	4.3530	1285	612
350	4.4828	1285	4.4826	1285	4.4820	1286	4.4815	1285	630
360	4.6113	1285	4.6111	1285	4.6106	1285	4.6100	1286	648
370	4.7398	1285	4.7396	1285	4.7391	1286	4.7386	1286	666
380	4.8683	1287	4.8681	1288	4.8677	1287	4.8672	1288	684
390	4.9970	1287	4.9969	1287	4.9964	1288	4.9960	1288	702
400	5.1257	1289	5.1256	1289	5.1252	1289	5.1248	1289	720
410	5.2546	1289	5.2545	1289	5.2541	1289	5.2537	1290	738
420	5.3835	1291	5.3834	1291	5.3830	1292	5.3827	1292	756
430	5.5126	1291	5.5125	1291	5.5122	1291	5.5119	1291	774
440	5.6417	1294	5.6416	1294	5.6413	1294	5.6410	1295	792
450	5.7711	1294	5.7710	1294	5.7707	1295	5.7705	1294	810
460	5.9005	1296	5.9004	1296	5.9002	1296	5.8999	1297	828
470	6.0301	1298	6.0300	1298	6.0298	1298	6.0296	1298	846
480	6.1599	1300	6.1598	1300	6.1596	1301	6.1594	1301	864
490	6.2899	1301	6.2898	1301	6.2897	1301	6.2895	1301	882
500	6.4200	1304	6.4199	1304	6.4198	1304	6.4196	1305	900
510	6.5504	1305	6.5503	1306	6.5502	1305	6.5501	1305	918
520	6.6809	1308	6.6809	1308	6.6807	1308	6.6806	1308	936
530	6.8117	1310	6.8117	1310	6.8115	1311	6.8114	1311	954
540	6.9427	1312	6.9427	1312	6.9426	1312	6.9425	1312	972
550	7.0739	1314	7.0739	1314	7.0738	1314	7.0737	1314	990
560	7.2053	1317	7.2053	1317	7.2052	1317	7.2051	1318	1008
570	7.3370	1319	7.3370	1319	7.3369	1319	7.3369	1319	1026
580	7.4689	1322	7.4689	1322	7.4688	1323	7.4688	1322	1044
590	7.6011	1324	7.6011	1324	7.6011	1324	7.6010	1325	1062
600	7.7335	1327	7.7335	1327	7.7335	1327	7.7335	1327	1080
610	7.8662	1330	7.8662	1330	7.8662	1330	7.8662	1330	1098
620	7.9992	1333	7.9992	1333	7.9992	1333	7.9992	1333	1116
630	8.1325	1335	8.1325	1335	8.1325	1335	8.1325	1336	1134
640	8.2660	1338	8.2660	1338	8.2660	1339	8.2661	1338	1152
650	8.3998	1341	8.3998	1341	8.3999	1341	8.3999	1341	1170
660	8.5339	1344	8.5339	1344	8.5340	1344	8.5340	1344	1188
670	8.6683	1347	8.6683	1347	8.6684	1347	8.6684	1348	1206
680	8.8030	1349	8.8030	1349	8.8031	1349	8.8032	1349	1224
690	8.9379	1353	8.9379	1353	8.9380	1353	8.9381	1353	1242
700	9.0732		9.0732		9.0733		9.0734		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	9.0732	1356	9.0732	1356	9.0733	1356	9.0734	1356	1260
710	9.2088	1358	9.2088	1358	9.2089	1358	9.2090	1358	1278
720	9.3446	1362	9.3446	1362	9.3447	1362	9.3448	1363	1296
730	9.4808	1364	9.4808	1364	9.4809	1365	9.4811	1364	1314
740	9.6172	1368	9.6172	1368	9.6174	1368	9.6175	1368	1332
750	9.7540	1370	9.7540	1370	9.7542	1370	9.7543	1370	1350
760	9.8910	1374	9.8910	1374	9.8912	1374	9.8913	1374	1368
770	10.0284	1376	10.0284	1376	10.0286	1376	10.0287	1376	1386
780	10.1660	1380	10.1660	1380	10.1662	1380	10.1663	1381	1404
790	10.3040	1383	10.3040	1383	10.3042	1383	10.3044	1383	1422
800	10.4423	13986	10.4423	13986	10.4425	13987	10.4427	13987	1440
900	11.8409	14265	11.8409	14265	11.8412	14265	11.8414	14266	1620
1000	13.2674	14519	13.2674	14519	13.2677	14520	13.2680	14520	1800
1100	14.7193	14746	14.7193	14746	14.7197	14746	14.7200	14746	1980
1200	16.1939	14944	16.1939	14944	16.1943	14945	16.1946	14945	2160
1300	17.6883	15119	17.6883	15119	17.6888	15119	17.6891	15119	2340
1400	19.2002	15273	19.2002	15273	19.2007	15273	19.2010	15274	2520
1500	20.7275	15407	20.7275	15407	20.7280	15407	20.7284	15407	2700
1600	22.2682	15524	22.2682	15524	22.2687	15524	22.2691	15524	2880
1700	23.8206	15628	23.8206	15628	23.8211	15628	23.8215	15629	3060
1800	25.3834	15720	25.3834	15720	25.3839	15721	25.3844	15720	3240
1900	26.9554	15802	26.9554	15802	26.9560	15802	26.9564	15802	3420
2000	28.5356	15876	28.5356	15876	28.5362	15876	28.5366	15876	3600
2100	30.1232	15940	30.1232	15940	30.1238	15940	30.1242	15940	3780
2200	31.7172	16000	31.7172	16000	31.7178	16000	31.7182	16000	3960
2300	33.3172	16053	33.3172	16053	33.3178	16053	33.3182	16053	4140
2400	34.9225	16102	34.9225	16102	34.9231	16102	34.9235	16102	4320
2500	36.5327	16146	36.5327	16146	36.5333	16146	36.5337	16147	4500
2600	38.1473	16188	38.1473	16188	38.1479	16188	38.1484	16188	4680
2700	39.7661	16225	39.7661	16225	39.7667	16225	39.7672	16225	4860
2800	41.3886	16259	41.3886	16259	41.3892	16259	41.3897	16259	5040
2900	43.0145	16292	43.0145	16292	43.0151	16292	43.0156	16292	5220
3000	44.6437		44.6437		44.6443		44.6448		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
100	1.2589	1313							180
110	1.3902	1303	1.3343	1422					198
120	1.5205	1298	1.4765	1363					216
130	1.6503	1296	1.6128	1343	1.5721	1405			234
140	1.7799	1292	1.7471	1330	1.7126	1372	1.6761	1426	252
150	1.9091	1292	1.8801	1322	1.8498	1358	1.8187	1394	270
160	2.0383	1289	2.0123	1314	1.9856	1342	1.9581	1372	288
170	2.1672	1289	2.1437	1311	2.1198	1334	2.0953	1360	306
180	2.2961	1287	2.2748	1306	2.2532	1326	2.2313	1347	324
190	2.4248	1287	2.4054	1304	2.3858	1321	2.3660	1339	342
200	2.5535	1287	2.5358	1301	2.5179	1317	2.4999	1332	360
210	2.6822	1285	2.6659	1298	2.6496	1311	2.6331	1325	378
220	2.8107	1286	2.7957	1298	2.7807	1310	2.7656	1321	396
230	2.9393	1286	2.9255	1296	2.9117	1306	2.8977	1317	414
240	3.0679	1284	3.0551	1293	3.0423	1303	3.0294	1313	432
250	3.1963	1284	3.1844	1294	3.1726	1302	3.1607	1311	450
260	3.3247	1285	3.3138	1292	3.3028	1300	3.2918	1309	468
270	3.4532	1284	3.4430	1292	3.4328	1300	3.4227	1306	486
280	3.5816	1285	3.5722	1290	3.5628	1297	3.5533	1304	504
290	3.7101	1284	3.7012	1290	3.6925	1296	3.6837	1303	522
300	3.8385	1284	3.8302	1291	3.8221	1296	3.8140	1302	540
310	3.9669	1285	3.9593	1290	3.9517	1295	3.9442	1300	558
320	4.0954	1285	4.0883	1289	4.0812	1295	4.0742	1299	576
330	4.2239	1284	4.2172	1289	4.2107	1293	4.2041	1298	594
340	4.3523	1286	4.3461	1290	4.3400	1294	4.3339	1298	612
350	4.4809	1286	4.4751	1290	4.4694	1294	4.4637	1298	630
360	4.6095	1286	4.6041	1290	4.5988	1294	4.5935	1298	648
370	4.7381	1286	4.7331	1290	4.7282	1293	4.7233	1297	666
380	4.8667	1289	4.8621	1291	4.8575	1295	4.8530	1298	684
390	4.9956	1288	4.9912	1291	4.9870	1294	4.9828	1297	702
400	5.1244	1290	5.1203	1293	5.1164	1296	5.1125	1299	720
410	5.2534	1290	5.2496	1293	5.2460	1296	5.2424	1298	738
420	5.3824	1291	5.3789	1295	5.3756	1297	5.3722	1300	756
430	5.5115	1292	5.5084	1294	5.5053	1297	5.5022	1299	774
440	5.6407	1295	5.6378	1297	5.6350	1299	5.6321	1302	792
450	5.7702	1295	5.7675	1297	5.7649	1299	5.7623	1302	810
460	5.8997	1296	5.8972	1299	5.8948	1301	5.8925	1303	828
470	6.0293	1299	6.0271	1301	6.0249	1303	6.0228	1305	846
480	6.1592	1301	6.1572	1302	6.1552	1305	6.1533	1306	864
490	6.2893	1301	6.2874	1304	6.2857	1305	6.2839	1308	882
500	6.4194	1305	6.4178	1306	6.4162	1308	6.4147	1310	900
510	6.5499	1306	6.5484	1308	6.5470	1309	6.5457	1310	918
520	6.6805	1308	6.6792	1310	6.6779	1312	6.6767	1314	936
530	6.8113	1311	6.8102	1312	6.8091	1314	6.8081	1314	954
540	6.9424	1312	6.9414	1314	6.9405	1316	6.9395	1317	972
550	7.0736	1315	7.0728	1316	7.0721	1317	7.0712	1319	990
560	7.2051	1317	7.2044	1319	7.2038	1320	7.2031	1322	1008
570	7.3368	1320	7.3363	1320	7.3358	1322	7.3353	1323	1026
580	7.4688	1322	7.4683	1324	7.4680	1326	7.4676	1326	1044
590	7.6010	1324	7.6007	1326	7.6006	1326	7.6002	1329	1062
600	7.7334	1328	7.7333	1328	7.7332	1330	7.7331	1331	1080
610	7.8662	1330	7.8661	1332	7.8662	1333	7.8662	1333	1098
620	7.9992	1333	7.9993	1334	7.9995	1335	7.9995	1337	1116
630	8.1325	1336	8.1327	1337	8.1330	1338	8.1332	1339	1134
640	8.2661	1338	8.2664	1339	8.2668	1340	8.2671	1341	1152
650	8.3999	1341	8.4003	1343	8.4008	1344	8.4012	1345	1170
660	8.5340	1345	8.5346	1345	8.5352	1346	8.5357	1347	1188
670	8.6685	1347	8.6691	1348	8.6698	1348	8.6704	1349	1206
680	8.8032	1349	8.8039	1350	8.8046	1351	8.8053	1353	1224
690	8.9381	1354	8.9389	1355	8.9397	1355	8.9406	1356	1242
700	9.0735		9.0744		9.0752		9.0762		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
700	9.0735	1356	9.0744	1357	9.0752	1358	9.0762	1359	1260
710	9.2091	1358	9.2101	1359	9.2110	1360	9.2121	1360	1278
720	9.3449	1363	9.3460	1363	9.3470	1364	9.3481	1365	1296
730	9.4812	1364	9.4823	1365	9.4834	1366	9.4846	1367	1314
740	9.6176	1368	9.6188	1369	9.6200	1369	9.6213	1370	1332
750	9.7544	1370	9.7557	1371	9.7569	1372	9.7583	1372	1350
760	9.8914	1375	9.8928	1375	9.8941	1376	9.8955	1377	1368
770	10.0289	1376	10.0303	1377	10.0317	1377	10.0332	1378	1386
780	10.1665	1380	10.1680	1381	10.1694	1381	10.1710	1382	1404
790	10.3045	1383	10.3061	1383	10.3075	1385	10.3092	1385	1422
800	10.4428	13988	10.4444	13994	10.4460	13999	10.4477	14005	1440
900	11.8416	14267	11.8438	14270	11.8459	14275	11.8482	14278	1620
1000	13.2683	14520	13.2708	14524	13.2734	14527	13.2760	14530	1800
1100	14.7203	14747	14.7232	14750	14.7261	14753	14.7290	14756	1980
1200	16.1950	14944	16.1982	14947	16.2014	14949	16.2046	14951	2160
1300	17.6894	15120	17.6929	15121	17.6963	15123	17.6997	15125	2340
1400	19.2014	15274	19.2050	15275	19.2086	15277	19.2122	15278	2520
1500	20.7288	15407	20.7325	15409	20.7363	15410	20.7400	15412	2700
1600	22.2695	15524	22.2734	15525	22.2773	15526	22.2812	15528	2880
1700	23.8219	15629	23.8259	15630	23.8299	15631	23.8340	15631	3060
1800	25.3848	15720	25.3889	15721	25.3930	15722	25.3971	15722	3240
1900	26.9568	15802	26.9610	15803	26.9652	15803	26.9693	15805	3420
2000	28.5370	15876	28.5413	15877	28.5455	15878	28.5498	15878	3600
2100	30.1246	15941	30.1290	15940	30.1333	15941	30.1376	15942	3780
2200	31.7187	16000	31.7230	16001	31.7274	16001	31.7318	16001	3960
2300	33.3187	16053	33.3231	16053	33.3275	16054	33.3319	16055	4140
2400	34.9240	16102	34.9284	16103	34.9329	16103	34.9374	16103	4320
2500	36.5342	16146	36.5387	16146	36.5432	16147	36.5477	16147	4500
2600	38.1488	16188	38.1533	16189	38.1579	16188	38.1624	16189	4680
2700	39.7676	16225	39.7722	16225	39.7767	16226	39.7813	16226	4860
2800	41.3901	16259	41.3947	16259	41.3993	16259	41.4039	16259	5040
2900	43.0160	16292	43.0206	16293	43.0252	16293	43.0298	16293	5220
3000	44.6452		44.6499		44.6545		44.6591		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	10 atm		40 atm		70 atm		100 atm		°R
140	1.6761	1426							252
150	1.8187	1394							270
160	1.9581	1372							288
170	2.0953	1360							306
180	2.2313	1347	1.9967	1615					324
190	2.3660	1339	2.1582	1558	1.941	184			342
200	2.4999	1332	2.3140	1513	2.125	173	1.94	20	360
210	2.6331	1325	2.4653	1479	2.298	166	2.14	18	378
220	2.7656	1321	2.6132	1455	2.464	160	2.32	18	396
230	2.8977	1317	2.7587	1435	2.624	156	2.50	17	414
240	3.0294	1313	2.9022	1417	2.780	152	2.67	16	432
250	3.1607	1311	3.0439	1398	2.932	149	2.83	15	450
260	3.2918	1309	3.1837	1395	3.081	148	2.98	16	468
270	3.4227	1306	3.3232	1382	3.229	146	3.14	16	486
280	3.5533	1304	3.4614	1372	3.375	144	3.298	150	504
290	3.6837	1303	3.5986	1365	3.519	143	3.448	148	522
300	3:8140	1302	3.7351	1359	3.662	141	3.596	147	540
310	3.9442	1300	3.8710	1353	3.803	140	3.743	145	558
320	4.0742	1299	4.0063	1347	3.943	140	3.888	144	576
330	4.2041	1298	4.1410	1345	4.083	139	4.032	142	594
340	4.3339	1298	4.2755	1340	4.222	138	4.174	142	612
350	4.4637	1298	4.4095	1337	4.3600	1374	4.316	141	630
360	4.5935	1298	4.5432	1335	4.4974	1369	4.457	140	648
370	4.7233	1297	4.6767	1329	4.6343	1364	4.597	139	666
380	4.8530	1298	4.8096	1331	4.7707	1361	4.736	139	684
390	4.9828	1297	4.9427	1329	4.9068	1358	4.875	138	702
400	5.1125	1299	5.0756	1327	5.0426	1354	5.013	138	720
410	5.2424	1298	5.2083	1325	5.1780	1351	5.151	138	738
420	5.3722	1300	5.3408	1326	5.3131	1351	5.2892	1374	756
430	5.5022	1299	5.4734	1323	5.4482	1345	5.4266	1365	774
440	5.6321	1302	5.6057	1325	5.5827	1348	5.5631	1368	792
450	5.7623	1302	5.7382	1323	5.7175	1343	5.6999	1362	810
460	5.8925	1303	5.8705	1325	5.8518	1344	5.8361	1362	828
470	6.0228	1305	6.0030	1325	5.9862	1342	5.9723	1361	846
480	6.1533	1306	6.1355	1325	6.1204	1344	6.1084	1360	864
490	6.2839	1308	6.2680	1325	6.2548	1343	6.2444	1358	882
500	6.4147	1310	6.4005	1327	6.3891	1343	6.3802	1359	900
510	6.5457	1310	6.5332	1327	6.5234	1342	6.5161	1357	918
520	6.6767	1314	6.6659	1329	6.6576	1344	6.6518	1359	936
530	6.8081	1314	6.7988	1330	6.7920	1345	6.7877	1356	954
540	6.9395	1317	6.9318	1332	6.9265	1345	6.9233	1359	972
550	7.0712	1319	7.0650	1332	7.0610	1346	7.0592	1358	990
560	7.2031	1322	7.1982	1335	7.1956	1348	7.1950	1360	1008
570	7.3353	1323	7.3317	1336	7.3304	1348	7.3310	1359	1026
580	7.4676	1326	7.4653	1339	7.4652	1351	7.4669	1363	1044
590	7.6002	1329	7.5992	1340	7.6003	1351	7.6032	1361	1062
600	7.7331	1331	7.7332	1342	7.7354	1353	7.7393	1363	1080
610	7.8662	1333	7.8674	1346	7.8707	1355	7.8756	1365	1098
620	7.9995	1337	8.0020	1347	8.0062	1358	8.0121	1368	1116
630	8.1332	1339	8.1367	1349	8.1420	1357	8.1489	1368	1134
640	8.2671	1341	8.2716	1351	8.2777	1361	8.2857	1369	1152
650	8.4012	1345	8.4067	1354	8.4138	1364	8.4226	1371	1170
660	8.5357	1347	8.5421	1356	8.5502	1365	8.5597	1374	1188
670	8.6704	1349	8.6777	1359	8.6867	1368	8.6971	1375	1206
680	8.8053	1353	8.8136	1361	8.8235	1368	8.8346	1378	1224
690	8.9406	1356	8.9497	1364	8.9603	1374	8.9724	1379	1242
700	9.0762		9.0861		9.0977		9.1103		1260

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-4. ENTHALPY OF NITROGEN - Cont.* $(H-E_0^o)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
700	9.0762	1359	9.0861	1366	9.0977	1373	9.1103	1381	1260
710	9.2121	1360	9.2227	1369	9.2350	1377	9.2484	1384	1278
720	9.3481	1365	9.3596	1373	9.3727	1379	9.3868	1386	1296
730	9.4846	1367	9.4969	1373	9.5106	1381	9.5254	1388	1314
740	9.6213	1370	9.6342	1378	9.6487	1384	9.6642	1391	1332
750	9.7583	1372	9.7720	1380	9.7871	1386	9.8033	1392	1350
760	9.8955	1377	9.9100	1382	9.9257	1390	9.9425	1395	1368
770	10.0332	1378	10.0482	1385	10.0647	1391	10.0820	1398	1386
780	10.1710	1382	10.1867	1389	10.2038	1394	10.2218	1400	1404
790	10.3092	1385	10.3256	1391	10.3432	1397	10.3618	1402	1422
800	10.4477	14005	10.4647	14058	10.4829	14108	10.5020	14157	1440
900	11.8482	14278	11.8705	14320	11.8937	14359	11.9177	14396	1620
1000	13.2760	14530	13.3025	14563	13.3296	14595	13.3573	14624	1800
1100	14.7290	14756	14.7588	14781	14.7891	14806	14.8197	14832	1980
1200	16.2046	14951	16.2369	14974	16.2697	14994	16.3029	15014	2160
1300	17.6997	15125	17.7343	15143	17.7691	15160	17.8043	15178	2340
1400	19.2122	15278	19.2486	15293	19.2851	15308	19.3221	15321	2520
1500	20.7400	15412	20.7779	15424	20.8159	15438	20.8542	15450	2700
1600	22.2812	15528	22.3203	15539	22.3597	15549	22.3992	15558	2880
1700	23.8340	15631	23.8742	15640	23.9146	15649	23.9550	15659	3060
1800	25.3971	15722	25.4382	15731	25.4795	15738	25.5209	15745	3240
1900	26.9693	15805	27.0113	15811	27.0533	15819	27.0954	15825	3420
2000	28.5498	15878	28.5924	15884	28.6352	15889	28.6779	15895	3600
2100	30.1376	15942	30.1808	15947	30.2241	15952	30.2674	15958	3780
2200	31.7318	16001	31.7755	16006	31.8193	16010	31.8632	16015	3960
2300	33.3319	16055	33.3761	16058	33.4203	16063	33.4647	16065	4140
2400	34.9374	16103	34.9819	16107	35.0266	16111	35.0712	16115	4320
2500	36.5477	16147	36.5926	16150	36.6377	16153	36.6827	16156	4500
2600	38.1624	16189	38.2076	16192	38.2530	16193	38.2983	16196	4680
2700	39.7813	16226	39.8268	16228	39.8723	16231	39.9179	16234	4860
2800	41.4039	16259	41.4496	16262	41.4954	16264	41.5413	16265	5040
2900	43.0298	16293	43.0758	16295	43.1218	16296	43.1678	16298	5220
3000	44.6591		44.7053		44.7514		44.7976		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-5. ENTROPY OF NITROGEN S/R

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	23.8092	3338	21.5037	3344	20.1079	3364	19.5381	3390	180
110	24.1430	3046	21.8381	3051	20.4443	3066	19.8771	3082	198
120	24.4476	2801	22.1432	2805	20.7509	2816	20.1853	2826	216
130	24.7277	2596	22.4237	2597	21.0325	2605	20.4679	2613	234
140	24.9873	2415	22.6834	2417	21.2930	2424	20.7292	2431	252
150	25.2288	2259	22.9251	2261	21.5354	2265	20.9723	2270	270
160	25.4547	2123	23.1512	2124	21.7619	2197	21.1993	2133	288
170	25.6670	2000	23.3636	2001	21.9816	1936	21.4126	2007	306
180	25.8670	1893	23.5637	1894	22.1752	1897	21.6133	1900	324
190	26.0563	1796	23.7531	1797	22.3649	1798	21.8033	1801	342
200	26.2359	1708	23.9328	1709	22.5447	1711	21.9834	1712	360
210	26.4067	1630	24.1037	1629	22.7158	1631	22.1546	1633	378
220	26.5697	1556	24.2666	1557	22.8789	1558	22.3179	1559	396
230	26.7253	1490	24.4223	1490	23.0347	1492	22.4738	1493	414
240	26.8743	1429	24.5713	1429	23.1839	1430	22.6231	1431	432
250	27.0172	1373	24.7142	1374	23.3269	1374	22.7662	1375	450
260	27.1545	1322	24.8516	1322	23.4643	1323	22.9037	1324	468
270	27.2867	1273	24.9838	1273	23.5966	1274	23.0361	1275	486
280	27.4140	1229	25.1111	1229	23.7240	1230	23.1636	1231	504
290	27.5369	1188	25.2340	1189	23.8470	1189	23.2867	1189	522
300	27.6557	1149	25.3529	1149	23.9659	1149	23.4056	1150	540
310	27.7706	1112	25.4678	1112	24.0808	1113	23.5206	1113	558
320	27.8818	1079	25.5790	1079	24.1921	1080	23.6319	1080	576
330	27.9897	1046	25.6869	1046	24.3001	1046	23.7399	1047	594
340	28.0943	1017	25.7915	1017	24.4047	1018	23.8446	1018	612
350	28.1960	988	25.8932	988	24.5065	988	23.9464	988	630
360	28.2948	962	25.9920	963	24.6053	962	24.0452	963	648
370	28.3910	937	26.0883	937	24.7015	938	24.1415	938	666
380	28.4847	912	26.1820	912	24.7953	912	24.2353	912	684
390	28.5759	891	26.2732	891	24.8865	891	24.3265	892	702
400	28.6650	869	26.3623	869	24.9756	869	24.4157	869	720
410	28.7519	849	26.4492	849	25.0625	850	24.5026	850	738
420	28.8368	829	26.5341	829	25.1475	829	24.5876	829	756
430	28.9197	811	26.6170	812	25.2304	811	24.6705	811	774
440	29.0008	794	26.6982	793	25.3115	794	24.7516	795	792
450	29.0802	777	26.7775	777	25.3909	778	24.8311	777	810
460	29.1579	762	26.8552	762	25.4687	762	24.9088	762	828
470	29.2341	746	26.9314	746	25.5449	746	24.9850	747	846
480	29.3087	732	27.0060	732	25.6195	732	25.0597	732	864
490	29.3819	719	27.0792	719	25.6927	719	25.1329	719	882
500	29.4538	705	27.1511	705	25.7646	705	25.2048	705	900
510	29.5243	692	27.2216	692	25.8351	692	25.2753	692	918
520	29.5935	680	27.2908	680	25.9043	681	25.3445	681	936
530	29.6615	669	27.3588	669	25.9724	669	25.4126	669	954
540	29.7284	658	27.4257	658	26.0393	658	25.4795	658	972
550	29.7942	647	27.4915	647	26.1051	647	25.5453	647	990
560	29.8589	636	27.5562	636	26.1698	636	25.6100	636	1008
570	29.9225	627	27.6198	628	26.2334	627	25.6736	628	1026
580	29.9852	617	27.6826	617	26.2961	617	25.7364	617	1044
590	30.0469	608	27.7443	608	26.3578	608	25.7981	608	1062
600	30.1077	600	27.8051	600	26.4186	600	25.8589	600	1080
610	30.1677	590	27.8651	590	26.4786	590	25.9189	590	1098
620	30.2267	583	27.9241	583	26.5376	583	25.9779	583	1116
630	30.2850	574	27.9824	574	26.5959	574	26.0362	574	1134
640	30.3424	567	28.0398	567	26.6533	567	26.0936	567	1152
650	30.3991	559	28.0965	559	26.7100	560	26.1503	559	1170
660	30.4550	552	28.1524	552	26.7660	552	26.2062	553	1188
670	30.5102	545	28.2076	545	26.8212	545	26.2615	545	1206
680	30.5647	538	28.2621	538	26.8757	538	26.3160	538	1224
690	30.6185	532	28.3159	532	26.9295	532	26.3698	532	1242
700	30.6717		28.3691		26.9827		26.4230		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	30.6717	525	28.3691	525	26.9827	525	26.4230	525	1260
710	30.7242	519	28.4216	519	27.0352	519	26.4755	519	1278
720	30.7761	513	28.4735	513	27.0871	513	26.5274	513	1296
730	30.8274	507	28.5248	507	27.1384	507	26.5787	507	1314
740	30.8781	502	28.5755	502	27.1891	502	26.6294	502	1332
750	30.9283	496	28.6257	496	27.2393	496	26.6796	496	1350
760	30.9779	490	28.6753	490	27.2889	490	26.7292	490	1368
770	31.0269	485	28.7243	485	27.3379	485	26.7782	485	1386
780	31.0754	481	28.7728	481	27.3864	481	26.8267	481	1404
790	31.1235	475	28.8209	475	27.4345	475	26.8748	475	1422
800	31.1710	4498	28.8684	4498	27.4820	4498	26.9223	4499	1440
900	31.6208	4105	29.3182	4105	27.9318	4106	27.3722	4105	1620
1000	32.0313	3779	29.7287	3779	28.3424	3779	27.7827	3779	1800
1100	32.4092	3504	30.1066	3504	28.7203	3504	28.1606	3504	1980
1200	32.7596	3268	30.4570	3268	29.0707	3268	28.5110	3269	2160
1300	33.0864	3060	30.7838	3060	29.3975	3060	28.8379	3060	2340
1400	33.3924	2879	31.0898	2879	29.7035	2879	29.1439	2879	2520
1500	33.6803	2716	31.3777	2716	29.9914	2716	29.4318	2716	2700
1600	33.9519	2570	31.6493	2570	30.2630	2570	29.7034	2570	2880
1700	34.2089	2440	31.9063	2440	30.5200	2440	29.9604	2440	3060
1800	34.4529	2322	32.1503	2322	30.7640	2322	30.2044	2322	3240
1900	34.6851	2214	32.3825	2214	30.9962	2214	30.4366	2214	3420
2000	34.9065	2116	32.6039	2116	31.2176	2116	30.6580	2116	3600
2100	35.1181	2025	32.8155	2025	31.4292	2025	30.8696	2025	3780
2200	35.3206	1943	33.0180	1943	31.6317	1943	31.0721	1943	3960
2300	35.5149	1866	33.2123	1866	31.8260	1866	31.2664	1866	4140
2400	35.7015	1796	33.3989	1796	32.0126	1796	31.4530	1796	4320
2500	35.8811	1729	33.5785	1729	32.1922	1729	31.6326	1729	4500
2600	36.0540	1669	33.7514	1669	32.3651	1669	31.8055	1669	4680
2700	36.2209	1612	33.9183	1612	32.5320	1612	31.9724	1612	4860
2800	36.3821	1558	34.0795	1558	32.6932	1558	32.1336	1558	5040
2900	36.5379	1509	34.2353	1509	32.8490	1509	32.2894	1509	5220
3000	36.6888		34.3862		32.9999		32.4403		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	19.1705	3420	17.607	424	16.55	77			180
110	19.5125	3099	18.031	338	17.321	406	16.72	55	198
120	19.8224	2837	18.3689	2983	17.727	322	17.266	360	216
130	20.1061	2623	18.6672	2719	18.0491	2844	17.626	301	234
140	20.3684	2436	18.9391	2506	18.3335	2590	17.9274	2688	252
150	20.6120	2276	19.1897	2330	18.5925	2389	18.1962	2458	270
160	20.8396	2137	19.4227	2179	18.8314	2225	18.4420	2273	288
170	21.0533	2011	19.6406	2045	19.0539	2082	18.6693	2122	306
180	21.2544	1902	19.8451	1931	19.2621	1959	18.8815	1991	324
190	21.4446	1803	20.0382	1826	19.4580	1851	19.0806	1876	342
200	21.6249	1714	20.2208	1734	19.6431	1753	19.2682	1775	360
210	21.7963	1635	20.3942	1650	19.8184	1669	19.4457	1686	378
220	21.9598	1560	20.5592	1575	19.9853	1589	19.6143	1602	396
230	22.1158	1494	20.7167	1507	20.1442	1519	19.7745	1531	414
240	22.2652	1433	20.8674	1443	20.2961	1453	19.9276	1465	432
250	22.4085	1376	21.0117	1385	20.4414	1394	20.0741	1404	450
260	22.5461	1325	21.1502	1332	20.5808	1342	20.2145	1350	468
270	22.6786	1275	21.2834	1283	20.7150	1289	20.3495	1296	486
280	22.8061	1231	21.4117	1237	20.8439	1244	20.4791	1250	504
290	22.9292	1190	21.5354	1195	20.9683	1201	20.6041	1207	522
300	23.0482	1151	21.6549	1156	21.0884	1161	20.7248	1166	540
310	23.1633	1113	21.7705	1118	21.2045	1122	20.8414	1128	558
320	23.2746	1080	21.8823	1085	21.3167	1089	20.9542	1092	576
330	23.3826	1048	21.9908	1051	21.4256	1054	21.0634	1058	594
340	23.4874	1018	22.0959	1021	21.5310	1025	21.1692	1029	612
350	23.5892	989	22.1980	992	21.6335	995	21.2721	998	630
360	23.6881	963	22.2972	966	21.7330	969	21.3719	971	648
370	23.7844	938	22.3938	940	21.8299	943	21.4690	946	666
380	23.8782	912	22.4878	915	21.9242	917	21.5636	919	684
390	23.9694	892	22.5793	894	22.0159	896	21.6555	899	702
400	24.0586	870	22.6687	872	22.1055	874	21.7454	875	720
410	24.1456	849	22.7559	851	22.1929	853	21.8329	855	738
420	24.2305	830	22.8410	832	22.2782	833	21.9184	835	756
430	24.3135	811	22.9242	813	22.3615	815	22.0019	816	774
440	24.3946	795	23.0055	796	22.4430	797	22.0835	799	792
450	24.4741	777	23.0851	778	22.5227	781	22.1634	782	810
460	24.5518	763	23.1629	764	22.6008	765	22.2416	766	828
470	24.6281	746	23.2393	748	22.6773	748	22.3182	750	846
480	24.7027	733	23.3141	733	22.7521	735	22.3932	736	864
490	24.7760	719	23.3874	721	22.8256	721	22.4668	722	882
500	24.8479	705	23.4595	706	22.8977	708	22.5390	708	900
510	24.9184	693	23.5301	693	22.9685	694	22.6098	695	918
520	24.9877	680	23.5994	681	23.0379	682	22.6793	683	936
530	25.0557	669	23.6675	670	23.1061	671	22.7476	672	954
540	25.1226	658	23.7345	659	23.1732	659	22.8148	659	972
550	25.1884	648	23.8004	648	23.2391	649	22.8807	650	990
560	25.2532	636	23.8652	637	23.3040	638	22.9457	638	1008
570	25.3168	627	23.9289	628	23.3678	628	23.0095	629	1026
580	25.3795	617	23.9917	618	23.4306	618	23.0724	619	1044
590	25.4412	608	24.0535	609	23.4924	610	23.1343	610	1062
600	25.5020	601	24.1144	600	23.5534	601	23.1953	602	1080
610	25.5621	590	24.1744	591	23.6135	591	23.2555	592	1098
620	25.6211	583	24.2335	584	23.6726	584	23.3147	584	1116
630	25.6794	574	24.2919	574	23.7310	575	23.3731	576	1134
640	25.7368	567	24.3493	568	23.7885	568	23.4307	568	1152
650	25.7935	559	24.4061	559	23.8453	560	23.4875	560	1170
660	25.8494	552	24.4620	553	23.9013	553	23.5435	554	1188
670	25.9046	546	24.5173	545	23.9566	546	23.5989	546	1206
680	25.9592	538	24.5718	539	24.0112	539	23.6535	539	1224
690	26.0130	532	24.6257	533	24.0651	533	23.7074	533	1242
700	26.0662		24.6790		24.1184		23.7607		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	26.0662	525	24.6790	525	24.1184	526	23.7607	526	1260
710	26.1187	519	24.7315	519	24.1710	519	23.8133	521	1278
720	26.1706	513	24.7834	514	24.2229	514	23.8654	514	1296
730	26.2219	507	24.8348	507	24.2743	508	23.9168	507	1314
740	26.2726	502	24.8855	502	24.3251	502	23.9675	503	1332
750	26.3228	496	24.9357	497	24.3753	497	24.0178	497	1350
760	26.3724	491	24.9854	490	24.4250	491	24.0675	492	1368
770	26.4215	485	25.0344	485	24.4741	485	24.1167	485	1386
780	26.4700	481	25.0829	482	24.5226	482	24.1652	482	1404
790	26.5181	475	25.1311	475	24.5708	475	24.2134	475	1422
800	26.5656	4498	25.1786	4500	24.6183	4502	24.2609	4504	1440
900	27.0154	4106	25.6286	4107	25.0685	4108	24.7113	4110	1620
1000	27.4260	3779	26.0393	3780	25.4793	3781	25.1223	3781	1800
1100	27.8039	3504	26.4173	3505	25.8574	3506	25.5004	3507	1980
1200	28.1543	3268	26.7678	3269	26.2080	3269	25.8511	3269	2160
1300	28.4811	3061	27.0947	3060	26.5349	3061	26.1780	3062	2340
1400	28.7872	2879	27.4007	2880	26.8410	2880	26.4842	2879	2520
1500	29.0751	2716	27.6887	2716	27.1290	2716	26.7721	2717	2700
1600	29.3467	2570	27.9603	2570	27.4006	2571	27.0438	2571	2880
1700	29.6037	2440	28.2173	2440	27.6577	2440	27.3009	2440	3060
1800	29.8477	2322	28.4613	2323	27.9017	2322	27.5449	2323	3240
1900	30.0799	2214	28.6936	2214	28.1339	2214	27.7772	2214	3420
2000	30.3013	2116	28.9150	2116	28.3553	2117	27.9986	2116	3600
2100	30.5129	2025	29.1266	2025	28.5670	2025	28.2102	2026	3780
2200	30.7154	1943	29.3291	1943	28.7695	1943	28.4128	1943	3960
2300	30.9097	1866	29.5234	1866	28.9638	1866	28.6071	1866	4140
2400	31.0963	1796	29.7100	1796	29.1504	1796	28.7937	1796	4320
2500	31.2759	1729	29.8896	1729	29.3300	1729	28.9733	1729	4500
2600	31.4488	1669	30.0625	1669	29.5029	1669	29.1462	1669	4680
2700	31.6157	1612	30.2294	1612	29.6698	1612	29.3131	1612	4860
2800	31.7769	1558	30.3906	1558	29.8310	1558	29.4743	1558	5040
2900	31.9327	1509	30.5464	1509	29.9868	1509	29.6301	1509	5220
3000	32.0836		30.6973		30.1377		29.7810		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
110	16.72	55							198
120	17.266	360	12.0	28					216
130	17.626	301	14.76	98					234
140	17.9274	2688	15.74	54	13.5	13			252
150	18.1962	2458	16.279	380	14.84	71			270
160	18.4420	2273	16.659	308	15.551	469			288
170	18.6693	2122	16.9669	2665	16.020	358			306
180	18.8815	1991	17.2334	2389	16.378	296			324
190	19.0806	1876	17.4723	2182	16.674	258			342
200	19.2682	1775	17.6905	2016	16.932	231	16.382	263	360
210	19.4457	1686	17.8921	1882	17.163	211	16.645	234	378
220	19.6143	1602	18.0803	1766	17.374	194	16.879	212	396
230	19.7745	1531	18.2569	1668	17.568	181	17.091	195	414
240	19.9276	1465	18.4237	1579	17.749	170	17.286	182	432
250	20.0741	1404	18.5816	1504	17.919	161	17.468	169	450
260	20.2145	1350	18.7320	1434	18.0795	1519	17.637	160	468
270	20.3495	1296	18.8754	1371	18.2314	1447	17.797	152	486
280	20.4791	1250	19.0125	1315	18.3761	1381	17.949	144	504
290	20.6041	1207	19.1440	1266	18.5142	1319	18.093	137	522
300	20.7248	1166	19.2706	1216	18.6461	1267	18.230	131	540
310	20.8414	1128	19.3922	1173	18.7728	1217	18.3607	1257	558
320	20.9542	1092	19.5095	1134	18.8945	1174	18.4864	1209	576
330	21.0634	1058	19.6229	1096	19.0119	1130	18.6073	1163	594
340	21.1692	1029	19.7325	1060	19.1249	1093	18.7236	1122	612
350	21.2721	998	19.8385	1030	19.2342	1059	18.8358	1084	630
360	21.3719	971	19.9415	998	19.3401	1025	18.9442	1049	648
370	21.4690	946	20.0413	970	19.4426	993	19.0491	1016	666
380	21.5636	919	20.1383	944	19.5419	965	19.1507	984	684
390	21.6555	899	20.2327	919	19.6384	938	19.2491	957	702
400	21.7454	875	20.3246	895	19.7322	914	19.3448	931	720
410	21.8329	855	20.4141	872	19.8236	890	19.4379	904	738
420	21.9184	835	20.5013	851	19.9126	866	19.5283	882	756
430	22.0019	816	20.5864	832	19.9992	847	19.6165	860	774
440	22.0835	799	20.6696	813	20.0839	826	19.7025	838	792
450	22.1634	782	20.7509	795	20.1665	807	19.7863	819	810
460	22.2416	766	20.8304	779	20.2472	790	19.8682	798	828
470	22.3182	750	20.9083	760	20.3262	771	19.9480	783	846
480	22.3932	736	20.9843	747	20.4033	756	20.0263	767	864
490	22.4668	722	21.0590	732	20.4789	743	20.1030	751	882
500	22.5390	708	21.1322	718	20.5532	726	20.1781	734	900
510	22.6098	695	21.2040	704	20.6258	712	20.2515	720	918
520	22.6793	683	21.2744	690	20.6970	699	20.3235	706	936
530	22.7476	672	21.3434	680	20.7669	688	20.3941	694	954
540	22.8148	659	21.4114	668	20.8357	674	20.4635	681	972
550	22.8807	650	21.4782	656	20.9031	663	20.5316	669	990
560	22.9457	638	21.5438	645	20.9694	651	20.5985	657	1008
570	23.0095	629	21.6083	635	21.0345	641	20.6642	646	1026
580	23.0724	619	21.6718	624	21.0986	630	20.7288	635	1044
590	23.1343	610	21.7342	616	21.1616	620	20.7923	625	1062
600	23.1953	602	21.7958	607	21.2236	612	20.8548	617	1080
610	23.2555	592	21.8565	597	21.2848	600	20.9165	605	1098
620	23.3147	584	21.9162	588	21.3448	595	20.9770	598	1116
630	23.3731	576	21.9750	581	21.4043	584	21.0368	588	1134
640	23.4307	568	22.0331	572	21.4627	576	21.0956	580	1152
650	23.4875	560	22.0903	565	21.5203	568	21.1536	572	1170
660	23.5435	554	22.1468	557	21.5771	561	21.2108	564	1188
670	23.5989	546	22.2025	549	21.6332	554	21.2672	557	1206
680	23.6535	539	22.2574	543	21.6886	545	21.3229	548	1224
690	23.7074	533	22.3117	537	21.7431	539	21.3777	542	1242
700	23.7607		22.3654		21.7970		21.4319		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	23.7607	526	22.3654	529	21.7970	532	21.4319	536	1260
710	23.8133	521	22.4183	523	21.8502	527	21.4855	529	1278
720	23.8654	514	22.4706	517	21.9029	519	21.5384	523	1296
730	23.9168	507	22.5223	511	21.9548	513	21.5907	515	1314
740	23.9675	503	22.5734	505	22.0061	508	21.6422	510	1332
750	24.0178	497	22.6239	499	22.0569	502	21.6932	504	1350
760	24.0675	492	22.6738	494	22.1071	495	21.7436	498	1368
770	24.1167	485	22.7232	488	22.1566	491	21.7934	493	1386
780	24.1652	482	22.7720	484	22.2057	486	21.8427	487	1404
790	24.2134	475	22.8204	478	22.2543	479	21.8914	482	1422
800	24.2609	4504	22.8682	4521	22.3022	4539	21.9396	4553	1440
900	24.7113	4110	23.3203	4120	22.7561	4132	22.3949	4145	1620
1000	25.1223	3781	23.7323	3791	23.1693	3798	22.8094	3805	1800
1100	25.5004	3507	24.1114	3513	23.5491	3519	23.1899	3525	1980
1200	25.8511	3269	24.4627	3274	23.9010	3279	23.5424	3283	2160
1300	26.1780	3062	24.7901	3064	24.2289	3068	23.8707	3072	2340
1400	26.4842	2879	25.0965	2883	24.5357	2885	24.1779	2887	2520
1500	26.7721	2717	25.3848	2719	24.8242	2722	24.4666	2724	2700
1600	27.0438	2571	25.6567	2573	25.0964	2573	24.7390	2575	2880
1700	27.3009	2440	25.9140	2442	25.3537	2444	24.9965	2445	3060
1800	27.5449	2323	26.1582	2323	25.5981	2325	25.2410	2326	3240
1900	27.7772	2214	26.3905	2215	25.8306	2216	25.4736	2217	3420
2000	27.9986	2116	26.6120	2118	26.0522	2118	25.6953	2119	3600
2100	28.2102	2026	26.8238	2026	26.2640	2027	25.9072	2028	3780
2200	28.4128	1943	27.0264	1943	26.4667	1944	26.1100	1943	3960
2300	28.6071	1866	27.2207	1867	26.6611	1867	26.3043	1868	4140
2400	28.7937	1796	27.4074	1796	26.8478	1797	26.4911	1797	4320
2500	28.9733	1729	27.5870	1730	27.0275	1729	26.6708	1730	4500
2600	29.1462	1669	27.7600	1669	27.2004	1670	26.8438	1670	4680
2700	29.3131	1612	27.9269	1613	27.3674	1613	27.0108	1613	4860
2800	29.4743	1558	28.0882	1558	27.5287	1559	27.1721	1559	5040
2900	29.6301	1509	28.2440	1509	27.6846	1509	27.3280	1510	5220
3000	29.7810		28.3949		27.8355		27.4790		5400

Table 7-6. SPECIFIC-HEAT RATIO OF NITROGEN $\gamma = C_p/C_v$

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	1.400		1.402		1.409	- 2	1.416	- 3	180
110	1.400		1.402	- 1	1.407	- 1	1.413	- 3	198
120	1.400		1.401		1.406	- 1	1.410	- 2	216
130	1.400		1.401		1.405	- 1	1.408	- 1	234
140	1.400		1.401		1.404	- 1	1.407	- 1	252
150	1.400		1.401		1.403		1.406	- 1	270
160	1.400		1.401		1.403	- 1	1.405		288
170	1.400		1.401	- 1	1.402		1.405	- 1	306
180	1.400		1.400		1.402		1.404	- 1	324
190	1.400		1.400		1.402		1.403		342
200	1.400		1.400		1.402	- 1	1.403		360
210	1.400		1.400		1.401		1.403	- 1	378
220	1.400		1.400		1.401		1.402		396
230	1.400		1.400		1.401		1.402		414
240	1.400		1.400		1.401		1.402		432
250	1.400		1.400		1.401		1.402	- 1	450
260	1.400		1.400		1.401		1.401		468
270	1.400		1.400		1.401	- 1	1.401		486
280	1.400		1.400		1.400		1.401		504
290	1.400		1.400		1.400		1.401		522
300	1.400	- 1	1.400	- 1	1.400	- 1	1.401		540
320	1.399		1.399		1.399		1.401	- 1	576
340	1.399		1.399		1.399		1.400		612
360	1.399	- 1	1.399	- 1	1.399	- 1	1.400	- 1	648
380	1.398	- 1	1.398	- 1	1.398	- 1	1.399	- 1	684
400	1.397	- 1	1.397	- 1	1.397	- 1	1.398	- 1	720
420	1.396	- 1	1.396	- 1	1.396	- 1	1.397	- 1	756
440	1.395	- 1	1.395	- 1	1.395	- 1	1.396	- 1	792
460	1.394	- 1	1.394	- 1	1.394	- 1	1.395	- 2	828
480	1.393	- 2	1.393	- 2	1.393	- 2	1.393	- 2	864
500	1.391	- 2	1.391	- 2	1.391	- 2	1.391	- 1	900
520	1.389	- 2	1.389	- 1	1.389	- 1	1.390	- 2	936
540	1.387	- 1	1.388	- 2	1.388	- 2	1.388	- 2	972
560	1.386	- 2	1.386	- 2	1.386	- 2	1.386	- 2	1008
580	1.384	- 3	1.384	- 2	1.384	- 2	1.384	- 2	1044
600	1.381	- 2	1.382	- 3	1.382	- 3	1.382	- 2	1080
620	1.379	- 2	1.379	- 2	1.379	- 2	1.380	- 3	1116
640	1.377	- 2	1.377	- 2	1.377	- 2	1.377	- 3	1152
660	1.375	- 2	1.375	- 2	1.375	- 2	1.374	- 2	1188
680	1.373	- 2	1.373	- 2	1.373	- 2	1.372	- 2	1224
700	1.371	- 3	1.371	- 3	1.371	- 3	1.370	- 2	1260
720	1.368	- 2	1.368	- 2	1.368	- 2	1.368	- 2	1296
740	1.366	- 2	1.366	- 2	1.366	- 2	1.366	- 2	1332
760	1.364	- 2	1.364	- 2	1.364	- 2	1.364	- 2	1368
780	1.362	- 2	1.362	- 2	1.362	- 2	1.362	- 2	1404

°K	$\gamma = C_p/C_v$		°R
* 800	1.360	-10	1440
900	1.350	- 9	1620
1000	1.341	- 7	1800
1100	1.334	- 7	1980
1200	1.327	- 5	2160
1300	1.322	- 5	2340
1400	1.317	- 4	2520
1500	1.313	- 3	2700
1600	1.310	- 3	2880
1700	1.307	- 2	3060
1800	1.305	- 2	3240
1900	1.303	- 2	3420
2000	1.301	- 2	3600
2100	1.299	- 2	3780
2200	1.297	- 1	3960

°K	$\gamma = C_p/C_v$		°R
2300	1.296	- 1	4140
2400	1.295	- 1	4320
2500	1.294	- 1	4500
2600	1.293	- 1	4680
2700	1.292	- 1	4860
2800	1.291	- 1	5040
2900	1.290	- 1	5220
3000	1.289		5400

* At higher temperatures in this pressure range, γ is a function only of temperature as given here.

°K	1 atm		4 atm		7 atm		10 atm		°R
100	1.424	-5							180
110	1.419	-4							198
120	1.415	-3	1.467	-15					216
130	1.412	-2	1.452	-8	1.500	-18			234
140	1.410	-1	1.444	-7	1.482	-14	1.526	-24	252
150	1.409	-2	1.437	-6	1.468	-11	1.502	-17	270
160	1.407	-1	1.431	-4	1.457	-6	1.485	-13	288
170	1.406		1.427	-4	1.451	-9	1.472	-10	306
180	1.406	-1	1.423	-3	1.442	-6	1.462	-9	324
190	1.405	-1	1.420	-2	1.436	-4	1.453	-6	342
200	1.404		1.418	-2	1.432	-3	1.447	-6	360
210	1.404	-1	1.416	-2	1.429	-4	1.441	-4	378
220	1.403		1.414	-1	1.425	-2	1.437	-4	396
230	1.403		1.413	-1	1.423	-2	1.433	-3	414
240	1.403	-1	1.412	-2	1.421	-2	1.430	-3	432
250	1.402		1.410	-1	1.419	-2	1.427	-3	450
260	1.402		1.409		1.417	-2	1.424	-2	468
270	1.402		1.409	-1	1.415	-1	1.422	-2	486
280	1.402	-1	1.408	-1	1.414	-1	1.420	-1	504
290	1.401		1.407		1.413	-1	1.419	-2	522
300	1.401		1.407	-2	1.412	-2	1.417	-3	540
320	1.401	-1	1.405	-1	1.410	-2	1.414	-2	576
340	1.400		1.404	-1	1.408	-2	1.412	-2	612
360	1.400	-1	1.403	-1	1.406	-1	1.410	-2	648
380	1.399	-1	1.402	-1	1.405	-2	1.408	-2	684
400	1.398	-1	1.401	-2	1.403	-1	1.406	-2	720
420	1.397	-1	1.399	-1	1.402	-2	1.404	-2	756
440	1.396	-1	1.398	-2	1.400	-2	1.402	-2	792
460	1.395	-2	1.396	-1	1.398	-1	1.400	-2	828
480	1.393	-2	1.395	-2	1.397	-2	1.398	-2	864
500	1.391	-1	1.393	-2	1.395	-2	1.396	-2	900
520	1.390	-2	1.391	-2	1.393	-3	1.394	-2	936
540	1.388	-2	1.389	-2	1.390	-2	1.392	-3	972
560	1.386	-2	1.387	-2	1.388	-2	1.389	-2	1008
580	1.384	-2	1.385	-2	1.386	-2	1.387	-2	1044
600	1.382	-2	1.383	-2	1.384	-3	1.385	-3	1080
620	1.380	-3	1.381	-3	1.381	-2	1.382	-2	1116
640	1.377	-3	1.378	-2	1.379	-2	1.380	-3	1152
660	1.374	-2	1.376	-2	1.377	-3	1.377	-2	1188
680	1.372	-2	1.374	-3	1.374	-2	1.375	-2	1224
700	1.370	-2	1.371	-2	1.372	-2	1.373	-3	1260
720	1.368	-2	1.369	-2	1.370	-3	1.370	-2	1296
740	1.366	-2	1.367	-2	1.367	-2	1.368	-2	1332
760	1.364	-2	1.365	-3	1.365	-2	1.366	-3	1368
780	1.362	-2	1.362	-2	1.363	-2	1.363	-2	1404

°K	$\gamma = C_p/C_v$		°R
*800	1.360	-10	1440
900	1.350	-9	1620
1000	1.341	-7	1800
1100	1.334	-7	1980
1200	1.327	-5	2160
1300	1.322	-5	2340
1400	1.317	-4	2520
1500	1.313	-3	2700
1600	1.310	-3	2880
1700	1.307	-2	3060
1800	1.305	-2	3240
1900	1.303	-2	3420
2000	1.301	-2	3600
2100	1.299	-2	3780
2200	1.297	-1	3960

°K	$\gamma = C_p/C_v$		°R
2300	1.296	-1	4140
2400	1.295	-1	4320
2500	1.294	-1	4500
2600	1.293	-1	4680
2700	1.292	-1	4860
2800	1.291	-1	5040
2900	1.290	-1	5220
3000	1.289		5400

*At higher temperatures in this pressure range, γ is a function only of temperature as given here.

°K	10 atm		40 atm		70 atm		100 atm		°R
140	1.526	-24							252
150	1.502	-17							270
160	1.485	-13							288
170	1.472	-10							306
180	1.462	- 9	1.723	-65					324
190	1.453	- 6	1.658	-36	1.960	-116			342
200	1.447	- 6	1.622	-32	1.844	- 78	2.11	-16	360
210	1.441	- 4	1.590	-25	1.766	- 58	1.95	-10	378
220	1.437	- 4	1.565	-20	1.708	- 43	1.85	- 7	396
230	1.433	- 3	1.545	-17	1.665	- 34	1.78	- 5	414
240	1.430	- 3	1.528	-14	1.631	- 28	1.73	- 5	432
250	1.427	- 3	1.514	-11	1.603	- 22	1.68	- 3	450
260	1.424	- 2	1.503	-10	1.581	- 18	1.65	- 3	468
270	1.422	- 2	1.493	- 9	1.563	- 16	1.62	- 2	486
280	1.420	- 1	1.484	- 7	1.547	- 14	1.602	- 20	504
290	1.419	- 2	1.477	- 6	1.533	- 11	1.582	- 16	522
300	1.417	- 3	1.471	-11	1.522	- 19	1.566	- 26	540
320	1.414	- 2	1.460	- 9	1.503	- 16	1.540	- 20	576
340	1.412	- 2	1.451	- 8	1.487	- 12	1.520	- 17	612
360	1.410	- 2	1.443	- 6	1.475	- 10	1.503	- 14	648
380	1.408	- 2	1.437	- 5	1.465	- 9	1.489	- 9	684
400	1.406	- 2	1.432	- 5	1.456	- 8	1.480	- 13	720
420	1.404	- 2	1.427	- 5	1.448	- 7	1.467	- 8	756
440	1.402	- 2	1.422	- 4	1.441	- 6	1.459	- 8	792
460	1.400	- 2	1.418	- 3	1.435	- 5	1.451	- 7	828
480	1.398	- 2	1.415	- 4	1.430	- 6	1.444	- 7	864
500	1.396	- 2	1.411	- 4	1.424	- 4	1.437	- 6	900
520	1.394	- 2	1.407	- 3	1.420	- 5	1.431	- 6	936
540	1.392	- 3	1.404	- 4	1.415	- 5	1.425	- 5	972
560	1.389	- 2	1.400	- 3	1.410	- 4	1.420	- 5	1008
580	1.387	- 2	1.397	- 3	1.406	- 4	1.415	- 5	1044
600	1.385	- 3	1.394	- 3	1.402	- 4	1.410	- 4	1080
620	1.382	- 2	1.391	- 3	1.398	- 3	1.406	- 5	1116
640	1.380	- 3	1.388	- 3	1.395	- 4	1.401	- 4	1152
660	1.377	- 2	1.385	- 3	1.391	- 3	1.397	- 4	1188
680	1.375	- 2	1.382	- 3	1.388	- 4	1.393	- 3	1224
700	1.373	- 3	1.379	- 3	1.384	- 3	1.390	- 4	1260
720	1.370	- 2	1.376	- 3	1.381	- 3	1.386	- 4	1296
740	1.368	- 2	1.373	- 3	1.378	- 3	1.382	- 3	1332
760	1.366	- 3	1.370	- 2	1.375	- 3	1.379	- 4	1368
780	1.363	- 2	1.368	- 3	1.372	- 3	1.375	- 3	1404
800	1.361	-10	1.365	-11	1.369	- 13	1.372	- 13	1440
900	1.351	- 9	1.354	-10	1.356	- 10	1.359	- 12	1620
1000	1.342	- 8	1.344	- 8	1.346	- 9	1.347	- 9	1800
1100	1.334	- 6	1.336	- 7	1.337	- 7	1.338	- 7	1980
1200	1.328	- 6	1.329	- 6	1.330	- 6	1.331	- 7	2160
1300	1.322	- 5	1.323	- 5	1.324	- 5	1.324	- 5	2340
1400	1.317	- 3	1.318	- 4	1.319	- 5	1.319	- 4	2520
1500	1.314	- 4	1.314	- 4	1.314	- 3	1.315	- 4	2700
1600	1.310	- 3	1.310	- 3	1.311	- 3	1.311	- 3	2880
1700	1.307	- 2	1.307	- 2	1.308	- 3	1.308	- 3	3060
1800	1.305	- 2	1.305	- 2	1.305	- 2	1.305	- 2	3240
1900	1.303	- 2	1.303	- 2	1.303	- 2	1.303	- 2	3420
2000	1.301	- 2	1.301	- 2	1.301	- 2	1.301	- 2	3600
2100	1.299	- 2	1.299	- 2	1.299	- 2	1.299	- 2	3780
2200	1.297	- 1	1.297	- 1	1.297	- 1	1.297	- 1	3960
2300	1.296		1.296		1.296		1.296		4140

Table 7-6. SPECIFIC-HEAT RATIO OF NITROGEN - Cont. $\gamma = C_p / C_v$

°K	10 atm		40 atm		70 atm		100 atm		°R
2300	1.296	- 1	1.296	- 1	1.296	- 1	1.296	- 1	4140
2400	1.295	- 1	1.295	- 1	1.295	- 2	1.295	- 2	4320
2500	1.294	- 1	1.294	- 1	1.293	- 1	1.293	- 1	4500
2600	1.293	- 1	1.293	- 1	1.292		1.292	- 1	4680
2700	1.292	- 1	1.292	- 1	1.292	- 1	1.291	- 1	4860
2800	1.291	- 1	1.291	- 1	1.291	- 1	1.290		5040
2900	1.290	- 1	1.290	- 1	1.290	- 1	1.290	- 1	5220
3000	1.289		1.289		1.289		1.289		5400

Table 7-7. SOUND VELOCITY AT LOW FREQUENCY IN NITROGEN a/a_0

°K	.01 atm		.1 atm		1 atm		°R
100	.605	29	.604	30	.598	32	180
110	.634	29	.634	28	.630	29	198
120	.663	27	.662	27	.659	27	216
130	.690	26	.689	26	.686	27	234
140	.716	25	.715	26	.713	26	252
150	.741	24	.741	24	.739	24	270
160	.765	24	.765	24	.763	24	288
170	.789	23	.789	22	.787	24	306
180	.812	22	.811	23	.811	22	324
190	.834	21	.834	21	.833	22	342
200	.855	22	.855	21	.855	21	360
210	.877	20	.876	21	.876	21	378
220	.897	20	.897	20	.897	20	396
230	.917	20	.917	20	.917	20	414
240	.937	19	.937	19	.937	19	432
250	.956	19	.956	19	.956	19	450
260	.975	19	.975	19	.975	19	468
270	.994	18	.994	18	.994	19	486
280	1.012	18	1.012	18	1.013	17	504
290	1.030	18	1.030	18	1.030	18	522
300	1.048	34	1.048	34	1.048	34	540
320	1.082	33	1.082	33	1.082	33	576
340	1.115	32	1.115	32	1.115	33	612
360	1.147	31	1.147	32	1.148	31	648
380	1.178	30	1.179	30	1.179	30	684
400	1.208	30	1.209	29	1.209	30	720
420	1.238	29	1.238	29	1.239	28	756
440	1.267	28	1.267	28	1.267	29	792
460	1.295	27	1.295	27	1.296	26	828
480	1.322	26	1.322	26	1.322	27	864
500	1.348	26	1.348	26	1.349	26	900
520	1.374	25	1.374	26	1.375	25	936
540	1.399	25	1.400	24	1.400	25	972
560	1.424	24	1.424	24	1.425	24	1008
580	1.448	24	1.448	24	1.449	24	1044
600	1.472	23	1.472	23	1.473	23	1080
620	1.495	23	1.495	23	1.496	22	1116
640	1.518	22	1.518	22	1.518	22	1152
660	1.540	22	1.540	22	1.540	22	1188
680	1.562	22	1.562	22	1.562	22	1224
700	1.584	20	1.584	20	1.584	21	1260
720	1.604	21	1.604	21	1.605	21	1296
740	1.625	21	1.625	21	1.626	21	1332
760	1.646	20	1.646	20	1.647	20	1368
780	1.666	20	1.666	20	1.667	20	1404
800	1.686	96	1.686	96	1.687	96	1440
900	1.782	90	1.782	90	1.783	90	1620
1000	1.872	86	1.872	86	1.873	86	1800
1100	1.958	82	1.958	82	1.959	82	1980
1200	2.040	79	2.040	79	2.041	79	2160
1300	2.119	76	2.119	76	2.120	76	2340
1400	2.195	74	2.195	74	2.196	73	2520
1500	2.269	72	2.269	72	2.269	72	2700
1600	2.341	69	2.341	69	2.341	69	2880
1700	2.410	68	2.410	68	2.410	68	3060
1800	2.478	66	2.478	66	2.478	65	3240
1900	2.544	64	2.544	64	2.543	65	3420
2000	2.608	62	2.608	62	2.608	63	3600
2100	2.670	61	2.670	61	2.671	60	3780
2200	2.731	60	2.731	60	2.731	61	3960
2300	2.791		2.791		2.792		4140

°K	.01 atm		.1 atm		1 atm		°R
2300	2.791	59	2.791	59	2.792	59	4140
2400	2.850	58	2.850	58	2.851	57	4320
2500	2.908	56	2.908	56	2.908	57	4500
2600	2.964	55	2.964	55	2.965	55	4680
2700	3.019	55	3.019	55	3.020	54	4860
2800	3.074	53	3.074	53	3.074	53	5040
2900	3.127	52	3.127	52	3.127	53	5220
3000	3.179		3.179		3.180		5400

°K	1 atm		4 atm		7 atm.		10 atm		°R
100	.598	32							180
110	.630	29							198
120	.659	27	.646	31					216
130	.686	27	.677	29	.667	32			234
140	.713	26	.706	27	.699	26			252
150	.739	24	.733	26	.725	30	.722	28	270
160	.763	24	.759	25	.755	26	.750	27	288
170	.787	24	.784	24	.781	25	.777	26	306
180	.811	22	.808	23	.806	23	.803	24	324
190	.833	22	.831	23	.829	23	.827	24	342
200	.855	21	.854	21	.852	23	.851	23	360
210	.876	21	.875	21	.875	21	.874	22	378
220	.897	20	.896	21	.896	21	.896	21	396
230	.917	20	.917	20	.917	21	.917	21	414
240	.937	19	.937	20	.938	20	.938	20	432
250	.956	19	.957	19	.958	19	.958	20	450
260	.975	19	.976	19	.977	19	.978	19	468
270	.994	19	.995	19	.996	19	.997	19	486
280	1.013	17	1.014	18	1.015	18	1.016	19	504
290	1.030	18	1.032	18	1.033	18	1.035	17	522
300	1.048	34	1.050	34	1.051	35	1.052	35	540
320	1.082	33	1.084	33	1.086	33	1.087	34	576
340	1.115	33	1.117	33	1.119	33	1.121	33	612
360	1.148	31	1.150	31	1.152	31	1.154	31	648
380	1.179	30	1.181	31	1.183	31	1.185	31	684
400	1.209	30	1.212	29	1.214	29	1.216	30	720
420	1.239	28	1.241	29	1.243	29	1.246	28	756
440	1.267	29	1.270	27	1.272	28	1.274	28	792
460	1.296	26	1.297	28	1.300	28	1.302	28	828
480	1.322	27	1.325	26	1.328	26	1.330	26	864
500	1.349	26	1.351	26	1.354	26	1.356	26	900
520	1.375	25	1.377	26	1.380	25	1.382	26	936
540	1.400	25	1.403	24	1.405	25	1.408	24	972
560	1.425	24	1.427	24	1.430	24	1.432	24	1008
580	1.449	24	1.451	24	1.454	24	1.456	24	1044
600	1.473	23	1.475	24	1.478	23	1.480	23	1080
620	1.496	22	1.499	22	1.501	22	1.503	23	1116
640	1.518	22	1.521	22	1.523	23	1.526	22	1152
660	1.540	22	1.543	22	1.546	21	1.548	22	1188
680	1.562	22	1.565	21	1.567	22	1.570	22	1224
700	1.584	21	1.586	22	1.589	21	1.592	20	1260
720	1.605	21	1.608	21	1.610	21	1.612	21	1296
740	1.626	21	1.629	20	1.631	20	1.633	21	1332
760	1.647	20	1.649	20	1.651	21	1.654	20	1368
780	1.667	20	1.669	20	1.672	20	1.674	20	1404
800	1.687	96	1.689	96	1.692	95	1.694	95	1440
900	1.783	90	1.785	90	1.787	90	1.789	91	1620
1000	1.873	86	1.875	86	1.877	86	1.880	85	1800
1100	1.959	82	1.961	82	1.963	83	1.965	82	1980
1200	2.041	79	2.043	79	2.046	78	2.047	79	2160
1300	2.120	76	2.122	76	2.124	75	2.126	75	2340
1400	2.196	73	2.198	73	2.199	75	2.201	75	2520
1500	2.269	72	2.271	72	2.274	71	2.276	70	2700
1600	2.341	69	2.343	69	2.345	69	2.346	69	2880
1700	2.410	68	2.412	68	2.414	68	2.415	68	3060
1800	2.478	65	2.480	66	2.482	65	2.483	66	3240
1900	2.543	65	2.546	64	2.547	64	2.549	64	3420
2000	2.608	63	2.610	62	2.611	63	2.613	62	3600
2100	2.671	60	2.672	61	2.674	60	2.675	61	3780
2200	2.731	61	2.733	60	2.734	61	2.736	60	3960
2300	2.792		2.793		2.795		2.796		4140

°K	1 atm		4 atm		7 atm		10 atm		°R
2300	2.792	59	2.793	59	2.795	58	2.796	59	4140
2400	2.851	57	2.852	58	2.853	58	2.855	57	4320
2500	2.908	57	2.910	56	2.911	56	2.912	57	4500
2600	2.965	55	2.966	55	2.967	56	2.969	55	4680
2700	3.020	54	3.021	54	3.023	54	3.024	54	4860
2800	3.074	53	3.075	54	3.077	53	3.078	53	5040
2900	3.127	53	3.129	53	3.130	52	3.131	52	5220
3000	3.180		3.182		3.182		3.183		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	.722	28							270
160	.750	27							288
170	.777	26							306
180	.803	24	.787	31					324
190	.827	24	.818	31	.843	29			342
200	.851	23	.849	27	.872	27	.94	2	360
210	.874	22	.876	25	.899	25	.96	2	378
220	.896	21	.901	24	.924	25	.98	2	396
230	.917	21	.925	23	.949	23	1.00	2	414
240	.938	20	.948	22	.972	23	1.02	1	432
250	.958	20	.970	22	.995	21	1.03	2	450
260	.978	19	.992	21	1.016	22	1.05	2	468
270	.997	19	1.013	20	1.038	20	1.07	2	486
280	1.016	19	1.033	20	1.058	20	1.092	18	504
290	1.035	17	1.053	19	1.078	19	1.110	19	522
300	1.052	35	1.072	36	1.097	38	1.129	37	540
320	1.087	34	1.108	35	1.135	35	1.166	34	576
340	1.121	33	1.143	34	1.170	34	1.200	34	612
360	1.154	31	1.177	32	1.204	32	1.234	32	648
380	1.185	31	1.209	31	1.236	31	1.266	32	684
400	1.216	30	1.240	30	1.267	31	1.298	29	720
420	1.246	28	1.270	29	1.298	29	1.327	29	756
440	1.274	28	1.299	29	1.327	28	1.356	28	792
460	1.302	28	1.328	27	1.355	27	1.384	27	828
480	1.330	26	1.355	27	1.382	27	1.411	26	864
500	1.356	26	1.382	26	1.409	26	1.437	25	900
520	1.382	26	1.408	25	1.435	25	1.462	25	936
540	1.408	24	1.433	25	1.460	24	1.487	25	972
560	1.432	24	1.458	24	1.484	24	1.512	23	1008
580	1.456	24	1.482	23	1.508	23	1.535	23	1044
600	1.480	23	1.505	24	1.531	23	1.558	23	1080
620	1.503	23	1.529	22	1.554	23	1.581	22	1116
640	1.526	22	1.551	22	1.577	22	1.603	22	1152
660	1.548	22	1.573	22	1.599	21	1.625	21	1188
680	1.570	22	1.595	21	1.620	21	1.646	21	1224
700	1.592	20	1.616	21	1.641	21	1.667	20	1260
720	1.612	21	1.637	21	1.662	21	1.687	20	1296
740	1.633	21	1.658	20	1.683	20	1.707	20	1332
760	1.654	20	1.678	20	1.703	19	1.727	19	1368
780	1.674	20	1.698	19	1.722	19	1.746	19	1404
800	1.694	95	1.717	95	1.741	94	1.765	93	1440
900	1.789	91	1.812	89	1.835	89	1.858	87	1620
1000	1.880	85	1.901	85	1.924	83	1.945	84	1800
1100	1.965	82	1.986	82	2.007	81	2.029	80	1980
1200	2.047	79	2.068	77	2.088	77	2.109	76	2160
1300	2.126	75	2.145	76	2.165	75	2.185	73	2340
1400	2.201	75	2.221	72	2.240	72	2.258	73	2520
1500	2.276	70	2.293	71	2.312	70	2.331	69	2700
1600	2.346	69	2.364	68	2.382	69	2.400	68	2880
1700	2.415	68	2.432	68	2.451	65	2.468	65	3060
1800	2.483	66	2.500	65	2.516	65	2.533	65	3240
1900	2.549	64	2.565	64	2.581	64	2.598	62	3420
2000	2.613	62	2.629	62	2.645	61	2.660	62	3600
2100	2.675	61	2.691	60	2.706	60	2.722	59	3780
2200	2.736	60	2.751	60	2.766	59	2.781	59	3960
2300	2.796	59	2.811	58	2.825	59	2.840	58	4140
2400	2.855	57	2.869	58	2.884	55	2.898	56	4320
2500	2.912	57	2.927	56	2.939	56	2.954	55	4500
2600	2.969	55	2.983	55	2.995	56	3.009	55	4680
2700	3.024	54	3.038	53	3.051	54	3.064	53	4860
2800	3.078		3.091		3.105		3.117		5040

Table 7-7. SOUND VELOCITY AT LOW FREQUENCY IN NITROGEN - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
2800	3.078	53	3.091	53	3.105	52	3.117	53	5040
2900	3.131	52	3.144	52	3.157	52	3.170	52	5220
3000	3.183		3.196		3.209		3.222		5400

Table 7-8. VISCOSITY OF NITROGEN

η/η_0

°K	1 atm		10 atm		20 atm		80 atm		°R
100	.413	194							180
150	.607	172							270
200	.779	155							360
250	.934	140							450
300	1.074	129	1.079	129	1.086	128	1.093	128	540
350	1.203	120	1.208	121	1.214	120	1.221	119	630
400	1.323	114	1.329	114	1.334	114	1.340	113	720
450	1.437	109	1.443	109	1.448	109	1.453	108	810
500	1.546	105	1.552	105	1.557	105	1.561	104	900
550	1.651	101	1.657	100	1.662	100	1.665	100	990
600	1.752	92	1.757	92	1.762	91	1.765	91	1080
650	1.844	88	1.849	87	1.853	87	1.856	87	1170
700	1.932	85	1.936	85	1.940	84	1.943	84	1260
750	2.017	82	2.021	81	2.024	81	2.027	81	1350
800	2.099	80	2.102	80	2.105	80	2.108	80	1440
850	2.179	78	2.182	78	2.185	78	2.188	78	1530
900	2.257	76	2.260	75	2.263	75	2.266	75	1620
950	2.333	73	2.335	73	2.338	73	2.341	73	1710
1000	2.406	71	2.408	72	2.411	72	2.414	71	1800
1050	2.477	69	2.480	69	2.483	69	2.485	69	1890
1100	2.546	68	2.549	67	2.552	67	2.554	67	1980
1150	2.614	65	2.616	66	2.619	65	2.621	65	2070
1200	2.679	63	2.682	63	2.684	63	2.686	63	2160
1250	2.742	63	2.745	62	2.747	62	2.749	62	2250
1300	2.805	61	2.807	61	2.809	60	2.811	60	2340
1350	2.866	59	2.868	59	2.869	60	2.871	60	2430
1400	2.925	58	2.927	58	2.929	58	2.931	58	2520
1450	2.983	57	2.985	57	2.987	57	2.989	57	2610
1500	3.040		3.042		3.044		3.046		2700

η/η_0

°K	40 atm		60 atm		80 atm		100 atm		°R
300	1.104	125	1.127	121	1.154	115	1.187	107	540
350	1.229	118	1.248	114	1.269	111	1.294	105	630
400	1.347	112	1.362	110	1.380	107	1.399	104	720
450	1.459	107	1.472	106	1.487	104	1.503	102	810
500	1.566	104	1.578	102	1.591	101	1.605	99	900
550	1.670	99	1.680	98	1.692	97	1.704	96	990
600	1.769	91	1.778	90	1.789	90	1.800	89	1080
650	1.860	87	1.868	87	1.879	86	1.889	85	1170
700	1.947	84	1.955	84	1.965	83	1.974	82	1260
750	2.031	81	2.039	80	2.048	79	2.056	79	1350
800	2.112	79	2.119	78	2.127	78	2.135	78	1440
850	2.191	78	2.197	77	2.205	76	2.213	76	1530
900	2.269	75	2.274	75	2.281	74	2.289	74	1620
950	2.344	73	2.349	73	2.355	74	2.363	73	1710
1000	2.417	71	2.422	72	2.429	71	2.436	71	1800
1050	2.488	69	2.494	69	2.500	69	2.507	68	1890
1100	2.557	66	2.563	66	2.569	66	2.575	65	1980
1150	2.623	65	2.629	64	2.635	64	2.640	64	2070
1200	2.688	63	2.693	63	2.699	63	2.704	62	2160
1250	2.751	62	2.756	62	2.762	60	2.766	63	2250
1300	2.813	60	2.818	60	2.822	60	2.829	60	2340
1350	2.873	60	2.878	60	2.882	59	2.889	58	2430
1400	2.933	58	2.938	58	2.941	58	2.947	57	2520
1450	2.991	57	2.996	56	2.999	57	3.004	57	2610
1500	3.048		3.052		3.056		3.061		2700

Table 7-9. THERMAL CONDUCTIVITY OF NITROGEN AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
100	.390	37	180
110	.427	38	198
120	.465	37	216
130	.502	36	234
140	.538	38	252
150	.576	36	270
160	.612	36	288
170	.648	36	306
180	.684	35	324
190	.719	34	342
200	.753	36	360
210	.789	34	378
220	.823	34	396
230	.857	35	414
240	.892	32	432
250	.924	33	450
260	.957	33	468
270	.990	31	486
280	1.021	30	504
290	1.051	30	522
300	1.081	30	540
310	1.111	30	558
320	1.141	31	576
330	1.172	30	594
340	1.202	30	612
350	1.232	30	630
360	1.262	30	648
370	1.292	29	666
380	1.321	28	684
390	1.349	28	702
400	1.377	28	720
410	1.405	28	738
420	1.433	27	756
430	1.460	27	774
440	1.487	26	792
450	1.513	27	810
460	1.540	26	828
470	1.566	26	846
480	1.592	27	864
490	1.619	26	882
500	1.645		900

°K	k/k_0		°R
500	1.645	26	900
510	1.671	26	918
520	1.697	25	936
530	1.722	25	954
540	1.747	24	972
550	1.771	24	990
560	1.795	24	1008
570	1.819	24	1026
580	1.843	24	1044
590	1.867	23	1062
600	1.890	23	1080
610	1.913	23	1098
620	1.936	23	1116
630	1.959	23	1134
640	1.982	23	1152
650	2.005	22	1170
660	2.027	21	1188
670	2.048	22	1206
680	2.070	22	1224
690	2.092	22	1242
700	2.114	22	1260
710	2.136	21	1278
720	2.157	21	1296
730	2.178	21	1314
740	2.199	21	1332
750	2.220	20	1350
760	2.240	19	1368
770	2.259	20	1386
780	2.279	20	1404
790	2.299	19	1422
800	2.318	186	1440
900	2.504	169	1620
1000	2.673	155	1800
1100	2.828	140	1980
1200	2.968		2160

Table 7-10. PRANDTL NUMBER OF NITROGEN AT ATMOSPHERIC PRESSURE $\eta C_p/k$

° K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		° R
100	.786	− 8	.851	− 5	.922	− 2	.887	− 5	180
120	.778	− 8	.846	− 6	.920	− 3	.882	− 4	216
140	.770	− 8	.840	− 6	.917	− 4	.878	− 5	252
160	.762	− 8	.834	− 6	.913	− 3	.873	− 5	288
180	.754	− 7	.828	− 5	.910	− 3	.868	− 3	324
200	.747	− 7	.823	− 5	.907	− 2	.865	− 5	360
220	.740	− 7	.818	− 5	.905	− 3	.860	− 4	396
240	.733	− 8	.813	− 6	.902	− 4	.856	− 5	432
260	.725	− 6	.807	− 4	.898	− 2	.851	− 3	468
280	.719	− 6	.803	− 5	.896	− 3	.848	− 4	504
300	.713	− 6	.798	− 4	.893	− 2	.844	− 3	540
320	.707	− 4	.794	− 3	.891	− 2	.841	− 3	576
340	.703	− 4	.791	− 4	.889	− 2	.838	− 2	612
360	.699	− 4	.787	− 3	.887	− 1	.836	− 2	648
380	.695	− 4	.784	− 2	.886	− 2	.834	− 3	684
400	.691	− 2	.782	− 2	.884	− 1	.831	− 1	720
420	.689	− 1	.780		.883		.830		756
440	.688	− 1	.780	− 1	.883		.830	− 1	792
460	.687	− 2	.779	− 2	.883	− 1	.829	− 1	828
480	.685	− 1	.777	− 1	.882	− 1	.828	− 1	864
500	.684	− 1	.776	− 1	.881		.827	− 1	900
520	.683		.775		.881		.826		936
540	.683	1	.775	1	.881		.826	1	972
560	.684	1	.776	1	.881	1	.827	1	1008
580	.685	1	.777	1	.882		.828		1044
600	.686	2	.778	1	.882	1	.828	1	1080
650	.688	3	.779	3	.883	1	.829	2	1170
700	.691	4	.782	3	.884	2	.831	3	1260
750	.695	5	.785	3	.886	2	.834	3	1350
800	.700	11	.788	9	.888	4	.837	6	1440
900	.711	13	.797	9	.892	6	.843	8	1620
1000	.724	12	.806	9	.898	5	.851	7	1800
1100	.736	12	.815	9	.903	5	.858	7	1980
1200	.748		.824		.908		.865		2160

Table 7-11. VAPOR PRESSURE OF NITROGEN

Remarks	T	P	P	P	T
	°K	mm Hg	atm	psia	°R
Triple point	63.156	94.0	.1237	1.818	113.681
Normal boiling point	77.395	760.0	1.000	14.696	139.311
Critical point	126.1_{35}	254_{52}	33.49	492.2	227.0_{43}
Solid	52	5.7	.0075	.110	93.6
	54	10.2	.0134	.197	97.2
	56	17.6	.0232	.341	100.8
	58	29.4	.0386	.568	104.4
	60	47.2	.0621	.913	108.0
	62	73.6	.0969	1.424	111.6
Liquid	64	109.4	.1439	2.115	115.2
	66	154.1	.2028	2.980	118.8
	68	212.6	.2797	4.110	122.4
	70	287.6	.3785	5.56	126.0
	72	382.5	.503	7.40	129.6
	74	500.0	.658	9.67	133.2
	76	643.0	.847	12.44	136.8
	78	815.0	1.073	15.76	140.4
	80	1019.0	1.341	19.71	144.0
	82	1259.0	1.657	24.35	147.6
	84	1539.0	2.026	29.77	151.2
	86	1869.0	2.460	36.15	154.8
	88	2255.0	2.967	43.60	158.4
	90	2697.0	3.548	52.1	162.0
	92	3194.0	4.203	61.8	165.6
	94	3752.0	4.937	72.5	169.2
	96	4377.0	5.76	84.6	172.8
	98	5076.0	6.68	98.1	176.4
	100	5851.0	7.70	113.1	180.0
	102	6708.0	8.83	129.7	183.6
	104	7650.0	10.07	147.9	187.2
	106	8682.0	11.42	167.9	190.8
	108	9808.0	12.91	189.7	194.4
	110	11033.0	14.52	213.3	198.0
	112	12360.0	16.26	239.0	201.6
	114	13797.0	18.15	266.8	205.2
	116	15351.0	20.20	296.8	208.8
	118	17033.0	22.41	329.4	212.4
	120	18854.0	24.81	364.6	216.0
	122	20823.0	27.40	402.7	219.6
	124	22960.0	30.21	444.0	223.2
	126	25287.0	33.27	489.0	226.8

Table 7-11/a. VAPOR PRESSURE OF LIQUID NITROGEN

40/T	T	$Log_{10}P$(atm)*		P	T	72/T
$^oK^{-1}$	^oK			atm	^oR	$^oR^{-1}$
.64	62.50	(9.0398-10)'	790	(.1096)	112.50	.64
.63	63.49	9.1188-10	788	.1315	114.29	.63
.62	64.52	9.1976-10	786	.1576	116.13	.62
.61	65.57	9.2762-10	784	.1889	118.03	.61
.60	66.67	9.3546-10	783	.2263	120.00	.60
.59	67.80	9.4329-10	782	.2710	122.03	.59
.58	68.97	9.5111-10	781	.3244	124.14	.58
.57	70.18	9.5892-10	780	.3883	126.32	.57
.56	71.43	9.6672-10	778	.465	128.57	.56
.55	72.73	9.7450-10	775	.556	130.91	.55
.54	74.07	9.8225-10	770	.665	133.33	.54
.53	75.47	9.8995-10	764	.793	135.85	.53
.52	76.92	9.9759-10	760	.946	138.46	.52
.51	78.43	.0519	756	1.127	141.18	.51
.50	80.00	.1275	753	1.341	144.00	.50
.49	81.63	.2028	750	1.595	146.94	.49
.48	83.33	.2778	757	1.896	150.00	.48
.47	85.11	.3535	767	2.257	153.19	.47
.46	86.96	.4302	772	2.693	156.52	.46
.45	88.89	.5074	766	3.217	160.00	.45
.44	90.91	.5840	757	3.837	163.64	.44
.43	93.02	.6597	755	4.568	167.44	.43
.42	95.24	.7352	756	5.44	171.43	.42
.41	97.56	.8108	756	6.47	175.61	.41
.40	100.00	.8864	757	7.70	180.00	.40
.39	102.56	.9621	757	9.16	184.62	.39
.38	105.26	1.0378	758	10.91	189.47	.38
.37	108.11	1.1136	759	12.99	194.59	.37
.36	111.11	1.1895		15.47	200.00	.36
100/T						180/T
.90	111.11	1.1895	304	15.47	200.00	.90
.89	112.36	1.2199	305	16.59	202.25	.89
.88	113.64	1.2504	306	17.80	204.55	.88
.87	114.94	1.2810	307	19.10	206.90	.87
.86	116.28	1.3117	309	20.50	209.30	.86
.85	117.65	1.3426	311	22.01	211.76	.85
.84	119.05	1.3737	314	23.64	214.29	.84
.83	120.48	1.4051	316	25.42	216.87	.83
.82	121.95	1.4367	320	27.33	219.51	.82
.81	123.46	1.4687	325	29.42	222.22	.81
.80	125.00	1.5012	331	31.71	225.00	.80
.79	126.58	(1.5343)	344	(34.22)	227.85	.79
.78	128.21	(1.5687)		(37.04)	230.77	.78

* Tabulated values in this column are for interpolation with respect to reciprocal temperature.

' Figures in parentheses are extrapolated to permit interpolation to the critical point and triple point.

Table 7-11/b. CONSTANTS FOR $LOG_{10}P$ (SOLID) = A - B/T

Units of P	A	Units of T	B
mm Hg	7.65894	^oK	359.093
atm	4.77813	^oR	646.367
psia	5.94532		

Table 7-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR NITROGEN

°K	C_p° / R		$(H^\circ - E_0^\circ)^* / RT_0$		S° / R		$-(F^\circ - E_0^\circ) / RT$		°R
10	3.5019	− 13	.1246	1281	11.1440	24267	7.740	2379	18
20	3.5006	− 2	.2527	1282	13.5707	14196	10.119	1403	36
30	3.5004	− 1	.3809	1281	14.9903	10067	11.522	999	54
40	3.5003		.5090	1282	15.9970	7811	12.521	776	72
50	3.5003		.6372	1281	16.7781	6382	13.297	635	90
60	3.5003		.7653	1281	17.4163	5396	13.932	538	108
70	3.5003	1	.8934	1282	17.9559	4674	14.470	465	126
80	3.5004		1.0216	1281	18.4233	4122	14.935	411	144
90	3.5004		1.1497	1282	18.8355	3688	15.346	368	162
100	3.5004	1	1.2779	1281	19.2043	3337	15.714	333	180
110	3.5005		1.4060	1282	19.5380	3046	16.047	303	198
120	3.5005		1.5342	1281	19.8426	2801	16.350	280	216
130	3.5005	1	1.6623	1282	20.1227	2595	16.630	259	234
140	3.5006		1.7905	1281	20.3822	2415	16.889	241	252
150	3.5006	1	1.9186	1282	20.6237	2259	17.130	225	270
160	3.5007		2.0468	1281	20.8496	2123	17.355	212	288
170	3.5007		2.1749	1282	21.0619	2000	17.567	200	306
180	3.5007	1	2.3031	1281	21.2619	1893	17.767	189	324
190	3.5008		2.4312	1282	21.4512	1796	17.956	179	342
200	3.5008	1	2.5594	1282	21.6308	1708	18.135	171	360
210	3.5009	1	2.6876	1281	21.8016	1629	18.306	162	378
220	3.5010		2.8157	1282	21.9645	1556	18.468	156	396
230	3.5010	2	2.9439	1282	22.1201	1490	18.624	149	414
240	3.5012	1	3.0721	1281	22.2691	1429	18.773	142	432
250	3.5013	2	3.2002	1282	22.4120	1373	18.915	137	450
260	3.5015	2	3.3284	1282	22.5493	1322	19.052	132	468
270	3.5017	4	3.4566	1282	22.6815	1273	19.184	128	486
280	3.5021	4	3.5848	1282	22.8088	1229	19.312	122	504
290	3.5025	5	3.7130	1282	22.9317	1188	19.434	119	522
300	3.5030	6	3.8412	1283	23.0505	1149	19.553	115	540
310	3.5036	8	3.9695	1283	23.1654	1112	19.668	111	558
320	3.5044	10	4.0978	1283	23.2766	1079	19.779	107	576
330	3.5054	11	4.2261	1283	23.3845	1046	19.886	105	594
340	3.5065	13	4.3544	1284	23.4891	1017	19.991	101	612
350	3.5078	16	4.4828	1285	23.5908	988	20.092	99	630
360	3.5094	17	4.6113	1285	23.6896	962	20.191	96	648
370	3.5111	20	4.7398	1285	23.7858	937	20.287	93	666
380	3.5131	23	4.8683	1287	23.8795	912	20.380	91	684
390	3.5154	25	4.9970	1287	23.9707	891	20.471	89	702
400	3.5179	27	5.1257	1289	24.0598	869	20.560	86	720
410	3.5206	31	5.2546	1289	24.1467	849	20.646	84	738
420	3.5237	33	5.3835	1291	24.2316	829	20.730	83	756
430	3.5270	36	5.5126	1291	24.3145	811	20.813	80	774
440	3.5306	38	5.6417	1294	24.3956	794	20.893	79	792
450	3.5344	42	5.7711	1294	24.4750	777	20.972	77	810
460	3.5386	44	5.9005	1296	24.5527	762	21.049	75	828
470	3.5430	46	6.0301	1298	24.6289	746	21.124	74	846
480	3.5476	50	6.1599	1300	24.7035	732	21.198	72	864
490	3.5526	52	6.2899	1301	24.7767	719	21.270	71	882
500	3.5578	54	6.4200	1304	24.8486	705	21.341	70	900
510	3.5632	56	6.5504	1305	24.9191	692	21.411	68	918
520	3.5688	59	6.6809	1308	24.9883	680	21.479	67	936
530	3.5747	61	6.8117	1310	25.0563	669	21.546	65	954
540	3.5808	63	6.9427	1312	25.1232	658	21.611	65	972
550	3.5871	65	7.0739	1314	25.1890	647	21.676	63	990
560	3.5936	67	7.2053	1317	25.2537	636	21.739	62	1008
570	3.6003	69	7.3370	1319	25.3173	627	21.801	61	1026
580	3.6072	70	7.4689	1322	25.3800	617	21.862	61	1044
590	3.6142	72	7.6011	1324	25.4417	608	21.923	59	1062
600	3.6214		7.7335		25.5025		21.982		1080

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR NITROGEN - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	3.6214	73	7.7335	1327	25.5025	600	21.982	58	1080
610	3.6287	75	7.8662	1330	25.5625	590	22.040	57	1098
620	3.6362	75	7.9992	1333	25.6215	583	22.097	57	1116
630	3.6437	77	8.1325	1335	25.6798	574	22.154	55	1134
640	3.6514	77	8.2660	1338	25.7372	567	22.209	55	1152
650	3.6591	79	8.3998	1341	25.7939	559	22.264	54	1170
660	3.6670	79	8.5339	1344	25.8498	552	22.318	53	1188
670	3.6749	80	8.6683	1347	25.9050	545	22.371	52	1206
680	3.6829	80	8.8030	1349	25.9595	538	22.423	52	1224
690	3.6909	81	8.9379	1353	26.0133	532	22.475	51	1242
700	3.6990	81	9.0732	1356	26.0665	525	22.526	50	1260
710	3.7071	81	9.2088	1358	26.1190	519	22.576	50	1278
720	3.7152	82	9.3446	1362	26.1709	513	22.626	49	1296
730	3.7234	82	9.4808	1364	26.2222	507	22.675	48	1314
740	3.7316	82	9.6172	1368	26.2729	502	22.723	48	1332
750	3.7398	82	9.7540	1370	26.3231	496	22.771	47	1350
760	3.7480	82	9.8910	1374	26.3727	490	22.818	46	1368
770	3.7562	81	10.0284	1376	26.4217	485	22.864	46	1386
780	3.7643	82	10.1660	1380	26.4702	481	22.910	46	1404
790	3.7725	81	10.3040	1383	26.5183	475	22.956	44	1422
800	3.7806	401	10.4423	6957	26.5658	2304	23.000	217	1440
850	3.8207	389	11.1380	7029	26.7962	2194	23.217	205	1530
900	3.8596	374	11.8409	7099	27.0156	2097	23.422	195	1620
950	3.8970	356	12.5508	7166	27.2253	2008	23.617	185	1710
1000	3.9326	338	13.2674	7230	27.4261	1927	23.802	177	1800
1050	3.9664	318	13.9904	7289	27.6188	1852	23.979	170	1890
1100	3.9982	299	14.7193	7346	27.8040	1784	24.149	163	1980
1150	4.0281	281	15.4539	7400	27.9824	1720	24.312	156	2070
1200	4.0562	263	16.1939	7449	28.1544	1662	24.468	151	2160
1250	4.0825	247	16.9388	7495	28.3206	1606	24.619	146	2250
1300	4.1072	231	17.6883	7539	28.4812	1554	24.765	140	2340
1350	4.1303	215	18.4422	7580	28.6366	1506	24.905	136	2430
1400	4.1518	202	19.2002	7619	28.7872	1461	25.041	132	2520
1450	4.1720	189	19.9621	7654	28.9333	1418	25.173	128	2610
1500	4.1909	177	20.7275	7688	29.0751	1377	25.301	124	2700
1550	4.2086	166	21.4963	7719	29.2128	1339	25.425	120	2790
1600	4.2252	156	22.2682	7748	29.3467	1302	25.545	117	2880
1650	4.2408	146	23.0430	7776	29.4769	1268	25.662	114	2970
1700	4.2554	138	23.8206	7802	29.6037	1236	25.776	111	3060
1750	4.2692	129	24.6008	7826	29.7273	1204	25.887	109	3150
1800	4.2821	122	25.3834	7850	29.8477	1175	25.996	105	3240
1850	4.2943	114	26.1684	7870	29.9652	1147	26.101	104	3330
1900	4.3057	109	26.9554	7892	30.0799	1120	26.205	100	3420
1950	4.3166	102	27.7446	7910	30.1919	1094	26.305	99	3510
2000	4.3268	97	28.5356	7929	30.3013	1070	26.404	96	3600
2050	4.3365	92	29.3285	7947	30.4083	1046	26.500	95	3690
2100	4.3457	87	30.1232	7962	30.5129	1023	26.595	92	3780
2150	4.3544	83	30.9194	7978	30.6152	1002	26.687	90	3870
2200	4.3627	78	31.7172	7993	30.7154	981	26.777	89	3960
2250	4.3705	75	32.5165	8007	30.8135	962	26.866	87	4050
2300	4.3780	72	33.3172	8020	30.9097	942	26.953	85	4140
2350	4.3852	68	34.1192	8033	31.0039	924	27.038	84	4230
2400	4.3920	65	34.9225	8045	31.0963	906	27.122	82	4320
2450	4.3985	62	35.7270	8057	31.1869	890	27.204	80	4410
2500	4.4047	59	36.5327	8068	31.2759	872	27.284	79	4500
2550	4.4106	57	37.3395	8078	31.3631	857	27.363	78	4590
2600	4.4163	55	38.1473	8089	31.4488	842	27.441	76	4680
2650	4.4218	52	38.9562	8099	31.5330	827	27.517	76	4770
2700	4.4270	50	39.7661	8108	31.6157	813	27.593	74	4860
2750	4.4320	49	40.5769	8117	31.6970	799	27.667	72	4950
2800	4.4369		41.3886		31.7769		27.739		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR NITROGEN - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2800	4.4369	46	41.3886	8125	31.7769	785	27.739	72	5040
2850	4.4415	45	42.2011	8134	31.8554	773	27.811	70	5130
2900	4.4460	43	43.0145	8142	31.9327	761	27.881	69	5220
2950	4.4503	42	43.8287	8150	32.0088	748	27.950	69	5310
3000	4.4545	40	44.6437	8158	32.0836	737	28.019	67	5400
3050	4.4585	39	45.4595	8164	32.1573	725	28.086	66	5490
3100	4.4624	39	46.2759	8172	32.2298	715	28.152	66	5580
3150	4.4663	36	47.0931	8178	32.3013	703	28.218	64	5670
3200	4.4699	36	47.9109	8186	32.3716	693	28.282	63	5760
3250	4.4735	35	48.7295	8191	32.4409	684	28.345	63	5850
3300	4.4770	34	49.5486	8198	32.5093	673	28.408	62	5940
3350	4.4804	32	50.3684	8204	32.5766	664	28.470	60	6030
3400	4.4836	32	51.1888	8210	32.6430	655	28.530	61	6120
3450	4.4868	32	52.0098	8216	32.7085	646	28.591	59	6210
3500	4.4900	30	52.8314	8221	32.7731	637	28.650	58	6300
3550	4.4930	30	53.6535	8227	32.8368	628	28.708	58	6390
3600	4.4960	28	54.4762	8232	32.8996	621	28.766	57	6480
3650	4.4988	28	55.2994	8238	32.9617	612	28.823	57	6570
3700	4.5016	28	56.1232	8242	33.0229	605	28.880	55	6660
3750	4.5044	27	56.9474	8248	33.0834	597	28.935	55	6750
3800	4.5071	26	57.7722	8252	33.1431	589	28.990	55	6840
3850	4.5097	26	58.5974	8257	33.2020	582	29.045	53	6930
3900	4.5123	25	59.4231	8262	33.2602	575	29.098	53	7020
3950	4.5148	25	60.2493	8266	33.3177	568	29.151	53	7110
4000	4.5173	24	61.0759	8271	33.3745	561	29.204	52	7200
4050	4.5197	24	61.9030	8276	33.4306	555	29.256	51	7290
4100	4.5221	24	62.7306	8279	33.4861	548	29.307	50	7380
4150	4.5245	23	63.5585	8283	33.5409	542	29.357	51	7470
4200	4.5268	22	64.3868	8288	33.5951	536	29.408	49	7560
4250	4.5290	22	65.2156	8292	33.6487	530	29.457	49	7650
4300	4.5312	22	66.0448	8297	33.7017	524	29.506	49	7740
4350	4.5334	22	66.8745	8300	33.7541	518	29.555	48	7830
4400	4.5356	21	67.7045	8304	33.8059	513	29.603	47	7920
4450	4.5377	21	68.5349	8308	33.8572	507	29.650	47	8010
4500	4.5398	21	69.3657	8311	33.9079	502	29.697	47	8100
4550	4.5419	21	70.1968	8316	33.9581	496	29.744	46	8190
4600	4.5440	20	71.0284	8319	34.0077	492	29.790	46	8280
4650	4.5460	20	71.8603	8324	34.0569	486	29.836	45	8370
4700	4.5480	20	72.6927	8326	34.1055	481	29.881	44	8460
4750	4.5500	20	73.5253	8330	34.1536	477	29.925	45	8550
4800	4.5520	20	74.3583	8334	34.2013	471	29.970	44	8640
4850	4.5540	19	75.1917	8338	34.2484	468	30.014	43	8730
4900	4.5559	20	76.0255	8342	34.2952	463	30.057	43	8820
4950	4.5579	19	76.8597	8344	34.3415	458	30.100	43	8910
5000	4.5598		77.6941		34.3873		30.143		9000

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-12/a. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR ATOMIC NITROGEN

°K	$\frac{C_p^\circ}{R}$	$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
10	2.5000	.0915	915	9.9377	17328	7.4377	17328	18
20		.1830	916	11.6705	10137	9.1705	10137	36
30		.2746	915	12.6842	7192	10.1842	7192	54
40		.3661	915	13.4034	5579	10.9034	5579	72
50		.4576	915	13.9613	4558	11.4613	4558	90
60		.5491	916	14.4171	3853	11.9171	3853	108
70		.6407	915	14.8024	3339	12.3024	3339	126
80		.7322	915	15.1363	2944	12.6363	2944	144
90		.8237	915	15.4307	2634	12.9307	2634	162
100		.9152	915	15.6941	2383	13.1941	2383	180
110		1.0067	916	15.9324	2175	13.4324	2175	198
120		1.0983	915	16.1499	2001	13.6499	2001	216
130		1.1898	915	16.3500	1853	13.8500	1853	234
140		1.2813	915	16.5353	1725	14.0353	1725	252
150		1.3728	915	16.7078	1613	14.2078	1613	270
160		1.4643	916	16.8691	1516	14.3691	1516	288
170		1.5559	915	17.0207	1429	14.5207	1429	306
180		1.6474	915	17.1636	1352	14.6636	1352	324
190		1.7389	915	17.2988	1282	14.7988	1282	342
200		1.8304	916	17.4270	1220	14.9270	1220	360
210		1.9220	915	17.5490	1163	15.0490	1163	378
220		2.0135	915	17.6653	1111	15.1653	1111	396
230		2.1050	915	17.7764	1064	15.2764	1064	414
240		2.1965	915	17.8828	1020	15.3828	1020	432
250		2.2880	916	17.9848	981	15.4848	981	450
260		2.3796	915	18.0829	944	15.5829	944	468
270		2.4711	915	18.1773	909	15.6773	909	486
280		2.5626	915	18.2682	877	15.7682	877	504
290		2.6541	915	18.3559	848	15.8559	848	522
300		2.7456	916	18.4407	819	15.9407	819	540
310		2.8372	915	18.5226	794	16.0226	794	558
320		2.9287	915	18.6020	769	16.1020	769	576
330		3.0202	915	18.6789	747	16.1789	747	594
340		3.1117	916	18.7536	724	16.2536	724	612
350		3.2033	915	18.8260	705	16.3260	705	630
360		3.2948	915	18.8965	685	16.3965	685	648
370		3.3863	915	18.9650	666	16.4650	666	666
380		3.4778	915	19.0316	650	16.5316	650	684
390		3.5693	916	19.0966	633	16.5966	633	702
400		3.6609	915	19.1599	617	16.6599	617	720
410		3.7524	915	19.2216	602	16.7216	602	738
420		3.8439	915	19.2818	589	16.7818	589	756
430		3.9354	915	19.3407	574	16.8407	574	774
440		4.0269	916	19.3981	562	16.8981	562	792
450		4.1185	915	19.4543	550	16.9543	550	810
460		4.2100	915	19.5093	537	17.0093	537	828
470		4.3015	915	19.5630	527	17.0630	527	846
480		4.3930	916	19.6157	515	17.1157	515	864
490		4.4846	915	19.6672	505	17.1672	505	882
500		4.5761	915	19.7177	495	17.2177	495	900
510		4.6676	915	19.7672	486	17.2672	486	918
520		4.7591	915	19.8158	476	17.3158	476	936
530		4.8506	916	19.8634	467	17.3634	467	954
540		4.9422	915	19.9101	459	17.4101	459	972
550		5.0337	915	19.9560	450	17.4560	450	990
560		5.1252	915	20.0010	443	17.5010	443	1008
570		5.2167	915	20.0453	435	17.5453	435	1026
580		5.3082	916	20.0888	427	17.5888	427	1044
590		5.3998	915	20.1315	420	17.6315	420	1062
600	2.5000	5.4913		20.1735		17.6735		1080

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	2.5000		5.4913	915	20.1735	413	17.6735	413	1080
610			5.5828	915	20.2148	407	17.7148	407	1098
620			5.6743	916	20.2555	400	17.7555	400	1116
630			5.7659	915	20.2955	394	17.7955	394	1134
640			5.8574	915	20.3349	387	17.8349	387	1152
650			5.9489	915	20.3736	382	17.8736	382	1170
660			6.0404	915	20.4118	376	17.9118	376	1188
670			6.1319	916	20.4494	370	17.9494	370	1206
680			6.2235	915	20.4864	365	17.9864	365	1224
690			6.3150	915	20.5229	360	18.0229	360	1242
700			6.4065	915	20.5589	355	18.0589	355	1260
710			6.4980	915	20.5944	349	18.0944	349	1278
720			6.5895	916	20.6293	345	18.1293	345	1296
730			6.6811	915	20.6638	340	18.1638	340	1314
740			6.7726	915	20.6978	336	18.1978	336	1332
750			6.8641	915	20.7314	331	18.2314	331	1350
760			6.9556	916	20.7645	327	18.2645	327	1368
770			7.0472	915	20.7972	322	18.2972	322	1386
780			7.1387	915	20.8294	319	18.3294	319	1404
790			7.2302	915	20.8613	314	18.3613	314	1422
800			7.3217	4576	20.8927	1516	18.3927	1516	1440
850			7.7793	4576	21.0443	1429	18.5443	1429	1530
900			8.2369	4576	21.1872	1352	18.6872	1352	1620
950			8.6945	4576	21.3224	1282	18.8224	1282	1710
1000			9.1521	4577	21.4506	1220	18.9506	1220	1800
1050			9.6098	4576	21.5726	1163	19.0726	1163	1890
1100			10.0674	4576	21.6889	1111	19.1889	1111	1980
1150			10.5250	4576	21.8000	1064	19.3000	1064	2070
1200			10.9826	4576	21.9064	1020	19.4064	1020	2160
1250			11.4402	4576	22.0084	981	19.5084	981	2250
1300			11.8978	4576	22.1065	943	19.6065	943	2340
1350			12.3554	4576	22.2008	910	19.7008	910	2430
1400			12.8130	4576	22.2918	877	19.7918	877	2520
1450			13.2706	4575	22.3795	847	19.8795	847	2610
1500			13.7281	4577	22.4642	820	19.9642	820	2700
1550	2.5000		14.1858	4577	22.5462	795	20.0462	795	2790
1600	2.5000		14.6435	4576	22.6257	769	20.1257	769	2880
1650	2.5000	1	15.1011	4576	22.7026	746	20.2026	746	2970
1700	2.5001		15.5587	4576	22.7772	725	20.2772	725	3060
1750	2.5001	1	16.0163	4576	22.8497	705	20.3497	704	3150
1800	2.5002		16.4739	4576	22.9202	685	20.4201	685	3240
1850	2.5002	1	16.9315	4577	22.9887	666	20.4886	667	3330
1900	2.5003	1	17.3892	4577	23.0553	650	20.5553	649	3420
1950	2.5004	1	17.8469	4578	23.1203	633	20.6202	633	3510
2000	2.5005	2	18.3047	4577	23.1836	618	20.6835	617	3600
2050	2.5007	2	18.7624	4576	23.2454	602	20.7452	603	3690
2100	2.5009	2	19.2200	4577	23.3056	588	20.8055	588	3780
2150	2.5011	3	19.6777	4579	23.3644	575	20.8643	575	3870
2200	2.5014	4	20.1356	4580	23.4219	563	20.9218	562	3960
2250	2.5018	4	20.5936	4581	23.4782	550	20.9780	550	4050
2300	2.5022	5	21.0517	4580	23.5332	538	21.0330	537	4140
2350	2.5027	6	21.5097	4581	23.5870	527	21.0867	526	4230
2400	2.5033	7	21.9678	4583	23.6397	516	21.1393	516	4320
2450	2.5040	9	22.4261	4586	23.6913	506	21.1909	507	4410
2500	2.5049	9	22.8847	4586	23.7419	496	21.2416	495	4500
2550	2.5058	11	23.3433	4588	23.7915	487	21.2911	486	4590
2600	2.5069	13	23.8021	4590	23.8402	477	21.3397	476	4680
2650	2.5082	13	24.2611	4592	23.8879	469	21.3873	467	4770
2700	2.5095	16	24.7203	4595	23.9348	461	21.4340	459	4860
2750	2.5111	17	25.1798	4597	23.9809	453	21.4799	450	4950
2800	2.5128		25.6395		24.0262		21.5249		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-12/a. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR ATOMIC NITROGEN - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2800	2.5128	19	25.6395	4601	24.0262	445	21.5249	443	5040
2850	2.5147	21	26.0996	4604	24.0707	437	21.5692	435	5130
2900	2.5168	23	26.5600	4608	24.1144	430	21.6127	428	5220
2950	2.5191	25	27.0208	4612	24.1574	424	21.6555	420	5310
3000	2.5216	27	27.4820	4618	24.1998	417	21.6975	413	5400
3050	2.5243	29	27.9438	4623	24.2415	411	21.7388	407	5490
3100	2.5272	32	28.4061	4629	24.2826	404	21.7795	400	5580
3150	2.5304	35	28.8690	4635	24.3230	399	21.8195	395	5670
3200	2.5339	37	29.3325	4642	24.3629	393	21.8590	388	5760
3250	2.5376	39	29.7967	4649	24.4022	388	21.8978	383	5850
3300	2.5415	41	30.2616	4656	24.4410	382	21.9361	378	5940
3350	2.5456	45	30.7272	4663	24.4792	378	21.9739	372	6030
3400	2.5501	47	31.1935	4672	24.5170	372	22.0111	367	6120
3450	2.5548	49	31.6607	4681	24.5542	368	22.0478	362	6210
3500	2.5597	52	32.1288	4689	24.5910	363	22.0840	356	6300
3550	2.5649	55	32.5977	4700	24.6273	359	22.1196	350	6390
3600	2.5704	57	33.0677	4709	24.6632	355	22.1546	346	6480
3650	2.5761	60	33.5386	4720	24.6987	351	22.1892	340	6570
3700	2.5821	63	34.0106	4731	24.7338	347	22.2232	336	6660
3750	2.5884	66	34.4837	4744	24.7685	343	22.2568	332	6750
3800	2.5950	68	34.9581	4757	24.8028	340	22.2900	328	6840
3850	2.6018	71	35.4338	4770	24.8368	336	22.3228	324	6930
3900	2.6089	74	35.9108	4784	24.8704	333	22.3552	320	7020
3950	2.6163	77	36.3892	4797	24.9037	330	22.3872	317	7110
4000	2.6240	79	36.8689	4811	24.9367	326	22.4189	313	7200
4050	2.6319	81	37.3500	4824	24.9693	324	22.4502	309	7290
4100	2.6400	84	37.8324	4840	25.0017	320	22.4811	305	7380
4150	2.6484	86	38.3164	4855	25.0337	318	22.5116	302	7470
4200	2.6570	89	38.8019	4871	25.0655	315	22.5418	299	7560
4250	2.6659	91	39.2890	4888	25.0970	312	22.5717	296	7650
4300	2.6750	94	39.7778	4904	25.1282	310	22.6013	292	7740
4350	2.6844	96	40.2682	4922	25.1592	307	22.6305	289	7830
4400	2.6940	97	40.7604	4940	25.1899	305	22.6594	287	7920
4450	2.7037	100	41.2544	4958	25.2204	303	22.6881	283	8010
4500	2.7137	102	41.7502	4977	25.2507	300	22.7164	280	8100
4550	2.7239	104	42.2479	4996	25.2807	299	22.7444	278	8190
4600	2.7343	106	42.7475	5015	25.3106	296	22.7722	274	8280
4650	2.7449	107	43.2490	5034	25.3402	294	22.7996	272	8370
4700	2.7556	110	43.7524	5055	25.3696	292	22.8268	269	8460
4750	2.7666	111	44.2579	5075	25.3988	290	22.8537	267	8550
4800	2.7777	112	44.7654	5094	25.4278	289	22.8804	264	8640
4850	2.7889	114	45.2748	5116	25.4567	287	22.9068	261	8730
4900	2.8003	116	45.7864	5136	25.4854	285	22.9329	260	8820
4950	2.8119	116	46.3000	5156	25.5139	283	22.9589	257	8910
5000	2.8235		46.8156		25.5422		22.9846		9000

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 7-13. COEFFICIENTS FOR THE EQUATION OF STATE FOR NITROGEN

$$Z = 1 + B_1P + C_1P^2 + D_1P^3$$

T	B_1	C_1	D_1	T	B_1	C_1	D_1
°K	atm^{-1} *	atm^{-2} *	atm^{-3} *	°K	atm^{-1} *	atm^{-2} *	atm^{-3} *
100	-.(1)17951	-.(3)3487	-.(3)21663	600	+.(3)435	+.(6)360	-.(9)58
110	-.(1)13778	-.(1)1964	-.(4)37186	610	.(3)436	.(6)342	-.(9)55
120	-.(1)10780	-.(3)1145	-.(5)79827	620	.(3)436	.(6)324	-.(9)53
130	-.(2)8562	-.(4)6822	-.(5)19016	630	.(3)435	.(6)308	-.(9)50
140	-.(2)6883	-.(4)4125	-.(6)40744	640	.(3)435	.(6)293	-.(9)48
150	-.(2)5586	-.(4)2490	-.(7)10394	650	.(3)434	.(6)279	-.(9)46
160	-.(2)4567	-.(4)1479	+.(7)88448	660	.(3)433	.(6)265	-.(9)44
170	-.(2)3755	-.(5)8412	+.(6)10092	670	.(3)432	.(6)253	-.(9)42
180	-.(2)3100	-.(5)4355	+.(7)8925	680	.(3)431	.(6)241	-.(9)40
190	-.(2)2565	-.(5)1748	+.(7)7274	690	.(3)429	.(6)229	-.(9)38
200	-.(2)2125	-.(7)801	+.(7)5727	700	.(3)428	.(6)219	-.(9)36
210	-.(2)1759	+.(6)984	+.(7)4434	710	.(3)426	.(6)208	-.(9)34
220	-.(2)1453	.(5)164	+.(7)3402	720	.(3)424	.(6)199	-.(9)33
230	-.(2)1195	.(5)204	+.(7)2594	730	.(3)423	.(6)190	-.(9)31
240	-.(3)977	.(5)225	+.(7)1968	740	.(3)421	.(6)181	-.(9)30
250	-.(3)790	.(5)235	+.(7)1484	750	.(3)419	.(6)174	-.(9)29
260	-.(3)631	.(5)236	+.(7)1111	760	.(3)417	.(6)166	-.(9)27
270	-.(3)493	.(5)233	+.(8)823	770	.(3)414	.(6)158	-.(9)26
280	-.(3)375	.(5)226	+.(8)602	780	.(3)412	.(6)151	-.(9)25
290	-.(3)272	.(5)215	+.(8)430	790	.(3)410	.(6)145	-.(9)24
300	-.(3)183	.(5)208	+.(8)298	800	.(3)408	.(6)139	-.(9)23
310	-.(3)105	.(5)197	+.(8)197	850	.(3)396	.(6)112	-.(9)18
320	-.(4)374	.(5)187	+.(8)118	900	.(3)384	.(7)91	-.(9)15
330	+.(4)220	.(5)176	+.(9)58	950	.(3)372	.(7)74	-.(9)12
340	+.(4)742	.(5)166	+.(9)12	1000	.(3)360	.(7)61	-.(9)10
350	.(3)120	.(5)156	-.(9)21	1050	.(3)348	.(7)51	
360	.(3)160	.(5)147	-.(9)47	1100	.(3)337	.(7)42	
370	.(3)196	.(5)138	-.(9)67	1150	.(3)326	.(7)35	
380	.(3)227	.(5)130	-.(9)81	1200	.(3)316	.(7)27	
390	.(3)255	.(5)122	-.(9)91	1250	.(3)306	.(7)25	
400	.(3)279	.(5)114	-.(9)97	1300	.(3)297	.(7)20	
410	.(3)301	.(5)107	-.(8)101	1350	.(3)288	.(7)17	
420	.(3)320	.(5)101	-.(8)104	1400	.(3)279	.(7)14	
430	.(3)336	.(6)948	-.(8)104	1450	.(3)271	.(7)12	
440	.(3)351	.(6)891	-.(8)104	1500	.(3)263	.(7)10	
450	.(3)364	.(6)838	-.(8)103	1550	.(3)256	.(8)8	
460	.(3)375	.(6)789	-.(8)101	1600	.(3)249	.(8)9	
470	.(3)385	.(6)743	-.(9)98	1650	.(3)242	.(8)5	
480	.(3)394	.(6)700	-.(9)95	1700	.(3)235	.(8)5	
490	.(3)401	.(6)661	-.(9)92	1750	.(3)229	.(8)4	
500	.(3)408	.(6)623	-.(9)89	1800	.(3)223		
510	.(3)414	.(6)589	-.(9)86	1850	.(3)218		
520	.(3)418	.(6)556	-.(9)82	1900	.(3)212		
530	.(3)422	.(6)525	-.(9)79	1950	.(3)207		
540	.(3)426	.(6)497	-.(9)76	2000	.(3)202		
550	.(3)429	.(6)471	-.(9)73	2050	.(3)197		
560	.(3)431	.(6)445	-.(9)69	2100	.(3)193		
570	.(3)433	.(6)422	-.(9)66	2150	.(3)188		
580	.(3)434	.(6)400	-.(9)63	2200	.(3)184		
590	.(3)435	.(6)379	-.(9)61	2250	.(3)180		
				2500	.(3)162		
				2750	.(3)147		
				3000	.(3)135		

*Numbers in parentheses indicate the number of zeros immediately to the right of the decimal point.

CHAPTER 8

THE THERMODYNAMIC PROPERTIES OF OXYGEN

The Correlation of the Experimental Data

The tabulated thermodynamic properties of oxygen have been obtained from a new correlation of the existing data via the equation $Z = PV/RT = 1 + B_1P + C_1P^2 + D_1P^3$. The virial coefficients, B_1 and C_1, were obtained through the Lennard-Jones 6-12 potential by a method devised for fitting several properties jointly [1]. The fourth virial coefficient, D_1, was fitted empirically. The coefficients are given in table 8-13. The tables of the compressibility factor and density were computed directly from the above equations of state, whereas the tables of specific heat, entropy, and enthalpy were obtained by combining the ideal-gas values of Woolley [2] with the gas imperfection corrections obtained from the derivatives of the virial coefficients. A fuller account of the method of fitting the experimental data is to be found in the report by Woolley [3].

The experimental PVT data for oxygen extending to elevated pressure are indicated in figure 8a. The direct experimental values of Z are represented in the form of $V[(PV/RT) - 1]$ plotted as a function of density, with temperatures in degrees Kelvin indicated adjacent to the plotted points. The data at the ice point and at room temperature seem quite dependable; they include measurements by Amagat [4], Holborn and Otto [5], Kuypers and Kammerlingh Onnes [6], Van Urk and Nijhoff [7], and Baxter and Starkweather [19]. The data of Amagat are mainly useful as an indication of the trend of the data toward higher pressures. The data of Holborn and Otto have been adjusted slightly for the effect of deformation of the container at elevated pressure and for individual pressures and temperatures occurring in their evaluation of the amount of substance present for individual measurements somewhat as suggested by Cragoe [8]. The points as plotted in figure 8a are thus corrected and differ slightly from the reported numbers of Holborn and Otto.

The correlation of the PVT data was aided in the case of the second virial by the use of other data, including that of Workman [9] at 26°C and 60°C for the effect of pressure on the specific heat and the data of Rossini and Frandsen [10] at 28°C on the dependence of internal energy on the pressure. Data on the effect of pressure on velocity of sound were available [11, 12] but differed too much from the indications of the other data to justify giving them any weight in the correlation.

Experimental data on various thermodynamic properties have been compared with the calculated quantities and represented in the figures below as deviations from the tabulated values. The experimental data include: specific-heat data by Henry [13], Workman [9], and Wacker, Cheney, and Scott [14]; data on isentropic cooling by expansion (Lummer and Pringsheim method) by Eucken and Von Lüde [15]; and sound velocity data by Shilling and Partington [16], Keesom, Van Itterbeek, and Van Lammeren [11], Van Lammeren [12], and King and Partington [17].

The dimensionless representation has been accomplished for certain properties by expressing them relative to the value at standard conditions (0°C and 1 atmosphere). Thus, for density,

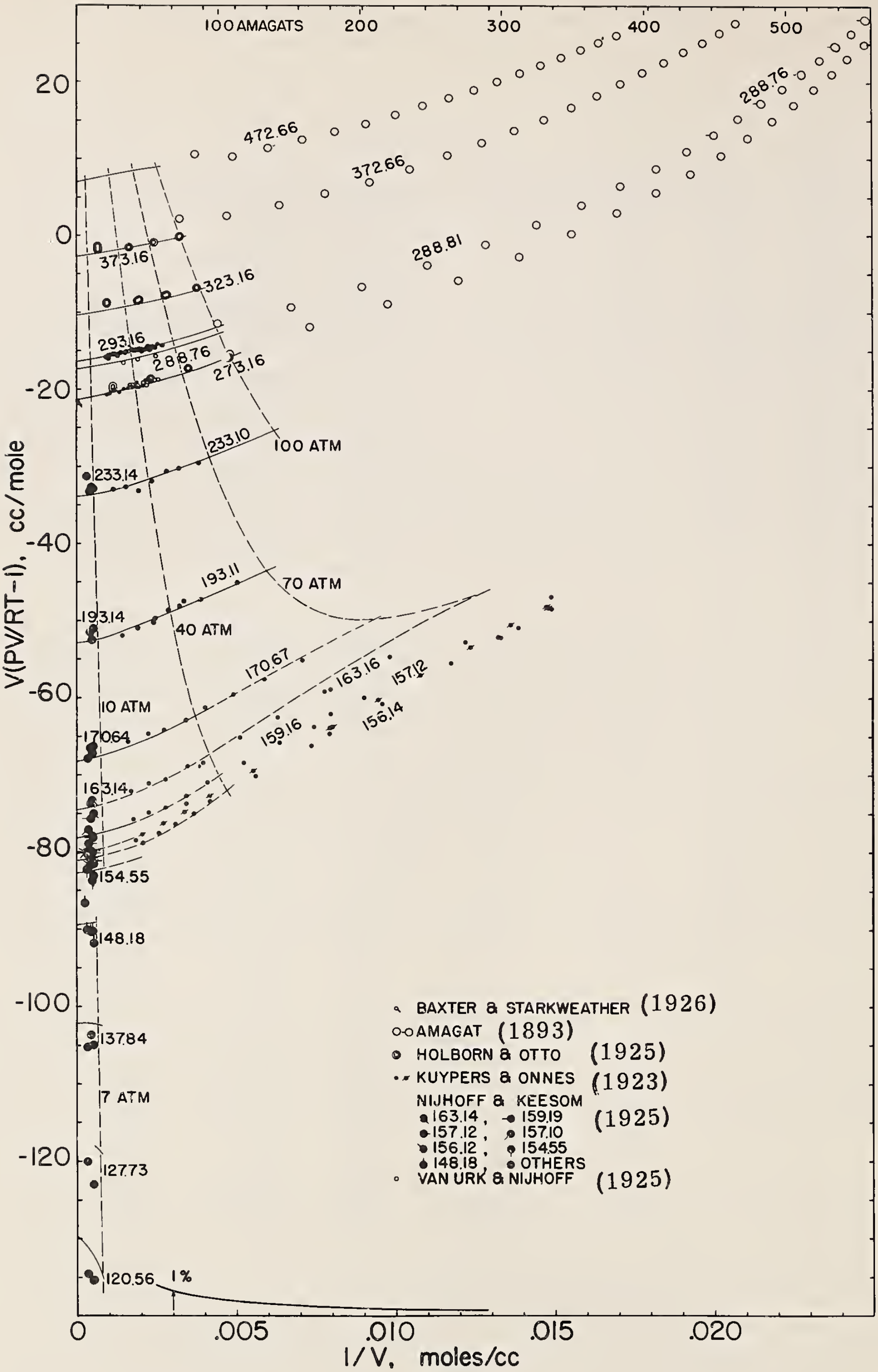


Figure 8a. Experimental PVT data for oxygen

the property is expressed as ρ/ρ_0, for sound velocity as a/a_0, for thermal conductivity as k/k_0, and for viscosity as η/η_0. The reference values, ρ_0, a_0, k_0, and η_0, result, in general, from the correlating equations which were fitted to represent the experimental data over as wide a range as possible. Values for these quantities are given in various units in table 8-b. The value of ρ_0 for oxygen as given, 1.42904 g ℓ^{-1}, may be compared with 1.42898 g ℓ^{-1}, the mean of the experimental determinations [19, 47 - 58], and 1.42895 g ℓ^{-1}, the most recent determination included [58]. The value of η_0 for oxygen as given, 1.9192 x 10^{-4} poise, is well within the range of the experimental determinations [24, 28, 59 - 61], the mean of which is 1.9226 x 10^{-4} poise, and close to the latest of these, 1.9184 x 10^{-4} poise [24]. The value of k_0 for oxygen as given, 5.867 x 10^{-5} cal $cm^{-1} sec^{-1} {}^\circ K^{-1}$, is within the range of the experimental values [30 - 36, 62 - 66], whose mean is 5.788 x 10^{-5} cal $cm^{-1} sec^{-1} {}^\circ K^{-1}$, and fairly close to the latest determination included, 5.83 x 10^{-5} cal $cm^{-1} sec^{-1} {}^\circ K^{-1}$. The value of a_0 for oxygen as given, 314.82 m sec^{-1}, is appreciably below 315.8 m sec^{-1}, the mean of reported observations [11, 67 - 70]. A small part of this difference may be attributed to vibrational relaxation.

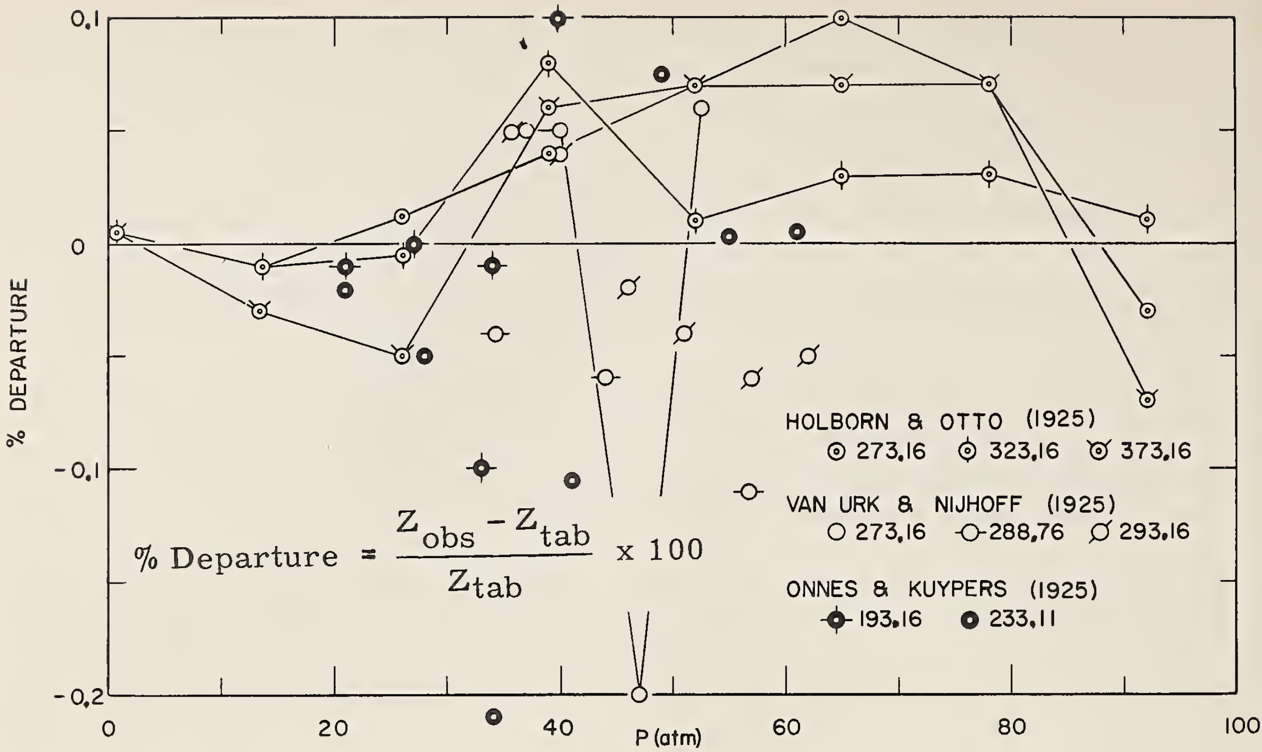
The tables of viscosity and thermal conductivity were computed from semi-empirical equations (see summary tables 1-B and 1-C), which were fitted to the existing experimental data of references 24 to 29. The values for the vapor pressure of liquid oxygen are based on the experimental work of H. J. Hoge [18], as are also the critical constants. Comparisons with earlier experimental data are given in reference 18.

The Reliability of the Tables

The tables of compressibility factors, densities, and the derived properties of gaseous oxygen are thought to be fairly reliable in the region 0° to 100°C. Low-pressure data are not available for higher temperatures. Experimental difficulties are greater at lower temperatures, and values there are presumed to be somewhat less reliable for this reason. The available experimental data - below 70 atmospheres - seem to be fitted rather closely down to -80°C and less closely at lower temperatures as may be seen in figures 8a and 8b. With the spread of a 1 percent error shown at the bottom of the figure 8a, it appears that compressibility values have been represented within a part in a thousand and considerably better in some regions. At low density, the errors result largely from imperfect fitting of the second virial coefficient and may amount to 3 percent of the deviation from ideality. The derived corrections to the thermodynamic properties are considerably more uncertain than the compressibility in the same region because of the natural increase in uncertainty in differentiation.

The tabulated values of the compressibility factors (table 8-1) are compared with the experimental data in figure 8b, where the departures are within 0.2 percent. In the experimental temperature range (see figure 8a) at 10 atmospheres and below, the tabulated values are probably reliable within 3 percent of the deviation from ideality. For these temperatures, the values of Z at 70 atmospheres are probably good to within 0.001. The extrapolated values, whether for higher temperature or pressure, are less reliable. The table of densities (table 8-2) has corresponding reliability.

The uncertainty in the values of $(Cp - C_p^o)/R$, the contribution due to nonideality, may approach 10 percent at the low pressures where the compressibility factor is uncertain by almost



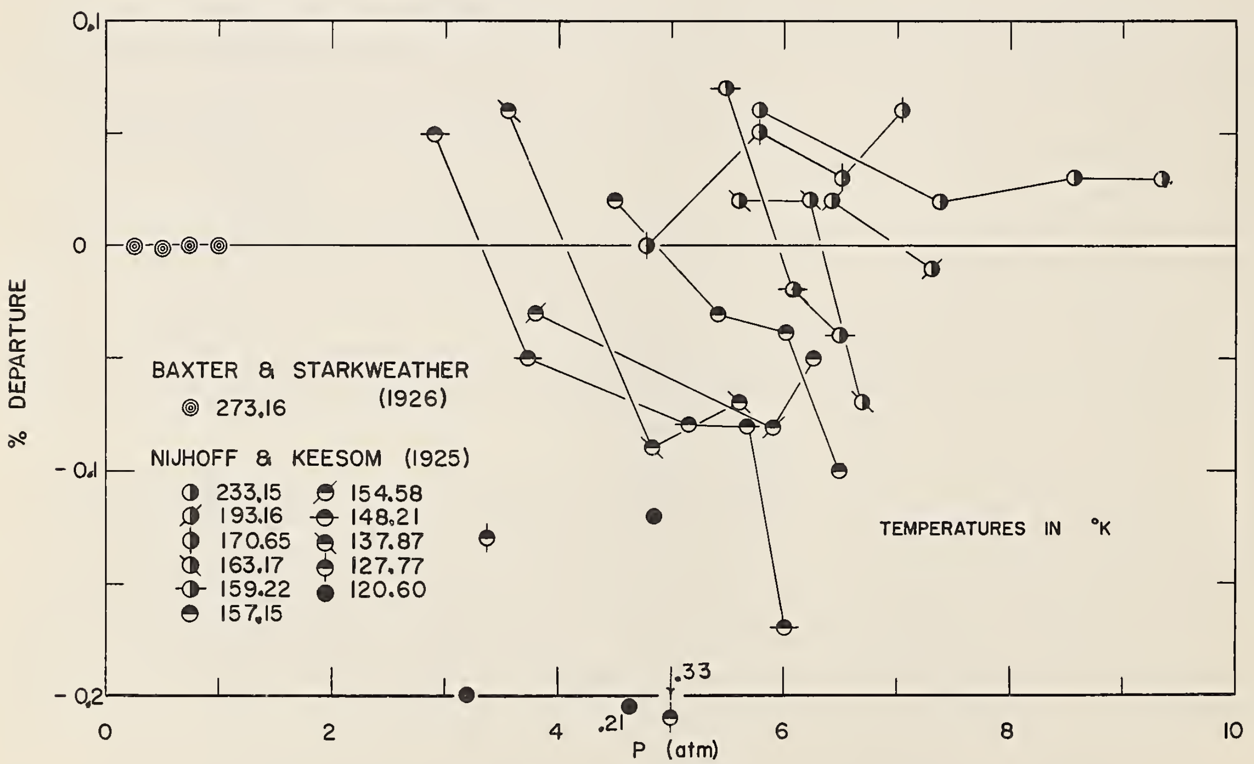


Figure 8b. Departures of experimental compressibility factors from the tabulated values for oxygen (table 8-1)

3 percent of its deviation. At higher pressures, where the compressibility factor is uncertain by an amount approaching 0.001, the error in $(C_p - C_p^o)/R$ may approach 0.01. The effect of dissociation is not included in this table (table 8-3), but its magnitude may be estimated by the procedure given by Damköhler [22]. Comparisons with experimental data at low and at elevated pressures are shown in figures 8c and 8d. The points designated as "Shilling and Partington" in figure 8c represent values derived from sound velocity measurements. These do not provide reliable values of specific heat at elevated temperatures, due to the effect of dispersion related to vibrational excitation. The departures shown in figure 8c are approximately as large as the entire vibrational contribution to the specific heat.

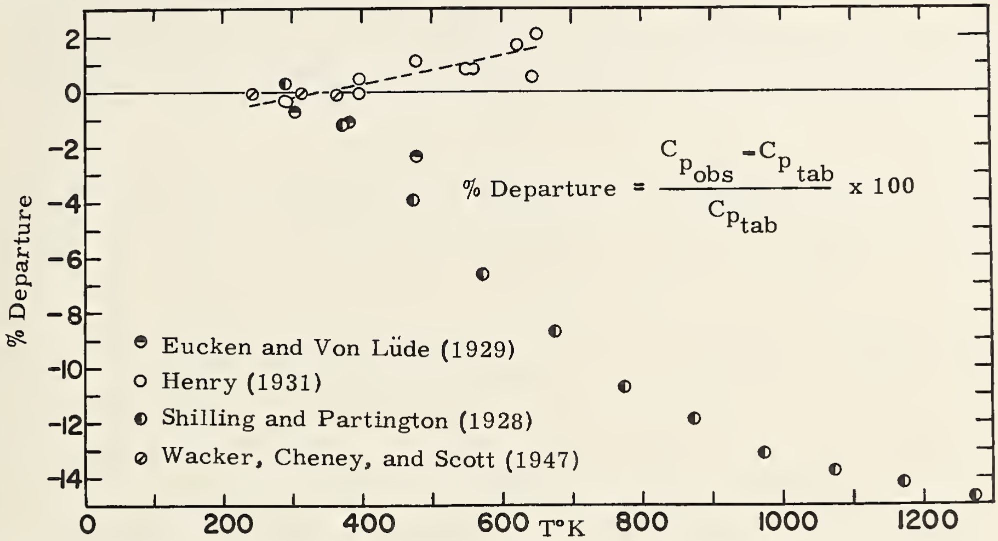


Figure 8c. Departures of experimental specific heats from the tabulated values for oxygen (table 8-3)

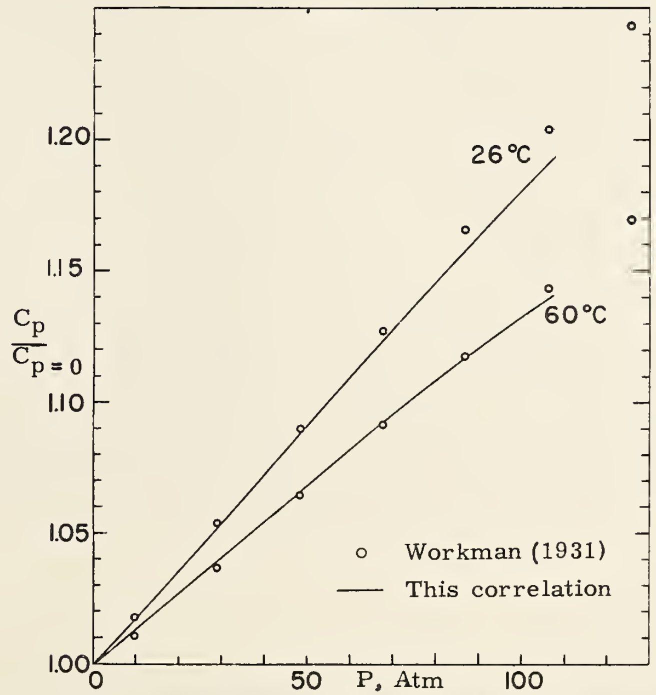


Figure 8d. Dependence of specific heat upon pressure

The values of the enthalpy (table 8-4) and entropy (table 8-5) of molecular oxygen tabulated here do not include the effect of dissociation. Its magnitude may be estimated and found to be negligible at moderate temperatures and pressure. Above about 2000°K, allowance needs to be made in many cases for dissociation effects [23]. These can be estimated from figures 8e and 8f.

If one neglects dissociation, the tables of entropy and enthalpy should be uncertain by less than about 7 percent of the difference between the real and the ideal values of the properties at low pressures where the values of the compressibility factor are good to within 3 percent of the departure from ideality. At higher pressures, where the values of the compressibility factor are good to 0.001, the derived corrections at best might be uncertain by about 0.003 at the higher temperatures and by about two or three times this amount at the lower temperatures. At the lowest temperatures of the table, the values are very uncertain and are accordingly given to fewer digits.

On the basis of the reliabilities estimated for specific heats and compressibility factors, the uncertainties in the values of γ (table 8-6) may approach 10 percent of the real-gas correction, except for the least accurate values at the lowest temperatures.

The tabulated values of sound velocity at low frequency (table 8-7) are thought to be quite reliable except at the lowest temperatures and at elevated pressures. Except for the very lowest temperatures, the values seem likely to be reliable to within 0.001, i.e., for all digits given to a pressure of 10 atmospheres and up to 40 atmospheres above 400°K. For 100 atmospheres, the uncertainty may be less than 0.015 from 200°K to 300°K, running from 0.010 down to 0.005 at higher temperatures. Figure 8g shows the departure of the experimental data from the tabular values. The large deviations of sound velocity data at elevated temperatures are due to dispersion effects. The experimental sound frequencies were not sufficiently low to allow the molecules to adjust their vibrational excitations appreciably for the temperature change during the sound vibration.

The values of viscosity (table 8-8) and thermal conductivity (table 8-9) of oxygen at atmospheric pressure were computed from the formulas given in summary tables 1-B and 1-C. The values of viscosity are considered to be reliable to within 1 percent below 1000°K and to within 2 percent as extrapolated to 2000°K. Figure 8h compares the experimental results of six authors [24 - 29] with the values of the table. The table of thermal conductivity (table 8-9) is considered reliable to about 2 percent in the experimental range, which is from 86°K to 376°K. In the region of extrapolation to higher temperature, the values are more uncertain. Figure 8i shows the departure of the results of seven experimental determinations [30 - 36] from the tabular values. The Prandtl numbers (table 8-10) are correspondingly reliable to within 2 percent.

The vapor pressures (table 8-11) are based on an experimental investigation by Hoge [18] of the vapor pressure of liquid oxygen. Figure 8j shows the experimental data plotted as deviations from the tabular values. A comparison of these results with the results of other observers [37 - 44] is given in figure 8k.

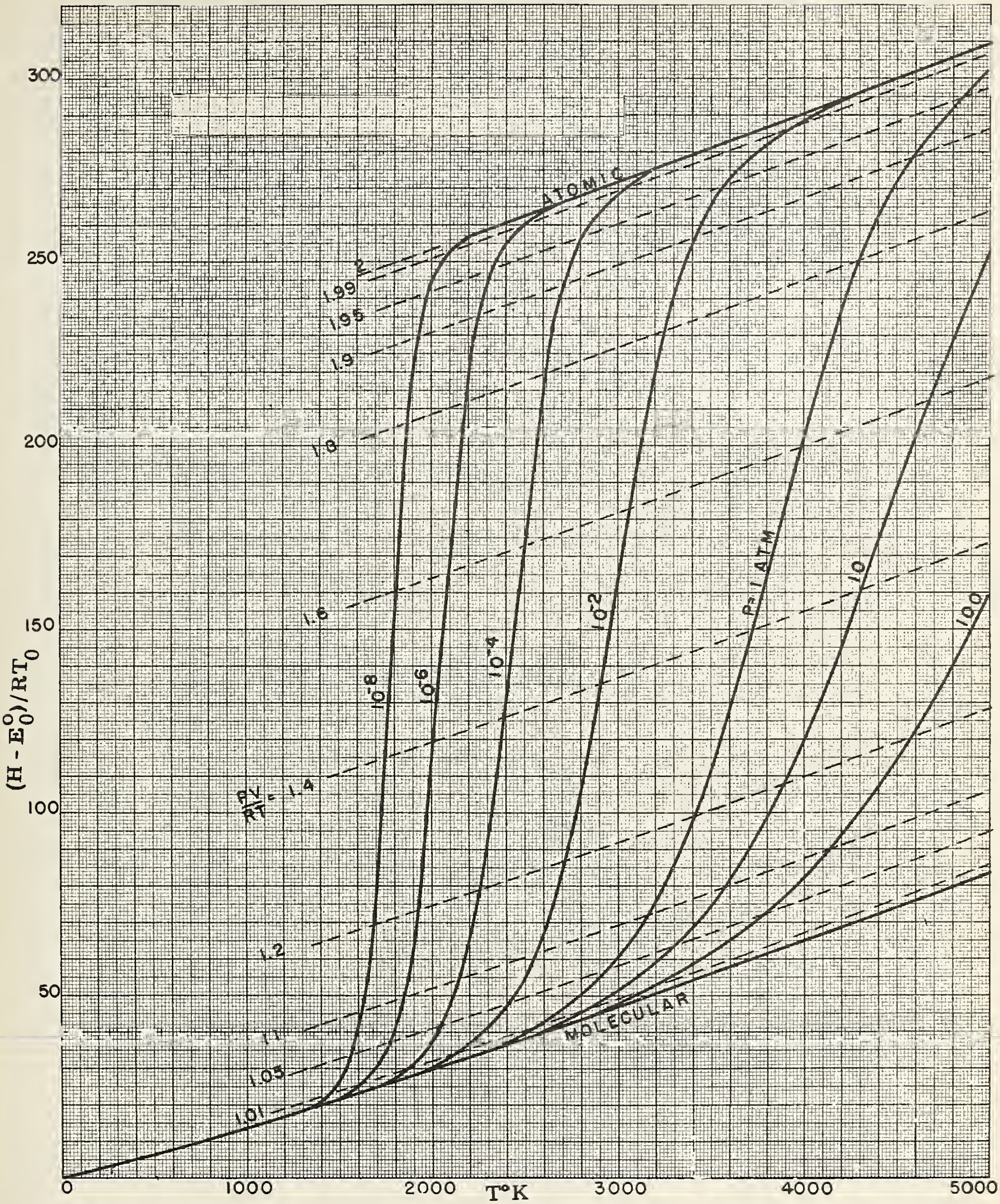


Figure 8e. The effect of dissociation on the enthalpy of oxygen

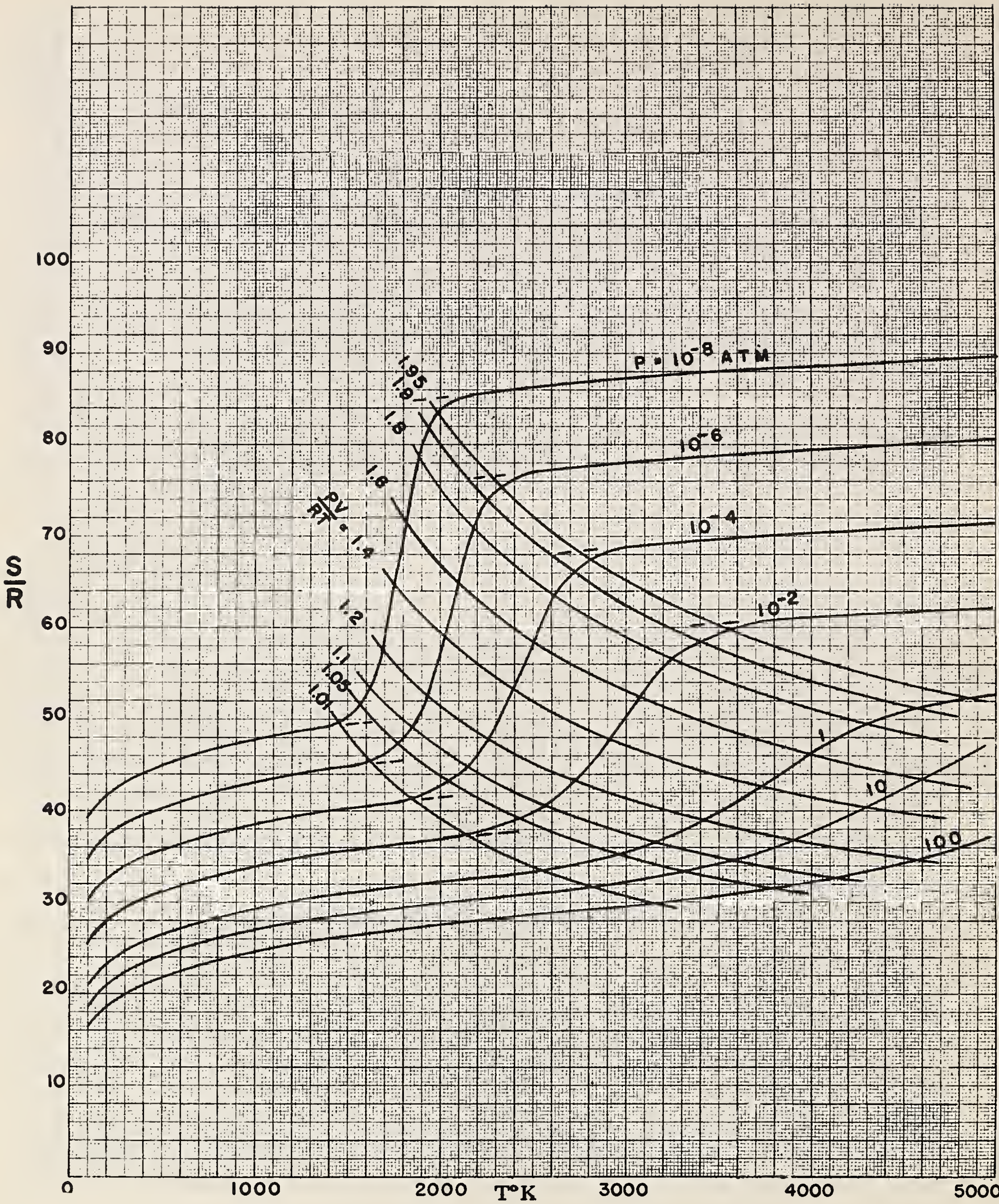


Figure 8f. The effect of dissociation on the entropy of oxygen

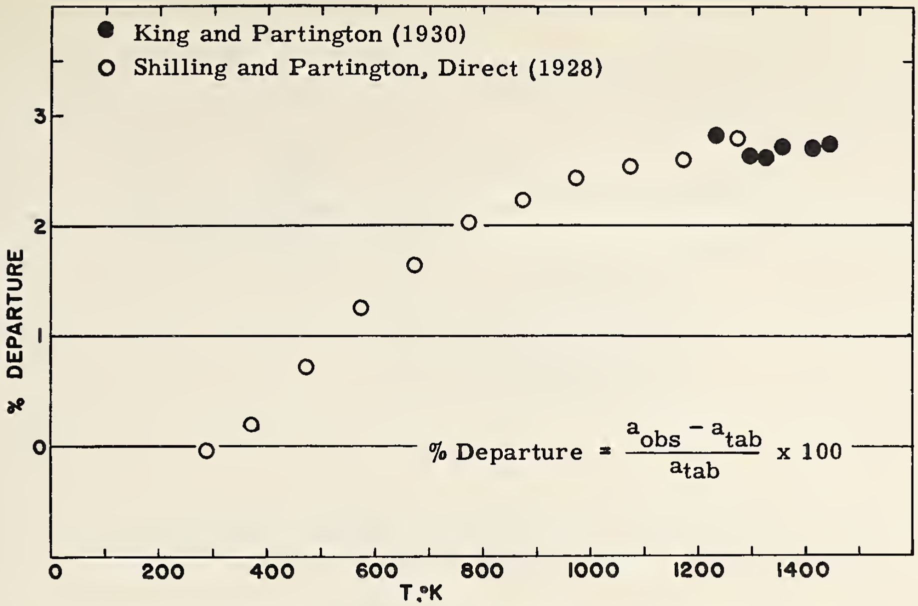


Figure 8g. Departures of experimental sound velocities from the tabulated values for oxygen (table 8-7)

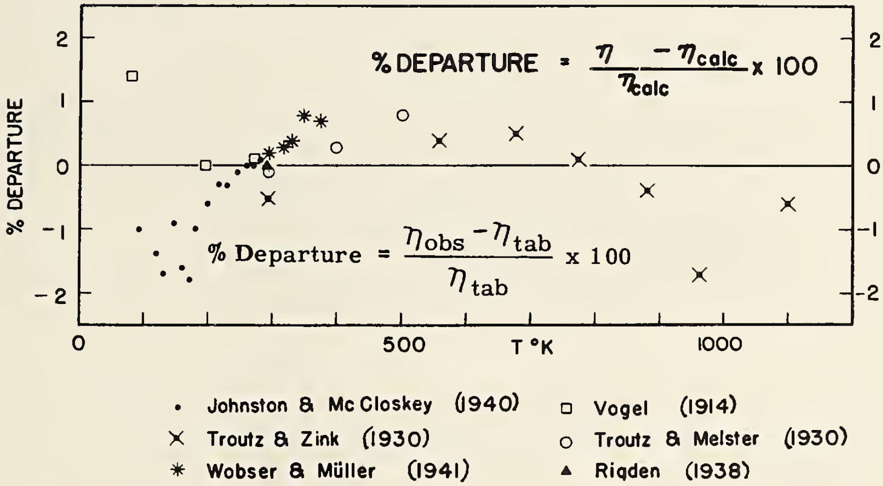


Figure 8h. Departures of experimental viscosities from the tabulated values for oxygen (table 8-8)

Below a pressure of about 1.4 m Hg, the tables are based on mercury manometry and are accurate to about ±0.22 mm Hg. Above about 1.4 m Hg, the uncertainty increases to ±1 or 2 mm Hg and then gradually increases further at higher pressures, reaching a value of perhaps ±10 mm Hg at the critical point. In these estimates, no allowance has been made for possible disagreement between the temperature scales used and the thermodynamic scale. The International Temperature Scale was used down to 90.19°K and the NBS provisional scale was used at lower temperatures.

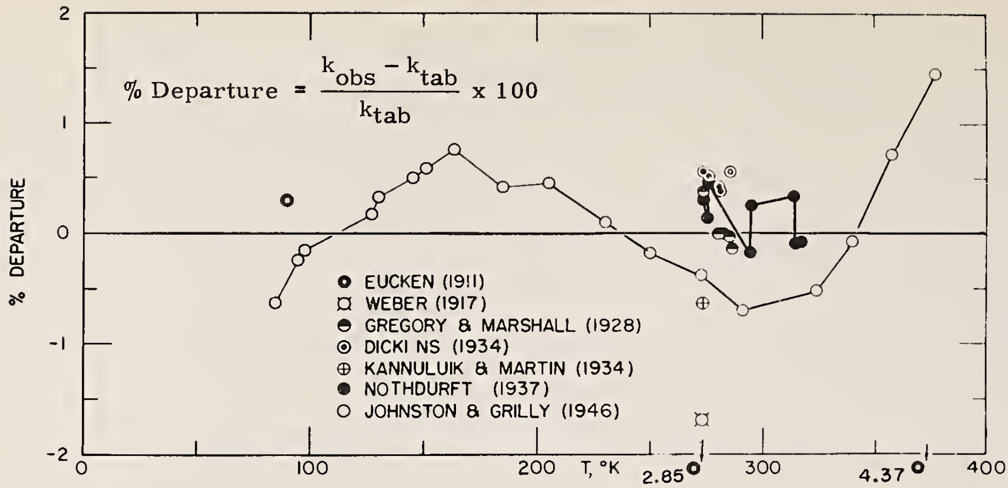


Figure 8i. Departures of experimental thermal conductivities from the tabulated values for oxygen (table 8-9)

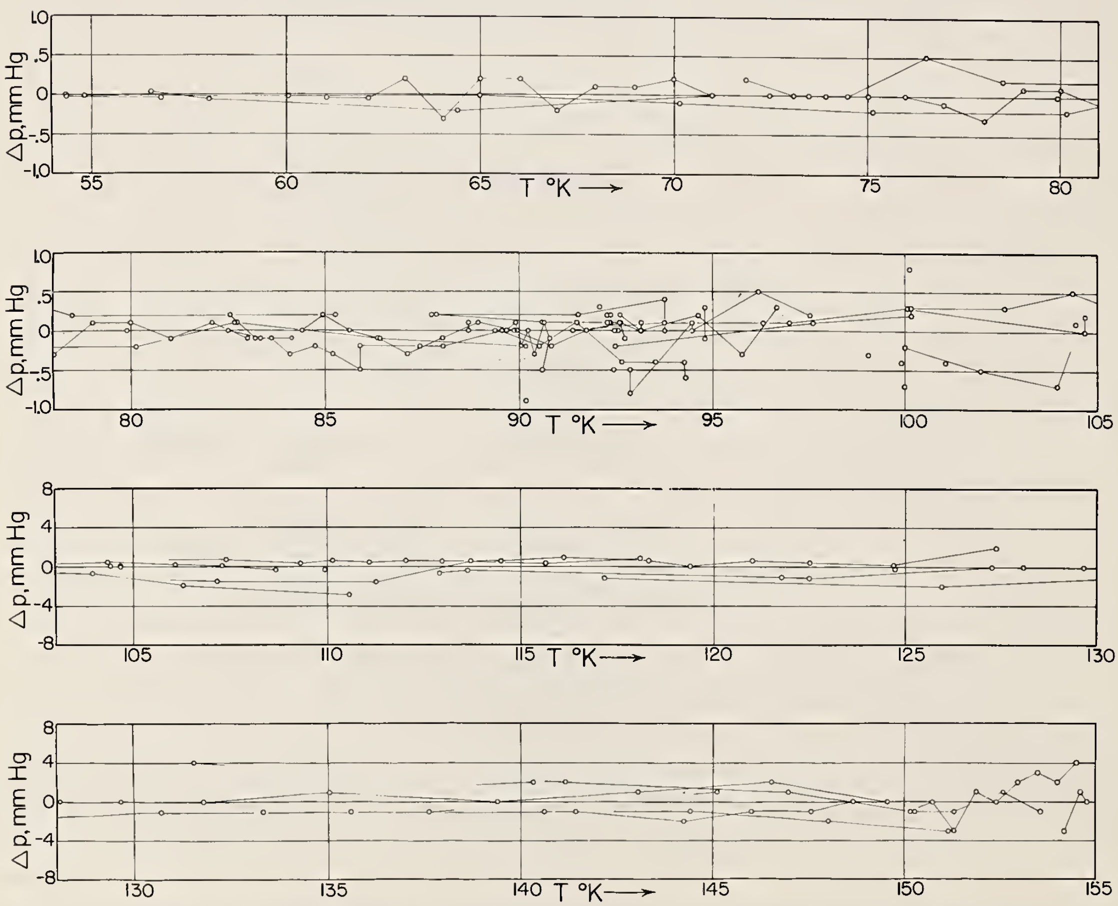


Figure 8j. Departures of experimental vapor pressures from the tabulated values for oxygen (table 8-11)

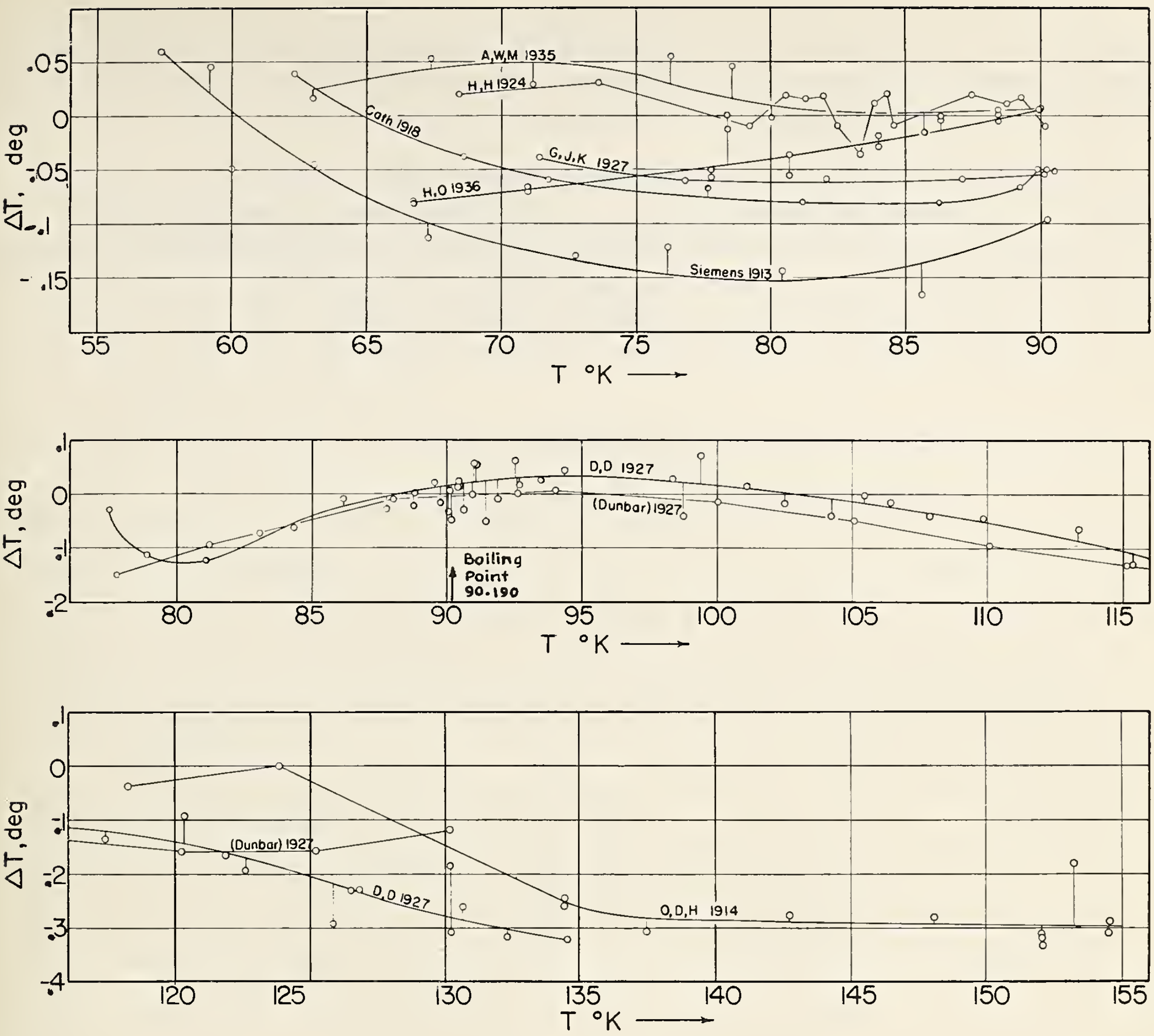


Figure 8k. Comparison of the vapor-pressure data of various observers

A, W, M	Aston, Willihnganz, and Messerby	(1935)
H, H	Henning and Heuse	(1924)
G, J, K	Giauque, Johnston, and Kelley	(1927)
Cath		(1918)
H, O	Henning and Otto	(1936)
Siemens		(1913)
D, D	Dodge and Davis	(1927)
Dunbar	(See reference 43)	(1927)
O, D, H	Onnes, Dorsman, and Holst	(1914)

The only available data [45] for the vapor pressure of solid oxygen do not appear to be very reliable, and hence the tabulation has not been extended below the triple point. At 43.8°K which is the temperature of the higher of the two solid-solid transitions of oxygen, Aoyama and Kanda [45] reported the vapor pressure to be 0.0111 mm Hg.

The ideal-gas thermodynamic functions for molecular oxygen are for the normal isotopic mixture and are based on the tables by Woolley [2]. The calculations for oxygen are based in general on rather precise spectroscopic data, except for some of the high-energy states, so that the tabulated values should be quite reliable in summary table 1-D. The tabulation for the atomic species is based on the values reported by Rossini and co-workers [46].

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Table 8-a. VALUES OF THE GAS CONSTANT, R, FOR MOLECULAR OXYGEN

Values of R for Molecular Oxygen for Temperatures in Degrees Kelvin

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.56427	2.64947	1948.84	37.6845
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0410753	0.0424401	31.2172	0.603643
lb $mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Molecular Oxygen for Temperatures in Degrees Rankine

Density \ Pressure	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	1.42459	1.47193	1082.69	20.9358
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0228196	0.0235778	17.3429	0.335357
lb $mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 8-b. CONVERSION FACTORS FOR THE MOLECULAR OXYGEN TABLES

Conversion Factors for Table 8-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ/ρ_0	ρ	g cm^{-3}	1.42900×10^{-3}
		mole cm^{-3}	4.46562×10^{-5}
		g $liter^{-1}$	1.42904
		lb in^{-3}	5.16262×10^{-5}
		lb ft^{-3}	8.92101×10^{-2}

Conversion Factors for Tables 8-4 and 8-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$,	$(H^o - E_0^o)$,	cal $mole^{-1}$	542.821
$(H - E_0^o)/RT_0$	$(H - E_0^o)$	cal g^{-1}	16.9632
		joules g^{-1}	70.9742
		Btu $(lb\ mole)^{-1}$	976.437
		Btu lb^{-1}	30.5137

Conversion Factors for Tables 8-3, 8-5, and 8-12

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal $mole^{-1}$ $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
C_p/R, S/R,	C_p, S,	cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.0620997
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.259826
		Btu $(lb\ mole)^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.0620588

The molecular weight of oxygen is 32 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 8-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
a_0	a	m sec^{-1}	314.82
		ft sec^{-1}	1032.9

Conversion Factors for Table 8-8

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η/η_0	η	poise or g sec^{-1} cm^{-1}	1.9192×10^{-4}
		kg hr^{-1} m^{-1}	6.9091×10^{-2}
		slug hr^{-1} ft^{-1}	1.4430×10^{-3}
		lb sec^{-1} ft^{-1}	1.2896×10^{-5}
		lb hr^{-1} ft^{-1}	4.6427×10^{-2}

Conversion Factors for Table 8-9

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0	k	cal cm^{-1} sec^{-1} $^{o}K^{-1}$	5.867×10^{-5}
		Btu ft^{-1} hr^{-1} $^{o}R^{-1}$	1.419×10^{-2}
		watts cm^{-1} $^{o}K^{-1}$	2.455×10^{-4}

Conversion Factors for Table 8-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^o - E_0^o)/RT_0$	$(H^o - E_0^o)$	cal mole^{-1}	542.821
		cal g^{-1}	33.9264
		joules g^{-1}	141.948
		Btu (lb mole)$^{-1}$	976.437
		Btu lb^{-1}	61.0274

Conversion Factors for Table 8-12/a

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C_p^o/R, S^o/R,	C_p^o, S^o,	cal mole^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	1.98719
		cal g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.124199
$-(F^o - E_0^o)/RT$	$-(F^o - E_0^o)/T$	joules g^{-1} $^oK^{-1}$ (or $^oC^{-1}$)	0.519652
		Btu (lb mole)$^{-1}$ $^oR^{-1}$ (or $^oF^{-1}$)	1.98588
		Btu lb^{-1} $^oR^{-1}$ (or $^oF^{-1}$)	0.124118

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	.99978	5	.99781	50	.99114	206	.98431	371	180
110	.99983	4	.99831	36	.99320	146	.98802	259	198
120	.99987	2	.99867	26	.99466	107	.99061	188	216
130	.99989	2	.99893	20	.99573	80	.99249	142	234
140	.99991	2	.99913	16	.99653	62	.99391	109	252
150	.99993	1	.99929	12	.99715	49	.99500	86	270
160	.99994	1	.99941	10	.99764	39	.99586	68	288
170	.99995	1	.99951	8	.99803	31	.99654	55	306
180	.99996		.99959	6	.99834	25	.99709	45	324
190	.99996	1	.99965	5	.99859	21	.99754	37	342
200	.99997		.99970	5	.99880	18	.99791	31	360
210	.99997	1	.99975	3	.99898	15	.99822	26	378
220	.99998		.99978	3	.99913	13	.99848	22	396
230	.99998		.99981	3	.99926	10	.99870	18	414
240	.99998	1	.99984	2	.99936	9	.99888	16	432
250	.99999		.99986	2	.99945	8	.99904	14	450
260	.99999		.99988	2	.99953	7	.99918	12	468
270	.99999		.99990	2	.99960	6	.99930	11	486
280	.99999		.99992	1	.99966	5	.99941	9	504
290	.99999		.99993	1	.99971	5	.99950	8	522
300	.99999		.99994	1	.99976	4	.99958	7	540
310	.99999	1	.99995	1	.99980	3	.99965	6	558
320	1.00000		.99996	1	.99983	3	.99971	5	576
330	1.00000		.99997		.99986	3	.99976	5	594
340	1.00000		.99997	1	.99989	3	.99981	4	612
350	1.00000		.99998		.99992	2	.99985	4	630
360	1.00000		.99998	1	.99994	2	.99989	4	648
370	1.00000		.99999		.99996	2	.99993	3	666
380	1.00000		.99999	1	.99998	1	.99996	2	684
390	1.00000		1.00000		.99999	1	.99998	3	702
400	1.00000		1.00000		1.00000	2	1.00001	2	720
410	1.00000		1.00000	1	1.00002	1	1.00003	2	738
420	1.00000		1.00001		1.00003	1	1.00005	2	756
430	1.00000		1.00001		1.00004	1	1.00007	1	774
440	1.00000		1.00001	1	1.00005	1	1.00008	2	792
450	1.00000		1.00002		1.00006		1.00010	1	810
460	1.00000		1.00002		1.00006	1	1.00011	1	828
470	1.00000		1.00002		1.00007	1	1.00012	1	846
480	1.00000		1.00002		1.00008		1.00013	1	864
490	1.00000		1.00002		1.00008	1	1.00014	1	882
500	1.00000		1.00002		1.00009		1.00015	1	900
510	1.00000		1.00002		1.00009	1	1.00016	1	918
520	1.00000		1.00002		1.00010		1.00017		936
530	1.00000		1.00002	1	1.00010		1.00017	1	954
540	1.00000		1.00003		1.00010		1.00018		972
550	1.00000		1.00003		1.00010		1.00018	1	990
560	1.00000		1.00003		1.00010	1	1.00019		1008
570	1.00000		1.00003		1.00011		1.00019	1	1026
580	1.00000		1.00003		1.00011		1.00020		1044
590	1.00000		1.00003		1.00011	1	1.00020		1062
600	1.00000		1.00003		1.00012		1.00020		1080
610	1.00000		1.00003		1.00012		1.00020	1	1098
620	1.00000		1.00003		1.00012		1.00021		1116
630	1.00000		1.00003		1.00012		1.00021		1134
640	1.00000		1.00003		1.00012		1.00021		1152
650	1.00000		1.00003		1.00012		1.00021		1170
660	1.00000		1.00003		1.00012		1.00021		1188
670	1.00000		1.00003		1.00012		1.00021		1206
680	1.00000		1.00003		1.00012		1.00021	1	1224
690	1.00000		1.00003		1.00012		1.00022		1242
700	1.00000		1.00003		1.00012		1.00022		1260

°K	.01 atm	.1 atm		.4 atm		.7 atm		°R
700	1.00000	1.00003		1.00012		1.00022		1260
710	1.00000	1.00003		1.00012		1.00022		1278
720	1.00000	1.00003		1.00012		1.00022		1296
730	1.00000	1.00003		1.00012		1.00022		1314
740	1.00000	1.00003		1.00012		1.00022		1332
750	1.00000	1.00003		1.00012		1.00022		1350
760	1.00000	1.00003		1.00012		1.00022		1368
770	1.00000	1.00003		1.00012		1.00022		1386
780	1.00000	1.00003		1.00012		1.00022		1404
790	1.00000	1.00003		1.00012		1.00022		1422
800	1.00000	1.00003		1.00012		1.00022	- 1	1440
850	1.00000	1.00003		1.00012		1.00021		1530
900	1.00000	1.00003		1.00012		1.00021		1620
950	1.00000	1.00003		1.00012		1.00021	- 1	1710
1000	1.00000	1.00003		1.00012	- 1	1.00020		1800
1050	1.00000	1.00003		1.00011		1.00020	- 1	1890
1100	1.00000	1.00003		1.00011		1.00019		1980
1150	1.00000	1.00003		1.00011	- 1	1.00019	- 1	2070
1200	1.00000	1.00003		1.00010		1.00018		2160
1250	1.00000	1.00003	- 1	1.00010		1.00018	- 1	2250
1300	1.00000	1.00002		1.00010		1.00017		2340
1350	1.00000	1.00002		1.00010	- 1	1.00017	- 1	2430
1400	1.00000	1.00002		1.00009		1.00016		2520
1450	1.00000	1.00002		1.00009		1.00016	- 1	2610
1500	1.00000	1.00002		1.00009		1.00015		2700
1550	1.00000	1.00002		1.00009	- 1	1.00015		2790
1600	1.00000	1.00002		1.00008		1.00015	- 1	2880
1650	1.00000	1.00002		1.00008		1.00014		2970
1700	1.00000	1.00002		1.00008		1.00014		3060
1750	1.00000	1.00002		1.00008		1.00014	- 1	3150
1800	1.00000	1.00002		1.00008	- 1	1.00013		3240
1850	1.00000	1.00002		1.00007		1.00013		3330
1900	1.00000	1.00002		1.00007		1.00013	- 1	3420
1950	1.00000	1.00002		1.00007		1.00012		3510
2000	1.00000	1.00002		1.00007		1.00012		3600
2050	1.00000	1.00002		1.00007		1.00012		3690
2100	1.00000	1.00002		1.00007	- 1	1.00012	- 1	3780
2150	1.00000	1.00002		1.00006		1.00011		3870
2200	1.00000	1.00002		1.00006		1.00011		3960
2250	1.00000	1.00002		1.00006		1.00011		4050
2300	1.00000	1.00002	- 1	1.00006		1.00011	- 1	4140
2350	1.00000	1.00001		1.00006		1.00010		4230
2400	1.00000	1.00001		1.00006		1.00010		4320
2450	1.00000	1.00001		1.00006		1.00010		4410
2500	1.00000	1.00001		1.00006	- 1	1.00010		4500
2550	1.00000	1.00001		1.00005		1.00010	- 1	4590
2600	1.00000	1.00001		1.00005		1.00009		4680
2650	1.00000	1.00001		1.00005		1.00009		4770
2700	1.00000	1.00001		1.00005		1.00009		4860
2750	1.00000	1.00001		1.00005		1.00009		4950
2800	1.00000	1.00001		1.00005		1.00009		5040
2850	1.00000	1.00001		1.00005		1.00009		5130
2900	1.00000	1.00001		1.00005		1.00009	- 1	5220
2950	1.00000	1.00001		1.00005		1.00008		5310
3000	1.00000	1.00001		1.00005		1.00008		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	.97724	553							180
110	.98277	375	.9227	200					198
120	.98652	272	.9427	126	.891	27			216
130	.98924	204	.9553	89	.9179	174			234
140	.99128	156	.9642	66	.9353	124			252
150	.99284	123	.9708	51	.9477	94	.9236	141	270
160	.99407	98	.9759	40	.9571	73	.9377	109	288
170	.99505	78	.9799	33	.9644	58	.9486	85	306
180	.99583	65	.9832	26	.9702	47	.9571	69	324
190	.99648	53	.9858	22	.9749	39	.9640	56	342
200	.99701	44	.98796	180	.97880	319	.96956	461	360
210	.99745	37	.98976	150	.98199	266	.97417	384	378
220	.99782	32	.99126	127	.98465	225	.97801	324	396
230	.99814	27	.99253	108	.98690	190	.98125	274	414
240	.99841	23	.99361	92	.98880	163	.98399	234	432
250	.99864	19	.99453	80	.99043	140	.98633	200	450
260	.99883	17	.99533	69	.99183	121	.98833	173	468
270	.99900	15	.99602	59	.99304	104	.99006	151	486
280	.99915	13	.99661	52	.99408	92	.99157	131	504
290	.99928	11	.99713	46	.99500	80	.99288	114	522
300	.99939	10	.99759	40	.99580	70	.99402	100	540
310	.99949	9	.99799	35	.99650	62	.99502	88	558
320	.99958	8	.99834	31	.99712	54	.99590	78	576
330	.99966	7	.99865	28	.99766	49	.99668	70	594
340	.99973	6	.99893	25	.99815	43	.99738	61	612
350	.99979	5	.99918	22	.99858	38	.99799	54	630
360	.99984	5	.99940	19	.99896	34	.99853	49	648
370	.99989	5	.99959	17	.99930	30	.99902	43	666
380	.99994	4	.99976	16	.99960	27	.99945	39	684
390	.99998	3	.99992	14	.99987	25	.99984	35	702
400	1.00001	3	1.00006	12	1.00012	22	1.00019	31	720
410	1.00004	3	1.00018	12	1.00034	19	1.00050	28	738
420	1.00007	3	1.00030	10	1.00053	18	1.00078	25	756
430	1.00010	2	1.00040	9	1.00071	16	1.00103	23	774
440	1.00012	2	1.00049	8	1.00087	14	1.00126	20	792
450	1.00014	2	1.00057	8	1.00101	13	1.00146	19	810
460	1.00016	2	1.00065	6	1.00114	12	1.00165	16	828
470	1.00018	1	1.00071	6	1.00126	10	1.00181	15	846
480	1.00019	1	1.00077	6	1.00136	10	1.00196	14	864
490	1.00020	2	1.00083	5	1.00146	8	1.00210	12	882
500	1.00022	1	1.00088	4	1.00154	8	1.00222	11	900
510	1.00023	1	1.00092	4	1.00162	7	1.00233	9	918
520	1.00024	1	1.00096	3	1.00169	6	1.00242	9	936
530	1.00025		1.00099	4	1.00175	6	1.00251	8	954
540	1.00025	1	1.00103	3	1.00181	5	1.00259	7	972
550	1.00026	1	1.00106	2	1.00186	4	1.00266	7	990
560	1.00027		1.00108	2	1.00190	4	1.00273	6	1008
570	1.00027	1	1.00110	2	1.00194	4	1.00279	5	1026
580	1.00028		1.00112	2	1.00198	3	1.00284	4	1044
590	1.00028	1	1.00114	2	1.00201	3	1.00288	4	1062
600	1.00029		1.00116	1	1.00204	2	1.00292	4	1080
610	1.00029	1	1.00117	2	1.00206	2	1.00296	3	1098
620	1.00030		1.00119	1	1.00208	2	1.00299	3	1116
630	1.00030		1.00120	1	1.00210	2	1.00302	2	1134
640	1.00030		1.00121	1	1.00212	2	1.00304	2	1152
650	1.00030		1.00122		1.00214	1	1.00306	2	1170
660	1.00030	1	1.00122	1	1.00215	1	1.00308	1	1188
670	1.00031		1.00123		1.00216	1	1.00309	1	1206
680	1.00031		1.00123	1	1.00217		1.00310	1	1224
690	1.00031		1.00124		1.00217	1	1.00311	1	1242
700	1.00031		1.00124		1.00218		1.00312		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	1.00031		1.00124		1.00218		1.00312	1	1260
710	1.00031		1.00124	1	1.00218	1	1.00313		1278
720	1.00031		1.00125		1.00219		1.00313		1296
730	1.00031		1.00125		1.00219		1.00313		1314
740	1.00031		1.00125		1.00219		1.00313		1332
750	1.00031		1.00125		1.00219		1.00313		1350
760	1.00031		1.00125		1.00219		1.00313		1368
770	1.00031		1.00125		1.00219	- 1	1.00313		1386
780	1.00031		1.00125		1.00218		1.00313	- 1	1404
790	1.00031		1.00125	- 1	1.00218		1.00312	- 1	1422
800	1.00031		1.00124	- 1	1.00218	- 3	1.00311	- 4	1440
850	1.00031	- 1	1.00123	- 2	1.00215	- 4	1.00307	- 5	1530
900	1.00030	- 1	1.00121	- 3	1.00211	- 4	1.00302	- 7	1620
950	1.00029		1.00118	- 3	1.00207	- 5	1.00295	- 7	1710
1000	1.00029	- 1	1.00115	- 3	1.00202	- 5	1.00288	- 7	1800
1050	1.00028	- 1	1.00112	- 3	1.00197	- 5	1.00281	- 7	1890
1100	1.00027		1.00109	- 2	1.00192	- 5	1.00274	- 7	1980
1150	1.00027	- 1	1.00107	- 3	1.00187	- 5	1.00267	- 7	2070
1200	1.00026	- 1	1.00104	- 3	1.00182	- 5	1.00260	- 7	2160
1250	1.00025		1.00101	- 3	1.00177	- 5	1.00253	- 7	2250
1300	1.00025	- 1	1.00098	- 2	1.00172	- 5	1.00246	- 7	2340
1350	1.00024	- 1	1.00096	- 3	1.00167	- 4	1.00239	- 6	2430
1400	1.00023		1.00093	- 2	1.00163	- 4	1.00233	- 6	2520
1450	1.00023	- 1	1.00091	- 3	1.00159	- 4	1.00227	- 6	2610
1500	1.00022		1.00088	- 2	1.00155	- 4	1.00221	- 5	2700
1550	1.00022	- 1	1.00086	- 2	1.00151	- 4	1.00216	- 6	2790
1600	1.00021	- 1	1.00084	- 2	1.00147	- 4	1.00210	- 5	2880
1650	1.00020		1.00082	- 2	1.00143	- 3	1.00205	- 5	2970
1700	1.00020		1.00080	- 2	1.00140	- 4	1.00200	- 5	3060
1750	1.00020	- 1	1.00078	- 2	1.00136	- 3	1.00195	- 5	3150
1800	1.00019		1.00076	- 2	1.00133	- 3	1.00190	- 4	3240
1850	1.00019	- 1	1.00074	- 2	1.00130	- 3	1.00186	- 5	3330
1900	1.00018		1.00072	- 1	1.00127	- 3	1.00181	- 4	3420
1950	1.00018	- 1	1.00071	- 2	1.00124	- 3	1.00177	- 4	3510
2000	1.00017		1.00069	- 1	1.00121	- 2	1.00173	- 3	3600
2050	1.00017		1.00068	- 2	1.00119	- 3	1.00170	- 4	3690
2100	1.00017	- 1	1.00066	- 1	1.00116	- 2	1.00166	- 4	3780
2150	1.00016		1.00065	- 2	1.00114	- 3	1.00162	- 3	3870
2200	1.00016		1.00063	- 1	1.00111	- 2	1.00159	- 3	3960
2250	1.00016	- 1	1.00062	- 1	1.00109	- 2	1.00156	- 4	4050
2300	1.00015		1.00061	- 1	1.00107	- 3	1.00152	- 3	4140
2350	1.00015		1.00060	- 2	1.00104	- 2	1.00149	- 3	4230
2400	1.00015	- 1	1.00058	- 1	1.00102	- 2	1.00146	- 3	4320
2450	1.00014		1.00057	- 1	1.00100	- 2	1.00143	- 2	4410
2500	1.00014		1.00056	- 1	1.00098	- 1	1.00141	- 3	4500
2550	1.00014		1.00055	- 1	1.00097	- 2	1.00138	- 3	4590
2600	1.00014	- 1	1.00054	- 1	1.00095	- 2	1.00135	- 2	4680
2650	1.00013		1.00053	- 1	1.00093	- 2	1.00133	- 3	4770
2700	1.00013		1.00052	- 1	1.00091	- 1	1.00130	- 2	4860
2750	1.00013		1.00051	- 1	1.00090	- 2	1.00128	- 2	4950
2800	1.00013	- 1	1.00050	- 1	1.00088	- 1	1.00126	- 2	5040
2850	1.00012		1.00049		1.00087	- 2	1.00124	- 2	5130
2900	1.00012		1.00049	- 1	1.00085	- 1	1.00122	- 3	5220
2950	1.00012		1.00048	- 1	1.00084	- 2	1.00119	- 2	5310
3000	1.00012		1.00047		1.00082		1.00117		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	.9236	141							270
160	.9377	109	.696	69					288
170	.9486	85	.765	47	.525	118			306
180	.9571	69	.812	35	.643	78			324
190	.9640	56	.847	26	.721	55			342
200	.96956	461	.8734	209	.7764	408	.6871	641	360
210	.97417	384	.8943	169	.8172	315	.7512	468	378
220	.97801	324	.9112	138	.8487	250	.7980	357	396
230	.98125	274	.9250	115	.8737	203	.8337	280	414
240	.98399	234	.9365	97	.8940	168	.8617	228	432
250	.98633	200	.9462	82	.9108	141	.8845	188	450
260	.98833	173	.95442	703	.9249	119	.9033	158	468
270	.99006	151	.96145	606	.9368	103	.9191	135	486
280	.99157	131	.96751	524	.9471	88	.9326	115	504
290	.99288	114	.97275	456	.9559	77	.9441	100	522
300	.99402	100	.97731	398	.9636	66	.9541	87	540
310	.99502	88	.98129	350	.9702	59	.9628	77	558
320	.99590	78	.98479	308	.9761	51	.9705	68	576
330	.99668	70	.98787	272	.9812	46	.9773	61	594
340	.99738	61	.99059	241	.9858	40	.9834	53	612
350	.99799	54	.99300	213	.9898	36	.9887	47	630
360	.99853	49	.99513	189	.9934	31	.9934	42	648
370	.99902	43	.99702	171	.9965	29	.9976	38	666
380	.99945	39	.99873	153	.9994	25	1.0014	35	684
390	.99984	35	1.00026	135	1.0019	23	1.0049	30	702
400	1.00019	31	1.00161	119	1.0042	20	1.0079	27	720
410	1.00050	28	1.00280	109	1.0062	18	1.0106	24	738
420	1.00078	25	1.00389	98	1.0080	17	1.0130	23	756
430	1.00103	23	1.00487	87	1.0097	14	1.0153	19	774
440	1.00126	20	1.00574	78	1.0111	13	1.0172	18	792
450	1.00146	19	1.00652	71	1.0124	12	1.0190	15	810
460	1.00165	16	1.00723	63	1.0136	11	1.0205	16	828
470	1.00181	15	1.00786	57	1.0147	9	1.0221	12	846
480	1.00196	14	1.00843	51	1.0156	9	1.0233	11	864
490	1.00210	12	1.00894	48	1.0165	8	1.0244	12	882
500	1.00222	11	1.00942	41	1.0173	6	1.0256	9	900
510	1.00233	9	1.00983	36	1.0179	7	1.0265	8	918
520	1.00242	9	1.01019	33	1.0186	5	1.0273	7	936
530	1.00251	8	1.01052	31	1.0191	5	1.0280	8	954
540	1.00259	7	1.01083	27	1.0196	4	1.0288	5	972
550	1.00266	7	1.01110	24	1.0200	5	1.0293	6	990
560	1.00273	6	1.01134	21	1.0205	3	1.0299	4	1008
570	1.00279	5	1.01155	19	1.0208	3	1.0303	5	1026
580	1.00284	4	1.01174	16	1.0211	2	1.0308	3	1044
590	1.00288	4	1.01190	15	1.0213	3	1.0311	3	1062
600	1.00292	4	1.01205	13	1.0216	2	1.0314	4	1080
610	1.00296	3	1.01218	12	1.0218	2	1.0318	4	1098
620	1.00299	3	1.01230	10	1.0220	2	1.0322	2	1116
630	1.00302	2	1.01240	8	1.0222	2	1.0324		1134
640	1.00304	2	1.01248	6	1.0224		1.0324		1152
650	1.00306	2	1.01254	6	1.0224	1	1.0324	1	1170
660	1.00308	1	1.01260	6	1.0225	1	1.0325	2	1188
670	1.00309	1	1.01266	4	1.0226		1.0327	1	1206
680	1.00310	1	1.01270	3	1.0226	1	1.0328		1224
690	1.00311	1	1.01273	2	1.0227		1.0328		1242
700	1.00312	1	1.01275	1	1.0227		1.0328		1260
710	1.00313		1.01276	1	1.0227		1.0328		1278
720	1.00313		1.01277	1	1.0227		1.0328		1296
730	1.00313		1.01278		1.0227		1.0328		1314
740	1.00313		1.01278	-1	1.0227	-1	1.0328	-1	1332
750	1.00313		1.01277		1.0226		1.0327		1350

°K	10 atm		40 atm		70 atm		100 atm		°R
750	1.00313		1.01277	- 1	1.0226		1.0327		1350
760	1.00313		1.01276	- 3	1.0226	- 1	1.0327	- 2	1368
770	1.00313		1.01273	- 3	1.0225		1.0325		1386
780	1.00313	- 1	1.01270	- 1	1.0225		1.0325		1404
790	1.00312	- 1	1.01269	- 4	1.0225	- 1	1.0325	- 2	1422
800	1.00311	- 4	1.01265	- 18	1.0224	- 3	1.0323	- 5	1440
850	1.00307	- 5	1.01247	- 24	1.0221	- 5	1.0318	- 6	1530
900	1.00302	- 7	1.01223	- 27	1.0216	- 5	1.0312	- 8	1620
950	1.00295	- 7	1.01196	- 29	1.0211	- 5	1.0304	- 8	1710
1000	1.00288	- 7	1.01167	- 30	1.0206	- 6	1.0296	- 8	1800
1050	1.00281	- 7	1.01137	- 30	1.0200	- 5	1.0288	- 7	1890
1100	1.00274	- 7	1.01107	- 31	1.0195	- 5	1.0281	- 8	1980
1150	1.00267	- 7	1.01076	- 29	1.0190	- 6	1.0273	- 8	2070
1200	1.00260	- 7	1.01047	- 29	1.0184	- 4	1.0265	- 7	2160
1250	1.00253	- 7	1.01018	- 27	1.0180	- 6	1.0258	- 8	2250
1300	1.00246	- 7	1.00991	- 27	1.0174	- 5	1.0250	- 7	2340
1350	1.00239	- 6	1.00964	- 26	1.0169	- 4	1.0243	- 6	2430
1400	1.00233	- 6	1.00938	- 24	1.0165	- 4	1.0237	- 6	2520
1450	1.00227	- 6	1.00914	- 24	1.0161	- 5	1.0231	- 7	2610
1500	1.00221	- 5	1.00890	- 23	1.0156	- 4	1.0224	- 5	2700
1550	1.00216	- 6	1.00867	- 22	1.0152	- 3	1.0219	- 6	2790
1600	1.00210	- 5	1.00845	- 22	1.0149	- 4	1.0213	- 6	2880
1650	1.00205	- 5	1.00823	- 20	1.0145	- 4	1.0207	- 5	2970
1700	1.00200	- 5	1.00803	- 20	1.0141	- 3	1.0202	- 5	3060
1750	1.00195	- 5	1.00783	- 18	1.0138	- 4	1.0197	- 4	3150
1800	1.00190	- 4	1.00765	- 18	1.0134	- 3	1.0193	- 5	3240
1850	1.00186	- 5	1.00747	- 19	1.0131	- 3	1.0188	- 5	3330
1900	1.00181	- 4	1.00728	- 17	1.0128	- 3	1.0183	- 4	3420
1950	1.00177	- 4	1.00711	- 15	1.0125	- 3	1.0179	- 4	3510
2000	1.00173	- 3	1.00696	- 15	1.0122	- 3	1.0175	- 4	3600
2050	1.00170	- 4	1.00681	- 15	1.0119	- 2	1.0171	- 4	3690
2100	1.00166	- 4	1.00666	- 14	1.0117	- 3	1.0167	- 3	3780
2150	1.00162	- 3	1.00652	- 14	1.0114	- 2	1.0164	- 3	3870
2200	1.00159	- 3	1.00638	- 14	1.0112	- 2	1.0161	- 4	3960
2250	1.00156	- 4	1.00624	- 14	1.0110	- 3	1.0157	- 4	4050
2300	1.00152	- 3	1.00610	- 12	1.0107	- 2	1.0153	- 3	4140
2350	1.00149	- 3	1.00598	- 12	1.0105	- 2	1.0150	- 3	4230
2400	1.00146	- 3	1.00586	- 11	1.0103	- 2	1.0147	- 3	4320
2450	1.00143	- 2	1.00575	- 11	1.0101	- 2	1.0144	- 2	4410
2500	1.00141	- 3	1.00564	- 11	1.0099	- 2	1.0142	- 3	4500
2550	1.00138	- 3	1.00553	- 10	1.0097	- 2	1.0139	- 3	4590
2600	1.00135	- 2	1.00543	- 10	1.0095	- 2	1.0136	- 2	4680
2650	1.00133	- 3	1.00533	- 10	1.0093	- 1	1.0134	- 3	4770
2700	1.00130	- 2	1.00523	- 9	1.0092	- 2	1.0131	- 2	4860
2750	1.00128	- 2	1.00514	- 9	1.0090	- 1	1.0129	- 2	4950
2800	1.00126	- 2	1.00505	- 9	1.0089	- 2	1.0127	- 2	5040
2850	1.00124	- 2	1.00496	- 8	1.0087	- 1	1.0125	- 3	5130
2900	1.00122	- 3	1.00488	- 9	1.0086	- 2	1.0122	- 2	5220
2950	1.00119	- 2	1.00479	- 8	1.0084	- 1	1.0120	- 2	5310
3000	1.00117		1.00471		1.0083		1.0118		5400

Table 8-2. DENSITY OF OXYGEN ρ/ρ_0

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	.02730	-249	.27350	-2499	1.10136	-10220	1.94076	-18306	180
110	.02481	-207	.24851	-2079	.99916	- 8461	1.75770	-15069	198
120	.02274	-175	.22772	-1757	.91455	- 7125	1.60701	-12642	216
130	.02099	-150	.21015	-1505	.84330	- 6087	1.48059	-10772	234
140	.01949	-130	.19510	-1304	.78243	- 5261	1.37287	- 9293	252
150	.01819	-113	.18206	-1140	.72982	- 4595	1.27994	- 8103	270
160	.01706	-101	.17066	-1005	.68387	- 4048	1.19891	- 7130	288
170	.01605	- 89	.16061	- 894	.64339	- 3594	1.12761	- 6323	306
180	.01516	- 80	.15167	- 799	.60745	- 3211	1.06438	- 5648	324
190	.01436	- 71	.14368	- 719	.57534	- 2888	1.00790	- 5075	342
200	.01365	- 65	.13649	- 650	.54646	- 2612	.95715	- 4586	360
210	.01300	- 60	.12999	- 592	.52034	- 2372	.91129	- 4165	378
220	.01240	- 53	.12407	- 540	.49662	- 2166	.86964	- 3799	396
230	.01187	- 50	.11867	- 494	.47496	- 1983	.83165	- 3480	414
240	.01137	- 45	.11373	- 455	.45513	- 1825	.79685	- 3199	432
250	.01092	- 42	.10918	- 421	.43688	- 1684	.76486	- 2952	450
260	.01050	- 39	.10497	- 389	.42004	- 1558	.73534	- 2732	468
270	.01011	- 36	.10108	- 361	.40446	- 1447	.70802	- 2536	486
280	.00975	- 34	.09747	- 336	.38999	- 1347	.68266	- 2360	504
290	.00941	- 31	.09411	- 314	.37652	- 1256	.65906	- 2202	522
300	.00910	- 30	.09097	- 293	.36396	- 1176	.63704	- 2060	540
310	.00880	- 27	.08804	- 276	.35220	- 1102	.61644	- 1930	558
320	.00853	- 26	.08528	- 258	.34118	- 1034	.59714	- 1812	576
330	.00827	- 24	.08270	- 243	.33084	- 974	.57902	- 1706	594
340	.00803	- 23	.08027	- 230	.32110	- 919	.56196	- 1608	612
350	.00780	- 22	.07797	- 216	.31191	- 867	.54588	- 1518	630
360	.00758	- 20	.07581	- 205	.30324	- 820	.53070	- 1436	648
370	.00738	- 20	.07376	- 194	.29504	- 777	.51634	- 1361	666
380	.00718	- 18	.07182	- 185	.28727	- 737	.50273	- 1290	684
390	.00700	- 18	.06997	- 174	.27990	- 700	.48983	- 1226	702
400	.00682	- 16	.06823	- 167	.27290	- 666	.47757	- 1166	720
410	.00666	- 16	.06656	- 158	.26624	- 634	.46591	- 1110	738
420	.00650	- 15	.06498	- 152	.25990	- 605	.45481	- 1058	756
430	.00635	- 15	.06346	- 144	.25385	- 577	.44423	- 1010	774
440	.00620	- 14	.06202	- 138	.24808	- 552	.43413	- 966	792
450	.00606	- 13	.06064	- 131	.24256	- 527	.42447	- 923	810
460	.00593	- 12	.05933	- 127	.23729	- 505	.41524	- 884	828
470	.00581	- 12	.05806	- 121	.23224	- 484	.40640	- 847	846
480	.00569	- 12	.05685	- 116	.22740	- 464	.39793	- 813	864
490	.00557	- 11	.05569	- 111	.22276	- 446	.38980	- 780	882
500	.00546	- 11	.05458	- 107	.21830	- 428	.38200	- 749	900
510	.00535	- 10	.05351	- 103	.21402	- 412	.37451	- 721	918
520	.00525	- 10	.05248	- 99	.20990	- 396	.36730	- 693	936
530	.00515	- 10	.05149	- 95	.20594	- 381	.36037	- 667	954
540	.00505	- 9	.05054	- 92	.20213	- 368	.35370	- 643	972
550	.00496	- 9	.04962	- 89	.19845	- 354	.34727	- 621	990
560	.00487	- 8	.04873	- 85	.19491	- 342	.34106	- 598	1008
570	.00479	- 8	.04788	- 83	.19149	- 330	.33508	- 578	1026
580	.00471	- 8	.04705	- 80	.18819	- 319	.32930	- 558	1044
590	.00463	- 8	.04625	- 77	.18500	- 309	.32372	- 540	1062
600	.00455	- 8	.04548	- 74	.18191	- 298	.31832	- 522	1080
610	.00447	- 7	.04474	- 73	.17893	- 289	.31310	- 505	1098
620	.00440	- 7	.04401	- 69	.17604	- 279	.30805	- 489	1116
630	.00433	- 7	.04332	- 68	.17325	- 271	.30316	- 474	1134
640	.00426	- 6	.04264	- 66	.17054	- 262	.29842	- 459	1152
650	.00420	- 7	.04198	- 63	.16792	- 255	.29383	- 445	1170
660	.00413	- 6	.04135	- 62	.16537	- 246	.28938	- 432	1188
670	.00407	- 6	.04073	- 60	.16291	- 240	.28506	- 419	1206
680	.00401	- 6	.04013	- 58	.16051	- 233	.28087	- 408	1224
690	.00395	- 5	.03955	- 57	.15818	- 226	.27679	- 395	1242
700	.00390		.03898		.15592		.27284		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	.00390	- 6	.03898	- 54	.15592	- 219	.27284	- 384	1260
710	.00384	- 5	.03844	- 54	.15373	- 214	.26900	- 374	1278
720	.00379	- 5	.03790	- 52	.15159	- 207	.26526	- 363	1296
730	.00374	- 5	.03738	- 50	.14952	- 202	.26163	- 354	1314
740	.00369	- 5	.03688	- 49	.14750	- 197	.25809	- 344	1332
750	.00364	- 5	.03639	- 48	.14553	- 192	.25465	- 335	1350
760	.00359	- 5	.03591	- 47	.14361	- 186	.25130	- 326	1368
770	.00354	- 4	.03544	- 45	.14175	- 182	.24804	- 318	1386
780	.00350	- 5	.03499	- 45	.13993	- 177	.24486	- 310	1404
790	.00345	- 4	.03454	- 43	.13816	- 173	.24176	- 302	1422
800	.00341	- 20	.03411	- 200	.13643	- 802	.23874	- 1405	1440
850	.00321	- 18	.03211	- 179	.12841	- 714	.22469	- 1248	1530
900	.00303	- 16	.03032	- 159	.12127	- 638	.21221	- 1117	1620
950	.00287	- 14	.02873	- 144	.11489	- 574	.20104	- 1005	1710
1000	.00273	- 13	.02729	- 130	.10915	- 520	.19099	- 909	1800
1050	.00260	- 12	.02599	- 118	.10395	- 472	.18190	- 827	1890
1100	.00248	- 11	.02481	- 108	.09923	- 432	.17363	- 755	1980
1150	.00237	- 10	.02373	- 99	.09491	- 395	.16608	- 692	2070
1200	.00227	- 9	.02274	- 91	.09096	- 364	.15916	- 636	2160
1250	.00218	- 8	.02183	- 84	.08732	- 336	.15280	- 588	2250
1300	.00210	- 8	.02099	- 78	.08396	- 311	.14692	- 544	2340
1350	.00202	- 7	.02021	- 72	.08085	- 289	.14148	- 505	2430
1400	.00195	- 7	.01949	- 67	.07796	- 268	.13643	- 471	2520
1450	.00188	- 6	.01882	- 63	.07528	- 251	.13172	- 439	2610
1500	.00182	- 6	.01819	- 58	.07277	- 235	.12733	- 410	2700
1550	.00176	- 5	.01761	- 55	.07042	- 220	.12323	- 385	2790
1600	.00171	- 6	.01706	- 52	.06822	- 207	.11938	- 362	2880
1650	.00165	- 4	.01654	- 49	.06615	- 194	.11576	- 340	2970
1700	.00161	- 5	.01605	- 46	.06421	- 184	.11236	- 321	3060
1750	.00156	- 4	.01559	- 43	.06237	- 173	.10915	- 304	3150
1800	.00152	- 4	.01516	- 41	.06064	- 164	.10611	- 286	3240
1850	.00148	- 4	.01475	- 39	.05900	- 155	.10325	- 272	3330
1900	.00144	- 4	.01436	- 37	.05745	- 147	.10053	- 258	3420
1950	.00140	- 4	.01399	- 35	.05598	- 140	.09795	- 245	3510
2000	.00136	- 3	.01364	- 33	.05458	- 134	.09550	- 233	3600
2050	.00133	- 3	.01331	- 31	.05324	- 126	.09317	- 221	3690
2100	.00130	- 3	.01300	- 31	.05198	- 121	.09096	- 212	3780
2150	.00127	- 3	.01269	- 29	.05077	- 115	.08884	- 202	3870
2200	.00124	- 3	.01240	- 27	.04962	- 111	.08682	- 193	3960
2250	.00121	- 2	.01213	- 27	.04851	- 105	.08489	- 184	4050
2300	.00119	- 3	.01186	- 25	.04746	- 101	.08305	- 177	4140
2350	.00116	- 2	.01161	- 24	.04645	- 97	.08128	- 169	4230
2400	.00114	- 3	.01137	- 23	.04548	- 93	.07959	- 163	4320
2450	.00111	- 2	.01114	- 22	.04455	- 89	.07796	- 156	4410
2500	.00109	- 2	.01092	- 22	.04366	- 85	.07640	- 149	4500
2550	.00107	- 2	.01070	- 20	.04281	- 83	.07491	- 144	4590
2600	.00105	- 2	.01050	- 20	.04198	- 79	.07347	- 139	4680
2650	.00103	- 2	.01030	- 19	.04119	- 76	.07208	- 133	4770
2700	.00101	- 2	.01011	- 19	.04043	- 74	.07075	- 129	4860
2750	.00099	- 2	.00992	- 17	.03969	- 71	.06946	- 124	4950
2800	.00097	- 1	.00975	- 17	.03898	- 68	.06822	- 120	5040
2850	.00096	- 2	.00958	- 17	.03830	- 66	.06702	- 115	5130
2900	.00094	- 2	.00941	- 16	.03764	- 64	.06587	- 112	5220
2950	.00092	- 1	.00925	- 15	.03700	- 62	.06475	- 108	5310
3000	.00091		.00910		.03638		.06367		5400

ρ/ρ_0

°K	1 atm		4 atm		7 atm		10 atm		°R
100	2.79257	-26816							180
110	2.52441	-21916	10.755	-1106					198
120	2.30525	-18318	9.649	- 860	17.86	-1851			216
130	2.12207	-15563	8.789	- 702	16.009	-1421			234
140	1.96644	-13398	8.087	- 591	14.588	-1150			252
150	1.83246	-11665	7.496	- 506	13.438	- 964	19.69	-151	270
160	1.71581	-10252	6.990	- 438	12.474	- 823	18.18	-126	288
170	1.61329	- 9082	6.552	- 384	11.651	- 713	16.92	-108	306
180	1.52247	- 8108	6.168	- 340	10.938	- 626	15.84	- 94	324
190	1.44139	- 7279	5.828	- 304	10.312	- 554	14.90	- 83	342
200	1.36860	- 6575	5.5245	- 2727	9.7584	- 4949	14.073	- 734	360
210	1.30285	- 5968	5.2518	- 2463	9.2635	- 4450	13.339	- 656	378
220	1.24317	- 5443	5.0055	- 2237	8.8185	- 4026	12.683	- 592	396
230	1.18874	- 4984	4.7818	- 2042	8.4159	- 3662	12.091	- 536	414
240	1.13890	- 4581	4.5776	- 1872	8.0497	- 3347	11.555	- 488	432
250	1.09309	- 4224	4.3904	- 1723	7.7150	- 3072	11.067	- 447	450
260	1.05085	- 3909	4.2181	- 1590	7.4078	- 2830	10.620	- 412	468
270	1.01176	- 3628	4.0591	- 1473	7.1248	- 2617	10.208	- 379	486
280	.97548	- 3376	3.9118	- 1369	6.8631	- 2428	9.829	- 352	504
290	.94172	- 3149	3.7749	- 1275	6.6203	- 2258	9.477	- 326	522
300	.91023	- 2946	3.6474	- 1190	6.39455	- 21063	9.151	- 304	540
310	.88077	- 2760	3.5284	- 1115	6.18392	- 19697	8.847	- 284	558
320	.85317	- 2592	3.4169	- 1046	5.98695	- 18456	8.563	- 266	576
330	.82725	- 2438	3.3123	- 983	5.80239	- 17343	8.297	- 250	594
340	.80287	- 2299	3.21404	- 9261	5.62896	- 16318	8.047	- 235	612
350	.77988	- 2170	3.12143	- 8738	5.46578	- 15385	7.812	- 221	630
360	.75818	- 2053	3.03405	- 8256	5.31193	- 14532	7.591	- 209	648
370	.73765	- 1945	2.95149	- 7816	5.16661	- 13747	7.382	- 197	666
380	.71820	- 1844	2.87333	- 7412	5.02914	- 13028	7.185	- 187	684
390	.69976	- 1751	2.79921	- 7036	4.89886	- 12367	6.998	- 177	702
400	.68225	- 1666	2.72885	- 6688	4.77519	- 11749	6.8212	- 1684	720
410	.66559	- 1587	2.66197	- 6369	4.65770	- 11176	6.6528	- 1603	738
420	.64972	- 1513	2.59828	- 6068	4.54594	- 10652	6.4925	- 1525	756
430	.63459	- 1443	2.53760	- 5790	4.43942	- 10159	6.3400	- 1456	774
440	.62016	- 1380	2.47970	- 5530	4.33783	- 9699	6.1944	- 1388	792
450	.60636	- 1319	2.42440	- 5289	4.24084	- 9273	6.0556	- 1328	810
460	.59317	- 1263	2.37151	- 5060	4.14811	- 8874	5.9228	- 1269	828
470	.58054	- 1210	2.32091	- 4848	4.05937	- 8497	5.7959	- 1216	846
480	.56844	- 1161	2.27243	- 4651	3.97440	- 8150	5.6743	- 1166	864
490	.55683	- 1115	2.22592	- 4463	3.89290	- 7816	5.5577	- 1118	882
500	.54568	- 1070	2.18129	- 4286	3.81474	- 7510	5.4459	- 1074	900
510	.53498	- 1030	2.13843	- 4121	3.73964	- 7217	5.3385	- 1031	918
520	.52468	- 990	2.09722	- 3963	3.66747	- 6941	5.2354	- 993	936
530	.51478	- 953	2.05759	- 3818	3.59806	- 6685	5.1361	- 955	954
540	.50525	- 920	2.01941	- 3678	3.53121	- 6437	5.0406	- 920	972
550	.49605	- 886	1.98263	- 3544	3.46684	- 6205	4.9486	- 887	990
560	.48719	- 855	1.94719	- 3420	3.40479	- 5986	4.8599	- 855	1008
570	.47864	- 825	1.91299	- 3302	3.34493	- 5781	4.7744	- 826	1026
580	.47039	- 798	1.87997	- 3190	3.28712	- 5581	4.6918	- 797	1044
590	.46241	- 771	1.84807	- 3084	3.23131	- 5395	4.6121	- 770	1062
600	.45470	- 745	1.81723	- 2981	3.17736	- 5215	4.5351	- 746	1080
610	.44725	- 722	1.78742	- 2886	3.12521	- 5047	4.4605	- 720	1098
620	.44003	- 698	1.75856	- 2793	3.07474	- 4886	4.3885	- 698	1116
630	.43305	- 677	1.73063	- 2706	3.02588	- 4734	4.3187	- 676	1134
640	.42628	- 656	1.70357	- 2623	2.97854	- 4588	4.2511	- 655	1152
650	.41972	- 636	1.67734	- 2541	2.93266	- 4447	4.1856	- 635	1170
660	.41336	- 617	1.65193	- 2467	2.88819	- 4313	4.1221	- 615	1188
670	.40719	- 599	1.62726	- 2393	2.84506	- 4187	4.0606	- 598	1206
680	.40120	- 581	1.60333	- 2325	2.80319	- 4062	4.0008	- 580	1224
690	.39539	- 565	1.58008	- 2258	2.76257	- 3950	3.9428	- 564	1242
700	.38974		1.55750		2.72307		3.8864		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	.38974	- 549	1.55750	- 2193	2.72307	- 3835	3.8864	- 548	1260
710	.38425	- 534	1.53557	- 2135	2.68472	- 3731	3.8316	- 532	1278
720	.37891	- 519	1.51422	- 2074	2.64741	- 3627	3.7784	- 517	1296
730	.37372	- 505	1.49348	- 2018	2.61114	- 3529	3.7267	- 504	1314
740	.36867	- 491	1.47330	- 1965	2.57585	- 3434	3.6763	- 490	1332
750	.36376	- 479	1.45365	- 1912	2.54151	- 3344	3.6273	- 477	1350
760	.35897	- 466	1.43453	- 1863	2.50807	- 3257	3.5796	- 465	1368
770	.35431	- 455	1.41590	- 1815	2.47550	- 3172	3.5331	- 453	1386
780	.34976	- 442	1.39775	- 1770	2.44378	- 3093	3.4878	- 441	1404
790	.34534	- 432	1.38005	- 1723	2.41285	- 3016	3.4437	- 431	1422
800	.34102	- 2006	1.36282	- 8016	2.38269	- 14009	3.4006	- 1999	1440
850	.32096	- 1783	1.28266	- 7123	2.24260	- 12451	3.2007	- 1776	1530
900	.30313	- 1595	1.21143	- 6373	2.11809	- 11139	3.0231	- 1590	1620
950	.28718	- 1436	1.14770	- 5735	2.00670	- 10024	2.8641	- 1430	1710
1000	.27282	- 1299	1.09035	- 5189	1.90646	- 9070	2.7211	- 1294	1800
1050	.25983	- 1181	1.03846	- 4717	1.81576	- 8245	2.5917	- 1176	1890
1100	.24802	- 1078	.99129	- 4308	1.73331	- 7527	2.4741	- 1074	1980
1150	.23724	- 988	.94821	- 3949	1.65804	- 6901	2.3667	- 984	2070
1200	.22736	- 909	.90872	- 3632	1.58903	- 6348	2.2683	- 906	2160
1250	.21827	- 840	.87240	- 3353	1.52555	- 5861	2.1777	- 836	2250
1300	.20987	- 777	.83887	- 3105	1.46694	- 5426	2.0941	- 774	2340
1350	.20210	- 722	.80782	- 2883	1.41268	- 5040	2.0167	- 719	2430
1400	.19488	- 672	.77899	- 2684	1.36228	- 4692	1.9448	- 670	2520
1450	.18816	- 627	.75215	- 2505	1.31536	- 4379	1.8778	- 625	2610
1500	.18189	- 586	.72710	- 2344	1.27157	- 4097	1.8153	- 584	2700
1550	.17603	- 550	.70366	- 2198	1.23060	- 3841	1.7569	- 548	2790
1600	.17053	- 517	.68168	- 2064	1.19219	- 3608	1.7021	- 515	2880
1650	.16536	- 486	.66104	- 1943	1.15611	- 3397	1.6506	- 485	2970
1700	.16050	- 459	.64161	- 1832	1.12214	- 3202	1.6021	- 457	3060
1750	.15591	- 433	.62329	- 1730	1.09012	- 3025	1.5564	- 432	3150
1800	.15158	- 409	.60599	- 1637	1.05987	- 2861	1.5132	- 408	3240
1850	.14749	- 388	.58962	- 1550	1.03126	- 2711	1.4724	- 387	3330
1900	.14361	- 369	.57412	- 1472	1.00415	- 2572	1.4337	- 367	3420
1950	.13992	- 349	.55940	- 1397	.97843	- 2443	1.3970	- 348	3510
2000	.13643	- 333	.54543	- 1330	.95400	- 2325	1.3622	- 332	3600
2050	.13310	- 317	.53213	- 1266	.93075	- 2213	1.3290	- 316	3690
2100	.12993	- 302	.51947	- 1208	.90862	- 2112	1.2974	- 301	3780
2150	.12691	- 288	.50739	- 1152	.88750	- 2014	1.2673	- 288	3870
2200	.12403	- 276	.49587	- 1101	.86736	- 1926	1.2385	- 275	3960
2250	.12127	- 264	.48486	- 1054	.84810	- 1842	1.2110	- 263	4050
2300	.11863	- 252	.47432	- 1009	.82968	- 1763	1.1847	- 251	4140
2350	.11611	- 242	.46423	- 966	.81205	- 1690	1.1596	- 242	4230
2400	.11369	- 232	.45457	- 927	.79515	- 1621	1.1354	- 231	4320
2450	.11137	- 222	.44530	- 890	.77894	- 1557	1.1123	- 222	4410
2500	.10915	- 215	.43640	- 856	.76337	- 1496	1.0901	- 214	4500
2550	.10700	- 205	.42784	- 822	.74841	- 1437	1.0687	- 205	4590
2600	.10495	- 198	.41962	- 791	.73404	- 1384	1.0482	- 197	4680
2650	.10297	- 191	.41171	- 762	.72020	- 1332	1.0285	- 191	4770
2700	.10106	- 184	.40409	- 735	.70688	- 1285	1.0094	- 183	4860
2750	.09922	- 177	.39674	- 708	.69403	- 1238	.9911	- 177	4950
2800	.09745	- 171	.38966	- 683	.68165	- 1195	.9734	- 170	5040
2850	.09574	- 165	.38283	- 660	.66970	- 1153	.9564	- 165	5130
2900	.09409	- 159	.37623	- 637	.65817	- 1115	.9399	- 159	5220
2950	.09250	- 154	.36986	- 616	.64702	- 1077	.9240	- 154	5310
3000	.09096		.36370		.63625		.9086		5400

Table 8-2. DENSITY OF OXYGEN - Cont.

ρ/ρ_0

°K	10 atm		40 atm		70 atm		100 atm		°R
150	19.69	-151	124.2	-262					270
160	18.18	-126	98.0	-171					288
170	16.92	-108	80.9	-63					306
180	15.84	-94	74.6	-68	164.9	-256			324
190	14.90	-83	67.8	-54	139.3	-163			342
200	14.073	-734	62.4	-43	123.0	-117	198.5	-256	360
210	13.339	-656	58.1	-37	111.3	-90	172.9	-175	378
220	12.683	-592	54.4	-31	102.3	-73	155.4	-131	396
230	12.091	-536	51.30	-274	95.0	-60	142.3	-104	414
240	11.555	-488	48.56	-242	89.0	-51	131.9	-85	432
250	11.067	-447	46.14	-216	83.89	-446	123.41	-722	450
260	10.620	-412	43.98	-193	79.43	-391	116.19	-622	468
270	10.208	-379	42.05	-176	75.525	-3490	109.97	-547	486
280	9.829	-352	40.29	-160	72.035	-3124	104.50	-483	504
290	9.477	-326	38.69	-146	68.911	-2829	99.67	-433	522
300	9.151	-304	37.231	-1347	66.082	-2567	95.34	-391	540
310	8.847	-284	35.884	-1245	63.515	-2357	91.43	-356	558
320	8.563	-266	34.639	-1154	61.158	-2161	87.87	-325	576
330	8.297	-250	33.485	-1075	58.997	-2003	84.618	-2999	594
340	8.047	-235	32.410	-1002	56.994	-1852	81.619	-2757	612
350	7.812	-221	31.408	-938	55.142	-1726	78.862	-2553	630
360	7.591	-209	30.470	-880	53.416	-1605	76.309	-2375	648
370	7.382	-197	29.590	-828	51.811	-1510	73.934	-2219	666
380	7.185	-187	28.762	-780	50.301	-1412	71.715	-2082	684
390	6.998	-177	27.982	-736	48.889	-1332	69.633	-1943	702
400	6.8212	-1684	27.246	-696	47.557	-1252	67.690	-1827	720
410	6.6528	-1603	26.550	-661	46.305	-1183	65.863	-1721	738
420	6.4925	-1525	25.889	-626	45.122	-1124	64.142	-1634	756
430	6.3400	-1456	25.263	-596	43.998	-1059	62.508	-1534	774
440	6.1944	-1388	24.667	-567	42.939	-1008	60.974	-1461	792
450	6.0556	-1328	24.100	-540	41.931	-960	59.513	-1379	810
460	5.9228	-1269	23.560	-516	40.971	-915	58.134	-1326	828
470	5.7959	-1216	23.044	-493	40.056	-870	56.808	-1249	846
480	5.6743	-1166	22.551	-471	39.186	-833	55.559	-1192	864
490	5.5577	-1118	22.080	-452	38.353	-797	54.367	-1150	882
500	5.4459	-1074	21.628	-433	37.556	-758	53.217	-1089	900
510	5.3385	-1031	21.195	-415	36.798	-733	52.128	-1042	918
520	5.2354	-993	20.780	-399	36.065	-697	51.086	-998	936
530	5.1361	-955	20.381	-383	35.368	-672	50.088	-966	954
540	5.0406	-920	19.998	-369	34.696	-645	49.122	-917	972
550	4.9486	-887	19.6294	-3551	34.051	-624	48.205	-888	990
560	4.8599	-855	19.2743	-3421	33.427	-596	47.317	-848	1008
570	4.7744	-826	18.9322	-3299	32.831	-576	46.469	-823	1026
580	4.6918	-797	18.6023	-3182	32.255	-553	45.646	-787	1044
590	4.6121	-770	18.2841	-3074	31.702	-537	44.859	-761	1062
600	4.5351	-746	17.9767	-2969	31.165	-517	44.098	-739	1080
610	4.4605	-720	17.6798	-2873	30.648	-500	43.359	-716	1098
620	4.3885	-698	17.3925	-2777	30.148	-485	42.643	-685	1116
630	4.3187	-676	17.1148	-2688	29.663	-469	41.958	-656	1134
640	4.2511	-655	16.8460	-2601	29.194	-449	41.302	-635	1152
650	4.1856	-635	16.5859	-2523	28.745	-438	40.667	-620	1170
660	4.1221	-615	16.3336	-2447	28.307	-426	40.047	-606	1188
670	4.0606	-598	16.0889	-2373	27.881	-410	39.441	-584	1206
680	4.0008	-580	15.8516	-2302	27.471	-400	38.857	-563	1224
690	3.9428	-564	15.6214	-2234	27.071	-387	38.294	-547	1242
700	3.8864	-548	15.3980	-2171	26.684	-376	37.747	-531	1260
710	3.8316	-532	15.1809	-2109	26.308	-365	37.216	-517	1278
720	3.7784	-517	14.9700	-2053	25.943	-356	36.699	-503	1296
730	3.7267	-504	14.7647	-1995	25.587	-346	36.196	-489	1314
740	3.6763	-490	14.5652	-1940	25.241	-334	35.707	-473	1332
750	3.6273		14.3712		24.907		35.234		1350

°K	10 atm		40 atm		70 atm		100 atm		°R
750	3.6273	- 477	14.3712	- 1890	24.907	- 327	35.234	- 463	1350
760	3.5796	- 465	14.1822	- 1838	24.580	- 317	34.771	- 445	1368
770	3.5331	- 453	13.9984	- 1790	24.263	- 311	34.326	- 440	1386
780	3.4878	- 441	13.8194	- 1748	23.952	- 303	33.886	- 429	1404
790	3.4437	- 431	13.6446	- 1700	23.649	- 294	33.457	- 412	1422
800	3.4006	- 1999	13.4746	- 7904	23.355	- 1367	33.045	- 1929	1440
850	3.2007	- 1776	12.6842	- 7019	21.988	- 1212	31.116	- 1712	1530
900	3.0231	- 1590	11.9823	- 6276	20.776	- 1084	29.404	- 1526	1620
950	2.8641	- 1430	11.3547	- 5646	19.692	- 975	27.878	- 1373	1710
1000	2.7211	- 1294	10.7901	- 5108	18.717	- 881	26.505	- 1242	1800
1050	2.5917	- 1176	10.2793	- 4643	17.836	- 802	25.263	- 1132	1890
1100	2.4741	- 1074	9.8150	- 4239	17.034	- 733	24.131	- 1032	1980
1150	2.3667	- 984	9.3911	- 3887	16.301	- 670	23.099	- 945	2070
1200	2.2683	- 906	9.0024	- 3576	15.631	- 619	22.154	- 872	2160
1250	2.1777	- 836	8.6448	- 3303	15.012	- 569	21.282	- 802	2250
1300	2.0941	- 774	8.3145	- 3058	14.443	- 528	20.480	- 745	2340
1350	2.0167	- 719	8.0087	- 2840	13.915	- 492	19.735	- 694	2430
1400	1.9448	- 670	7.7247	- 2646	13.423	- 458	19.041	- 646	2520
1450	1.8778	- 625	7.4601	- 2470	12.965	- 426	18.395	- 601	2610
1500	1.8153	- 584	7.2131	- 2311	12.539	- 399	17.794	- 565	2700
1550	1.7569	- 548	6.9820	- 2167	12.140	- 376	17.229	- 529	2790
1600	1.7021	- 515	6.7653	- 2036	11.764	- 352	16.700	- 496	2880
1650	1.6506	- 485	6.5617	- 1917	11.412	- 332	16.204	- 469	2970
1700	1.6021	- 457	6.3700	- 1808	11.080	- 313	15.735	- 442	3060
1750	1.5564	- 432	6.1892	- 1708	10.767	- 295	15.293	- 419	3150
1800	1.5132	- 408	6.0184	- 1616	10.472	- 280	14.874	- 395	3240
1850	1.4724	- 387	5.8568	- 1531	10.192	- 265	14.479	- 374	3330
1900	1.4337	- 367	5.7037	- 1453	9.927	- 252	14.105	- 357	3420
1950	1.3970	- 348	5.5584	- 1382	9.675	- 239	13.748	- 338	3510
2000	1.3622	- 332	5.4202	- 1314	9.436	- 228	13.410	- 322	3600
2050	1.3290	- 316	5.2888	- 1251	9.208	- 217	13.088	- 307	3690
2100	1.2974	- 301	5.1637	- 1194	8.991	- 206	12.781	- 293	3780
2150	1.2673	- 288	5.0443	- 1140	8.785	- 198	12.488	- 280	3870
2200	1.2385	- 275	4.9303	- 1089	8.587	- 190	12.208	- 267	3960
2250	1.2110	- 263	4.8214	- 1041	8.397	- 180	11.941	- 255	4050
2300	1.1847	- 251	4.7173	- 998	8.217	- 173	11.686	- 245	4140
2350	1.1596	- 242	4.6175	- 957	8.044	- 166	11.441	- 235	4230
2400	1.1354	- 231	4.5218	- 918	7.878	- 159	11.206	- 226	4320
2450	1.1123	- 222	4.4300	- 881	7.719	- 153	10.980	- 217	4410
2500	1.0901	- 214	4.3419	- 847	7.566	- 147	10.763	- 208	4500
2550	1.0687	- 205	4.2572	- 814	7.419	- 141	10.555	- 200	4590
2600	1.0482	- 197	4.1758	- 784	7.278	- 136	10.355	- 194	4680
2650	1.0285	- 191	4.0974	- 755	7.142	- 132	10.161	- 185	4770
2700	1.0094	- 183	4.0219	- 728	7.010	- 126	9.976	- 179	4860
2750	.9911	- 177	3.9491	- 701	6.884	- 122	9.797	- 173	4950
2800	.9734	- 170	3.8790	- 678	6.762	- 117	9.624	- 167	5040
2850	.9564	- 165	3.8112	- 654	6.645	- 114	9.457	- 161	5130
2900	.9399	- 159	3.7458	- 631	6.531	- 110	9.296	- 155	5220
2950	.9240	- 154	3.6827	- 611	6.421	- 106	9.141	- 151	5310
3000	.9086		3.6216		6.315		8.990		5400

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	3.5024	-3	3.5117	-27	3.5459	-126			180
110	3.5021	-2	3.5090	-17	3.5333	-74	3.5597	-145	198
120	3.5019	-2	3.5073	-13	3.5259	-52	3.5452	-94	216
130	3.5017		3.5060	-8	3.5207	-34	3.5358	-63	234
140	3.5017	-1	3.5052	-6	3.5173	-28	3.5295	-50	252
150	3.5016	2	3.5046	-3	3.5145	-19	3.5245	-34	270
160	3.5018	1	3.5043	-2	3.5126	-14	3.5211	-27	288
170	3.5019	3	3.5041	-1	3.5112	-10	3.5184	-20	306
180	3.5022	5	3.5040	3	3.5102	-6	3.5164	-13	324
190	3.5027	7	3.5043	5	3.5096	-1	3.5151	-8	342
200	3.5034	9	3.5048	8	3.5095	3	3.5143	-4	360
210	3.5043	14	3.5056	12	3.5098	8	3.5139	4	378
220	3.5057	17	3.5068	16	3.5106	11	3.5143	8	396
230	3.5074	22	3.5084	21	3.5117	18	3.5151	15	414
240	3.5096	27	3.5105	26	3.5135	24	3.5166	20	432
250	3.5123	33	3.5131	32	3.5159	29	3.5186	27	450
260	3.5156	38	3.5163	38	3.5188	36	3.5213	33	468
270	3.5194	45	3.5201	44	3.5224	42	3.5246	40	486
280	3.5239	50	3.5245	49	3.5266	47	3.5286	47	504
290	3.5289	56	3.5294	56	3.5313	55	3.5333	52	522
300	3.5345	63	3.5350	63	3.5368	61	3.5385	61	540
310	3.5408	69	3.5413	68	3.5429	67	3.5446	66	558
320	3.5477	75	3.5481	75	3.5496	74	3.5512	73	576
330	3.5552	79	3.5556	79	3.5570	78	3.5585	77	594
340	3.5631	86	3.5635	86	3.5648	86	3.5662	84	612
350	3.5717	90	3.5721	90	3.5734	89	3.5746	88	630
360	3.5807	95	3.5811	95	3.5823	94	3.5834	94	648
370	3.5902	100	3.5906	99	3.5917	98	3.5928	98	666
380	3.6002	103	3.6005	103	3.6015	103	3.6026	101	684
390	3.6105	107	3.6108	107	3.6118	106	3.6127	107	702
400	3.6212	110	3.6215	110	3.6224	110	3.6234	108	720
410	3.6322	113	3.6325	113	3.6334	112	3.6342	112	738
420	3.6435	115	3.6438	115	3.6446	115	3.6454	114	756
430	3.6550	118	3.6553	117	3.6561	117	3.6568	117	774
440	3.6668	119	3.6670	119	3.6678	118	3.6685	119	792
450	3.6787	120	3.6789	120	3.6796	120	3.6804	118	810
460	3.6907	122	3.6909	122	3.6916	121	3.6922	122	828
470	3.7029	122	3.7031	122	3.7037	122	3.7044	121	846
480	3.7151	123	3.7153	123	3.7159	123	3.7165	122	864
490	3.7274	122	3.7276	122	3.7282	122	3.7287	122	882
500	3.7396	124	3.7398	124	3.7404	123	3.7409	124	900
510	3.7520	123	3.7522	123	3.7527	123	3.7533	122	918
520	3.7643	122	3.7645	122	3.7650	122	3.7655	121	936
530	3.7765	122	3.7767	122	3.7772	122	3.7776	122	954
540	3.7887	121	3.7889	121	3.7894	120	3.7898	121	972
550	3.8008	121	3.8010	120	3.8014	120	3.8019	120	990
560	3.8129	119	3.8130	119	3.8134	119	3.8139	119	1008
570	3.8248	118	3.8249	118	3.8253	118	3.8258	117	1026
580	3.8366	117	3.8367	117	3.8371	117	3.8375	117	1044
590	3.8483	116	3.8484	116	3.8488	116	3.8492	115	1062
600	3.8599	114	3.8600	114	3.8604	114	3.8607	114	1080
610	3.8713	113	3.8714	113	3.8718	112	3.8721	113	1098
620	3.8826	111	3.8827	111	3.8830	111	3.8834	111	1116
630	3.8937	110	3.8938	110	3.8941	110	3.8945	110	1134
640	3.9047	108	3.9048	108	3.9051	108	3.9055	107	1152
650	3.9155	107	3.9156	107	3.9159	107	3.9162	107	1170
660	3.9262	105	3.9263	105	3.9266	105	3.9269	105	1188
670	3.9367	103	3.9368	103	3.9371	103	3.9374	102	1206
680	3.9470	101	3.9471	101	3.9474	101	3.9476	101	1224
690	3.9571	101	3.9572	101	3.9575	101	3.9577	101	1242
700	3.9672		3.9673		3.9676		3.9678		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	3.9672	98	3.9673	98	3.9676	97	3.9678	98	1260
710	3.9770	96	3.9771	95	3.9773	96	3.9776	95	1278
720	3.9866	95	3.9866	96	3.9869	95	3.9871	96	1296
730	3.9961	93	3.9962	93	3.9964	93	3.9967	93	1314
740	4.0054	91	4.0055	91	4.0057	91	4.0060	90	1332
750	4 0145	90	4.0146	90	4.0148	90	4.0150	90	1350
760	4.0235	88	4.0236	87	4.0238	87	4.0240	88	1368
770	4.0323	86	4.0323	87	4.0325	87	4.0328	86	1386
780	4.0409	85	4.0410	85	4.0412	85	4.0414	85	1404
790	4.0494	83	4.0495	83	4.0497	82	4.0499	82	1422
800	4.0577	393	4.0578	393	4.0580	392	4.0581	393	1440
850	4.0970	357	4.0971	356	4.0972	357	4.0974	356	1530
900	4.1327	325	4.1327	325	4.1329	324	4.1330	325	1620
950	4.1652	296	4.1652	296	4.1653	296	4.1655	296	1710
1000	4.1948	271	4.1948	271	4.1949	271	4.1951	270	1800
1050	4.2219	250	4.2219	250	4.2220	250	4.2221	250	1890
1100	4.2469	229	4.2469	229	4.2470	229	4.2471	229	1980
1150	4.2698	214	4.2698	214	4.2699	214	4.2700	214	2070
1200	4.2912	200	4.2912	200	4.2913	200	4.2914	199	2160
1250	4.3112	188	4.3112	188	4.3113	188	4.3113	188	2250
1300	4.3300	179	4.3300	179	4.3301	179	4.3301	179	2340
1350	4.3479	172	4.3479	172	4.3480	172	4.3480	172	2430
1400	4.3651	164	4.3651	164	4.3652	164	4.3652	164	2520
1450	4.3815	160	4.3815	160	4.3816	159	4.3816	160	2610
1500	4.3975	155	4.3975	155	4.3975	155	4.3976	155	2700
1550	4.4130	152	4.4130	152	4.4130	152	4.4131	152	2790
1600	4.4282	149	4.4282	149	4.4282	149	4.4283	149	2880
1650	4.4431	147	4.4431	147	4.4431	147	4.4432	147	2970
1700	4.4578	146	4.4578	146	4.4578	146	4.4579	146	3060
1750	4.4724	144	4.4724	144	4.4724	144	4.4725	144	3150
1800	4.4868	143	4.4868	143	4.4868	143	4.4869	143	3240
1850	4.5011	142	4.5011	142	4.5011	142	4.5012	142	3330
1900	4.5153	142	4.5153	142	4.5153	142	4.5154	142	3420
1950	4.5295	141	4.5295	141	4.5295	141	4.5296	141	3510
2000	4.5436	140	4.5436	140	4.5436	140	4.5437	140	3600
2050	4.5576	139	4.5576	139	4.5576	139	4.5577	139	3690
2100	4.5715	139	4.5715	139	4.5715	139	4.5716	139	3780
2150	4.5854	139	4.5854	139	4.5854	139	4.5855	138	3870
2200	4.5993	137	4.5993	137	4.5993	137	4.5993	137	3960
2250	4.6130	137	4.6130	137	4.6130	137	4.6130	138	4050
2300	4.6267	137	4.6267	137	4.6267	137	4.6268	136	4140
2350	4.6404	136	4.6404	136	4.6404	136	4.6404	136	4230
2400	4.6540	134	4.6540	134	4.6540	134	4.6540	134	4320
2450	4.6674	134	4.6674	134	4.6674	134	4.6674	134	4410
2500	4.6808	132	4.6808	132	4.6808	132	4.6808	132	4500
2550	4.6940	131	4.6940	131	4.6940	131	4.6940	131	4590
2600	4.7071	129	4.7071	129	4.7071	129	4.7071	129	4680
2650	4.7200	128	4.7200	128	4.7200	128	4.7200	128	4770
2700	4.7328	126	4.7328	126	4.7328	126	4.7328	126	4860
2750	4.7454	125	4.7454	125	4.7454	125	4.7454	125	4950
2800	4.7579	124	4.7579	124	4.7579	124	4.7579	124	5040
2850	4.7703	121	4.7703	121	4.7703	121	4.7703	121	5130
2900	4.7824	120	4.7824	120	4.7824	120	4.7824	120	5220
2950	4.7944	118	4.7944	118	4.7944	118	4.7944	118	5310
3000	4.8062		4.8062		4.8062		4.8062		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
120	3.566	-15							216
130	3.5513	-94							234
140	3.5419	-72	3.684	-38					252
150	3.5347	-52	3.6461	-255	3.781	-56	3.951	-104	270
160	3.5295	-39	3.6206	-188	3.7252	-389	3.847	-67	288
170	3.5256	-30	3.6018	-143	3.6863	-284	3.780	-46	306
180	3.5226	-21	3.5875	-109	3.6579	-216	3.7343	-342	324
190	3.5205	-15	3.5766	-85	3.6363	-167	3.7001	-262	342
200	3.5190	-8	3.5681	-68	3.6196	-132	3.6739	-205	360
210	3.6182	-1	3.5613	-48	3.6064	-102	3.6534	-160	378
220	3.5181	4	3.5565	-39	3.5962	-80	3.6374	-128	396
230	3.5185	11	3.5526	-22	3.5882	-61	3.6246	-100	414
240	3.5196	18	3.5504	-16	3.5821	-43	3.6146	-75	432
250	3.5214	24	3.5488	3	3.5778	-27	3.6071	-55	450
260	3.5238	31	3.5491	10	3.5751	-15	3.6016	-39	468
270	3.5269	38	3.5501	19	3.5736	-1	3.5977	-22	486
280	3.5307	45	3.5520	27	3.5735	10	3.5955	-8	504
290	3.5352	51	3.5547	37	3.5745	21	3.5947	4	522
300	3.5403	59	3.5584	45	3.5766	31	3.5951	17	540
310	3.5462	65	3.5629	52	3.5797	41	3.5968	28	558
320	3.5527	72	3.5681	61	3.5838	49	3.5996	39	576
330	3.5599	76	3.5742	68	3.5887	58	3.6035	47	594
340	3.5675	84	3.5810	74	3.5945	65	3.6082	56	612
350	3.5759	87	3.5884	80	3.6010	72	3.6138	63	630
360	3.5846	93	3.5964	85	3.6082	78	3.6201	70	648
370	3.5939	97	3.6049	91	3.6160	84	3.6271	78	666
380	3.6036	101	3.6140	95	3.6244	89	3.6349	83	684
390	3.6137	106	3.6235	100	3.6333	94	3.6432	88	702
400	3.6243	108	3.6335	103	3.6427	99	3.6520	94	720
410	3.6351	111	3.6438	107	3.6526	102	3.6614	96	738
420	3.6462	114	3.6545	109	3.6628	104	3.6710	101	756
430	3.6576	117	3.6654	113	3.6732	109	3.6811	105	774
440	3.6693	118	3.6767	114	3.6841	110	3.6916	106	792
450	3.6811	118	3.6881	115	3.6951	112	3.7022	108	810
460	3.6929	121	3.6996	118	3.7063	115	3.7130	112	828
470	3.7050	121	3.7114	118	3.7178	115	3.7242	112	846
480	3.7171	122	3.7232	120	3.7293	117	3.7354	114	864
490	3.7293	122	3.7352	118	3.7410	116	3.7468	114	882
500	3.7415	123	3.7470	121	3.7526	118	3.7582	115	900
510	3.7538	122	3.7591	120	3.7644	118	3.7697	115	918
520	3.7660	121	3.7711	119	3.7762	117	3.7812	115	936
530	3.7781	122	3.7830	119	3.7879	117	3.7927	116	954
540	3.7903	120	3.7949	119	3.7996	117	3.8043	114	972
550	3.8023	120	3.8068	118	3.8113	116	3.8157	115	990
560	3.8143	119	3.8186	117	3.8229	115	3.8272	114	1008
570	3.8262	117	3.8303	116	3.8344	115	3.8386	113	1026
580	3.8379	117	3.8419	115	3.8459	113	3.8499	112	1044
590	3.8496	115	3.8534	114	3.8572	113	3.8611	111	1062
600	3.8611	114	3.8648	112	3.8685	111	3.8722	109	1080
610	3.8725	112	3.8760	112	3.8796	110	3.8831	109	1098
620	3.8837	111	3.8872	109	3.8906	108	3.8940	107	1116
630	3.8948	110	3.8981	108	3.9014	107	3.9047	106	1134
640	3.9058	107	3.9089	107	3.9121	106	3.9153	104	1152
650	3.9165	107	3.9196	106	3.9227	104	3.9257	104	1170
660	3.9272	105	3.9302	103	3.9331	103	3.9361	102	1188
670	3.9377	102	3.9405	102	3.9434	101	3.9463	100	1206
680	3.9479	101	3.9507	100	3.9535	99	3.9563	98	1224
690	3.9580	101	3.9607	100	3.9634	99	3.9661	98	1242
700	3.9681		3.9707		3.9733		3.9759		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	3.9681	97	3.9707	97	3.9733	96	3.9759	95	1260
710	3.9778	96	3.9804	95	3.9829	94	3.9854	94	1278
720	3.9874	95	3.9899	94	3.9923	93	3.9948	92	1296
730	3.9969	93	3.9993	92	4.0016	92	4.0040	91	1314
740	4.0062	90	4.0085	90	4.0108	89	4.0131	88	1332
750	4.0152	90	4.0175	89	4.0197	89	4.0219	88	1350
760	4.0242	88	4.0264	87	4.0286	86	4.0307	86	1368
770	4.0330	86	4.0351	85	4.0372	85	4.0393	84	1386
780	4.0416	85	4.0436	84	4.0457	83	4.0477	83	1404
790	4.0501	82	4.0520	83	4.0540	82	4.0560	81	1422
800	4.0583	393	4.0603	389	4.0622	387	4.0641	385	1440
850	4.0976	356	4.0992	355	4.1009	352	4.1026	350	1530
900	4.1332	324	4.1347	322	4.1361	321	4.1376	320	1620
950	4.1656	296	4.1669	295	4.1682	293	4.1696	291	1710
1000	4.1952	270	4.1964	269	4.1975	268	4.1987	267	1800
1050	4.2222	250	4.2233	248	4.2243	248	4.2254	246	1890
1100	4.2472	229	4.2481	228	4.2491	227	4.2500	226	1980
1150	4.2701	214	4.2709	213	4.2718	212	4.2726	211	2070
1200	4.2915	199	4.2922	199	4.2930	198	4.2937	198	2160
1250	4.3114	188	4.3121	187	4.3128	187	4.3135	186	2250
1300	4.3302	179	4.3308	179	4.3315	177	4.3321	177	2340
1350	4.3481	172	4.3487	171	4.3492	171	4.3498	171	2430
1400	4.3653	164	4.3658	163	4.3663	163	4.3669	162	2520
1450	4.3817	159	4.3821	160	4.3826	159	4.3831	159	2610
1500	4.3976	155	4.3981	155	4.3985	155	4.3990	154	2700
1550	4.4131	152	4.4136	151	4.4140	151	4.4144	151	2790
1600	4.4283	149	4.4287	149	4.4291	148	4.4295	148	2880
1650	4.4432	147	4.4436	146	4.4439	147	4.4443	146	2970
1700	4.4579	146	4.4582	146	4.4586	145	4.4589	145	3060
1750	4.4725	144	4.4728	144	4.4731	144	4.4734	144	3150
1800	4.4869	143	4.4872	143	4.4875	142	4.4878	142	3240
1850	4.5012	142	4.5015	141	4.5017	142	4.5020	141	3330
1900	4.5154	142	4.5156	142	4.5159	141	4.5161	142	3420
1950	4.5296	141	4.5298	141	4.5300	141	4.5303	140	3510
2000	4.5437	140	4.5439	140	4.5441	140	4.5443	140	3600
2050	4.5577	139	4.5579	138	4.5581	138	4.5583	138	3690
2100	4.5716	139	4.5717	139	4.5719	139	4.5721	139	3780
2150	4.5855	138	4.5856	139	4.5858	139	4.5860	139	3870
2200	4.5993	137	4.5995	137	4.5997	137	4.5999	136	3960
2250	4.6130	138	4.6132	137	4.6134	137	4.6135	137	4050
2300	4.6268	136	4.6269	137	4.6271	136	4.6272	137	4140
2350	4.6404	136	4.6406	136	4.6407	136	4.6409	135	4230
2400	4.6540	134	4.6542	134	4.6543	134	4.6544	134	4320
2450	4.6674	134	4.6676	134	4.6677	134	4.6678	134	4410
2500	4.6808	132	4.6810	132	4.6811	132	4.6812	132	4500
2550	4.6940	131	4.6942	130	4.6943	130	4.6944	130	4590
2600	4.7071	129	4.7072	129	4.7073	129	4.7074	129	4680
2650	4.7200	128	4.7201	128	4.7202	128	4.7203	128	4770
2700	4.7328	126	4.7329	126	4.7330	126	4.7331	126	4860
2750	4.7454	125	4.7455	125	4.7456	125	4.7457	125	4950
2800	4.7579	124	4.7580	124	4.7581	124	4.7582	124	5040
2850	4.7703	121	4.7704	121	4.7705	121	4.7706	120	5130
2900	4.7824	120	4.7825	120	4.7826	120	4.7826	120	5220
2950	4.7944	118	4.7945	118	4.7946	118	4.7946	118	5310
3000	4.8062		4.8063		4.8064		4.8064		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	3.951	-104							270
160	3.847	- 67							288
170	3.780	- 46	5.7	-7					306
180	3.7343	- 342	5.03	-38					324
190	3.7001	- 262	4.65	-23	6.5	-8			342
200	3.6739	- 205	4.415	-162	5.66	-50	7.6	-11	360
210	3.6534	- 160	4.253	-116	5.16	-33	6.48	- 72	378
220	3.6374	- 128	4.137	- 88	4.831	-237	5.76	- 49	396
230	3.6246	- 100	4.049	- 67	4.594	-168	5.27	- 32	414
240	3.6146	- 75	3.982	- 52	4.426	-125	4.95	- 24	432
250	3.6071	- 55	3.9296	- 422	4.301	- 97	4.710	- 173	450
260	3.6016	- 39	3.8874	- 339	4.204	- 75	4.537	- 130	468
270	3.5977	- 22	3.8535	- 272	4.129	- 60	4.407	- 100	486
280	3.5955	- 8	3.8263	- 222	4.069	- 49	4.307	- 78	504
290	3.5947	4	3.8041	- 179	4.020	- 39	4.229	- 64	522
300	3.5951	17	3.7862	- 141	3.981	- 32	4.165	- 52	540
310	3.5968	28	3.7721	- 111	3.949	- 26	4.113	- 41	558
320	3.5996	39	3.7610	- 84	3.923	- 22	4.072	- 34	576
330	3.6035	47	3.7526	- 60	3.901	- 17	4.038	- 29	594
340	3.6082	56	3.7466	- 41	3.884	- 15	4.009	- 23	612
350	3.6138	63	3.7425	- 22	3.869	- 11	3.986	- 19	630
360	3.6201	70	3.7403	- 7	3.858	- 8	3.967	- 15	648
370	3.6271	78	3.7396	8	3.850	- 6	3.952	- 13	666
380	3.6349	83	3.7404	18	3.844	- 5	3.939	- 10	684
390	3.6432	88	3.7422	31	3.839	- 3	3.929	- 8	702
400	3.6520	94	3.7453	40	3.836	- 1	3.921	- 5	720
410	3.6614	96	3.7493	47	3.835		3.916	- 5	738
420	3.6710	101	3.7540	56	3.835	2	3.911	- 2	756
430	3.6811	105	3.7596	64	3.837	2	3.909	- 1	774
440	3.6916	106	3.7660	69	3.839	3	3.908		792
450	3.7022	108	3.7729	73	3.842	4	3.908		810
460	3.7130	112	3.7802	79	3.8458	47	3.908	2	828
470	3.7242	112	3.7881	81	3.8505	53	3.910	3	846
480	3.7354	114	3.7962	86	3.8558	57	3.913	3	864
490	3.7468	114	3.8048	86	3.8615	62	3.916	4	882
500	3.7582	115	3.8134	91	3.8677	67	3.920	4	900
510	3.7697	115	3.8225	93	3.8744	70	3.924	5	918
520	3.7812	115	3.8318	93	3.8814	72	3.929	5	936
530	3.7927	116	3.8411	96	3.8886	76	3.934	6	954
540	3.8043	114	3.8507	95	3.8962	76	3.940	6	972
550	3.8157	115	3.8602	97	3.9038	80	3.946	6	990
560	3.8272	114	3.8699	97	3.9118	80	3.952	8	1008
570	3.8386	113	3.8796	96	3.9198	82	3.960	7	1026
580	3.8499	112	3.8892	97	3.9280	82	3.967	6	1044
590	3.8611	111	3.8989	98	3.9362	83	3.973	7	1062
600	3.8722	109	3.9087	96	3.9445	83	3.980	6	1080
610	3.8831	109	3.9183	95	3.9528	83	3.986	8	1098
620	3.8940	107	3.9278	96	3.9611	83	3.994	7	1116
630	3.9047	106	3.9374	94	3.9694	84	4.001	8	1134
640	3.9153	104	3.9468	94	3.9778	83	4.009	7	1152
650	3.9257	104	3.9562	93	3.9861	83	4.016	8	1170
660	3.9361	102	3.9655	92	3.9944	82	4.024	7	1188
670	3.9463	100	3.9747	90	4.0026	81	4.031	7	1206
680	3.9563	98	3.9837	89	4.0107	80	4.038	7	1224
690	3.9661	98	3.9926	90	4.0187	79	4.045	7	1242
700	3.9759	95	4.0016	87	4.0266	78	4.052	7	1260
710	3.9854	94	4.0103	85	4.0344	78	4.059	7	1278
720	3.9948	92	4.0188	85	4.0422	78	4.066	7	1296
730	4.0040	91	4.0273	84	4.0500	76	4.073	7	1314
740	4.0131	88	4.0357	82	4.0576	75	4.080	6	1332
750	4.0219		4.0439		4.0651		4.086		1350

°K	10 atm		40 atm		70 atm		100 atm		°R
750	4.0219	88	4.0439	81	4.0651	75	4.086	8	1350
760	4.0307	86	4.0520	80	4.0726	74	4.094	7	1368
770	4.0393	84	4.0600	77	4.0800	72	4.101	6	1386
780	4.0477	83	4.0677	78	4.0872	71	4.107	7	1404
790	4.0560	81	4.0755	75	4.0943	74	4.114	6	1422
800	4.0641	385	4.0830	360	4.1017	337	4.120	31	1440
850	4.1026	350	4.1190	331	4.1354	310	4.151	29	1530
900	4.1376	320	4.1521	302	4.1664	286	4.180	27	1620
950	4.1696	291	4.1823	278	4.1950	263	4.207	25	1710
1000	4.1987	267	4.2101	254	4.2213	242	4.232	23	1800
1050	4.2254	246	4.2355	236	4.2455	226	4.255	22	1890
1100	4.2500	226	4.2591	217	4.2681	208	4.277	20	1980
1150	4.2726	211	4.2808	204	4.2889	196	4.297	19	2070
1200	4.2937	198	4.3012	190	4.3085	185	4.316	18	2160
1250	4.3135	186	4.3202	180	4.3270	172	4.334	16	2250
1300	4.3321	177	4.3382	173	4.3442	166	4.350	16	2340
1350	4.3498	171	4.3555	166	4.3608	163	4.366	16	2430
1400	4.3669	162	4.3721	158	4.3771	154	4.382	15	2520
1450	4.3831	159	4.3879	155	4.3925	151	4.397	15	2610
1500	4.3990	154	4.4034	150	4.4076	148	4.412	14	2700
1550	4.4144	151	4.4184	148	4.4224	145	4.426	14	2790
1600	4.4295	148	4.4332	145	4.4369	142	4.440	14	2880
1650	4.4443	146	4.4477	144	4.4511	141	4.454	14	2970
1700	4.4589	145	4.4621	143	4.4652	142	4.468	14	3060
1750	4.4734	144	4.4764	141	4.4794	139	4.482	14	3150
1800	4.4878	142	4.4905	142	4.4933	138	4.496	14	3240
1850	4.5020	141	4.5047	138	4.5071	138	4.510	13	3330
1900	4.5161	142	4.5185	140	4.5209	138	4.523	14	3420
1950	4.5303	140	4.5325	139	4.5347	138	4.537	14	3510
2000	4.5443	140	4.5464	138	4.5485	137	4.551	13	3600
2050	4.5583	138	4.5602	137	4.5622	136	4.564	14	3690
2100	4.5721	139	4.5739	139	4.5758	138	4.578	13	3780
2150	4.5860	139	4.5878	138	4.5896	136	4.591	14	3870
2200	4.5999	136	4.6016	135	4.6032	134	4.605	13	3960
2250	4.6135	137	4.6151	136	4.6166	135	4.618	13	4050
2300	4.6272	137	4.6287	136	4.6301	135	4.631	14	4140
2350	4.6409	135	4.6423	135	4.6436	134	4.645	13	4230
2400	4.6544	134	4.6558	133	4.6570	132	4.658	13	4320
2450	4.6678	134	4.6691	133	4.6702	133	4.671	14	4410
2500	4.6812	132	4.6824	131	4.6835	130	4.685	13	4500
2550	4.6944	130	4.6955	130	4.6965	130	4.698	12	4590
2600	4.7074	129	4.7085	128	4.7095	127	4.710	13	4680
2650	4.7203	128	4.7213	128	4.7222	127	4.723	13	4770
2700	4.7331	126	4.7341	125	4.7349	125	4.736	12	4860
2750	4.7457	125	4.7466	124	4.7474	124	4.748	13	4950
2800	4.7582	124	4.7590	124	4.7598	123	4.761	12	5040
2850	4.7706	120	4.7714	120	4.7721	120	4.773	12	5130
2900	4.7826	120	4.7834	120	4.7841	119	4.785	12	5220
2950	4.7946	118	4.7954	118	4.7960	117	4.797	11	5310
3000	4.8064		4.8072		4.8077		4.808		5400

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	1.2772	1282	1.2752	1285	1.2687	1294	1.2625	1300	180
110	1.4054	1281	1.4037	1284	1.3981	1292	1.3925	1298	198
120	1.5335	1283	1.5321	1284	1.5273	1290	1.5223	1296	216
130	1.6618	1282	1.6605	1283	1.6563	1288	1.6519	1293	234
140	1.7900	1282	1.7888	1284	1.7851	1287	1.7812	1293	252
150	1.9182	1281	1.9172	1282	1.9138	1286	1.9105	1288	270
160	2.0463	1282	2.0454	1283	2.0424	1285	2.0393	1289	288
170	2.1745	1282	2.1737	1283	2.1709	1286	2.1682	1288	306
180	2.3027	1282	2.3020	1282	2.2995	1284	2.2970	1286	324
190	2.4309	1283	2.4302	1284	2.4279	1286	2.4256	1288	342
200	2.5592	1282	2.5586	1282	2.5565	1284	2.5544	1285	360
210	2.6874	1283	2.6868	1284	2.6849	1285	2.6829	1287	378
220	2.8157	1284	2.8152	1284	2.8134	1286	2.8116	1287	396
230	2.9441	1284	2.9436	1285	2.9420	1285	2.9403	1287	414
240	3.0725	1287	3.0721	1286	3.0705	1288	3.0690	1288	432
250	3.2012	1286	3.2007	1286	3.1993	1287	3.1978	1288	450
260	3.3298	1288	3.3293	1289	3.3280	1289	3.3266	1290	468
270	3.4586	1289	3.4582	1289	3.4569	1290	3.4556	1291	486
280	3.5875	1291	3.5871	1291	3.5859	1292	3.5847	1293	504
290	3.7166	1293	3.7162	1293	3.7151	1294	3.7140	1294	522
300	3.8459	1295	3.8455	1296	3.8445	1296	3.8434	1297	540
310	3.9754	1297	3.9751	1297	3.9741	1298	3.9731	1298	558
320	4.1051	1300	4.1048	1300	4.1039	1300	4.1029	1302	576
330	4.2351	1303	4.2348	1303	4.2339	1304	4.2331	1304	594
340	4.3654	1306	4.3651	1306	4.3643	1307	4.3635	1307	612
350	4.4960	1309	4.4957	1310	4.4950	1309	4.4942	1310	630
360	4.6269	1313	4.6267	1313	4.6259	1314	4.6252	1314	648
370	4.7582	1316	4.7580	1316	4.7573	1316	4.7566	1317	666
380	4.8898	1320	4.8896	1320	4.8889	1321	4.8883	1321	684
390	5.0218	1324	5.0216	1324	5.0210	1324	5.0204	1324	702
400	5.1542	1327	5.1540	1327	5.1534	1328	5.1528	1328	720
410	5.2869	1332	5.2867	1332	5.2862	1332	5.2856	1333	738
420	5.4201	1336	5.4199	1336	5.4194	1336	5.4189	1337	756
430	5.5537	1340	5.5535	1340	5.5530	1341	5.5526	1340	774
440	5.6877	1345	5.6875	1346	5.6871	1345	5.6866	1346	792
450	5.8222	1349	5.8221	1349	5.8216	1350	5.8212	1349	810
460	5.9571	1353	5.9570	1353	5.9566	1353	5.9561	1354	828
470	6.0924	1358	6.0923	1358	6.0919	1358	6.0915	1359	846
480	6.2282	1362	6.2281	1362	6.2277	1362	6.2274	1362	864
490	6.3644	1367	6.3643	1367	6.3639	1368	6.3636	1368	882
500	6.5011	1371	6.5010	1371	6.5007	1371	6.5004	1371	900
510	6.6382	1376	6.6381	1376	6.6378	1376	6.6375	1376	918
520	6.7758	1380	6.7757	1380	6.7754	1380	6.7751	1381	936
530	6.9138	1385	6.9137	1385	6.9134	1386	6.9132	1385	954
540	7.0523	1389	7.0522	1389	7.0520	1389	7.0517	1390	972
550	7.1912	1394	7.1911	1394	7.1909	1394	7.1907	1394	990
560	7.3306	1398	7.3305	1398	7.3303	1398	7.3301	1398	1008
570	7.4704	1402	7.4703	1402	7.4701	1403	7.4699	1403	1026
580	7.6106	1407	7.6105	1407	7.6104	1407	7.6102	1407	1044
590	7.7513	1411	7.7512	1411	7.7511	1411	7.7509	1411	1062
600	7.8924	1415	7.8923	1416	7.8922	1415	7.8920	1416	1080
610	8.0339	1419	8.0339	1419	8.0337	1419	8.0336	1419	1098
620	8.1758	1423	8.1758	1423	8.1756	1423	8.1755	1423	1116
630	8.3181	1428	8.3181	1428	8.3179	1429	8.3178	1429	1134
640	8.4609	1431	8.4609	1431	8.4608	1431	8.4607	1431	1152
650	8.6040	1436	8.6040	1436	8.6039	1436	8.6038	1436	1170
660	8.7476	1439	8.7476	1439	8.7475	1439	8.7474	1439	1188
670	8.8915	1443	8.8915	1443	8.8914	1443	8.8913	1444	1206
680	9.0358	1447	9.0358	1447	9.0357	1447	9.0357	1447	1224
690	9.1805	1450	9.1805	1450	9.1804	1450	9.1804	1450	1242
700	9.3255		9.3255		9.3254		9.3254		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	9.3255	1454	9.3255	1454	9.3254	1455	9.3254	1454	1260
710	9.4709	1458	9.4709	1458	9.4709	1458	9.4708	1458	1278
720	9.6167	1461	9.6167	1461	9.6167	1461	9.6166	1462	1296
730	9.7628	1465	9.7628	1465	9.7628	1465	9.7628	1465	1314
740	9.9093	1468	9.9093	1468	9.9093	1468	9.9093	1468	1332
750	10.0561	1471	10.0561	1471	10.0561	1471	10.0561	1471	1350
760	10.2032	1475	10.2032	1475	10.2032	1475	10.2032	1475	1368
770	10.3507	1478	10.3507	1478	10.3507	1478	10.3507	1479	1386
780	10.4985	1481	10.4985	1481	10.4985	1481	10.4986	1481	1404
790	10.6466	1484	10.6466	1484	10.6466	1485	10.6467	1484	1422
800	10.7950	7464	10.7950	7464	10.7951	7464	10.7951	7465	1440
850	11.5414	7532	11.5414	7532	11.5415	7531	11.5416	7531	1530
900	12.2946	7595	12.2946	7595	12.2946	7597	12.2947	7597	1620
950	13.0541	7652	13.0541	7653	13.0543	7652	13.0544	7653	1710
1000	13.8193	7703	13.8194	7703	13.8195	7703	13.8197	7703	1800
1050	14.5896	7751	14.5897	7751	14.5898	7752	14.5900	7751	1890
1100	15.3647	7795	15.3648	7795	15.3650	7795	15.3651	7796	1980
1150	16.1442	7836	16.1443	7836	16.1445	7836	16.1447	7836	2070
1200	16.9278	7873	16.9279	7873	16.9281	7873	16.9283	7873	2160
1250	17.7151	7908	17.7152	7908	17.7154	7908	17.7156	7909	2250
1300	18.5059	7943	18.5060	7943	18.5062	7943	18.5065	7943	2340
1350	19.3002	7974	19.3003	7974	19.3005	7975	19.3008	7974	2430
1400	20.0976	8005	20.0977	8005	20.0980	8005	20.0982	8005	2520
1450	20.8981	8035	20.8982	8035	20.8985	8035	20.8987	8036	2610
1500	21.7016	8064	21.7017	8064	21.7020	8064	21.7023	8064	2700
1550	22.5080	8091	22.5081	8091	22.5084	8091	22.5087	8091	2790
1600	23.3171	8119	23.3172	8119	23.3175	8119	23.3178	8119	2880
1650	24.1290	8147	24.1291	8147	24.1294	8147	24.1297	8147	2970
1700	24.9437	8172	24.9438	8172	24.9441	8172	24.9444	8172	3060
1750	25.7609	8200	25.7610	8200	25.7613	8200	25.7616	8201	3150
1800	26.5809	8227	26.5810	8227	26.5813	8227	26.5817	8227	3240
1850	27.4036	8252	27.4037	8252	27.4040	8252	27.4044	8252	3330
1900	28.2288	8277	28.2289	8277	28.2292	8278	28.2296	8277	3420
1950	29.0565	8304	29.0566	8304	29.0570	8304	29.0573	8304	3510
2000	29.8869	8329	29.8870	8329	29.8874	8329	29.8877	8329	3600
2050	30.7198	8356	30.7199	8356	30.7203	8356	30.7206	8356	3690
2100	31.5554	8381	31.5555	8381	31.5559	8381	31.5562	8381	3780
2150	32.3935	8406	32.3936	8406	32.3940	8406	32.3943	8406	3870
2200	33.2341	8430	33.2342	8430	33.2346	8430	33.2349	8430	3960
2250	34.0771	8456	34.0772	8456	34.0776	8456	34.0779	8456	4050
2300	34.9227	8482	34.9228	8482	34.9232	8482	34.9235	8483	4140
2350	35.7709	8508	35.7710	8508	35.7714	8508	35.7718	8508	4230
2400	36.6217	8530	36.6218	8530	36.6222	8530	36.6226	8530	4320
2450	37.4747	8555	37.4748	8555	37.4752	8555	37.4756	8555	4410
2500	38.3302	8580	38.3303	8580	38.3307	8580	38.3311	8580	4500
2550	39.1882	8605	39.1883	8605	39.1887	8605	39.1891	8605	4590
2600	40.0487	8627	40.0488	8627	40.0492	8627	40.0496	8627	4680
2650	40.9114	8651	40.9115	8651	40.9119	8651	40.9123	8651	4770
2700	41.7765	8675	41.7766	8675	41.7770	8675	41.7774	8675	4860
2750	42.6440	8698	42.6441	8698	42.6445	8698	42.6449	8698	4950
2800	43.5138	8720	43.5139	8720	43.5143	8720	43.5147	8720	5040
2850	44.3858	8743	44.3859	8743	44.3863	8743	44.3867	8743	5130
2900	45.2601	8765	45.2602	8765	45.2606	8765	45.2610	8765	5220
2950	46.1366	8786	46.1367	8786	46.1371	8786	46.1375	8786	5310
3000	47.0152		47.0153		47.0157		47.0161		5400

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
100	1.254	132							180
110	1.3865	1310	1.315	148					198
120	1.5175	1302	1.4628	1393	1.394	156			216
130	1.6477	1298	1.6021	1360	1.5505	1449			234
140	1.7775	1295	1.7381	1340	1.6954	1400			252
150	1.9070	1292	1.8721	1329	1.8354	1373	1.7963	1427	270
160	2.0362	1292	2.0050	1324	1.9727	1356	1.9390	1395	288
170	2.1654	1290	2.1374	1315	2.1083	1344	2.0785	1375	306
180	2.2944	1289	2.2689	1311	2.2427	1335	2.2160	1360	324
190	2.4233	1290	2.4000	1308	2.3762	1329	2.3520	1351	342
200	2.5523	1287	2.5308	1305	2.5091	1322	2.4871	1340	360
210	2.6810	1288	2.6613	1302	2.6413	1319	2.6211	1334	378
220	2.8098	1288	2.7915	1302	2.7732	1315	2.7545	1329	396
230	2.9386	1288	2.9217	1300	2.9047	1312	2.8874	1325	414
240	3.0674	1289	3.0517	1300	3.0359	1310	3.0199	1323	432
250	3.1963	1290	3.1817	1299	3.1669	1310	3.1522	1319	450
260	3.3253	1291	3.3116	1299	3.2979	1308	3.2841	1318	468
270	3.4544	1291	3.4415	1301	3.4287	1309	3.4159	1315	486
280	3.5835	1294	3.5716	1301	3.5596	1308	3.5474	1317	504
290	3.7129	1295	3.7017	1302	3.6904	1309	3.6791	1317	522
300	3.8424	1297	3.8319	1303	3.8213	1309	3.8108	1316	540
310	3.9721	1299	3.9622	1305	3.9522	1312	3.9424	1316	558
320	4.1020	1302	4.0927	1307	4.0834	1313	4.0740	1319	576
330	4.2322	1304	4.2234	1310	4.2147	1314	4.2059	1320	594
340	4.3626	1308	4.3544	1312	4.3461	1317	4.3379	1322	612
350	4.4934	1311	4.4856	1315	4.4778	1320	4.4701	1323	630
360	4.6245	1314	4.6171	1319	4.6098	1322	4.6024	1327	648
370	4.7559	1317	4.7490	1321	4.7420	1326	4.7351	1329	666
380	4.8876	1321	4.8811	1325	4.8746	1328	4.8680	1332	684
390	5.0197	1326	5.0136	1328	5.0074	1332	5.0012	1337	702
400	5.1523	1328	5.1464	1332	5.1406	1335	5.1349	1338	720
410	5.2851	1333	5.2796	1336	5.2741	1339	5.2687	1342	738
420	5.4184	1337	5.4132	1340	5.4080	1343	5.4029	1346	756
430	5.5521	1341	5.5472	1344	5.5423	1346	5.5375	1349	774
440	5.6862	1346	5.6816	1348	5.6769	1352	5.6724	1354	792
450	5.8208	1349	5.8164	1352	5.8121	1354	5.8078	1357	810
460	5.9557	1354	5.9516	1357	5.9475	1359	5.9435	1361	828
470	6.0911	1359	6.0873	1361	6.0834	1363	6.0796	1366	846
480	6.2270	1363	6.2234	1365	6.2197	1367	6.2162	1369	864
490	6.3633	1367	6.3599	1369	6.3564	1372	6.3531	1374	882
500	6.5000	1372	6.4968	1374	6.4936	1376	6.4905	1378	900
510	6.6372	1377	6.6342	1378	6.6312	1380	6.6283	1382	918
520	6.7749	1380	6.7720	1383	6.7692	1385	6.7665	1386	936
530	6.9129	1386	6.9103	1387	6.9077	1389	6.9051	1391	954
540	7.0515	1389	7.0490	1391	7.0466	1393	7.0442	1395	972
550	7.1904	1395	7.1881	1397	7.1859	1397	7.1837	1399	990
560	7.3299	1398	7.3278	1400	7.3256	1402	7.3236	1403	1008
570	7.4697	1403	7.4678	1404	7.4658	1405	7.4639	1407	1026
580	7.6100	1407	7.6082	1409	7.6063	1411	7.6046	1412	1044
590	7.7507	1412	7.7491	1412	7.7474	1414	7.7458	1415	1062
600	7.8919	1415	7.8903	1417	7.8888	1418	7.8873	1420	1080
610	8.0334	1420	8.0320	1421	8.0306	1422	8.0293	1423	1098
620	8.1754	1423	8.1741	1425	8.1728	1426	8.1716	1427	1116
630	8.3177	1429	8.3166	1429	8.3154	1431	8.3143	1432	1134
640	8.4606	1431	8.4595	1433	8.4585	1433	8.4575	1435	1152
650	8.6037	1436	8.6028	1437	8.6018	1439	8.6010	1440	1170
660	8.7473	1440	8.7465	1441	8.7457	1441	8.7450	1442	1188
670	8.8913	1443	8.8906	1444	8.8898	1446	8.8892	1447	1206
680	9.0356	1447	9.0350	1448	9.0344	1449	9.0339	1450	1224
690	9.1803	1451	9.1798	1452	9.1793	1452	9.1789	1453	1242
700	9.3254		9.3250		9.3245		9.3242		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	1 atm		4 atm		7 atm		10 atm		°R
700	9.3254	1454	9.3250	1455	9.3245	1457	9.3242	1457	1260
710	9.4708	1458	9.4705	1459	9.4702	1460	9.4699	1461	1278
720	9.6166	1462	9.6164	1462	9.6162	1463	9.6160	1464	1296
730	9.7628	1465	9.7626	1466	9.7625	1467	9.7624	1468	1314
740	9.9093	1468	9.9092	1469	9.9092	1470	9.9092	1471	1332
750	10.0561	1471	10.0561	1473	10.0562	1473	10.0563	1474	1350
760	10.2032	1476	10.2034	1476	10.2035	1477	10.2037	1477	1368
770	10.3508	1478	10.3510	1479	10.3512	1479	10.3514	1481	1386
780	10.4986	1481	10.4989	1482	10.4991	1483	10.4995	1483	1404
790	10.6467	1484	10.6471	1485	10.6474	1486	10.6478	1487	1422
800	10.7951	7465	10.7956	7468	10.7960	7471	10.7965	7475	1440
850	11.5416	7533	11.5424	7536	11.5431	7539	11.5440	7541	1530
900	12.2949	7596	12.2960	7598	12.2970	7601	12.2981	7603	1620
950	13.0545	7653	13.0558	7655	13.0571	7657	13.0584	7659	1710
1000	13.8198	7704	13.8213	7706	13.8228	7708	13.8243	7710	1800
1050	14.5902	7751	14.5919	7753	14.5936	7755	14.5953	7757	1890
1100	15.3653	7796	15.3672	7797	15.3691	7799	15.3710	7801	1980
1150	16.1449	7836	16.1469	7838	16.1490	7839	16.1511	7840	2070
1200	16.9285	7874	16.9307	7875	16.9329	7876	16.9351	7878	2160
1250	17.7159	7908	17.7182	7910	17.7205	7911	17.7229	7912	2250
1300	18.5067	7944	18.5092	7944	18.5116	7946	18.5141	7947	2340
1350	19.3011	7974	19.3036	7976	19.3062	7976	19.3088	7977	2430
1400	20.0985	8005	20.1012	8006	20.1038	8007	20.1065	8008	2520
1450	20.8990	8035	20.9018	8036	20.9045	8037	20.9073	8038	2610
1500	21.7025	8065	21.7054	8065	21.7082	8066	21.7111	8067	2700
1550	22.5090	8091	22.5119	8092	22.5148	8093	22.5178	8093	2790
1600	23.3181	8119	23.3211	8120	23.3241	8121	23.3271	8121	2880
1650	24.1300	8147	24.1331	8148	24.1362	8148	24.1392	8149	2970
1700	24.9447	8173	24.9479	8173	24.9510	8173	24.9541	8174	3060
1750	25.7620	8200	25.7652	8200	25.7683	8202	25.7715	8202	3150
1800	26.5820	8227	26.5852	8228	26.5885	8228	26.5917	8229	3240
1850	27.4047	8252	27.4080	8253	27.4113	8253	27.4146	8253	3330
1900	28.2299	8277	28.2333	8277	28.2366	8278	28.2399	8279	3420
1950	29.0576	8304	29.0610	8305	29.0644	8305	29.0678	8305	3510
2000	29.8880	8330	29.8915	8329	29.8949	8330	29.8983	8331	3600
2050	30.7210	8356	30.7244	8357	30.7279	8357	30.7314	8357	3690
2100	31.5566	8381	31.5601	8381	31.5636	8381	31.5671	8382	3780
2150	32.3947	8406	32.3982	8407	32.4017	8407	32.4053	8407	3870
2200	33.2353	8430	33.2389	8430	33.2424	8431	33.2460	8431	3960
2250	34.0783	8456	34.0819	8456	34.0855	8457	34.0891	8457	4050
2300	34.9239	8482	34.9275	8483	34.9312	8482	34.9348	8483	4140
2350	35.7721	8508	35.7758	8508	35.7794	8509	35.7831	8509	4230
2400	36.6229	8530	36.6266	8530	36.6303	8530	36.6340	8530	4320
2450	37.4759	8555	37.4796	8556	37.4833	8556	37.4870	8556	4410
2500	38.3314	8580	38.3352	8580	38.3389	8580	38.3426	8581	4500
2550	39.1894	8606	39.1932	8605	39.1969	8606	39.2007	8606	4590
2600	40.0500	8627	40.0537	8627	40.0575	8627	40.0613	8627	4680
2650	40.9127	8651	40.9164	8652	40.9202	8652	40.9240	8652	4770
2700	41.7778	8675	41.7816	8675	41.7854	8675	41.7892	8675	4860
2750	42.6453	8698	42.6491	8698	42.6529	8698	42.6567	8699	4950
2800	43.5151	8720	43.5189	8720	43.5227	8721	43.5266	8720	5040
2850	44.3871	8743	44.3909	8744	44.3948	8743	44.3986	8744	5130
2900	45.2614	8765	45.2653	8765	45.2691	8766	45.2730	8765	5220
2950	46.1379	8786	46.1418	8786	46.1457	8786	46.1495	8787	5310
3000	47.0165		47.0204		47.0243		47.0282		5400

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 8-4. ENTHALPY OF OXYGEN - Cont.* $(H-E_0^0)/RT_0$

°K	10 atm		40 atm		70 atm		100 atm		°R
150	1.7963	1427							270
160	1.9390	1395	1.48	23					288
170	2.0785	1375	1.711	194	1.16	33			306
180	2.2160	1360	1.905	177	1.490	261			324
190	2.3520	1351	2.082	166	1.751	221			342
200	2.4871	1340	2.248	158	1.972	198	1.659	257	360
210	2.6211	1334	2.406	153	2.170	182	1.916	222	378
220	2.7545	1329	2.559	150	2.352	172	2.138	202	396
230	2.8874	1325	2.709	142	2.524	165	2.340	186	414
240	3.0199	1323	2.851	150	2.689	160	2.526	177	432
250	3.1522	1319	3.001	143	2.849	156	2.703	169	450
260	3.2841	1318	3.144	142	3.005	152	2.872	163	468
270	3.4159	1315	3.286	140	3.157	150	3.035	160	486
280	3.5474	1317	3.426	140	3.307	148	3.195	156	504
290	3.6791	1317	3.566	139	3.455	147	3.351	154	522
300	3.8108	1316	3.705	138	3.602	145	3.505	151	540
310	3.9424	1316	3.843	138	3.747	144	3.656	150	558
320	4.0740	1319	3.981	138	3.891	143	3.806	148	576
330	4.2059	1320	4.119	137	4.034	142	3.954	147	594
340	4.3379	1322	4.256	137	4.176	142	4.101	147	612
350	4.4701	1323	4.393	137	4.318	142	4.248	146	630
360	4.6024	1327	4.530	137	4.460	141	4.394	145	648
370	4.7351	1329	4.667	137	4.601	141	4.539	144	666
380	4.8680	1332	4.804	137	4.742	140	4.683	144	684
390	5.0012	1337	4.941	137	4.882	141	4.827	144	702
400	5.1349	1338	5.078	137	5.023	140	4.971	143	720
410	5.2687	1342	5.215	137	5.163	141	5.114	143	738
420	5.4029	1346	5.352	138	5.304	140	5.257	143	756
430	5.5375	1349	5.490	138	5.444	141	5.400	143	774
440	5.6724	1354	5.628	138	5.585	140	5.543	144	792
450	5.8078	1357	5.766	138	5.725	141	5.687	143	810
460	5.9435	1361	5.904	138	5.866	141	5.830	143	828
470	6.0796	1366	6.042	139	6.007	141	5.973	143	846
480	6.2162	1369	6.181	139	6.148	141	6.116	143	864
490	6.3531	1374	6.320	140	6.289	142	6.259	144	882
500	6.4905	1378	6.460	140	6.431	141	6.403	143	900
510	6.6283	1382	6.600	140	6.572	142	6.546	144	918
520	6.7665	1386	6.740	140	6.714	142	6.690	144	936
530	6.9051	1391	6.880	141	6.856	143	6.834	144	954
540	7.0442	1395	7.021	141	6.999	143	6.978	144	972
550	7.1837	1399	7.162	141	7.142	143	7.122	145	990
560	7.3236	1403	7.303	142	7.285	143	7.267	145	1008
570	7.4639	1407	7.445	143	7.428	144	7.412	145	1026
580	7.6046	1412	7.588	142	7.572	144	7.557	145	1044
590	7.7458	1415	7.730	143	7.716	144	7.702	146	1062
600	7.8873	1420	7.873	143	7.860	144	7.848	146	1080
610	8.0293	1423	8.016	144	8.004	145	7.994	146	1098
620	8.1716	1427	8.160	144	8.149	145	8.140	146	1116
630	8.3143	1432	8.304	144	8.294	146	8.286	147	1134
640	8.4575	1435	8.448	145	8.440	146	8.433	146	1152
650	8.6010	1440	8.593	145	8.586	146	8.579	148	1170
660	8.7450	1442	8.738	145	8.732	146	8.727	147	1188
670	8.8892	1447	8.883	146	8.878	147	8.874	148	1206
680	9.0339	1450	9.029	146	9.025	147	9.022	147	1224
690	9.1789	1453	9.175	146	9.172	147	9.169	149	1242
700	9.3242		9.321		9.319		9.318		1260

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 8-4. ENTHALPY OF OXYGEN - Cont.* $(H-E_0^o)/RT_0$

°K	10 atm	Δ	40 atm	Δ	70 atm	Δ	100 atm	Δ	°R
700	9.3242	1457	9.321	147	9.319	148	9.318	148	1260
710	9.4699	1461	9.468	147	9.467	148	9.466	149	1278
720	9.6160	1464	9.615	147	9.615	148	9.615	149	1296
730	9.7624	1468	9.762	148	9.763	148	9.764	149	1314
740	9.9092	1471	9.910	148	9.911	149	9.913	150	1332
750	10.0563	1474	10.058	148	10.060	149	10.063	149	1350
760	10.2037	1477	10.206	148	10.209	149	10.212	150	1368
770	10.3514	1481	10.354	149	10.358	149	10.362	151	1386
780	10.4995	1483	10.503	149	10.507	150	10.513	150	1404
790	10.6478	1487	10.652	150	10.657	150	10.663	151	1422
800	10.7965	15016	10.802	1507	10.807	1514	10.814	1519	1440
900	12.2981	15262	12.309	1531	12.321	1536	12.333	1541	1620
1000	13.8243	15467	13.840	1551	13.857	1554	13.874	1557	1800
1100	15.3710	15641	15.391	1567	15.411	1570	15.431	1573	1980
1200	16.9351	15790	16.958	1581	16.981	1584	17.004	1587	2160
1300	18.5141	15924	18.539	1595	18.565	1596	18.591	1598	2340
1400	20.1065	16046	20.134	1606	20.161	1608	20.189	1610	2520
1500	21.7111	16160	21.740	1618	21.769	1619	21.799	1620	2700
1600	23.3271	16270	23.358	1628	23.388	1630	23.419	1631	2880
1700	24.9541	16376	24.986	1639	25.018	1640	25.050	1641	3060
1800	26.5917	16482	26.625	1649	26.658	1650	26.691	1651	3240
1900	28.2399	16584	28.274	1659	28.308	1660	28.342	1661	3420
2000	29.8983	16688	29.933	1669	29.968	1670	30.003	1671	3600
2100	31.5671	16789	31.602	1680	31.638	1680	31.674	1681	3780
2200	33.2460	16888	33.282	1689	33.318	1690	33.355	1690	3960
2300	34.9348	16992	34.971	1700	35.008	1700	35.045	1700	4140
2400	36.6340	17086	36.671	1709	36.708	1710	36.745	1710	4320
2500	38.3426	17187	38.380	1719	38.418	1719	38.455	1720	4500
2600	40.0613	17279	40.099	1728	40.137	1729	40.175	1729	4680
2700	41.7892	17374	41.827	1738	41.866	1738	41.904	1739	4860
2800	43.5266	17464	43.565	1747	43.604	1747	43.643	1747	5040
2900	45.2730	17552	45.312	1755	45.351	1756	45.390	1756	5220
3000	47.0282		47.067		47.107		47.146		5400

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
100	25.4396	3337	23.1336	3345	21.7357	3372	21.1638	3404	180
110	25.7733	3049	23.4681	3054	22.0729	3072	21.5042	3092	198
120	26.0782	2802	23.7735	2806	22.3801	2821	21.8134	2833	216
130	26.3584	2595	24.0541	2598	22.6622	2607	22.0967	2618	234
140	26.6179	2417	24.3139	2419	22.9229	2426	22.3585	2433	252
150	26.8596	2259	24.5558	2261	23.1655	2267	22.6018	2274	270
160	27.0855	2123	24.7819	2124	23.3922	2129	22.8292	2134	288
170	27.2978	2002	24.9943	2003	23.6051	2007	23.0426	2010	306
180	27.4980	1894	25.1946	1896	23.8058	1898	23.2436	1902	324
190	27.6874	1796	25.3842	1796	23.9956	1799	23.4338	1802	342
200	27.8670	1710	25.5638	1711	24.1755	1713	23.6140	1715	360
210	28.0380	1631	25.7349	1631	24.3468	1633	23.7855	1634	378
220	28.2011	1559	25.8980	1559	24.5101	1561	23.9489	1563	396
230	28.3570	1493	26.0539	1494	24.6662	1495	24.1052	1496	414
240	28.5063	1433	26.2033	1433	24.8157	1434	24.2548	1435	432
250	28.6496	1378	26.3466	1378	24.9591	1380	24.3983	1381	450
260	28.7874	1328	26.4844	1329	25.0971	1329	24.5364	1330	468
270	28.9202	1280	26.6173	1280	25.2300	1281	24.6694	1282	486
280	29.0482	1238	26.7453	1238	25.3581	1239	24.7976	1239	504
290	29.1720	1197	26.8691	1198	25.4820	1198	24.9215	1199	522
300	29.2917	1160	26.9889	1160	25.6018	1160	25.0414	1161	540
310	29.4077	1125	27.1049	1125	25.7178	1126	25.1575	1126	558
320	29.5202	1093	27.2174	1093	25.8304	1094	25.2701	1094	576
330	29.6295	1062	27.3267	1062	25.9398	1062	25.3795	1063	594
340	29.7357	1035	27.4329	1035	26.0460	1036	25.4858	1036	612
350	29.8392	1007	27.5364	1007	26.1496	1007	25.5894	1008	630
360	29.9399	982	27.6371	982	26.2503	983	25.6902	983	648
370	30.0381	959	27.7353	959	26.3486	959	25.7885	959	666
380	30.1340	936	27.8312	937	26.4445	936	25.8844	937	684
390	30.2276	916	27.9249	916	26.5381	917	25.9781	917	702
400	30.3192	896	28.0165	896	26.6298	896	26.0698	896	720
410	30.4088	876	28.1061	876	26.7194	876	26.1594	877	738
420	30.4964	859	28.1937	859	26.8070	859	26.2471	859	756
430	30.5823	841	28.2796	841	26.8929	842	26.3330	841	774
440	30.6664	826	28.3637	826	26.9771	826	26.4171	827	792
450	30.7490	810	28.4463	810	27.0597	810	26.4998	810	810
460	30.8300	795	28.5273	795	27.1407	795	26.5808	796	828
470	30.9095	780	28.6068	780	27.2202	780	26.6604	780	846
480	30.9875	768	28.6848	769	27.2982	769	26.7384	768	864
490	31.0643	754	28.7617	754	27.3751	754	26.8152	754	882
500	31.1397	742	28.8371	742	27.4505	742	26.8906	743	900
510	31.2139	730	28.9113	730	27.5247	730	26.9649	730	918
520	31.2869	718	28.9843	718	27.5977	718	27.0379	718	936
530	31.3587	707	29.0561	707	27.6695	707	27.1097	707	954
540	31.4294	696	29.1268	696	27.7402	696	27.1804	697	972
550	31.4990	686	29.1964	686	27.8098	687	27.2501	686	990
560	31.5676	676	29.2650	676	27.8785	676	27.3187	676	1008
570	31.6352	666	29.3326	666	27.9461	666	27.3863	666	1026
580	31.7018	657	29.3992	657	28.0127	657	27.4529	657	1044
590	31.7675	648	29.4649	648	28.0784	648	27.5186	648	1062
600	31.8323	639	29.5297	639	28.1432	639	27.5834	639	1080
610	31.8962	630	29.5936	630	28.2071	630	27.6473	631	1098
620	31.9592	622	29.6566	622	28.2701	622	27.7104	622	1116
630	32.0214	614	29.7188	614	28.3323	614	27.7726	614	1134
640	32.0828	607	29.7802	607	28.3937	607	27.8340	607	1152
650	32.1435	598	29.8409	598	28.4544	598	27.8947	598	1170
660	32.2033	591	29.9007	591	28.5142	591	27.9545	591	1188
670	32.2624	584	29.9598	584	28.5733	584	28.0136	584	1206
680	32.3208	577	30.0182	577	28.6317	577	28.0720	577	1224
690	32.3785	570	30.0759	570	28.6894	571	28.1297	570	1242
700	32.4355		30.1329		28.7465		28.1867		1260

°K	.01 atm		.1 atm		.4 atm		.7 atm		°R
700	32.4355	564	30.1329	564	28.7465	564	28.1867	565	1260
710	32.4919	557	30.1893	557	28.8029	557	28.2432	557	1278
720	32.5476	550	30.2450	550	28.8586	550	28.2989	550	1296
730	32.6026	545	30.3000	545	28.9136	545	28.3539	545	1314
740	32.6571	538	30.3545	538	28.9681	538	28.4084	538	1332
750	32.7109	532	30.4083	532	29.0219	532	28.4622	532	1350
760	32.7641	527	30.4615	527	29.0751	527	28.5154	527	1368
770	32.8168	521	30.5142	521	29.1278	521	28.5681	521	1386
780	32.8689	515	30.5663	515	29.1799	515	28.6202	515	1404
790	32.9204	510	30.6178	510	29.2314	510	28.6717	510	1422
800	32.9714	2472	30.6688	2472	29.2824	2472	28.7227	2472	1440
850	33.2186	2352	30.9160	2352	29.5296	2352	28.9699	2353	1530
900	33.4538	2243	31.1512	2243	29.7648	2243	29.2052	2243	1620
950	33.6781	2145	31.3755	2145	29.9891	2145	29.4295	2145	1710
1000	33.8926	2053	31.5900	2053	30.2036	2053	29.6440	2053	1800
1050	34.0979	1970	31.7953	1970	30.4089	1971	29.8493	1970	1890
1100	34.2949	1893	31.9923	1893	30.6060	1893	30.0463	1893	1980
1150	34.4842	1821	32.1816	1821	30.7953	1821	30.2356	1821	2070
1200	34.6663	1756	32.3637	1756	30.9774	1756	30.4177	1756	2160
1250	34.8419	1695	32.5393	1695	31.1530	1695	30.5933	1695	2250
1300	35.0114	1638	32.7088	1638	31.3225	1638	30.7628	1639	2340
1350	35.1752	1584	32.8726	1584	31.4863	1584	30.9267	1584	2430
1400	35.3336	1535	33.0310	1535	31.6447	1535	31.0851	1535	2520
1450	35.4871	1488	33.1845	1488	31.7982	1488	31.2386	1488	2610
1500	35.6359	1444	33.3333	1444	31.9470	1444	31.3874	1444	2700
1550	35.7803	1404	33.4777	1404	32.0914	1404	31.5318	1404	2790
1600	35.9207	1364	33.6181	1364	32.2318	1364	31.6722	1364	2880
1650	36.0571	1329	33.7545	1329	32.3682	1329	31.8086	1329	2970
1700	36.1900	1294	33.8874	1294	32.5011	1294	31.9415	1294	3060
1750	36.3194	1262	34.0168	1262	32.6305	1262	32.0709	1262	3150
1800	36.4456	1232	34.1430	1232	32.7567	1232	32.1971	1232	3240
1850	36.5688	1202	34.2662	1202	32.8799	1202	32.3203	1202	3330
1900	36.6890	1175	34.3864	1175	33.0001	1175	32.4405	1175	3420
1950	36.8065	1148	34.5039	1148	33.1176	1148	32.5580	1148	3510
2000	36.9213	1124	34.6187	1124	33.2324	1124	32.6728	1124	3600
2050	37.0337	1100	34.7311	1100	33.3448	1100	32.7852	1100	3690
2100	37.1437	1077	34.8411	1077	33.4548	1077	32.8952	1077	3780
2150	37.2514	1056	34.9488	1056	33.5625	1056	33.0029	1056	3870
2200	37.3570	1035	35.0544	1035	33.6681	1035	33.1085	1035	3960
2250	37.4605	1015	35.1579	1015	33.7716	1015	33.2120	1015	4050
2300	37.5620	997	35.2594	997	33.8731	997	33.3135	997	4140
2350	37.6617	978	35.3591	978	33.9728	978	33.4132	978	4230
2400	37.7595	961	35.4569	961	34.0706	961	33.5110	961	4320
2450	37.8556	945	35.5530	945	34.1667	945	33.6071	945	4410
2500	37.9501	928	35.6475	928	34.2612	928	33.7016	928	4500
2550	38.0429	912	35.7403	912	34.3540	912	33.7944	912	4590
2600	38.1341	898	35.8315	898	34.4452	898	33.8856	898	4680
2650	38.2239	884	35.9213	884	34.5350	884	33.9754	884	4770
2700	38.3123	869	36.0097	869	34.6234	869	34.0638	869	4860
2750	38.3992	856	36.0966	856	34.7103	856	34.1507	856	4950
2800	38.4848	844	36.1822	844	34.7959	844	34.2363	844	5040
2850	38.5692	830	36.2666	830	34.8803	830	34.3207	830	5130
2900	38.6522	819	36.3496	819	34.9633	819	34.4037	819	5220
2950	38.7341	807	36.4315	807	35.0452	807	34.4856	807	5310
3000	38.8148		36.5122		35.1259		34.5663		5400

°K	1 atm		4 atm		7 atm		10 atm		°R
100	20.794	344							180
110	21.1381	3113							198
120	21.4494	2848	19.981	304					216
130	21.7342	2627	20.2851	2751	19.651	294			234
140	21.9969	2442	20.5602	2529	19.9448	2639			252
150	22.2411	2279	20.8131	2345	20.2087	2421	19.8036	2514	270
160	22.4690	2138	21.0476	2188	20.4508	2246	20.0550	2310	288
170	22.6828	2016	21.2664	2055	20.6754	2099	20.2860	2148	306
180	22.8844	1904	21.4719	1937	20.8853	1973	20.5008	2010	324
190	23.0748	1805	21.6656	1832	21.0826	1860	20.7018	1890	342
200	23.2553	1717	21.8488	1739	21.2686	1763	20.8908	1788	360
210	23.4270	1636	22.0227	1655	21.4449	1674	21.0696	1695	378
220	23.5906	1564	22.1882	1580	21.6123	1597	21.2391	1614	396
230	23.7470	1498	22.3462	1512	21.7720	1525	21.4005	1540	414
240	23.8968	1437	22.4974	1449	21.9245	1461	21.5545	1473	432
250	24.0405	1381	22.6423	1391	22.0706	1403	21.7018	1415	450
260	24.1786	1331	22.7814	1340	22.2109	1349	21.8433	1359	468
270	24.3117	1283	22.9154	1292	22.3458	1300	21.9792	1306	486
280	24.4400	1240	23.0446	1247	22.4758	1254	22.1098	1263	504
290	24.5640	1199	23.1693	1206	22.6012	1212	22.2361	1218	522
300	24.6839	1162	23.2899	1167	22.7224	1173	22.3579	1179	540
310	24.8001	1127	23.4066	1132	22.8397	1138	22.4758	1142	558
320	24.9128	1094	23.5198	1099	22.9535	1104	22.5900	1108	576
330	25.0222	1064	23.6297	1067	23.0639	1071	22.7008	1076	594
340	25.1286	1036	23.7364	1040	23.1710	1044	22.8084	1048	612
350	25.2322	1008	23.8404	1012	23.2754	1015	22.9132	1019	630
360	25.3330	983	23.9416	986	23.3769	989	23.0151	992	648
370	25.4313	960	24.0402	963	23.4758	966	23.1143	969	666
380	25.5273	937	24.1365	939	23.5724	942	23.2112	944	684
390	25.6210	917	24.2304	920	23.6666	921	23.3056	924	702
400	25.7127	896	24.3224	898	23.7587	902	23.3980	904	720
410	25.8023	877	24.4122	879	23.8489	880	23.4884	882	738
420	25.8900	860	24.5001	862	23.9369	864	23.5766	866	756
430	25.9760	841	24.5863	843	24.0233	845	23.6632	847	774
440	26.0601	827	24.6706	828	24.1078	830	23.7479	831	792
450	26.1428	810	24.7534	812	24.1908	813	23.8310	815	810
460	26.2238	796	24.8346	797	24.2721	798	23.9125	800	828
470	26.3034	780	24.9143	782	24.3519	783	23.9925	784	846
480	26.3814	769	24.9925	769	24.4302	771	24.0709	772	864
490	26.4583	754	25.0694	756	24.5073	757	24.1481	758	882
500	26.5337	742	25.1450	743	24.5830	744	24.2239	746	900
510	26.6079	731	25.2193	732	24.6574	733	24.2985	733	918
520	26.6810	718	25.2925	719	24.7307	720	24.3718	721	936
530	26.7528	707	25.3644	708	24.8027	709	24.4439	710	954
540	26.8235	697	25.4352	697	24.8736	698	24.5149	699	972
550	26.8932	686	25.5049	687	24.9434	688	24.5848	689	990
560	26.9618	676	25.5736	677	25.0122	678	24.6537	678	1008
570	27.0294	666	25.6413	667	25.0800	667	24.7215	668	1026
580	27.0960	658	25.7080	658	25.1467	659	24.7883	660	1044
590	27.1618	648	25.7738	649	25.2126	649	24.8543	650	1062
600	27.2266	639	25.8387	640	25.2775	641	24.9193	641	1080
610	27.2905	630	25.9027	631	25.3416	631	24.9834	632	1098
620	27.3535	622	25.9658	622	25.4047	623	25.0466	623	1116
630	27.4157	615	26.0280	615	25.4670	616	25.1089	616	1134
640	27.4772	607	26.0895	608	25.5286	608	25.1705	609	1152
650	27.5379	598	26.1503	598	25.5894	599	25.2314	599	1170
660	27.5977	591	26.2101	592	25.6493	592	25.2913	593	1188
670	27.6568	584	26.2693	584	25.7085	585	25.3506	585	1206
680	27.7152	577	26.3277	578	25.7670	578	25.4091	578	1224
690	27.7729	570	26.3855	570	25.8248	571	26.4669	572	1242
700	27.8299		26.4425		25.8819		25.5241		1260

°K	1 atm		4 atm		7 atm		10 atm		°R
700	27.8299	564	26.4425	565	25.8819	564	25.5241	565	1260
710	27.8863	558	26.4990	557	25.9383	558	25.5806	558	1278
720	27.9421	550	26.5547	551	25.9941	551	25.6364	551	1296
730	27.9971	545	26.6098	545	26.0492	546	25.6915	546	1314
740	28.0516	538	26.6643	539	26.1038	538	25.7461	539	1332
750	28.1054	532	26.7182	532	26.1576	533	25.8000	533	1350
760	28.1586	527	26.7714	527	26.2109	528	25.8533	528	1368
770	28.2113	521	26.8241	522	26.2637	521	25.9061	522	1386
780	28.2634	515	26.8763	515	26.3158	516	25.9583	516	1404
790	28.3149	510	26.9278	510	26.3674	511	26.0099	511	1422
800	28.3659	2473	26.9788	2474	26.4185	2474	26.0610	2475	1440
850	28.6132	2352	27.2262	2353	26.6659	2354	26.3085	2355	1530
900	28.8484	2243	27.4615	2244	26.9013	2245	26.5440	2246	1620
950	29.0727	2145	27.6859	2146	27.1258	2146	26.7686	2147	1710
1000	29.2872	2054	27.9005	2054	27.3404	2055	26.9833	2055	1800
1050	29.4926	1970	28.1059	1970	27.5459	1971	27.1888	1971	1890
1100	29.6896	1893	28.3029	1894	27.7430	1894	27.3859	1895	1980
1150	29.8789	1821	28.4923	1821	27.9324	1822	27.5754	1822	2070
1200	30.0610	1756	28.6744	1757	28.1146	1756	27.7576	1757	2160
1250	30.2366	1695	28.8501	1695	28.2902	1696	27.9333	1696	2250
1300	30.4061	1638	29.0196	1638	28.4598	1638	28.1029	1638	2340
1350	30.5699	1584	29.1834	1585	28.6236	1585	28.2667	1585	2430
1400	30.7283	1535	29.3419	1535	28.7821	1535	28.4252	1536	2520
1450	30.8818	1489	29.4954	1488	28.9356	1489	28.5788	1488	2610
1500	31.0307	1444	29.6442	1444	29.0845	1444	28.7276	1445	2700
1550	31.1751	1404	29.7886	1404	29.2289	1404	28.8721	1404	2790
1600	31.3155	1364	29.9290	1365	29.3693	1365	29.0125	1364	2880
1650	31.4519	1329	30.0655	1329	29.5058	1329	29.1489	1330	2970
1700	31.5848	1294	30.1984	1295	29.6387	1294	29.2819	1294	3060
1750	31.7142	1262	30.3279	1261	29.7681	1262	29.4113	1262	3150
1800	31.8404	1232	30.4540	1232	29.8943	1232	29.5375	1233	3240
1850	31.9636	1202	30.5772	1202	30.0175	1202	29.6608	1202	3330
1900	32.0838	1175	30.6974	1175	30.1377	1176	29.7810	1175	3420
1950	32.2013	1148	30.8149	1148	30.2553	1148	29.8985	1148	3510
2000	32.3161	1124	30.9297	1124	30.3701	1124	30.0133	1124	3600
2050	32.4285	1100	31.0421	1100	30.4825	1100	30.1257	1101	3690
2100	32.5385	1077	31.1521	1077	30.5925	1077	30.2358	1077	3780
2150	32.6462	1056	31.2598	1057	30.7002	1056	30.3435	1056	3870
2200	32.7518	1035	31.3655	1035	30.8058	1035	30.4491	1035	3960
2250	32.8553	1015	31.4690	1015	30.9093	1015	30.5526	1015	4050
2300	32.9568	997	31.5705	997	31.0108	997	30.6541	997	4140
2350	33.0565	978	31.6702	978	31.1105	978	30.7538	978	4230
2400	33.1543	961	31.7680	961	31.2083	962	30.8516	961	4320
2450	33.2504	945	31.8641	945	31.3045	945	30.9477	945	4410
2500	33.3449	928	31.9586	928	31.3990	928	31.0422	929	4500
2550	33.4377	912	32.0514	912	31.4918	912	31.1351	912	4590
2600	33.5289	898	32.1426	898	31.5830	898	31.2263	898	4680
2650	33.6187	884	32.2324	884	31.6728	884	31.3161	884	4770
2700	33.7071	869	32.3208	869	31.7612	869	31.4045	869	4860
2750	33.7940	856	32.4077	856	31.8481	856	31.4914	856	4950
2800	33.8796	844	32.4933	844	31.9337	844	31.5770	844	5040
2850	33.9640	830	32.5777	830	32.0181	830	31.6614	830	5130
2900	34.0470	819	32.6607	819	32.1011	819	31.7444	819	5220
2950	34.1289	807	32.7426	807	32.1830	807	31.8263	807	5310
3000	34.2096		32.8233		32.2637		31.9070		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
150	19.8036	2514							270
160	20.0550	2310	18.10	37					288
170	20.2860	2148	18.474	304	17.2	5			306
180	20.5008	2010	18.778	261	17.74	38			324
190	20.7018	1890	19.0389	2320	18.121	310			342
200	20.8908	1788	19.2709	2113	18.431	263	17.74	34	360
210	21.0696	1695	19.4822	1949	18.694	232	18.084	282	378
220	21.2391	1614	19.6771	1820	18.926	209	18.366	245	396
230	21.4005	1540	19.8591	1707	19.135	192	18.611	217	414
240	21.5545	1473	20.0298	1616	19.327	178	18.828	196	432
250	21.7018	1415	20.1914	1531	19.505	167	19.024	182	450
260	21.8433	1359	20.3445	1461	19.672	157	19.206	169	468
270	21.9792	1306	20.4906	1396	19.829	149	19.375	158	486
280	22.1098	1263	20.6302	1339	19.978	142	19.533	150	504
290	22.2361	1218	20.7641	1287	20.120	136	19.683	142	522
300	22.3579	1179	20.8928	1239	20.2555	1300	19.825	136	540
310	22.4758	1142	21.0167	1195	20.3855	1248	19.961	130	558
320	22.5900	1108	21.1362	1156	20.5103	1204	20.091	125	576
330	22.7008	1076	21.2518	1119	20.6307	1161	20.216	119	594
340	22.8084	1048	21.3637	1087	20.7468	1126	20.335	117	612
350	22.9132	1019	21.4724	1053	20.8594	1087	20.4516	1120	630
360	23.0151	992	21.5777	1025	20.9681	1055	20.5636	1085	648
370	23.1143	969	21.6802	997	21.0736	1027	20.6721	1052	666
380	23.2112	944	21.7799	972	21.1763	997	20.7773	1021	684
390	23.3056	924	21.8771	948	21.2760	973	20.8794	995	702
400	23.3980	904	21.9719	926	21.3733	947	20.9789	967	720
410	23.4884	882	22.0645	904	21.4680	924	21.0756	943	738
420	23.5766	866	22.1549	883	21.5604	903	21.1699	920	756
430	23.6632	847	22.2432	864	21.6507	880	21.2619	898	774
440	23.7479	831	22.3296	849	21.7387	864	21.3517	878	792
450	23.8310	815	22.4145	830	21.8251	846	21.4395	860	810
460	23.9125	800	22.4975	813	21.9097	827	21.5255	840	828
470	23.9925	784	22.5788	797	21.9924	811	21.6095	823	846
480	24.0709	772	22.6585	785	22.0735	794	21.6918	807	864
490	24.1481	758	22.7370	769	22.1529	782	21.7725	792	882
500	24.2239	746	22.8139	756	22.2311	767	21.8517	777	900
510	24.2985	733	22.8895	744	22.3078	753	21.9294	763	918
520	24.3718	721	22.9639	730	22.3831	740	22.0057	748	936
530	24.4439	710	23.0369	719	22.4571	728	22.0805	736	954
540	24.5149	699	23.1088	708	22.5299	715	22.1541	724	972
550	24.5848	689	23.1796	696	22.6014	704	22.2265	712	990
560	24.6537	678	23.2492	686	22.6718	693	22.2977	699	1008
570	24.7215	668	23.3178	676	22.7411	683	22.3676	689	1026
580	24.7883	660	23.3854	665	22.8094	672	22.4365	679	1044
590	24.8543	650	23.4519	657	22.8766	663	22.5044	668	1062
600	24.9193	641	23.5176	647	22.9429	652	22.5712	659	1080
610	24.9834	632	23.5823	637	23.0081	643	22.6371	648	1098
620	25.0466	623	23.6460	630	23.0724	635	22.7019	639	1116
630	25.1089	616	23.7090	620	23.1359	626	22.7658	631	1134
640	25.1705	609	23.7710	614	23.1985	618	22.8289	623	1152
650	25.2314	599	23.8324	604	23.2603	608	22.8912	613	1170
660	25.2913	593	23.8928	597	23.3211	601	22.9525	605	1188
670	25.3506	585	23.9525	589	23.3812	594	23.0130	597	1206
680	25.4091	578	24.0114	583	23.4406	587	23.0727	591	1224
690	26.4669	572	24.0697	575	23.4993	578	23.1318	582	1242
700	25.5241		24.1272		23.5571		23.1900		1260

°K	10 atm		40 atm		70 atm		100 atm		°R
700	25.5241	565	24.1272	568	23.5571	573	23.1900	576	1260
710	25.5806	558	24.1840	561	23.6144	564	23.2476	568	1278
720	25.6364	551	24.2401	555	23.6708	557	23.3044	561	1296
730	25.6915	546	24.2956	549	23.7265	553	23.3605	555	1314
740	25.7461	539	24.3505	542	23.7818	545	23.4160	548	1332
750	25.8000	533	24.4047	536	23.8363	539	23.4708	542	1350
760	25.8533	528	24.4583	531	23.8902	532	23.5250	536	1368
770	25.9061	522	24.5114	524	23.9434	528	23.5786	530	1386
780	25.9583	516	24.5638	519	23.9962	520	23.6316	523	1404
790	26.0099	511	24.6157	513	24.0482	517	23.6839	518	1422
800	26.0610	2475	24.6670	2487	24.0999	2496	23.7357	2507	1440
850	26.3085	2355	24.9157	2364	24.3495	2374	23.9864	2382	1530
900	26.5440	2246	25.1521	2252	24.5869	2258	24.2246	2267	1620
950	26.7686	2147	25.3773	2153	24.8127	2160	24.4513	2165	1710
1000	26.9833	2055	25.5926	2060	25.0287	2065	24.6678	2070	1800
1050	27.1888	1971	25.7986	1977	25.2352	1982	24.8748	1985	1890
1100	27.3859	1895	25.9963	1898	25.4334	1902	25.0733	1907	1980
1150	27.5754	1822	26.1861	1824	25.6236	1828	25.2640	1831	2070
1200	27.7576	1757	26.3685	1761	25.8064	1763	25.4471	1766	2160
1250	27.9333	1696	26.5446	1698	25.9827	1700	25.6237	1702	2250
1300	28.1029	1638	26.7144	1641	26.1527	1644	25.7939	1646	2340
1350	28.2667	1585	26.8785	1587	26.3171	1589	25.9585	1591	2430
1400	28.4252	1536	27.0372	1538	26.4760	1539	26.1176	1540	2520
1450	28.5788	1488	27.1910	1489	26.6299	1491	26.2716	1493	2610
1500	28.7276	1445	27.3399	1446	26.7790	1447	26.4209	1450	2700
1550	28.8721	1404	27.4845	1405	26.9237	1407	26.5659	1408	2790
1600	29.0125	1364	27.6250	1366	27.0644	1367	26.7067	1367	2880
1650	29.1489	1330	27.7616	1330	27.2011	1331	26.8434	1332	2970
1700	29.2819	1294	27.8946	1295	27.3342	1296	26.9766	1297	3060
1750	29.4113	1262	28.0241	1264	27.4638	1264	27.1063	1265	3150
1800	29.5375	1233	28.1505	1233	27.5902	1234	27.2328	1235	3240
1850	29.6608	1202	28.2738	1203	27.7136	1203	27.3563	1204	3330
1900	29.7810	1175	28.3941	1175	27.8339	1176	27.4767	1177	3420
1950	29.8985	1148	28.5116	1149	27.9515	1149	27.5944	1150	3510
2000	30.0133	1124	28.6265	1125	28.0664	1125	27.7094	1125	3600
2050	30.1257	1101	28.7390	1100	28.1789	1101	27.8219	1101	3690
2100	30.2358	1077	28.8490	1078	28.2890	1079	27.9320	1079	3780
2150	30.3435	1056	28.9568	1057	28.3969	1056	28.0399	1057	3870
2200	30.4491	1035	29.0625	1035	28.5025	1036	28.1456	1036	3960
2250	30.5526	1015	29.1660	1015	28.6061	1016	28.2492	1016	4050
2300	30.6541	997	29.2675	998	28.7077	997	28.3508	998	4140
2350	30.7538	978	29.3673	978	28.8074	979	28.4506	979	4230
2400	30.8516	961	29.4651	962	28.9053	962	28.5485	962	4320
2450	30.9477	945	29.5613	945	29.0015	945	28.6447	946	4410
2500	31.0422	929	29.6558	928	29.0960	929	28.7393	929	4500
2550	31.1351	912	29.7486	913	29.1889	913	28.8322	913	4590
2600	31.2263	898	29.8399	898	29.2802	898	28.9235	898	4680
2650	31.3161	884	29.9297	884	29.3700	885	29.0133	885	4770
2700	31.4045	869	30.0181	869	29.4585	869	29.1018	869	4860
2750	31.4914	856	30.1050	857	29.5454	856	29.1887	857	4950
2800	31.5770	844	30.1907	844	29.6310	844	29.2744	844	5040
2850	31.6614	830	30.2751	830	29.7154	831	29.3588	831	5130
2900	31.7444	819	30.3581	819	29.7985	820	29.4419	820	5220
2950	31.8263	807	30.4400	807	29.8805	807	29.5239	808	5310
3000	31.9070		30.5207		29.9612		29.6047		5400

Table 8-6. SPECIFIC-HEAT RATIO OF OXYGEN $\gamma = C_p/C_v$

°K	.01 atm		.1 atm		1 atm			°R
100	1.400		1.402	-1				180
120	1.400		1.401		1.417	-6		216
140	1.400		1.401		1.411	-3		252
160	1.400		1.401	-1	1.408	-2		288
180	1.400		1.400		1.406	-2		324
200	1.400	-1	1.400		1.404	-1		360
220	1.399		1.400	-1	1.403	-1		396
240	1.399	-1	1.399	-1	1.402	-2		432
260	1.398	-2	1.398	-2	1.400	-2		468
280	1.396	-1	1.396	-1	1.398	-2		504
300	1.395	-2	1.395	-2	1.396	-2		540
320	1.393	-3	1.393	-3	1.394	-2		576
340	1.390	-2	1.390	-2	1.392	-3		612
360	1.388	-3	1.388	-3	1.389	-3		648
380	1.385	-3	1.385	-3	1.386	-4		684
400	1.382	-4	1.382	-4	1.382	-3		720
420	1.378	-3	1.378	-3	1.379	-3		756
440	1.375	-3	1.375	-3	1.376	-4		792
460	1.372	-4	1.372	-4	1.372	-3		828
480	1.368	-3	1.368	-3	1.369	-3		864
500	1.365	-3	1.365	-3	1.366	-4		900
520	1.362	-3	1.362	-3	1.362	-3		936
540	1.359	-3	1.359	-4	1.359	-3		972
560	1.356	-3	1.355	-2	1.356	-3		1008
580	1.353	-3	1.353	-3	1.353	-3		1044
600	1.350	-3	1.350	-3	1.350	-3		1080
620	1.347	-3	1.347	-3	1.347	-3		1116
640	1.344	-2	1.344	-2	1.344	-2		1152
660	1.342	-3	1.342	-3	1.342	-2		1188
680	1.339	-2	1.339	-2	1.340	-3		1224
700	1.337	-2	1.337	-2	1.337	-2		1260
720	1.335	-2	1.335	-2	1.335	-2		1296
740	1.333	-2	1.333	-2	1.333	-2		1332
760	1.331	-2	1.331	-2	1.331	-2		1368
780	1.329	-2	1.329	-2	1.329	-2		1404
800	1.327	-8	1.327	-8	1.327	-8		1440
900	1.319	-6	1.319	-6	1.319	-6		1620
1000	1.313	-5	1.313	-5	1.313	-5		1800
1100	1.308	-4	1.308	-4	1.308	-4		1980
1200	1.304	-4	1.304	-4	1.304	-4		2160
1300	1.300	-3	1.300	-3	1.300	-3		2340
1400	1.297	-3	1.297	-3	1.297	-3		2520
1500	1.294	-2	1.294	-2	1.294	-2		2700
1600	1.292	-3	1.292	-3	1.292	-3		2880
1700	1.289	-2	1.289	-2	1.289	-2		3060
1800	1.287	-2	1.287	-2	1.287	-3		3240
1900	1.285	-3	1.285	-3	1.284	-2		3420
2000	1.282	-2	1.282	-2	1.282	-2		3600
2100	1.280	-2	1.280	-2	1.280	-2		3780
2200	1.278	-2	1.278	-2	1.278	-2		3960
2300	1.276	-2	1.276	-2	1.276	-2		4140
2400	1.274	-2	1.274	-2	1.274	-2		4320
2500	1.272	-2	1.272	-2	1.272	-2		4500
2600	1.270	-2	1.270	-2	1.270	-2		4680
2700	1.268	-2	1.268	-2	1.268	-2		4860
2800	1.266	-2	1.266	-2	1.266	-2		5040
2900	1.264	-1	1.264	-1	1.264	-1		5220
3000	1.263		1.263		1.263			5400

$\gamma = C_p/C_v$

Table 8-6. SPECIFIC-HEAT RATIO OF OXYGEN - Cont.

°K	1 atm		4 atm		7 atm		10 atm		°R
120	1.417	-6							216
140	1.411	-3	1.450	-15					252
160	1.408	-2	1.435	- 9	1.466	-18	1.500	-29	288
180	1.406	-2	1.426	- 6	1.448	-12	1.471	-18	324
200	1.404	-1	1.420	- 5	1.436	- 8	1.453	-12	360
220	1.403	-1	1.415	- 3	1.428	- 6	1.441	- 9	396
240	1.402	-2	1.412	- 4	1.422	- 5	1.432	- 7	432
260	1.400	-2	1.408	- 3	1.417	- 5	1.425	- 5	468
280	1.398	-2	1.405	- 3	1.412	- 4	1.420	- 6	504
300	1.396	-2	1.402	- 3	1.408	- 4	1.414	- 5	540
320	1.394	-2	1.399	- 3	1.404	- 4	1.409	- 4	576
340	1.392	-3	1.396	- 4	1.400	- 4	1.405	- 5	612
360	1.389	-3	1.392	- 3	1.396	- 4	1.400	- 4	648
380	1.386	-4	1.389	- 4	1.392	- 4	1.396	- 5	684
400	1.382	-3	1.385	- 3	1.388	- 4	1.391	- 4	720
420	1.379	-3	1.382	- 4	1.384	- 4	1.387	- 4	756
440	1.376	-4	1.378	- 4	1.380	- 4	1.383	- 5	792
460	1.372	-3	1.374	- 3	1.376	- 3	1.378	- 4	828
480	1.369	-3	1.371	- 4	1.373	- 4	1.374	- 3	864
500	1.366	-4	1.367	- 3	1.369	- 4	1.371	- 4	900
520	1.362	-3	1.364	- 4	1.365	- 3	1.367	- 4	936
540	1.359	-3	1.360	- 3	1.362	- 4	1.363	- 3	972
560	1.356	-3	1.357	- 3	1.358	- 3	1.360	- 4	1008
580	1.353	-3	1.354	- 3	1.355	- 3	1.356	- 3	1044
600	1.350	-3	1.351	- 3	1.352	- 3	1.353	- 3	1080
620	1.347	-3	1.348	- 3	1.349	- 3	1.350	- 3	1116
640	1.344	-2	1.345	- 2	1.346	- 2	1.347	- 3	1152
660	1.342	-2	1.343	- 3	1.344	- 3	1.344	- 2	1188
680	1.340	-3	1.340	- 2	1.341	- 2	1.342	- 3	1224
700	1.337	-2	1.338	- 2	1.339	- 3	1.339	- 2	1260
720	1.335	-2	1.336	- 2	1.336	- 2	1.337	- 2	1296
740	1.333	-2	1.334	- 2	1.334	- 2	1.335	- 2	1332
760	1.331	-2	1.332	- 2	1.332	- 2	1.333	- 2	1368
780	1.329	-2	1.330	- 2	1.330	- 2	1.331	- 2	1404
800	1.327	-8	1.328	- 8	1.328	- 8	1.329	- 9	1440
900	1.319	-6	1.320	- 7	1.320	- 6	1.320	- 6	1620
1000	1.313	-5	1.313	- 5	1.314	- 6	1.314	- 5	1800
1100	1.308	-4	1.308	- 4	1.308	- 4	1.309	- 5	1980
1200	1.304	-4	1.304	- 4	1.304	- 3	1.304	- 3	2160
1300	1.300	-3	1.300	- 3	1.301	- 4	1.301	- 4	2340
1400	1.297	-3	1.297	- 3	1.297	- 3	1.297	- 2	2520
1500	1.294	-2	1.294	- 2	1.294	- 2	1.295	- 3	2700
1600	1.292	-3	1.292	- 3	1.292	- 3	1.292	- 3	2880
1700	1.289	-2	1.289	- 2	1.289	- 2	1.289	- 2	3060
1800	1.287	-3	1.287	- 3	1.287	- 3	1.287	- 2	3240
1900	1.284	-2	1.284	- 2	1.284	- 2	1.285	- 3	3420
2000	1.282	-2	1.282	- 2	1.282	- 2	1.282	- 2	3600
2100	1.280	-2	1.280	- 2	1.280	- 2	1.280	- 2	3780
2200	1.278	-2	1.278	- 2	1.278	- 2	1.278	- 2	3960
2300	1.276	-2	1.276	- 2	1.276	- 2	1.276	- 2	4140
2400	1.274	-2	1.274	- 2	1.274	- 2	1.274	- 2	4320
2500	1.272	-2	1.272	- 2	1.272	- 2	1.272	- 2	4500
2600	1.270	-2	1.270	- 2	1.270	- 2	1.270	- 2	4680
2700	1.268	-2	1.268	- 2	1.268	- 2	1.268	- 2	4860
2800	1.266	-2	1.266	- 2	1.266	- 2	1.266	- 2	5040
2900	1.264	-1	1.264	- 1	1.264	- 1	1.264	- 1	5220
3000	1.263		1.263		1.263		1.263		5400

°K	10 atm		40 atm		70 atm		100 atm		°R
160	1.500	-29							288
180	1.471	-18	1.840	-157					324
200	1.453	-12	1.683	- 81	2.080	-262			360
220	1.441	- 9	1.602	- 49	1.818	-124	2.120	-270	396
240	1.432	- 7	1.553	- 33	1.694	- 71	1.850	-129	432
260	1.425	- 5	1.520	- 24	1.623	- 46	1.721	- 73	468
280	1.420	- 6	1.496	- 18	1.577	- 35	1.648	- 49	504
300	1.414	- 5	1.478	- 15	1.542	- 24	1.599	- 35	540
320	1.409	- 4	1.463	- 13	1.518	- 23	1.564	- 27	576
340	1.405	- 5	1.450	- 11	1.495	- 17	1.537	- 23	612
360	1.400	- 4	1.439	- 10	1.478	- 15	1.514	- 19	648
380	1.396	- 5	1.429	- 8	1.463	- 13	1.495	- 17	684
400	1.391	- 4	1.421	- 8	1.450	- 11	1.478	- 14	720
420	1.387	- 4	1.413	- 7	1.439	- 10	1.464	- 13	756
440	1.383	- 5	1.406	- 7	1.429	- 10	1.451	- 12	792
460	1.378	- 4	1.399	- 6	1.419	- 8	1.439	- 10	828
480	1.374	- 3	1.393	- 6	1.411	- 7	1.429	- 9	864
500	1.371	- 4	1.387	- 5	1.404	- 7	1.420	- 9	900
520	1.367	- 4	1.382	- 5	1.397	- 7	1.411	- 8	936
540	1.363	- 3	1.377	- 5	1.390	- 6	1.403	- 7	972
560	1.360	- 4	1.372	- 4	1.384	- 6	1.396	- 7	1008
580	1.356	- 3	1.368	- 5	1.378	- 5	1.389	- 6	1044
600	1.353	- 3	1.363	- 3	1.373	- 4	1.383	- 5	1080
620	1.350	- 3	1.360	- 4	1.369	- 5	1.378	- 5	1116
640	1.347	- 3	1.356	- 4	1.364	- 4	1.373	- 5	1152
660	1.344	- 2	1.352	- 3	1.360	- 4	1.368	- 5	1188
680	1.342	- 3	1.349	- 3	1.356	- 3	1.363	- 4	1224
700	1.339	- 2	1.346	- 3	1.353	- 4	1.359	- 4	1260
720	1.337	- 2	1.343	- 2	1.349	- 3	1.355	- 3	1296
740	1.335	- 2	1.341	- 3	1.346	- 3	1.352	- 3	1332
760	1.333	- 2	1.338	- 2	1.343	- 3	1.349	- 4	1368
780	1.331	- 2	1.336	- 3	1.340	- 2	1.345	- 3	1404
800	1.329	- 9	1.333	- 9	1.338	- 11	1.342	- 12	1440
900	1.320	- 6	1.324	- 8	1.327	- 8	1.330	- 9	1620
1000	1.314	- 5	1.316	- 6	1.319	- 7	1.321	- 7	1800
1100	1.309	- 5	1.310	- 4	1.312	- 5	1.314	- 6	1980
1200	1.304	- 3	1.306	- 4	1.307	- 4	1.308	- 4	2160
1300	1.301	- 4	1.302	- 4	1.303	- 4	1.304	- 4	2340
1400	1.297	- 2	1.298	- 3	1.299	- 3	1.300	- 3	2520
1500	1.295	- 3	1.295	- 3	1.296	- 3	1.297	- 4	2700
1600	1.292	- 3	1.292	- 2	1.293	- 3	1.293	- 3	2880
1700	1.289	- 2	1.290	- 3	1.290	- 3	1.290	- 2	3060
1800	1.287	- 2	1.287	- 2	1.287	- 2	1.288	- 3	3240
1900	1.285	- 3	1.285	- 3	1.285	- 2	1.285	- 2	3420
2000	1.282	- 2	1.282	- 2	1.283	- 3	1.283	- 3	3600
2100	1.280	- 2	1.280	- 2	1.280	- 2	1.280	- 2	3780
2200	1.278	- 2	1.278	- 2	1.278	- 2	1.278	- 2	3960
2300	1.276	- 2	1.276	- 2	1.276	- 2	1.276	- 2	4140
2400	1.274	- 2	1.274	- 2	1.274	- 2	1.274	- 2	4320
2500	1.272	- 2	1.272	- 2	1.272	- 2	1.272	- 2	4500
2600	1.270	- 2	1.270	- 2	1.270	- 2	1.270	- 2	4680
2700	1.268	- 2	1.268	- 2	1.268	- 2	1.268	- 2	4860
2800	1.266	- 2	1.266	- 2	1.266	- 2	1.266	- 2	5040
2900	1.264	- 1	1.264	- 1	1.264	- 1	1.264	- 1	5220
3000	1.263		1.263		1.263		1.263		5400

Table 8-7. SOUND VELOCITY AT LOW FREQUENCY IN OXYGEN a/a_0

°K	.01 atm		.1 atm		1 atm			°R
100	.606	58	.605	58				180
120	.664	53	.663	54	.659	54		216
140	.717	49	.717	49	.713	51		252
160	.766	47	.766	47	.764	47		288
180	.813	44	.813	44	.811	45		324
200	.857	41	.857	41	.856	42		360
220	.898	40	.898	40	.898	40		396
240	.938	38	.938	38	.938	38		432
260	.976	36	.976	36	.976	36		468
280	1.012	36	1.012	36	1.012	35		504
300	1.048	33	1.048	33	1.047	34		540
320	1.081	32	1.081	32	1.081	33		576
340	1.113	32	1.113	32	1.114	31		612
360	1.145	30	1.145	30	1.145	30		648
380	1.175	29	1.175	29	1.175	29		684
400	1.204	28	1.204	28	1.204	28		720
420	1.232	28	1.232	28	1.232	28		756
440	1.260	26	1.260	26	1.260	27		792
460	1.286	26	1.286	26	1.287	26		828
480	1.312	26	1.312	26	1.313	26		864
500	1.338	25	1.338	25	1.339	24		900
520	1.363	24	1.363	24	1.363	25		936
540	1.387	24	1.387	24	1.388	23		972
560	1.411	24	1.411	24	1.411	24		1008
580	1.435	22	1.435	22	1.435	23		1044
600	1.457	23	1.457	23	1.458	22		1080
620	1.480	22	1.480	22	1.480	22		1116
640	1.502	22	1.502	22	1.502	22		1152
660	1.524	21	1.524	21	1.524	22		1188
680	1.545	22	1.545	22	1.546	21		1224
700	1.567	21	1.567	21	1.567	21		1260
720	1.588	20	1.588	20	1.588	21		1296
740	1.608	21	1.608	21	1.609	20		1332
760	1.629	20	1.629	20	1.629	20		1368
780	1.649	19	1.649	20	1.649	20		1404
800	1.668	96	1.669	95	1.669	96		1440
900	1.764	92	1.764	92	1.765	91		1620
1000	1.856	86	1.856	86	1.856	87		1800
1100	1.942	84	1.942	84	1.943	83		1980
1200	2.026	79	2.026	79	2.026	80		2160
1300	2.105	77	2.105	77	2.106	77		2340
1400	2.182	74	2.182	74	2.183	74		2520
1500	2.256	72	2.256	72	2.257	72		2700
1600	2.328	69	2.328	69	2.329	69		2880
1700	2.397	68	2.397	68	2.398	67		3060
1800	2.465	65	2.465	65	2.465	65		3240
1900	2.530	63	2.530	63	2.530	63		3420
2000	2.593	62	2.593	62	2.593	62		3600
2100	2.655	60	2.655	60	2.655	61		3780
2200	2.715	59	2.715	59	2.716	59		3960
2300	2.774	58	2.774	58	2.775	57		4140
2400	2.832	56	2.832	56	2.832	56		4320
2500	2.888	55	2.888	55	2.888	55		4500
2600	2.943	53	2.943	53	2.943	54		4680
2700	2.996	53	2.996	53	2.997	52		4860
2800	3.049	51	3.049	51	3.049	52		5040
2900	3.100	52	3.100	52	3.101	51		5220
3000	3.152		3.152		3.152			5400

°K	1 atm		4 atm		7 atm		10 atm		°R
120	.659	54							216
140	.713	51	.703	54					252
160	.764	47	.757	50	.750	52	.743	54	288
180	.811	45	.807	46	.802	47	.797	49	324
200	.856	42	.853	43	.849	45	.846	46	360
220	.898	40	.896	41	.894	41	.892	42	396
240	.938	38	.937	38	.935	40	.934	40	432
260	.976	36	.975	37	.975	37	.974	39	468
280	1.012	35	1.012	36	1.012	36	1.013	35	504
300	1.047	34	1.048	34	1.048	34	1.048	35	540
320	1.081	33	1.082	32	1.082	33	1.083	33	576
340	1.114	31	1.114	32	1.115	32	1.116	32	612
360	1.145	30	1.146	30	1.147	30	1.148	31	648
380	1.175	29	1.176	29	1.177	30	1.179	29	684
400	1.204	28	1.205	29	1.207	28	1.208	29	720
420	1.232	28	1.234	28	1.235	28	1.237	28	756
440	1.260	27	1.262	26	1.263	27	1.265	26	792
460	1.287	26	1.288	27	1.290	26	1.291	27	828
480	1.313	26	1.315	25	1.316	26	1.318	26	864
500	1.339	24	1.340	25	1.342	25	1.344	25	900
520	1.363	25	1.365	24	1.367	24	1.369	24	936
540	1.388	23	1.389	24	1.391	24	1.393	24	972
560	1.411	24	1.413	24	1.415	23	1.417	23	1008
580	1.435	23	1.437	23	1.438	23	1.440	23	1044
600	1.458	22	1.460	22	1.461	23	1.463	23	1080
620	1.480	22	1.482	22	1.484	22	1.486	22	1116
640	1.502	22	1.504	22	1.506	22	1.508	22	1152
660	1.524	22	1.526	22	1.528	22	1.530	22	1188
680	1.546	21	1.548	21	1.550	21	1.552	21	1224
700	1.567	21	1.569	21	1.571	21	1.573	21	1260
720	1.588	21	1.590	21	1.592	20	1.594	21	1296
740	1.609	20	1.611	20	1.612	21	1.615	20	1332
760	1.629	20	1.631	20	1.633	20	1.635	20	1368
780	1.649	20	1.651	20	1.653	20	1.655	20	1404
800	1.669	96	1.671	96	1.673	96	1.675	95	1440
900	1.765	91	1.767	91	1.769	91	1.770	92	1620
1000	1.856	87	1.858	87	1.860	86	1.862	86	1800
1100	1.943	83	1.945	83	1.946	83	1.948	83	1980
1200	2.026	80	2.028	79	2.029	80	2.031	79	2160
1300	2.106	77	2.107	77	2.109	77	2.110	77	2340
1400	2.183	74	2.184	74	2.186	74	2.187	75	2520
1500	2.257	72	2.258	72	2.260	72	2.262	71	2700
1600	2.329	69	2.330	69	2.332	68	2.333	69	2880
1700	2.398	67	2.399	68	2.400	68	2.402	67	3060
1800	2.465	65	2.467	64	2.468	65	2.469	66	3240
1900	2.530	63	2.531	64	2.533	63	2.535	62	3420
2000	2.593	62	2.595	62	2.596	62	2.597	62	3600
2100	2.655	61	2.657	60	2.658	60	2.659	61	3780
2200	2.716	59	2.717	59	2.718	59	2.720	58	3960
2300	2.775	57	2.776	57	2.777	57	2.778	58	4140
2400	2.832	56	2.833	56	2.834	57	2.836	56	4320
2500	2.888	55	2.889	55	2.891	54	2.892	55	4500
2600	2.943	54	2.944	54	2.945	54	2.947	53	4680
2700	2.997	52	2.998	52	2.999	53	3.000	53	4860
2800	3.049	52	3.050	52	3.052	51	3.053	51	5040
2900	3.101	51	3.102	52	3.103	52	3.104	52	5220
3000	3.152		3.154		3.155		3.156		5400

Table 8-7. SOUND VELOCITY AT LOW FREQUENCY IN OXYGEN - Cont. a/a_0

°K	10 atm		40 atm		70 atm		100 atm		°R
160	.743	54							288
180	.797	49	.749	70					324
200	.846	46	.819	57	.812	64			360
220	.892	42	.876	51	.876	55	.911	45	396
240	.934	40	.927	46	.931	49	.956	44	432
260	.974	39	.973	42	.980	45	1.000	42	468
280	1.013	35	1.015	40	1.025	41	1.042	41	504
300	1.048	35	1.055	37	1.066	39	1.083	39	540
320	1.083	33	1.092	35	1.105	36	1.122	37	576
340	1.116	32	1.127	34	1.141	35	1.159	35	612
360	1.148	31	1.161	32	1.176	33	1.194	33	648
380	1.179	29	1.193	30	1.209	31	1.227	32	684
400	1.208	29	1.223	30	1.240	31	1.259	31	720
420	1.237	28	1.253	29	1.271	29	1.290	29	756
440	1.265	26	1.282	27	1.300	27	1.319	28	792
460	1.291	27	1.309	27	1.327	28	1.347	27	828
480	1.318	26	1.336	26	1.355	26	1.374	27	864
500	1.344	25	1.362	25	1.381	26	1.401	26	900
520	1.369	24	1.387	25	1.407	24	1.427	25	936
540	1.393	24	1.412	24	1.431	25	1.452	24	972
560	1.417	23	1.436	24	1.456	23	1.476	24	1008
580	1.440	23	1.460	23	1.479	23	1.500	23	1044
600	1.463	23	1.483	23	1.502	23	1.523	23	1080
620	1.486	22	1.506	22	1.525	23	1.546	22	1116
640	1.508	22	1.528	21	1.548	21	1.568	22	1152
660	1.530	22	1.549	22	1.569	22	1.590	21	1188
680	1.552	21	1.571	21	1.591	21	1.611	21	1224
700	1.573	21	1.592	21	1.612	21	1.632	21	1260
720	1.594	21	1.613	21	1.633	20	1.653	21	1296
740	1.615	20	1.634	20	1.653	21	1.674	20	1332
760	1.635	20	1.654	20	1.674	19	1.694	19	1368
780	1.655	20	1.674	20	1.693	20	1.713	20	1404
800	1.675	95	1.694	95	1.713	95	1.733	95	1440
900	1.770	92	1.789	91	1.808	90	1.828	89	1620
1000	1.862	86	1.880	86	1.898	86	1.917	85	1800
1100	1.948	83	1.966	83	1.984	82	2.002	81	1980
1200	2.031	79	2.049	79	2.066	78	2.083	79	2160
1300	2.110	77	2.128	76	2.144	76	2.162	75	2340
1400	2.187	75	2.204	73	2.220	73	2.237	73	2520
1500	2.262	71	2.277	71	2.293	71	2.310	69	2700
1600	2.333	69	2.348	69	2.364	68	2.379	68	2880
1700	2.402	67	2.417	67	2.432	66	2.447	67	3060
1800	2.469	66	2.484	65	2.498	65	2.514	63	3240
1900	2.535	62	2.549	62	2.563	63	2.577	63	3420
2000	2.597	62	2.611	62	2.626	60	2.640	60	3600
2100	2.659	61	2.673	60	2.686	60	2.700	59	3780
2200	2.720	58	2.733	58	2.746	58	2.759	58	3960
2300	2.778	58	2.791	57	2.804	57	2.817	57	4140
2400	2.836	56	2.848	56	2.861	55	2.874	55	4320
2500	2.892	55	2.904	55	2.916	55	2.929	54	4500
2600	2.947	53	2.959	53	2.971	53	2.983	53	4680
2700	3.000	53	3.012	52	3.024	52	3.036	52	4860
2800	3.053	51	3.064	52	3.076	51	3.088	50	5040
2900	3.104	52	3.116	51	3.127	51	3.138	51	5220
3000	3.156		3.167		3.178		3.189		5400

Table 8-8. VISCOSITY OF OXYGEN AT ATMOSPHERIC PRESSURE

°K	η/η_0		°R
100	.4050	403	180
110	.4453	396	198
120	.4849	390	216
130	.5239	381	234
140	.5620	373	252
150	.5993	366	270
160	.6359	359	288
170	.6718	351	306
180	.7069	341	324
190	.7410	333	342
200	.7743	328	360
210	.8071	321	378
220	.8392	315	396
230	.8707	309	414
240	.9016	304	432
250	.9320	297	450
260	.9617	292	468
270	.9909	285	486
280	1.0194	281	504
290	1.0475	276	522
300	1.0751	274	540
310	1.1025	269	558
320	1.1294	264	576
330	1.1558	260	594
340	1.1818	258	612
350	1.2076	255	630
360	1.2331	251	648
370	1.2582	248	666
380	1.2830	245	684
390	1.3075	241	702
400	1.3316	239	720
410	1.3555	236	738
420	1.3791	233	756
430	1.4024	231	774
440	1.4255	229	792
450	1.4484	226	810
460	1.4710	225	828
470	1.4935	222	846
480	1.5157	220	864
490	1.5377	218	882
500	1.5595		900

°K	η/η_0		°R
500	1.5595	216	900
510	1.5811	214	918
520	1.6025	212	936
530	1.6237	210	954
540	1.6447	209	972
550	1.6656	208	990
560	1.6864	207	1008
570	1.7071	205	1026
580	1.7276	203	1044
590	1.7479	201	1062
600	1.7680	200	1080
610	1.7880	198	1098
620	1.8078	197	1116
630	1.8275	195	1134
640	1.8470	194	1152
650	1.8664	193	1170
660	1.8857	192	1188
670	1.9049	192	1206
680	1.9241	191	1224
690	1.9432	190	1242
700	1.9622	188	1260
710	1.9810	186	1278
720	1.9996	185	1296
730	2.0181	184	1314
740	2.0365	182	1332
750	2.0547	181	1350
760	2.0728	181	1368
770	2.0909	180	1386
780	2.1089	179	1404
790	2.1268	179	1422
800	2.1447	177	1440
810	2.1624	175	1458
820	2.1799	175	1476
830	2.1974	174	1494
840	2.2148	173	1512
850	2.2321	173	1530
860	2.2494	172	1548
870	2.2666	172	1566
880	2.2838	172	1584
890	2.3010	171	1602
900	2.3181		1620

°K	η/η_0		°R
900	2.3181	170	1620
910	2.3351	169	1638
920	2.3520	169	1656
930	2.3689	168	1674
940	2.3857	167	1692
950	2.4024	166	1710
960	2.4190	165	1728
970	2.4355	165	1746
980	2.4520	164	1764
990	2.4684	17	1782
1000	2.485	17	1800
1010	2.502	16	1818
1020	2.518	16	1836
1030	2.534	16	1854
1040	2.550	16	1872
1050	2.566	16	1890
1060	2.582	16	1908
1070	2.598	16	1926
1080	2.614	17	1944
1090	2.631	17	1962
1100	2.648	155	1980
1200	2.803	148	2160
1300	2.951	145	2340
1400	3.096	141	2520
1500	3.237	137	2700
1600	3.374	135	2880
1700	3.509	131	3060
1800	3.640	130	3240
1900	3.770	127	3420
2000	3.897		3600

Table 8-9. THERMAL CONDUCTIVITY OF OXYGEN AT ATMOSPHERIC PRESSURE

°K	k/k_0		°R
80	.293	38	144
90	.331	37	162
100	.368	38	180
110	.406	38	198
120	.444	38	216
130	.482	38	234
140	.520	37	252
150	.557	38	270
160	.595	37	288
170	.632	37	306
180	.669	37	324
190	.706	37	342
200	.743	36	360
210	.779	36	378
220	.815	35	396
230	.850	35	414
240	.885	35	432
250	.920	34	450
260	.954	35	468
270	.989	3	486
280	1.02	4	504
290	1.06	3	522
300	1.09	3	540
310	1.12	4	558
320	1.16	3	576
330	1.19	3	594
340	1.22	3	612
350	1.25		630

°K	k/k_0		°R
350	1.25	3	630
360	1.28	4	648
370	1.32	3	666
380	1.35	3	684
390	1.38	3	702
400	1.41	3	720
410	1.44	3	738
420	1.47	3	756
430	1.50	3	774
440	1.53	3	792
450	1.56	3	810
460	1.59	3	828
470	1.62	2	846
480	1.64	3	864
490	1.67	3	882
500	1.70	3	900
510	1.73	3	918
520	1.76	2	936
530	1.78	3	954
540	1.81	3	972
550	1.84	2	990
560	1.86	3	1008
570	1.89	3	1026
580	1.92	2	1044
590	1.94	3	1062
600	1.97		1080

Table 8-10. PRANDTL NUMBER OF OXYGEN AT ATMOSPHERIC PRESSURE $\eta C_p/k$

°K	(N_{Pr})		$(N_{Pr})^{2/3}$		$(N_{Pr})^{1/3}$		$(N_{Pr})^{1/2}$		°R
100	.815	-15	.873	-11	.934	-6	.903	-9	180
110	.800	- 9	.862	- 7	.928	-3	.894	-5	198
120	.791	- 7	.855	- 5	.925	-3	.889	-4	216
130	.784	- 6	.850	- 4	.922	-2	.885	-3	234
140	.778	- 5	.846	- 4	.920	-2	.882	-3	252
150	.773	- 7	.842	- 5	.918	-3	.879	-4	270
160	.766	- 5	.837	- 3	.915	-2	.875	-3	288
170	.761	- 5	.834	- 4	.913	-2	.872	-3	306
180	.756	- 5	.830	- 4	.911	-2	.869	-2	324
190	.751	- 6	.826	- 4	.909	-2	.867	-4	342
200	.745	- 5	.822	- 4	.907	-2	.863	-3	360
210	.740	- 4	.818	- 3	.905	-2	.860	-2	378
220	.736	- 4	.815	- 3	.903	-2	.858	-2	396
230	.732	- 4	.812	- 3	.901	-1	.856	-3	414
240	.728	- 3	.809	- 2	.900	-2	.853	-2	432
250	.725	- 3	.807	- 2	.898	-1	.851	-1	450
260	.722	- 4	.805	- 3	.897	-2	.850	-3	468
270	.718	- 1	.802	- 1	.895		.847		486
280	.717	- 7	.801	- 5	.895	-3	.847	-4	504
290	.710	- 1	.796	- 1	.892		.843	-1	522
300	.709		.795		.892		.842		540
310	.709	- 6	.795	- 4	.892	-3	.842	-4	558
320	.703	- 1	.791	- 1	.889		.838		576
330	.702		.790		.889		.838		594
340	.702		.790		.889		.838		612
350	.702	- 1	.790	- 1	.889	-1	.838	-1	630
360	.701	- 5	.789	- 4	.888	-2	.837	-3	648
370	.696		.785		.886		.834		666
380	.696		.785		.886		.834		684
390	.696	- 1	.785		.886		.834		702
400	.695		.785		.886		.834		720
410	.695		.785		.886		.834		738
420	.695		.785		.886		.834		756
430	.695	- 1	.785	- 1	.886	-1	.834	-1	774
440	.694		.784		.885		.833		792
450	.694		.784		.885		.833		810
460	.694	1	.784	1	.885	1	.833	1	828
470	.695	2	.785	1	.886	1	.834	1	846
480	.697		.786		.887		.835		864
490	.697		.786		.887		.835		882
500	.697		.786		.887		.835		900
510	.697		.786		.887		.835		918
520	.697	3	.786	2	.887	1	.835	2	936
530	.700		.788		.888		.837		954
540	.700		.788		.888		.837		972
550	.700	1	.788	1	.888		.837		990
560	.701	1	.789	1	.888	1	.837	1	1008
570	.702		.790		.889		.838		1026
580	.702	2	.790	1	.889	1	.838	1	1044
590	.704		.791		.890		.839		1062
600	.704		.791		.890		.839		1080

Table 8-11. VAPOR PRESSURE OF OXYGEN

2/T	T	$Log_{10}P(atm)$*		P	T	3.6/T
$^oK^{-1}$	^oK			atm	^oR	$^oR^{-1}$
.037	54.054	7.133-10	197	.0014	97.297	.037
.036	55.556	7.330-10	197	.0021	100.000	.036
.035	57.143	7.527-10	197	.0034	102.857	.035
.034	58.824	7.724-10	197	.0053	105.882	.034
.033	60.606	7.921-10	197	.0083	109.091	.033
.032	62.500	8.118-10	197	.0131	112.500	.032
.031	64.516	8.315-10	196	.0207	116.129	.031
.030	66.667	8.511-10	195	.0324	120.000	.030
.029	68.966	8.706-10	194	.0508	124.138	.029
.028	71.429	8.900-10		.0794	128.571	.028
1/T						1.8/T
.0140	71.429	8.8999-10	385	.0794	128.571	.0140
.0139	71.942	8.9384-10	384	.0868	129.496	.0139
.0138	72.464	8.9768-10	383	.0948	130.435	.0138
.0137	72.993	9.0151-10	383	.1035	131.387	.0137
.0136	73.529	9.0534-10	382	.1131	132.353	.0136
.0135	74.074	9.0916-10	382	.1235	133.333	.0135
.0134	74.627	9.1298-10	382	.1348	134.328	.0134
.0133	75.188	9.1680-10	381	.1472	135.338	.0133
.0132	75.758	9.2061-10	381	.1607	136.364	.0132
.0131	76.336	9.2442-10	381	.1755	137.404	.0131
.0130	76.923	9.2823-10	381	.1916	138.462	.0130
.0129	77.519	9.3204-10	380	.2091	139.535	.0129
.0128	78.125	9.3584-10	380	.2282	140.625	.0128
.0127	78.740	9.3964-10	378	.2491	141.732	.0127
.0126	79.365	9.4342-10	377	.2718	142.857	.0126
.0125	80.000	9.4719-10	377	.2964	144.000	.0125
.0124	80.645	9.5096-10	376	.3233	145.161	.0124
.0123	81.301	9.5472-10	376	.3525	146.341	.0123
.0122	81.967	9.5848-10	375	.3844	147.541	.0122
.0121	82.645	9.6223-10	375	.4191	148.760	.0121
.0120	83.333	9.6598-10	375	.4569	150.000	.0120
.0119	84.034	9.6973-10	375	.4981	151.260	.0119
.0118	84.746	9.7348-10	374	.5430	152.542	.0118
.0117	85.470	9.7722-10	374	.5918	153.846	.0117
.0116	86.207	9.8096-10	373	.6451	155.172	.0116
.0115	86.957	9.84686-10	3725	.7029	156.522	.0115
.0114	87.719	9.88411-10	3718	.7658	157.895	.0114
.0113	88.496	9.92129-10	3712	.8342	159.292	.0113
.0112	89.286	9.95841-10	3704	.9087	160.714	.0112
.0111	90.090	9.99545-10	3697	.9896	162.162	.0111
.0110	90.909	.03242	3690	1.0775	163.636	.0110
.0109	91.743	.06932	3685	1.1731	165.138	.0109
.0108	92.593	.10617	3679	1.2769	166.667	.0108
.0107	93.458	.14296	3674	1.3898	168.224	.0107
.0106	94.340	.17970	3669	1.5125	169.811	.0106
.0105	95.238	.21639	3663	1.6459	171.428	.0105
.0104	96.154	.25302	3659	1.7907	173.077	.0104
.0103	97.087	.28961	3654	1.9481	174.757	.0103
.0102	98.039	.32615	3649	2.1191	176.470	.0102
.0101	99.010	.36264	3644	2.3048	178.218	.0101
.0100	100.000	.39908		2.5066	180.000	.0100

*Tabulated values in this column are for interpolation with respect to reciprocal temperature.

1/T	T	$Log_{10}P$ (atm)*		P	T	1.8/T
$^oK^{-1}$	^oK			atm	^oR	$^oR^{-1}$
.0100	100.000	.39908	3641	2.5066	180.000	.0100
.0099	101.010	.43549	3639	2.7258	181.818	.0099
.0098	102.041	.47188	3636	2.9640	183.673	.0098
.0097	103.093	.50824	3634	3.2228	185.567	.0097
.0096	104.167	.54458	3630	3.5041	187.500	.0096
.0095	105.263	.58088	3627	3.8096	189.474	.0095
.0094	106.383	.61715	3623	4.1414	191.489	.0094
.0093	107.527	.65338	3622	4.5017	193.548	.0093
.0092	108.696	.68960	3620	4.8933	195.652	.0092
.0091	109.890	.72580	3620	5.3186	197.802	.0091
.0090	111.111	.76200	3619	5.7810	200.000	.0090
.0089	112.360	.79819	3618	6.2833	202.247	.0089
.0088	113.636	.83437	3619	6.8292	204.545	.0088
.0087	114.943	.87056	3619	7.4227	206.896	.0087
.0086	116.279	.90675	3621	8.0677	209.302	.0086
.0085	117.647	.94296	3622	8.7692	211.765	.0085
.0084	119.048	.97918	3624	9.5319	214.286	.0084
.0083	120.482	1.01542	3626	10.361	216.867	.0083
.0082	121.951	1.05168	3631	11.264	219.512	.0082
.0081	123.457	1.08799	3636	12.246	222.222	.0081
.0080	125.000	1.12435	3640	13.315	225.000	.0080
.0079	126.582	1.16075	3646	14.479	227.848	.0079
.0078	128.205	1.19721		15.747	230.769	.0078
2/T						3.6/T
.0156	128.2051	1.19721	1826	15.747	230.769	.0156
.0155	129.0323	1.21547	1826	16.424	232.258	.0155
.0154	129.8701	1.23373	1829	17.129	233.766	.0154
.0153	130.7190	1.25202	1832	17.866	235.294	.0153
.0152	131.5789	1.27034	1834	18.635	236.842	.0152
.0151	132.4503	1.28868	1836	19.439	238.410	.0151
.0150	133.3333	1.30704	1840	20.279	240.000	.0150
.0149	134.2282	1.32544	1842	21.156	241.611	.0149
.0148	135.1351	1.34386	1846	22.073	243.243	.0148
.0147	136.0544	1.36232	1849	23.031	244.898	.0147
.0146	136.9863	1.38081	1853	24.033	246.575	.0146
.0145	137.9310	1.39934	1856	25.081	248.276	.0145
.0144	138.8889	1.41790	1860	26.176	250.000	.0144
.0143	139.8601	1.43650	1864	27.321	251.748	.0143
.0142	140.8451	1.45514	1869	28.519	253.521	.0142
.0141	141.8440	1.47383	1875	29.774	255.319	.0141
.0140	142.8571	1.49258	1880	31.087	257.143	.0140
.0139	143.8849	1.51138	1886	32.462	258.993	.0139
.0138	144.9275	1.53024	1893	33.903	260.870	.0138
.0137	145.9854	1.54917	1900	35.414	262.774	.0137
.0136	147.0588	1.56817	1909	36.997	264.706	.0136
.0135	148.1481	1.58726	1919	38.660	266.667	.0135
.0134	149.2537	1.60645	1930	40.406	268.657	.0134
.0133	150.3759	1.62575	1942	42.243	270.677	.0133
.0132	151.5152	1.64517	1956	44.174	272.727	.0132
.0131	152.6718	1.66473	1977	46.209	274.809	.0131
.0130	153.8462	1.68450	2008	48.362	276.923	.0130
.0129	155.0388	1.70458	2050	50.650	279.070	.0129
.0128	156.2500	1.72508		53.098	281.250	.0128

* Tabulated values in this column are for interpolation with respect to reciprocal temperature.

Table 8-11/a. VAPOR PRESSURE OF OXYGEN

Remarks	T	P	P	P	T
	°K	mm Hg	atm	psia	°R
Triple point- - - - - - -	54.363	1.14	.00150	.022	97.853
Normal boiling point- - -	90.190	760.0	1.000	14.696	162.342
Critical point- - - - - -	154.7_8	$381_{09}.$	50.1_4	$736._9$	278.6_0
	55	1.38	.00182	.027	99
	60	5.44	.00716	.105	108
	65	17.4	.0229	.34	117
	70	46.8	.0616	.90	126
	75	108.7	.1430	2.10	135
	80	225.3	.2964	4.36	144
	85	425.4	.5597	8.23	153
	90	745.0	.9803	14.41	162
	95	1223.3	1.6096	23.65	171
	100	1905.0	2.5066	36.84	180
	105	2838.2	3.7345	54.88	189
	110	4072.9	5.3591	78.76	198
	115	5661.6	7.4495	109.48	207
	120	7658.6	10.077	148.09	216
	125	10120	13.316	195.7	225
	130	13102	17.239	253.4	234
	135	16670	21.934	322.3	243
	140	20892	27.489	404.0	252
	145	25843	34.004	499.7	261
	150	31631	41.620	611.6	270

Table 8-12. IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR MOLECULAR OXYGEN

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
10	3.5423	-278	.1222	1291	12.7490	24447	9.411	2350	18
20	3.5145	- 68	.2513	1285	15.1937	14043	11.761	1379	36
30	3.5077	- 33	.3798	1283	16.5980	10276	13.140	1016	54
40	3.5044	- 15	.5081	1283	17.6256	7860	14.156	779	72
50	3.5029	- 6	.6364	1282	18.4116	6345	14.935	630	90
60	3.5023	- 4	.7646	1282	19.0461	5376	15.565	535	108
70	3.5019	- 3	.8928	1282	19.5837	4698	16.100	467	126
80	3.5016	- 1	1.0210	1282	20.0535	4121	16.567	411	144
90	3.5015	- 1	1.1492	1282	20.4656	3692	16.978	368	162
100	3.5014	- 1	1.2774	1282	20.8348	3336	17.346	332	180
110	3.5013		1.4056	1281	21.1684	3048	17.678	304	198
120	3.5013	- 1	1.5337	1282	21.4732	2802	17.982	279	216
130	3.5012	1	1.6619	1282	21.7534	2595	18.261	259	234
140	3.5013		1.7901	1282	22.0129	2416	18.520	241	252
150	3.5013	2	1.9183	1281	22.2545	2259	18.761	226	270
160	3.5015	2	2.0464	1282	22.4804	2123	18.987	212	288
170	3.5017	3	2.1746	1282	22.6927	2002	19.199	199	306
180	3.5020	5	2.3028	1282	22.8929	1894	19.398	189	324
190	3.5025	7	2.4310	1283	23.0823	1796	19.587	179	342
200	3.5032	10	2.5593	1282	23.2619	1710	19.766	171	360
210	3.5042	14	2.6875	1283	23.4329	1630	19.937	163	378
220	3.5056	17	2.8158	1284	23.5959	1559	20.100	155	396
230	3.5073	22	2.9442	1284	23.7518	1493	20.255	149	414
240	3.5095	27	3.0726	1286	23.9011	1433	20.404	143	432
250	3.5122	33	3.2012	1286	24.0444	1378	20.547	137	450
260	3.5155	38	3.3298	1288	24.1822	1328	20.684	132	468
270	3.5193	45	3.4586	1289	24.3150	1280	20.816	127	486
280	3.5238	50	3.5875	1291	24.4430	1238	20.943	123	504
290	3.5288	56	3.7166	1293	24.5668	1197	21.066	119	522
300	3.5344	63	3.8459	1295	24.6865	1160	21.185	115	540
310	3.5407	69	3.9754	1297	24.8025	1125	21.300	111	558
320	3.5476	75	4.1051	1300	24.9150	1093	21.411	108	576
330	3.5551	80	4.2351	1303	25.0243	1062	21.519	104	594
340	3.5631	86	4.3654	1306	25.1305	1035	21.623	102	612
350	3.5717	90	4.4960	1309	25.2340	1007	21.725	99	630
360	3.5807	95	4.6269	1313	25.3347	982	21.824	96	648
370	3.5902	100	4.7582	1316	25.4329	959	21.920	94	666
380	3.6002	103	4.8898	1320	25.5288	936	22.014	91	684
390	3.6105	107	5.0218	1324	25.6224	916	22.105	89	702
400	3.6212	110	5.1542	1327	25.7140	896	22.194	87	720
410	3.6322	113	5.2869	1332	25.8036	876	22.281	85	738
420	3.6435	115	5.4201	1336	25.8912	859	22.366	83	756
430	3.6550	118	5.5537	1340	25.9771	841	22.449	81	774
440	3.6668	119	5.6877	1345	26.0612	826	22.530	80	792
450	3.6787	120	5.8222	1349	26.1438	810	22.610	77	810
460	3.6907	122	5.9571	1353	26.2248	795	22.687	77	828
470	3.7029	122	6.0924	1358	26.3043	780	22.764	74	846
480	3.7151	123	6.2282	1362	26.3823	768	22.838	73	864
490	3.7274	122	6.3644	1367	26.4591	754	22.911	72	882
500	3.7396	124	6.5011	1371	26.5345	742	22.983	70	900
510	3.7520	123	6.6382	1376	26.6087	730	23.053	69	918
520	3.7643	122	6.7758	1380	26.6817	718	23.122	68	936
530	3.7765	122	6.9138	1385	26.7535	707	23.190	67	954
540	3.7887	121	7.0523	1389	26.8242	696	23.257	65	972
550	3.8008	121	7.1912	1394	26.8938	686	23.322	65	990
560	3.8129	119	7.3306	1398	26.9624	676	23.387	63	1008
570	3.8248	118	7.4704	1402	27.0300	666	23.450	62	1026
580	3.8366	117	7.6106	1407	27.0966	657	23.512	62	1044
590	3.8483	116	7.7513	1411	27.1623	648	23.574	60	1062
600	3.8599		7.8924		27.2271		23.634		1080

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	3.8599	114	7.8924	1415	27.2271	639	23.634	59	1080
610	3.8713	113	8.0339	1419	27.2910	630	23.693	59	1098
620	3.8826	111	8.1758	1423	27.3540	622	23.752	58	1116
630	3.8937	110	8.3181	1428	27.4162	614	23.810	56	1134
640	3.9047	108	8.4609	1431	27.4776	607	23.866	57	1152
650	3.9155	107	8.6040	1436	27.5383	598	23.923	55	1170
660	3.9262	105	8.7476	1439	27.5981	591	23.978	54	1188
670	3.9367	103	8.8915	1443	27.6572	584	24.032	54	1206
680	3.9470	101	9.0358	1447	27.7156	577	24.086	53	1224
690	3.9571	101	9.1805	1450	27.7733	570	24.139	52	1242
700	3.9672	98	9.3255	1454	27.8303	564	24.191	52	1260
710	3.9770	96	9.4709	1458	27.8867	557	24.243	51	1278
720	3.9866	95	9.6167	1461	27.9424	550	24.294	50	1296
730	3.9961	93	9.7628	1465	27.9974	545	24.344	50	1314
740	4.0054	91	9.9093	1468	28.0519	538	24.394	49	1332
750	4.0145	90	10.0561	1471	28.1057	532	24.443	49	1350
760	4.0235	88	10.2032	1475	28.1589	527	24.492	48	1368
770	4.0323	86	10.3507	1478	28.2116	521	24.540	47	1386
780	4.0409	85	10.4985	1481	28.2637	515	24.587	47	1404
790	4.0494	83	10.6466	1484	28.3152	510	24.634	46	1422
800	4.0577	393	10.7950	7464	28.3662	2472	24.680	224	1440
850	4.0970	357	11.5414	7532	28.6134	2352	24.904	213	1530
900	4.1327	325	12.2946	7595	28.8486	2243	25.117	202	1620
950	4.1652	296	13.0541	7652	29.0729	2145	25.319	194	1710
1000	4.1948	271	13.8193	7703	29.2874	2053	25.513	184	1800
1050	4.2219	250	14.5896	7751	29.4927	1970	25.697	177	1890
1100	4.2469	229	15.3647	7795	29.6897	1893	25.874	170	1980
1150	4.2698	214	16.1442	7836	29.8790	1821	26.044	164	2070
1200	4.2912	200	16.9278	7873	30.0611	1756	26.208	158	2160
1250	4.3112	188	17.7151	7908	30.2367	1695	26.366	152	2250
1300	4.3300	179	18.5059	7943	30.4062	1638	26.518	147	2340
1350	4.3479	172	19.3002	7974	30.5700	1584	26.665	142	2430
1400	4.3651	164	20.0976	8005	30.7284	1535	26.807	138	2520
1450	4.3815	160	20.8981	8035	30.8819	1488	26.945	134	2610
1500	4.3975	155	21.7016	8064	31.0307	1444	27.079	130	2700
1550	4.4130	152	22.5080	8091	31.1751	1404	27.209	126	2790
1600	4.4282	149	23.3171	8119	31.3155	1364	27.335	122	2880
1650	4.4431	147	24.1290	8147	31.4519	1329	27.457	120	2970
1700	4.4578	146	24.9437	8172	31.5848	1294	27.577	116	3060
1750	4.4724	144	25.7609	8200	31.7142	1262	27.693	114	3150
1800	4.4868	143	26.5809	8227	31.8404	1232	27.807	110	3240
1850	4.5011	142	27.4036	8252	31.9636	1202	27.917	108	3330
1900	4.5153	142	28.2288	8277	32.0838	1175	28.025	106	3420
1950	4.5295	141	29.0565	8304	32.2013	1148	28.131	103	3510
2000	4.5436	140	29.8869	8329	32.3161	1124	28.234	101	3600
2050	4.5576	139	30.7198	8356	32.4285	1100	28.335	99	3690
2100	4.5715	139	31.5554	8381	32.5385	1077	28.434	97	3780
2150	4.5854	139	32.3935	8406	32.6462	1056	28.531	94	3870
2200	4.5993	137	33.2341	8430	32.7518	1035	28.625	93	3960
2250	4.6130	137	34.0771	8456	32.8553	1015	28.718	91	4050
2300	4.6267	137	34.9227	8482	32.9568	997	28.809	90	4140
2350	4.6404	136	35.7709	8508	33.0565	978	28.899	87	4230
2400	4.6540	134	36.6217	8530	33.1543	961	28.986	86	4320
2450	4.6674	134	37.4747	8555	33.2504	945	29.072	85	4410
2500	4.6808	132	38.3302	8580	33.3449	928	29.157	83	4500
2550	4.6940	131	39.1882	8605	33.4377	912	29.240	81	4590
2600	4.7071	129	40.0487	8627	33.5289	898	29.321	81	4680
2650	4.7200	128	40.9114	8651	33.6187	884	29.402	79	4770
2700	4.7328	126	41.7765	8675	33.7071	869	29.481	77	4860
2750	4.7454	125	42.6440	8698	33.7940	856	29.558	77	4950
2800	4.7579		43.5138		33.8796		29.635		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2800	4.7579	124	43.5138	8720	33.8796	844	29.635	75	5040
2850	4.7703	121	44.3858	8743	33.9640	830	29.710	74	5130
2900	4.7824	120	45.2601	8765	34.0470	819	29.784	73	5220
2950	4.7944	118	46.1366	8786	34.1289	807	29.857	72	5310
3000	4.8062	115	47.0152	8809	34.2096	795	29.929	71	5400
3050	4.8177	114	47.8961	8829	34.2891	784	30.000	69	5490
3100	4.8291	111	48.7790	8850	34.3675	774	30.069	69	5580
3150	4.8402	110	49.6640	8869	34.4449	763	30.138	68	5670
3200	4.8512	107	50.5509	8889	34.5212	753	30.206	67	5760
3250	4.8619	105	51.4398	8909	34.5965	743	30.273	66	5850
3300	4.8724	103	52.3307	8929	34.6708	734	30.339	65	5940
3350	4.8827	102	53.2236	8947	34.7442	724	30.404	65	6030
3400	4.8929	99	54.1183	8965	34.8166	715	30.469	63	6120
3450	4.9028	97	55.0148	8982	34.8881	706	30.532	63	6210
3500	4.9125	95	55.9130	9002	34.9587	698	30.595	62	6300
3550	4.9220	92	56.8132	9018	35.0285	689	30.657	61	6390
3600	4.9312	91	57.7150	9033	35.0974	680	30.718	61	6480
3650	4.9403	88	58.6183	9050	35.1654	673	30.779	59	6570
3700	4.9491	87	59.5233	9068	35.2327	665	30.838	59	6660
3750	4.9578	84	60.4301	9083	35.2992	657	30.897	59	6750
3800	4.9662	82	61.3384	9098	35.3649	650	30.956	57	6840
3850	4.9744	81	62.2482	9112	35.4299	642	31.013	57	6930
3900	4.9825	78	63.1594	9127	35.4941	635	31.070	57	7020
3950	4.9903	76	64.0721	9141	35.5576	628	31.127	56	7110
4000	4.9979	75	64.9862	9160	35.6204	622	31.183	55	7200
4050	5.0054	72	65.9022	9171	35.6826	615	31.238	54	7290
4100	5.0126	71	66.8193	9178	35.7441	608	31.292	54	7380
4150	5.0197	68	67.7371	9190	35.8049	601	31.346	54	7470
4200	5.0265	67	68.6561	9204	35.8650	595	31.400	53	7560
4250	5.0332	65	69.5765	9218	35.9245	590	31.453	52	7650
4300	5.0397	63	70.4983	9234	35.9835	583	31.505	52	7740
4350	5.0460	61	71.4217	9244	36.0418	577	31.557	51	7830
4400	5.0521	59	72.3461	9254	36.0995	571	31.608	51	7920
4450	5.0580	58	73.2715	9261	36.1566	566	31.659	50	8010
4500	5.0638	55	74.1976	9270	36.2132	559	31.709	50	8100
4550	5.0693	53	75.1246	9282	36.2691	555	31.759	49	8190
4600	5.0746	51	76.0528	9299	36.3246	548	31.808	49	8280
4650	5.0797	50	76.9827	9308	36.3794	544	31.857	49	8370
4700	5.0847	49	77.9135	9310	36.4338	538	31.906	48	8460
4750	5.0896	47	78.8445	9315	36.4876	534	31.954	47	8550
4800	5.0943	44	79.7760	9326	36.5410	528	32.001	47	8640
4850	5.0987	41	80.7086	9337	36.5938	523	32.048	47	8730
4900	5.1028	40	81.6423	9347	36.6461	519	32.095	46	8820
4950	5.1068	41	82.5770	9352	36.6980	513	32.141	46	8910
5000	5.1109		83.5122		36.7493		32.187		9000

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
10	2.5000	9	.09152	9153	10.3601	17330	7.8601	17329	18
20	2.5009	171	.18305	9177	12.0931	10162	9.5930	10140	36
30	2.5180	512	.27482	9302	13.1093	7306	10.6070	7209	54
40	2.5692	726	.36784	9536	13.8399	5810	11.3279	5624	72
50	2.6418	724	.46320	9806	14.4209	4881	11.8903	4635	90
60	2.7142	589	.56126	10049	14.9090	4231	12.3538	3959	108
70	2.7731	414	.66175	10233	15.3321	3732	12.7497	3466	126
80	2.8145	250	.76408	10354	15.7053	3331	13.0963	3087	144
90	2.8395	115	.86762	10420	16.0384	2998	13.4050	2786	162
100	2.8510	13	.97182	1044	16.3382	2719	13.6836	2539	180
110	2.8523	- 54	1.0762	1044	16.6101	2480	13.9375	2332	198
120	2.8469	-100	1.1806	1040	16.8581	2275	14.1707	2156	216
130	2.8369	-131	1.2846	1036	17.0856	2098	14.3863	2004	234
140	2.8238	-148	1.3882	1032	17.2954	1943	14.5867	1871	252
150	2.8090	-156	1.4914	1025	17.4897	1808	14.7738	1754	270
160	2.7934	-157	1.5939	1020	17.6705	1689	14.9492	1651	288
170	2.7777	-153	1.6959	1014	17.8394	1583	15.1143	1559	306
180	2.7624	-146	1.7973	1008	17.9977	1490	15.2702	1475	324
190	2.7478	-138	1.8981	1004	18.1467	1406	15.4177	1400	342
200	2.7340	-134	1.9985	999	18.2873	1327	15.5577	1328	360
210	2.7206	-125	2.0984	994	18.4200	1262	15.6905	1269	378
220	2.7081	-117	2.1978	989	18.5462	1202	15.8174	1214	396
230	2.6964	-109	2.2967	985	18.6664	1147	15.9388	1162	414
240	2.6855	-102	2.3952	981	18.7811	1096	16.0550	1114	432
250	2.6753	- 95	2.4933	978	18.8907	1046	16.1664	1068	450
260	2.6658	- 89	2.5911	974	18.9953	1004	16.2732	1027	468
270	2.6569	- 83	2.6885	971	19.0957	966	16.3759	989	486
280	2.6486	- 77	2.7856	968	19.1923	928	16.4748	954	504
290	2.6409	- 71	2.8824	965	19.2851	895	16.5702	920	522
300	2.6338	- 67	2.9789	963	19.3746	861	16.6622	888	540
310	2.6271	- 62	3.0752	961	19.4607	833	16.7510	859	558
320	2.6209	- 58	3.1713	958	19.5440	806	16.8369	833	576
330	2.6151	- 54	3.2671	957	19.6246	780	16.9202	807	594
340	2.6097	- 51	3.3628	954	19.7026	756	17.0009	783	612
350	2.6046	- 48	3.4582	953	19.7782	733	17.0792	760	630
360	2.5998	- 44	3.5535	951	19.8515	712	17.1552	739	648
370	2.5954	- 42	3.6486	949	19.9227	691	17.2291	718	666
380	2.5912	- 39	3.7435	948	19.9918	674	17.3009	699	684
390	2.5873	- 37	3.8383	947	20.0592	654	17.3708	680	702
400	2.5836	- 34	3.9330	945	20.1246	638	17.4388	663	720
410	2.5802	- 33	4.0275	944	20.1884	621	17.5051	646	738
420	2.5769	- 31	4.1219	943	20.2505	605	17.5697	630	756
430	2.5738	- 29	4.2162	941	20.3110	592	17.6327	616	774
440	2.5709	- 28	4.3103	941	20.3702	578	17.6943	601	792
450	2.5681	- 26	4.4044	939	20.4280	563	17.7544	587	810
460	2.5655	- 25	4.4983	939	20.4843	553	17.8131	575	828
470	2.5630	- 23	4.5922	938	20.5396	539	17.8706	561	846
480	2.5607	- 22	4.6860	938	20.5935	529	17.9267	551	864
490	2.5585	- 20	4.7798	936	20.6464	516	17.9818	538	882
500	2.5565	- 20	4.8734	936	20.6980	507	18.0356	527	900
510	2.5545	- 18	4.9670	935	20.7487	495	18.0883	516	918
520	2.5527	- 18	5.0605	934	20.7982	487	18.1399	507	936
530	2.5509	- 17	5.1539	933	20.8469	476	18.1906	496	954
540	2.5492	- 16	5.2472	933	20.8945	467	18.2402	486	972
550	2.5476	- 15	5.3405	932	20.9412	459	18.2888	478	990
560	2.5461	- 15	5.4337	932	20.9871	451	18.3366	469	1008
570	2.5446	- 14	5.5269	931	21.0322	442	18.3835	460	1026
580	2.5432	- 13	5.6200	931	21.0764	435	18.4295	453	1044
590	2.5419	- 13	5.7131	930	21.1199	426	18.4748	444	1062
600	2.5406		5.8061		21.1625		18.5192		1080

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
600	2.5406	− 12	5.8061	930	21.1625	420	18.5192	436	1080
610	2.5394	− 12	5.8991	930	21.2045	412	18.5628	430	1098
620	2.5382	− 11	5.9921	929	21.2457	406	18.6058	422	1116
630	2.5371	− 11	6.0850	928	21.2863	399	18.6480	415	1134
640	2.5360	− 10	6.1778	928	21.3262	394	18.6895	408	1152
650	2.5350	− 10	6.2706	928	21.3656	387	18.7303	403	1170
660	2.5340	− 9	6.3634	928	21.4043	381	18.7706	396	1188
670	2.5331	− 10	6.4562	927	21.4424	375	18.8102	390	1206
680	2.5321	− 9	6.5489	927	21.4799	370	18.8492	384	1224
690	2.5312	− 8	6.6416	927	21.5169	365	18.8876	379	1242
700	2.5304	− 8	6.7343	926	21.5534	359	18.9255	372	1260
710	2.5296	− 8	6.8269	926	21.5893	353	18.9627	368	1278
720	2.5288	− 7	6.9195	925	21.6246	349	18.9995	361	1296
730	2.5281	− 7	7.0120	926	21.6595	344	19.0356	357	1314
740	2.5274	− 7	7.1046	925	21.6939	339	19.0713	352	1332
750	2.5267	− 6	7.1971	924	21.7278	335	19.1065	347	1350
760	2.5261	− 7	7.2895	925	21.7613	330	19.1412	343	1368
770	2.5254	− 6	7.3820	924	21.7943	326	19.1755	337	1386
780	2.5248	− 6	7.4744	924	21.8269	321	19.2092	334	1404
790	2.5242	− 5	7.5668	924	21.8590	318	19.2426	329	1422
800	2.5237	− 26	7.6592	4618	21.8908	1529	19.2755	1584	1440
850	2.5211	− 22	8.1210	4614	22.0437	1441	19.4339	1491	1530
900	2.5189	− 18	8.5824	4608	22.1878	1361	19.5830	1407	1620
950	2.5171	− 16	9.0432	4605	22.3239	1291	19.7237	1332	1710
1000	2.5155	− 14	9.5037	4603	22.4530	1226	19.8569	1266	1800
1050	2.5141	− 12	9.9640	4601	22.5756	1169	19.9835	1205	1890
1100	2.5129	− 11	10.4241	4599	22.6925	1117	20.1040	1150	1980
1150	2.5118	− 10	10.8840	4597	22.8042	1069	20.2190	1099	2070
1200	2.5108	− 8	11.3437	4595	22.9111	1025	20.3289	1054	2160
1250	2.5100	− 7	11.8032	4594	23.0136	985	20.4343	1011	2250
1300	2.5093	− 7	12.2626	4593	23.1121	947	20.5354	972	2340
1350	2.5086	− 6	12.7219	4592	23.2068	912	20.6326	934	2430
1400	2.5080	− 6	13.1811	4591	23.2980	880	20.7260	904	2520
1450	2.5074	− 4	13.6402	4589	23.3860	850	20.8164	870	2610
1500	2.5070	− 4	14.0991	4588	23.4710	822	20.9034	842	2700
1550	2.5066	− 3	14.5579	4588	23.5532	797	20.9876	816	2790
1600	2.5063	− 3	15.0167	4588	23.6329	772	21.0692	789	2880
1650	2.5060	− 3	15.4755	4587	23.7101	748	21.1481	764	2970
1700	2.5057	− 3	15.9342	4585	23.7849	726	21.2245	742	3060
1750	2.5054	− 2	16.3927	4585	23.8575	706	21.2987	721	3150
1800	2.5052	− 1	16.8512	4585	23.9281	686	21.3708	701	3240
1850	2.5051	− 2	17.3097	4586	23.9967	668	21.4409	681	3330
1900	2.5049		17.7683	4585	24.0635	651	21.5090	664	3420
1950	2.5049	− 1	18.2268	4585	24.1286	634	21.5754	646	3510
2000	2.5048	1	18.6853	4584	24.1920	618	21.6400	630	3600
2050	2.5049		19.1437	4585	24.2538	604	21.7030	614	3690
2100	2.5049	2	19.6022	4586	24.3142	589	21.7644	600	3780
2150	2.5051	2	20.0608	4587	24.3731	576	21.8244	586	3870
2200	2.5053	2	20.5195	4587	24.4307	563	21.8830	572	3960
2250	2.5055	3	20.9782	4587	24.4870	551	21.9402	560	4050
2300	2.5058	4	21.4369	4587	24.5421	539	21.9962	547	4140
2350	2.5062	5	21.8956	4587	24.5960	528	22.0509	536	4230
2400	2.5067	5	22.3543	4588	24.6488	517	22.1045	524	4320
2450	2.5072	6	22.8131	4588	24.7005	506	22.1569	514	4410
2500	2.5078	6	23.2719	4591	24.7511	497	22.2083	503	4500
2550	2.5084	8	23.7310	4592	24.8008	487	22.2586	494	4590
2600	2.5092	8	24.1902	4593	24.8495	478	22.3080	484	4680
2650	2.5100	9	24.6495	4596	24.8973	469	22.3564	475	4770
2700	2.5109	10	25.1091	4597	24.9442	461	22.4039	466	4860
2750	2.5119	11	25.5688	4599	24.9903	453	22.4505	458	4950
2800	2.5130		26.0287		25.0356		22.4963		5040

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)}{RT_0}$ *		$\frac{S^\circ}{R}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		°R
2800	2.5130	12	26.0287	4601	25.0356	444	22.4963	449	5040
2850	2.5142	13	26.4888	4603	25.0800	438	22.5412	441	5130
2900	2.5155	13	26 9491	4606	25.1238	430	22.5853	434	5220
2950	2.5168	14	27.4097	4608	25.1668	423	22.6287	427	5310
3000	2.5182	15	27.8705	4611	25.2091	417	22.6714	419	5400
3050	2.5197	16	28.3316	4615	25.2508	410	22.7133	413	5490
3100	2.5213	16	28.7931	4617	25.2918	403	22.7546	406	5580
3150	2.5229	18	29 2548	4620	25.3321	398	22.7952	400	5670
3200	2.5247	18	29.7168	4624	25.3719	392	22.8352	393	5760
3250	2.5265	19	30.1792	4626	25.4111	386	22.8745	387	5850
3300	2.5284	20	30.6418	4629	25.4497	380	22.9132	382	5940
3350	2.5304	21	31.1047	4633	25.4877	375	22.9514	376	6030
3400	2.5325	21	31.5680	4636	25.5252	369	22.9890	370	6120
3450	2.5346	22	32.0316	4640	25.5621	365	23.0260	365	6210
3500	2.5368	23	32.4956	4645	25.5986	360	23.0625	360	6300
3550	2.5391	23	32.9601	4650	25.6346	355	23.0985	354	6390
3600	2.5414	24	33.4251	4655	25.6701	351	23.1339	350	6480
3650	2.5438	25	33.8906	4659	25.7052	346	23.1689	345	6570
3700	2.5463	25	34.3565	4664	25.7398	342	23.2034	340	6660
3750	2.5488	25	34.8229	4668	25.7740	338	23.2374	336	6750
3800	2.5513	26	35.2897	4672	25.8078	333	23.2710	332	6840
3850	2.5539	27	35.7569	4677	25.8411	330	23.3042	327	6930
3900	2.5566	27	36.2246	4681	25.8741	326	23.3369	324	7020
3950	2.5593	28	36.6927	4687	25.9067	322	23.3693	319	7110
4000	2.5621	28	37.1614	4692	25.9389	319	23.4012	315	7200
4050	2.5649	28	37.6306	4698	25.9708	314	23.4327	312	7290
4100	2.5677	29	38.1004	4703	26.0022	312	23.4639	308	7380
4150	2.5706	29	38.5707	4709	26.0334	308	23.4947	304	7470
4200	2.5735	29	39.0416	4714	26.0642	305	23.5251	300	7560
4250	2.5764	30	39.5130	4719	26.0947	302	23.5551	297	7650
4300	2.5794	30	39.9849	4724	26.1249	298	23.5848	294	7740
4350	2.5824	29	40.4573	4730	26.1547	295	23.6142	290	7830
4400	2.5853	30	40.9303	4735	26.1842	293	23.6432	287	7920
4450	2.5883	30	41.4038	4741	26.2135	289	23.6719	284	8010
4500	2.5913	31	41.8779	4747	26.2424	286	23.7003	281	8100
4550	2.5944	30	42.3526	4752	26.2710	284	23.7284	278	8190
4600	2.5974	31	42.8278	4758	26.2994	281	23.7562	275	8280
4650	2.6005	31	43.3036	4764	26.3275	278	23.7837	272	8370
4700	2.6036	30	43.7800	4769	26.3553	276	23.8109	269	8460
4750	2.6066	31	44.2569	4774	26.3829	273	23.8378	267	8550
4800	2.6097	31	44.7343	4780	26.4102	271	23.8645	263	8640
4850	2.6128	30	45.2123	4784	26.4373	268	23.8908	262	8730
4900	2.6158	31	45.6907	4789	26.4641	266	23.9170	259	8820
4950	2.6189	30	46.1696	4793	26.4907	263	23.9429	256	8910
5000	2.6219		46.6489		26.5170		23.9685		9000

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 8-13. COEFFICIENTS FOR THE EQUATION OF STATE FOR OXYGEN

$$Z = 1 + B_1 P + C_1 P^2 + D_1 P^3$$

T °K	B_1 atm^{-1} *	C_1 atm^{-2} *	D_1 atm^{-3} *	T °K	B_1 atm^{-1} *	C_1 atm^{-2} *	D_1 atm^{-3} *
100	-.(1)218811	-.(3)49949	-.(3)3826	700	.(3)3096	.(6)26	-.(9)7331
110	-.(1)168698	-.(3)28147	-.(4)8265	710	.(3)3102	.(6)25	-.(9)7069
120	-.(1)132878	-.(3)16757	-.(4)2242	720	.(3)3107	.(6)24	-.(9)6816
130	-.(1)106472	-.(3)10412	-.(5)7148	730	.(3)3110	.(6)24	-.(9)6573
140	-.(2)86512	-.(4)6684	-.(5)2525	740	.(3)3112	.(6)23	-.(9)6338
150	-.(2)71105	-.(4)4404	-.(6)9312	750	.(3)3112	.(6)22	-.(9)6111
160	-.(2)58993	-.(4)2959	-.(6)3290	760	.(3)3111	.(6)22	-.(9)5893
170	-.(2)49330	-.(4)2017	-.(7)8969	770	.(3)3108	.(6)20	-.(9)5683
180	-.(2)41515	-.(4)1388	.(8)5949	780	.(3)3105	.(6)20	-.(9)5481
190	-.(2)35124	-.(5)958	.(7)4156	790	.(3)3101	.(6)20	-.(9)5287
200	-.(2)29842	-.(5)660	.(7)5150	800	.(3)3095	.(6)19	-.(9)5101
210	-.(2)25438	-.(5)450	.(7)5058	850	.(3)3056	.(6)17	-.(9)4271
220	-.(2)21734	-.(5)301	.(7)4541	900	.(3)3003	.(6)15	-.(9)3591
230	-.(2)18601	-.(5)193	.(7)3899	950	.(3)2942	.(6)13	-.(9)3035
240	-.(2)15931	-.(5)116	.(7)3261	1000	.(3)2875	.(6)11	-.(9)2577
250	-.(2)13644	-.(6)59	.(7)2683	1050	.(3)2805	.(6)10	-.(9)2200
260	-.(2)11672	-.(6)18	.(7)2180	1100	.(3)2734	.(7)9	-.(9)1887
270	-.(3)9966	.(6)12	.(7)1755	1150	.(3)2663	.(7)8	-.(9)1626
280	-.(3)8482	.(6)34	.(7)1400	1200	.(3)2590	.(7)7	-.(9)1408
290	-.(3)7186	.(6)49	.(7)1106	1250	.(3)2521	.(7)7	-.(9)1225
300	-.(3)6051	.(6)60	.(8)8649	1300	.(3)2455	.(7)6	-.(9)1070
310	-.(3)5053	.(6)67	.(8)6674	1350	.(3)2389	.(7)5	-.(10)938
320	-.(3)4172	.(6)72	.(8)5063	1400	.(3)2328	.(7)5	-.(10)826
330	-.(3)3394	.(6)75	.(8)3753	1450	.(3)2266	.(7)5	-.(10)730
340	-.(3)2704	.(6)77	.(8)2689	1500	.(3)2208	.(7)4	-.(10)647
350	-.(3)2091	.(6)78	.(8)1828	1550	.(3)2151	.(7)4	-.(10)576
360	-.(3)1544	.(6)77	.(8)1133	1600	.(3)2097	.(7)4	-.(10)514
370	-.(3)1057	.(6)76	.(9)5738	1650	.(3)2045	.(7)3	-.(10)460
380	-.(4)621	.(6)75	.(9)1256	1700	.(3)1994	.(7)3	-.(10)413
390	-.(4)231	.(6)74	-.(9)2315	1750	.(3)1946	.(7)3	-.(10)371
400	.(4)119	.(6)72	-.(9)5143	1800	.(3)1900	.(7)3	-.(10)335
410	.(4)433	.(6)70	-.(9)7362	1850	.(3)1855	.(7)3	-.(10)303
420	.(4)715	.(6)68	-.(9)9083	1900	.(3)1812	.(7)2	-.(10)275
430	.(4)969	.(6)66	-.(8)1039	1950	.(3)1771	.(7)2	-.(10)250
440	.(3)1197	.(6)64	-.(8)1138	2000	.(3)1731	.(7)2	-.(10)228
450	.(3)1403	.(6)62	-.(8)1209	2050	.(3)1693	.(7)2	-.(10)208
460	.(3)1589	.(6)59	-.(8)1258	2100	.(3)1656	.(7)2	-.(10)190
470	.(3)1756	.(6)58	-.(8)1289	2150	.(3)1621	.(7)2	-.(10)174
480	.(3)1907	.(6)55	-.(8)1306	2200	.(3)1587	.(7)2	-.(10)160
490	.(3)2044	.(6)53	-.(8)1311	2250	.(3)1554	.(7)2	-.(10)147
500	.(3)2167	.(6)52	-.(8)1306	2300	.(3)1522	.(7)1	-.(10)135
510	.(3)2277	.(6)50	-.(8)1295	2350	.(3)1491	.(7)1	-.(10)125
520	.(3)2377	.(6)48	-.(8)1277	2400	.(3)1462	.(7)1	-.(10)115
530	.(3)2467	.(6)46	-.(8)1255	2450	.(3)1433	.(7)1	-.(10)107
540	.(3)2548	.(6)45	-.(8)1229	2500	.(3)1406	.(7)1	-.(11)99
550	.(3)2621	.(6)43	-.(8)1200	2550	.(3)1379	.(7)1	-.(11)92
560	.(3)2686	.(6)42	-.(8)1170	2600	.(3)1353	.(7)1	-.(11)85
570	.(3)2745	.(6)40	-.(8)1138	2650	.(3)1328	.(7)1	-.(11)79
580	.(3)2797	.(6)39	-.(8)1105	2700	.(3)1304	.(7)1	-.(11)74
590	.(3)2843	.(6)37	-.(8)1072	2750	.(3)1281	.(7)1	-.(11)69
600	.(3)2884	.(6)36	-.(8)1039	2800	.(3)1258	.(7)1	-.(11)64
610	.(3)2921	.(6)35	-.(8)1005	2850	.(3)1236	.(7)1	-.(11)60
620	.(3)2954	.(6)34	-.(9)9728	2900	.(3)1215	.(7)1	-.(11)56
630	.(3)2982	.(6)33	-.(9)9403	2950	.(3)1194	.(7)1	-.(11)53
640	.(3)3007	.(6)32	-.(9)9084	3000	.(3)1174	.(7)1	-.(11)49
650	.(3)3029	.(6)30	-.(9)8771				
660	.(3)3048	.(6)29	-.(9)8466				
670	.(3)3063	.(6)29	-.(9)8169				
680	.(3)3076	.(6)28	-.(9)7881				
690	.(3)3087	.(6)27	-.(9)7601				

*Numbers in parentheses indicate the number of zeros immediately to the right of the decimal point.

CHAPTER 9

THE THERMODYNAMIC PROPERTIES OF STEAM

The most widely used tabulation of the properties of steam is that by Keenan and Keyes [1], based on experimental data up to 460°C and 360 atmospheres. Koch [2, 3, 4] has published a table in metric units, ranging from 0° to 550°C and from 0.01 to 300 atmospheres. Goff and Gratch [3] published an accurate table of low-pressure values of properties of water from -160° to 212°F. The recorrelation in 1949 by Keyes [4] of the existing data for steam and the recent experimental data of Kennedy [5] and Kirillin and Rumjanzev [6] prompted a reexamination of the situation. The tables given below are a result of this investigation.

Calculation of the Tables

The tables of the compressibility factor and density for steam given here comprise newly calculated values obtained from the thorough correlation by Keyes [4] of all of the then existing data of state. During the course of the calculations, the data of Kennedy [5] were processed with a view of extending the temperature and pressure range of the tables. These data were found too inconsistent at the higher pressures and unreliable at the lower pressures to warrant their use (see figure 9a). In view of this and of the purely empirical nature of the correlation equation used, the tables could not be extended beyond the tabulated range. The data of Kirillin and Rumjanzev are in good agreement with the values of the compressibility factor obtained from the Keyes correlation as is shown in figure 9b.

The data of state have been represented by Keyes [4] by the equations found on page 923 of reference 4. The implicit nature of this equation of state required an iterative procedure which was employed until each of the calculated values became constant to a part in 10,000. The values of the gas imperfection corrections to the heat capacity were calculated from an earlier correlation of Keyes, et al., [7], which is consistent with the PVT representation [4] and which was more amenable to computation. The corrections for enthalpy and entropy were obtained by integration of the above corrections. A fuller discussion of the details of the computation is to be found in the above cited works and in the report of Fano, Hubbell, and Beckett [8].

As a check of the consistency of the independent calculations of compressibility and gas imperfection corrections to the derived properties, the corrections to the free energy function were computed both from the tabulated compressibilities by numerical integration from the equation

$$\frac{F - F^o}{RT} = \int_o^P \frac{Z - 1}{P} dP$$

and from the tabulated entropy and enthalpy. The agreement between the results was very satisfactory, the discrepancies being in the worst case about 2 percent of the correction.

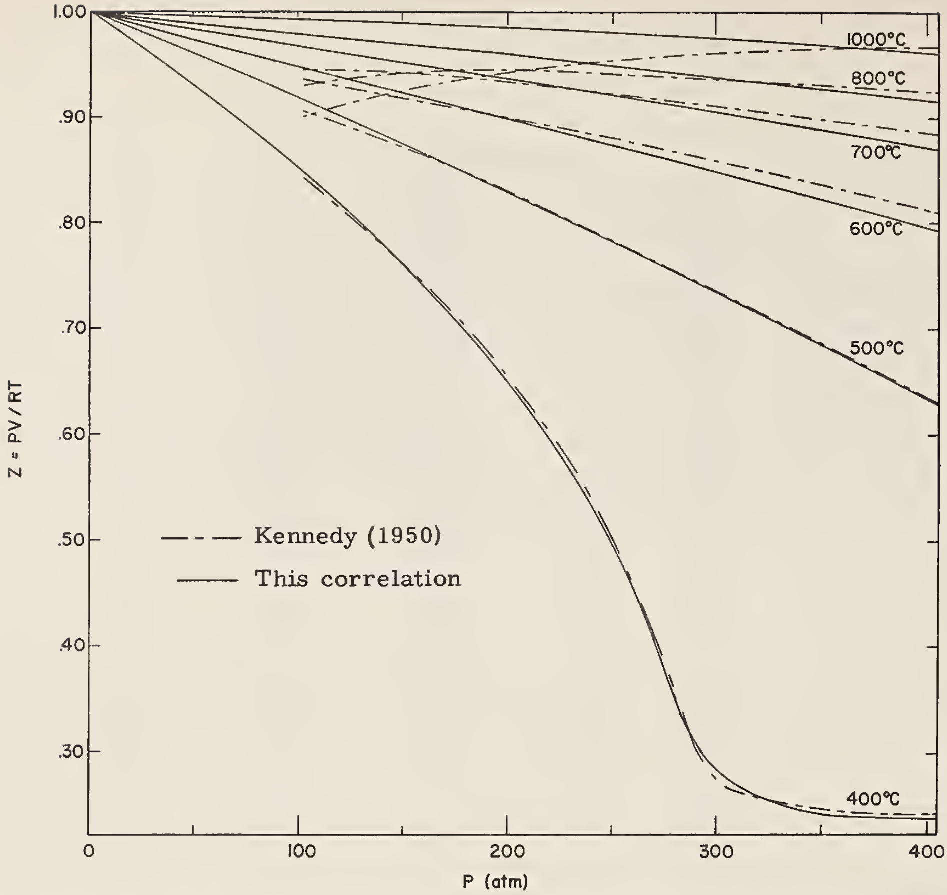

Figure 9a. A comparison of the experimental data of Kennedy [5] with this correlation

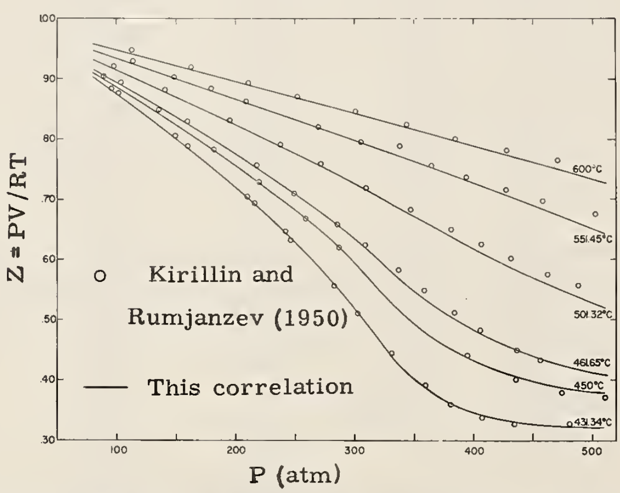

Figure 9b. A comparison of the experimental data of Kirillin and Rumjanzev [6] with this correlation

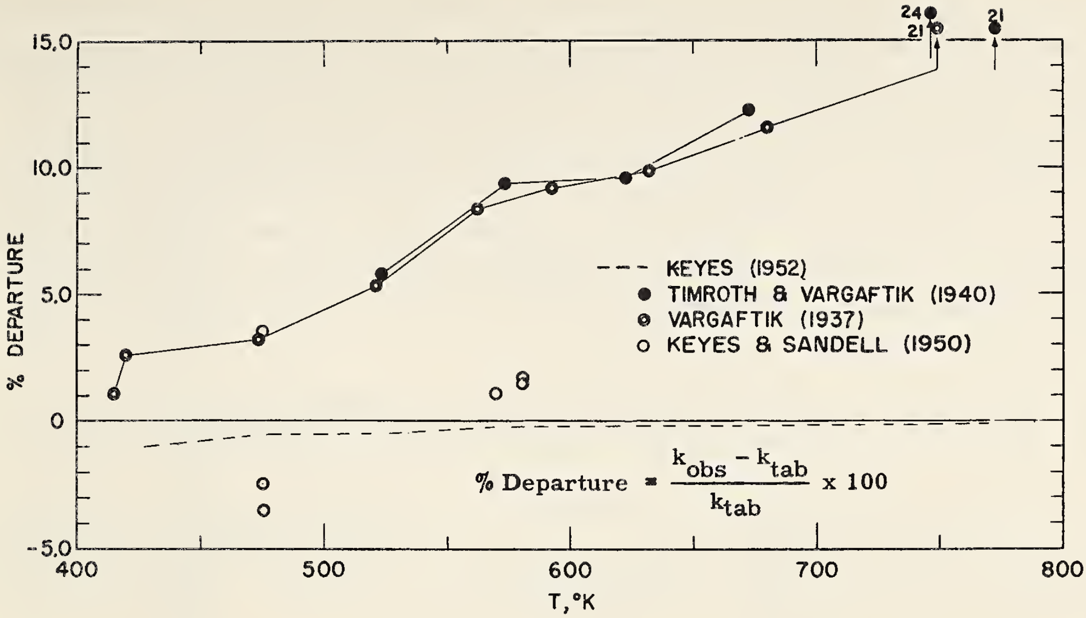

Figure 9c. Departures of low-pressure experimental thermal conductivities from the tabulated values for steam (table 9-7)

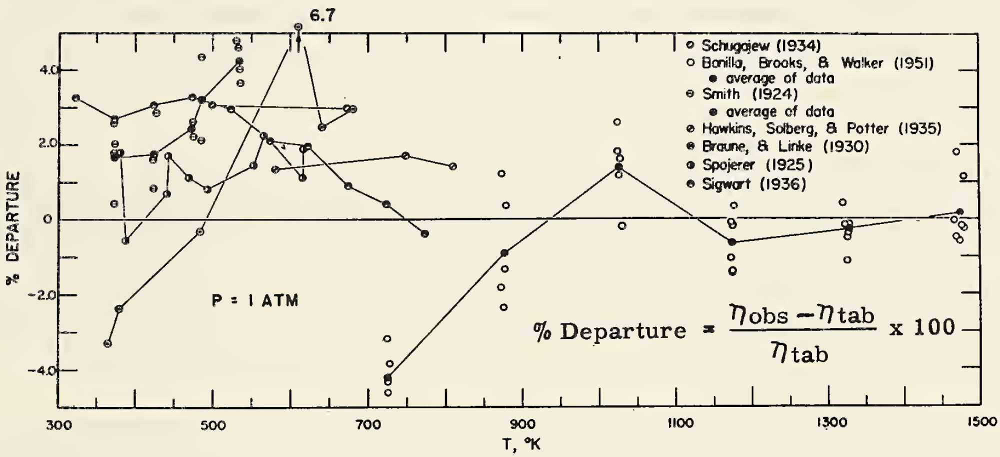

Figure 9d. Departure of low-pressure experimental viscosities from the tabulated values for steam (table 9-6)

The tabulated values of the thermodynamic functions for the ideal gas are those of Friedman and Haar [9]. These authors have calculated the properties of H_2O to temperatures of 5000°K employing a partition function expanded in closed form. The calculations include first order correction terms for anharmonicity, rotation-vibration interaction, and centrifugal stretching. The calculations are based on the best available molecular constants obtained from extensive spectroscopic measurements by Benedict, Gailor, and Plyler [10, 11] and Benedict, Claassen, and Shaw [12]. The same spectroscopic data were employed by Glatt, Adams, and Johnston [13] in a term-by-term summation over the energy levels of the unexpanded partition function with appropriate rotational cut-off. The agreement of this tabulation with earlier tables [14, 15, 16] is discussed fully by Friedman and Haar [9].

The viscosity and thermal conductivity were computed from the equations given in summary tables 1-B and 1-C. A discussion of the correlation is given by Hilsenrath and Touloukian [17].

The vapor pressures tabulated for the liquid were taken from the tabulation of Osborne, Stimson, and Ginnings [18]. The vapor pressure for ice was taken from the tabulation given by Dorsey [19], who lists values for the critical constants, $t_c = 374.15$°C, $p_c = 218.39$ atmospheres, and for the triple point pressure, p = 0.00603 atmospheres.

The Consistency and Reliability of the Tables

The accuracy of the tables of thermodynamic functions depends largely on the precision of the correlation of experimental data of state by Keyes [4]. It is estimated that the uncertainty in the values of the compressibility factor (table 9-1) does not exceed a few percent of Z - 1. The values of the density (table 9-2) are equally reliable, since they were computed directly from the compressibility factors. For the derived thermodynamic properties, namely, specific heat (table 9-3), enthalpy (table 9-4), entropy (table 9-5), and free energy function (table 9-8), the uncertainties should be approximately 10 percent of the gas imperfection correction.

The estimated uncertainties in the tabulated ideal-gas values are given in the summary table 1-D.

The tables of compressibility and density are in agreement with values obtained by appropriate interpolation methods from the table of specific volumes given in Keenan and Keyes [1]. The derived quantities, however, disagree by amounts corresponding to the differences between the values of the ideal-gas properties used here and those employed in the steam tables. A comparison of this tabulation with the Collins-Keyes [16] formulation for the ideal-gas specific heat shows table 9-10 to be higher by 0.015 in C_p^o/R in the temperature region 300° - 500°K.

Comparisons of tables of entropy and enthalpy must take into account the arbitrary values at the reference points for these functions. The reference point used here for both the enthalpy function and entropy is 0°K at which point the values of these properties are taken to be zero.

The tabulated values of thermal conductivity (table 9-7) have an average deviation of 2.1 percent from the observed values reported by Keyes and Sandell [20], whose experimental data extend to 625°K and 150 atmospheres. The tabulated values depart appreciably from data of Vargaftik [21]

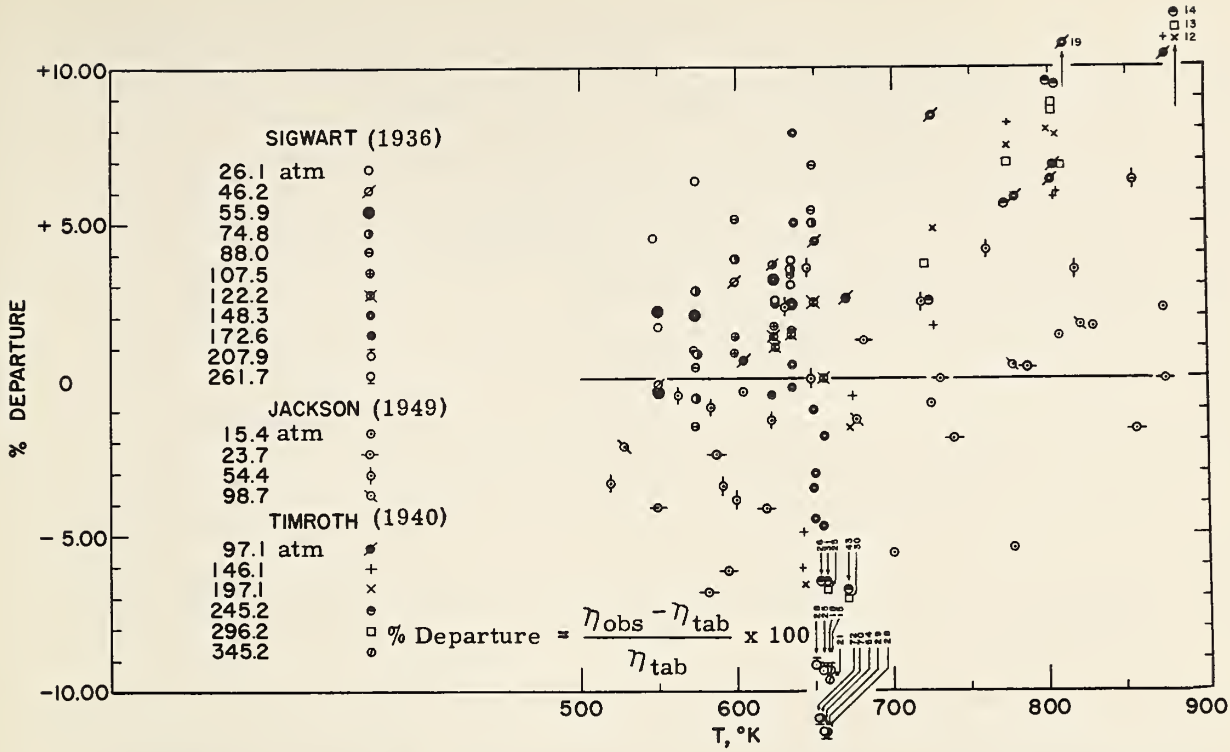

Figure 9e. Departures of high-pressure experimental viscosities from the tabulated values for steam (table 9-6/a)

and Timroth [22]. Figure 9c shows these departures in the low-pressure region (1 atmosphere). The broken line in that figure represents points calculated from the most recent correlation by F. G. Keyes [23].

The departures from the tabulated values of the low-pressure viscosity data for steam are shown in figure 9d to be less than 4 percent. The scatter of the reliable measurements at elevated pressures is higher (approximately 10 percent) as is indicated in figure 9e.

The tables of vapor pressure are thought to be reliable to better than 0.1 percent.

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Table 9-a. VALUES OF THE GAS CONSTANT, R, FOR STEAM

Values of R for Steam for Temperatures in Degrees Kelvin

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	4.55466	4.70660	3461.54	66.9353
$mole/cm^3$	82.0567	84.7832	62363.1	1205.91
mole/liter	0.0820544	0.0847809	62.3613	1.20587
lb/ft^3	0.0729579	0.0753821	55.4480	1.07219
$lb\ mole/ft^3$	1.31441	1.35808	998.952	19.3166

Values of R for Steam for Temperatures in Degrees Rankine

Pressure / Density	atm	kg/cm^2	mm Hg	lb/in^2
g/cm^3	2.53037	2.61444	1923.08	37.1863
$mole/cm^3$	45.5871	47.1018	34646.2	669.950
mole/liter	0.0455858	0.0471005	34.6452	0.669928
lb/ft^3	0.0405322	0.0418789	30.8044	0.595661
$lb\ mole/ft^3$	0.730228	0.754489	554.973	10.7314

Table 9-b. CONVERSION FACTORS FOR THE STEAM TABLES

Conversion Factors for Table 9-2

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
ρ in g cm^{-3}	ρ	mole cm^{-3}	.055506
		g $liter^{-1}$	1.00003×10^{3}
		lb in^{-3}	3.61275×10^{-2}
		lb ft^{-3}	62.4283

Conversion Factors for Table 9-4 and 9-10

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
$(H^{o} - E^{o}_{0})/RT_{0}$,	$(H^{o} - E^{o}_{0})$,	cal $mole^{-1}$	542.821
$(H - E^{o}_{0})/RT_{0}$	$(H - E^{o}_{0})$	cal g^{-1}	30.1299
		joules g^{-1}	126.064
		Btu $(lb\ mole)^{-1}$	976.437
		Btu lb^{-1}	54.1983

Conversion Factors for Tables 9-3, 9-5, 9-8, and 9-10

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
C^{o}_{p}/R, S^{o}/R,	C^{o}_{p}, S^{o},	cal $mole^{-1}$ $^{o}K^{-1}$ (or $^{o}C^{-1}$)	1.98719
C_{p}/R, S/R,	C_{p}, S,	cal g^{-1} $^{o}K^{-1}$ (or $^{o}C^{-1}$)	0.110301
$-(F^{o} - E^{o}_{0})/RT$,	$-(F^{o} - E^{o}_{0})/T$,	joules g^{-1} $^{o}K^{-1}$ (or $^{o}C^{-1}$)	0.461500
		Btu $(lb\ mole)^{-1}$ $^{o}R^{-1}$ (or $^{o}F^{-1}$)	1.98588
$-(F - E^{o}_{0})/RT$	$-(F - E^{o}_{0})/T$	Btu lb^{-1} $^{o}R^{-1}$ (or $^{o}F^{-1}$)	0.110229

Molecular weight of steam is 18.016 g $mole^{-1}$. Unless otherwise specified, the mole is the gram-mole; the calorie is the thermochemical calorie; and the joule is the absolute joule.

Conversion Factors for Table 9-6

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
η in poise or ($g\ sec^{-1}\ cm^{-1}$)	η	$kg\ hr^{-1}\ m^{-1}$	3.6000×10^{2}
		$slug\ hr^{-1}\ ft^{-1}$	7.5188
		$lb\ sec^{-1}\ ft^{-1}$	6.7197×10^{-2}
		$lb\ hr^{-1}\ ft^{-1}$	2.4191×10^{2}

Conversion Factors for Table 9-7

To Convert Tabulated Value of	To	Having the Dimensions Indicated Below	Multiply by
k/k_0^o	k	$cal\ cm^{-1}\ sec^{-1}\ {}^oK^{-1}$	3.789×10^{-5}
		$Btu\ ft^{-1}\ hr^{-1}\ {}^oR^{-1}$	9.160×10^{-3}
		$watts\ cm^{-1}\ {}^oK^{-1}$	1.585×10^{-4}

Table 9-1. COMPRESSIBILITY FACTOR FOR STEAM Z = PV/RT

°K	1 atm		10 atm		20 atm		40 atm		°R
380	.98591	176							684
390	.98767	145							702
400	.98912	120							720
410	.99032	101							738
420	.99133	86							756
430	.99219	75							774
440	.99294	65							792
450	.99359	56							810
460	.99415	50	.93377	671					828
470	.99465	44	.94048	569					846
480	.99509	39	.94617	488					864
490	.99548	35	.95105	423	.89209	1065			882
500	.99583	31	.95528	369	.90274	902			900
510	.99614	28	.95897	326	.91176	777			918
520	.99642	25	.96223	288	.91953	673			936
530	.99667	23	.96511	257	.92626	589	.83225	1613	954
540	.99690	21	.96768	231	.93215	521	.84838	1367	972
550	.99711	19	.96999	208	.93736	462	.86205	1174	990
560	.99730	17	.97207	188	.94198	413	.87379	1021	1008
570	.99747	16	.97395	170	.94611	372	.88400	895	1026
580	.99763	14	.97565	155	.94983	335	.89295	792	1044
590	.99777	13	.97720	142	.95318	304	.90087	705	1062
600	.99790	12	.97862	130	.95622	277	.90792	633	1080
610	.99802	12	.97992	119	.95899	253	.91425	570	1098
620	.99814	10	.98111	110	.96152	232	.91995	516	1116
630	.99824	10	.98221	102	.96384	212	.92511	469	1134
640	.99834	9	.98323	94	.96596	195	.92980	422	1152
650	.99843	9	.98417	86	.96791	178	.93402	385	1170
660	.99852	8	.98503	81	.96969	168	.93787	356	1188
670	.99860	7	.98584	75	.97137	155	.94143	329	1206
680	.99867	7	.98659	70	.97292	144	.94472	305	1224
690	.99874	6	.98729	66	.97436	134	.94777	283	1242
700	.99880	6	.98795	61	.97570	125	.95060	263	1260
710	.99886	6	.98856	57	.97695	118	.95323	245	1278
720	.99892	5	.98913	54	.97813	110	.95568	229	1296
730	.99897	5	.98967	51	.97923	103	.95797	214	1314
740	.99902	5	.99018	47	.98026	97	.96011	200	1332
750	.99907	4	.99065	45	.98123	90	.96211	188	1350
760	.99911	4	.99110	42	.98213	86	.96399	177	1368
770	.99915	4	.99152	40	.98299	80	.96576	166	1386
780	.99919	4	.99192	37	.98379	76	.96742	156	1404
790	.99923	4	.99229	36	.98455	72	.96898	147	1422
800	.99927	3	.99265	33	.98527	68	.97045	139	1440
810	.99930	3	.99298	32	.98595	64	.97184	131	1458
820	.99933	3	.99330	30	.98659	61	.97315	124	1476
830	.99936	3	.99360	29	.98720	58	.97439	117	1494
840	.99939	3	.99389	27	.98778	54	.97556	111	1512
850	.99942		.99416		.98832		.97667		1530

°K	60 atm		80 atm		100 atm		120 atm		°R
550	.76634	2397							990
560	.79031	1983							1008
570	.81014	1678	.71657	3026					1026
580	.82692	1441	.74683	2458					1044
590	.84133	1253	.77141	2053	.6840	340			1062
600	.85386	1101	.79194	1750	.7180	274	.6214	461	1080
610	.86487	975	.80944	1514	.7454	228	.6675	350	1098
620	.87462	871	.82458	1326	.7682	194	.7025	283	1116
630	.88333	782	.83784	1171	.7876	167	.7308	234	1134
640	.89115	692	.84955	1017	.8043	142	.7542	194	1152
650	.89807	625	.85972	905	.81848	1242	.7736	166	1170
660	.90432	572	.86877	823	.83090	1117	.7902	147	1188
670	.91004	526	.87700	751	.84207	1011	.80493	1316	1206
680	.91530	485	.88451	688	.85218	920	.81809	1185	1224
690	.92015	448	.89139	633	.86138	839	.82994	1074	1242
700	.92463	415	.89772	582	.86977	769	.84068	977	1260
710	.92878	385	.90354	539	.87746	707	.85045	894	1278
720	.93263	358	.90893	498	.88453	652	.85939	819	1296
730	.93621	334	.91391	463	.89105	603	.86758	755	1314
740	.93955	312	.91854	432	.89708	559	.87513	697	1332
750	.94267	291	.92286	402	.90267	520	.88210	645	1350
760	.94558	273	.92688	375	.90787	484	.88855	599	1368
770	.94831	255	.93063	350	.91271	451	.89454	557	1386
780	.95086	241	.93413	329	.91722	421	.90011	519	1404
790	.95327	226	.93742	309	.92143	395	.90530	485	1422
800	.95553	213	.94051	290	.92538	370	.91015	453	1440
810	.95766	200	.94341	273	.92908	348	.91468	425	1458
820	.95966	190	.94614	257	.93256	327	.91893	399	1476
830	.96156	179	.94871	242	.93583	308	.92292	375	1494
840	.96335	169	.95113	229	.93891	290	.92667	354	1512
850	.96504		.95342		.94181		.93021		1530

°K	120 atm		140 atm		160 atm		180 atm		°R
600	.6214	461							1080
610	.6675	350							1098
620	.7025	283	.6209	433					1116
630	.7308	234	.6642	337	.5797	518			1134
640	.7542	194	.6979	264	.6315	371	.5464	569	1152
650	.7736	166	.7243	218	.6686	289	.6033	395	1170
660	.7902	147	.7461	190	.6975	246	.6428	321	1188
670	.80493	1316	.7651	168	.7221	212	.6749	269	1206
680	.81809	1185	.78194	1495	.7433	187	.7018	231	1224
690	.82994	1074	.79689	1342	.76198	1652	.72492	2016	1242
700	.84068	977	.81031	1212	.77850	1478	.74508	1783	1260
710	.85045	894	.82243	1100	.79328	1332	.76291	1591	1278
720	.85939	819	.83343	1004	.80660	1206	.77882	1430	1296
730	.86758	755	.84347	919	.81866	1099	.79312	1294	1314
740	.87513	697	.85266	845	.82965	1005	.80606	1177	1332
750	.88210	645	.86111	780	.83970	922	.81783	1076	1350
760	.88855	599	.86891	720	.84892	851	.82859	988	1368
770	.89454	557	.87611	669	.85743	785	.83847	909	1386
780	.90011	519	.88280	621	.86528	728	.84756	840	1404
790	.90530	485	.88901	579	.87256	677	.85596	779	1422
800	.91015	453	.89480	540	.87933	630	.86375	723	1440
810	.91468	425	.90020	505	.88563	588	.87098	673	1458
820	.91893	399	.90525	473	.89151	549	.87771	627	1476
830	.92292	375	.90998	444	.89700	514	.88398	587	1494
840	.92667	354	.91442	418	.90214	485	.88985	551	1512
850	.93021		.91860		.90699		.89536		1530

°K	180 atm		200 atm		220 atm		240 atm		°R
640	.5464	569							1152
650	.6033	395	.5206	584	.3763	1224			1170
660	.6428	321	.5790	432	.4987	625	.3751	1120	1188
670	.6749	269	.6222	344	.5612	453	.4871	628	1206
680	.7018	231	.6566	287	.6065	360	.5499	459	1224
690	.72492	2016	.6853	245	.6425	298	.5958	366	1242
700	.74508	1783	.70978	2137	.6723	255	.6324	305	1260
710	.76291	1591	.73115	1884	.69785	2220	.6629	260	1278
720	.77882	1430	.74999	1679	.72005	1956	.6889	227	1296
730	.79312	1294	.76678	1508	.73961	1743	.7116	200	1314
740	.80606	1177	.78186	1364	.75704	1565	.7316	178	1332
750	.81783	1076	.79550	1240	.77269	1415	.7494	160	1350
760	.82859	988	.80790	1133	.78684	1287	.7654	145	1368
770	.83847	909	.81923	1039	.79971	1176	.7799	132	1386
780	.84756	840	.82962	957	.81147	1079	.7931	121	1404
790	.85596	779	.83919	885	.82226	994	.8052	110	1422
800	.86375	723	.84804	819	.83220	918	.8162	102	1440
810	.87098	673	.85623	761	.84138	851	.8264	95	1458
820	.87771	627	.86384	708	.84989	790	.8359	87	1476
830	.88398	587	.87092	660	.85779	736	.8446	81	1494
840	.88985	551	.87752	619	.86515	688	.8527	76	1512
850	.89536		.88371		.87203		.8603		1530

°K	240 atm		260 atm		280 atm		300 atm		°R
660	.3751	1120							1188
670	.4871	628	.3888	952					1206
680	.5499	459	.4840	604	.4066	805	.3323	931	1224
690	.5958	366	.5444	451	.4871	564	.4254	690	1242
700	.6324	305	.5895	365	.5435	436	.4944	519	1260
710	.6629	260	.6260	305	.5871	356	.5463	413	1278
720	.6889	227	.6565	261	.6227	300	.5876	344	1296
730	.7116	200	.6826	228	.6527	259	.6220	292	1314
740	.7316	178	.7054	202	.6786	227	.6512	254	1332
750	.7494	160	.7256	180	.7013	202	.6766	224	1350
760	.7654	145	.7436	162	.7215	180	.6990	199	1368
770	.7799	132	.7598	147	.7395	162	.7189	179	1386
780	.7931	121	.7745	134	.7557	148	.7368	161	1404
790	.8052	110	.7879	122	.7705	134	.7529	147	1422
800	.8162	102	.8001	113	.7839	124	.7676	134	1440
810	.8264	95	.8114	104	.7963	113	.7810	123	1458
820	.8359	87	.8218	96	.8076	105	.7933	114	1476
830	.8446	81	.8314	89	.8181	97	.8047	105	1494
840	.8527	76	.8403	83	.8278	89	.8152	97	1512
850	.8603		.8486		.8367		.8249		1530

°K	1 atm		10 atm		20 atm		40 atm		°R
	g/cm^3		g/cm^3		g/cm^3		g/cm^3		
380	.00058604	-1605							684
390	.00056999	-1506							702
400	.00055493	-1419							720
410	.00054074	-1342							738
420	.00052732	-1270							756
430	.00051462	-1208							774
440	.00050254	-1149							792
450	.00049105	-1095							810
460	.00048010	-1045	.0051115	-1445					828
470	.00046965	-999	.0049670	-1327					846
480	.00045966	-955	.0048343	-1229					864
490	.00045011	-916	.0047114	-1147	.010045	-317			882
500	.00044095	-878	.0045967	-1075	.0097284	-2851			900
510	.00043217	-843	.0044892	-1012	.0094433	-2598			918
520	.00042374	-810	.0043880	-957	.0091835	-2388			936
530	.00041564	-779	.0042923	-907	.0089447	-2211	.019910	-740	954
540	.00040785	-750	.0042016	-862	.0087236	-2062	.019170	-647	972
550	.00040035	-722	.0041154	-821	.0085174	-1932	.018523	-576	990
560	.00039313	-697	.0040333	-784	.0083242	-1817	.017947	-518	1008
570	.00038616	-672	.0039549	-750	.0081425	-1717	.017429	-472	1026
580	.00037944	-648	.0038799	-718	.0079708	-1627	.016957	-434	1044
590	.00037296	-626	.0038081	-689	.0078081	-1545	.016523	-402	1062
600	.00036670	-606	.0037392	-662	.0076536	-1472	.016121	-374	1080
610	.00036064	-586	.0036730	-636	.0075064	-1405	.015747	-350	1098
620	.00035478	-567	.0036094	-613	.0073659	-1344	.015397	-329	1116
630	.00034911	-548	.0035481	-590	.0072315	-1286	.015068	-310	1134
640	.00034363	-532	.0034891	-570	.0071029	-1234	.014758	-292	1152
650	.00033831	-516	.0034321	-550	.0069795	-1184	.014466	-278	1170
660	.00033315	-500	.0033771	-531	.0068611	-1140	.014188	-265	1188
670	.00032815	-484	.0033240	-514	.0067471	-1099	.013923	-252	1206
680	.00032331	-471	.0032726	-497	.0066372	-1058	.013671	-242	1224
690	.00031860	-457	.0032229	-481	.0065314	-1022	.013429	-231	1242
700	.00031403	-444	.0031748	-467	.0064292	-986	.013198	-222	1260
710	.00030959	-432	.0031281	-452	.0063306	-955	.012976	-213	1278
720	.00030527	-420	.0030829	-439	.0062351	-923	.012763	-205	1296
730	.00030107	-408	.0030390	-426	.0061428	-894	.012558	-197	1314
740	.00029699	-398	.0029964	-414	.0060534	-866	.012361	-190	1332
750	.00029301	-386	.0029550	-402	.0059668	-839	.012171	-184	1350
760	.00028915	-377	.0029148	-390	.0058829	-815	.011987	-177	1368
770	.00028538	-367	.0028758	-381	.0058014	-790	.011810	-172	1386
780	.00028171	-358	.0028377	-369	.0057224	-768	.011638	-165	1404
790	.00027813	-349	.0028008	-360	.0056456	-747	.011473	-161	1422
800	.00027464	-339	.0027648	-351	.0055709	-725	.011312	-156	1440
810	.00027125	-332	.0027297	-341	.0054984	-706	.011156	-150	1458
820	.00026793	-324	.0026956	-333	.0054278	-687	.011006	-147	1476
830	.00026469	-315	.0026623	-325	.0053591	-669	.010859	-142	1494
840	.00026154	-309	.0026298	-316	.0052922	-651	.010717	-138	1512
850	.00025845		.0025982		.0052271		.010579		1530

°K	60 atm		80 atm		100 atm		120 atm		°R
	g/cm^3		g/cm^3		g/cm^3		g/om^3		
550	.031254	− 1489							990
560	.029765	− 1238							1008
570	.028527	− 1060	.043003	− 2454					1026
580	.027467	− 928	.040549	− 1957					1044
590	.026539	− 826	.038592	− 1627	.05441	− 345			1062
600	.025713	− 743	.036965	− 1392	.05096	− 268	.07066	− 595	1080
610	.024970	− 677	.035573	− 1217	.04828	− 218	.06471	− 422	1098
620	.024293	− 621	.034356	− 1080	.04610	− 185	.06049	− 327	1116
630	.023672	− 574	.033276	− 971	.04425	− 160	.05722	− 264	1134
640	.023098	− 531	.032305	− 874	.04265	− 138	.05458	− 218	1152
650	.022567	− 496	.031431	− 798	.041269	− 1233	.05240	− 188	1170
660	.022071	− 466	.030633	− 741	.040036	− 1121	.05052	− 167	1188
670	.021605	− 440	.029292	− 689	.038915	− 1027	.048853	− 1493	1206
680	.021165	− 416	.029203	− 646	.037888	− 948	.047360	− 1352	1224
690	.020749	− 396	.028557	− 606	.036940	− 879	.046008	− 1237	1242
700	.020353	− 376	.027951	− 571	.036061	− 819	.044771	− 1138	1260
710	.019977	− 359	.027380	− 541	.035242	− 767	.043633	− 1053	1278
720	.019618	− 343	.026839	− 512	.034475	− 721	.042580	− 980	1296
730	.019275	− 328	.026327	− 486	.033754	− 680	.041600	− 916	1314
740	.018947	− 314	.025841	− 464	.033074	− 644	.040684	− 860	1332
750	.018633	− 302	.025377	− 443	.032430	− 610	.039824	− 809	1350
760	.018331	− 290	.024934	− 423	.031820	− 579	.039015	− 765	1368
770	.018041	− 279	.024511	− 405	.031241	− 552	.038250	− 724	1386
780	.017762	− 269	.024106	− 388	.030689	− 527	.037526	− 687	1404
790	.017493	− 260	.023718	− 374	.030162	− 504	.036839	− 655	1422
800	.017233	− 251	.023344	− 359	.029658	− 483	.036184	− 623	1440
810	.016982	− 242	.022985	− 346	.029175	− 464	.035561	− 596	1458
820	.016740	− 234	.022639	− 333	.028711	− 445	.034965	− 571	1476
830	.016506	− 227	.022306	− 322	.028266	− 428	.034394	− 547	1494
840	.016279	− 220	.021984	− 310	.027838	− 412	.033847	− 525	1512
850	.016059		.021674		.027426		.033322		1530

°K	120 atm		140 atm		160 atm		180 atm		°R
	g/cm³		g/cm³		g/cm³		g/cm³		
600	.07066	- 595							1080
610	.06471	- 422							1098
620	.06049	- 327	.07985	- 637					1116
630	.05722	- 264	.07348	- 466	.09619	- 927			1134
640	.05458	- 218	.06882	- 353	.08692	- 609	.1130	- 122	1152
650	.05240	- 188	.06529	- 287	.08083	- 452	.1008	- 76	1170
660	.05052	- 167	.06242	- 246	.07631	- 370	.09315	- 575	1188
670	.048853	- 1493	.05996	- 215	.07261	- 312	.08740	- 459	1206
680	.047360	- 1352	.057808	- 1906	.06949	- 268	.08281	- 380	1224
690	.046008	- 1237	.055902	- 1712	.066814	- 2351	.079009	- 3236	1242
700	.044771	- 1138	.054190	- 1550	.064463	- 2093	.075773	- 2813	1260
710	.043633	- 1053	.052640	- 1416	.062370	- 1881	.072960	- 2483	1278
720	.042580	- 980	.051224	- 1303	.060489	- 1708	.070477	- 2219	1296
730	.041600	- 916	.049921	- 1206	.058781	- 1562	.068258	- 2003	1314
740	.040684	- 860	.048715	- 1121	.057219	- 1439	.066255	- 1825	1332
750	.039824	- 809	.047594	- 1048	.055780	- 1332	.064430	- 1673	1350
760	.039015	- 765	.046546	- 982	.054448	- 1240	.062757	- 1545	1368
770	.038250	- 724	.045564	- 925	.053208	- 1159	.061212	- 1433	1386
780	.037526	- 687	.044639	- 873	.052049	- 1088	.059779	- 1336	1404
790	.036839	- 655	.043766	- 827	.050961	- 1024	.058443	- 1251	1422
800	.036184	- 623	.042939	- 784	.049937	- 967	.057192	- 1174	1440
810	.035561	- 596	.042155	- 747	.048970	- 917	.056018	- 1108	1458
820	.034965	- 571	.041408	- 711	.048053	- 869	.054910	- 1046	1476
830	.034394	- 547	.040697	- 680	.047184	- 827	.053864	- 993	1494
840	.033847	- 525	.040017	- 650	.046357	- 791	.052871	- 943	1512
850	.033322		.039367		.045566		.051928		1530

°K	180 atm		200 atm		220 atm		240 atm		°R
	g/cm³		g/cm³		g/cm³		g/cm³		
640	.1130	- 122							1152
650	.1008	- 76	.1298	- 149	.1975	- 507			1170
660	.09315	- 575	.1149	- 96	.1468	- 183	.2128	- 513	1188
670	.08740	- 459	.1053	- 70	.1285	- 114	.1615	- 206	1206
680	.08281	- 380	.09835	- 547	.1171	- 81	.1409	- 127	1224
690	.079009	- 3236	.09288	- 450	.1090	- 64	.1282	- 92	1242
700	.075773	- 2813	.088380	- 3792	.1026	- 51	.1190	- 70	1260
710	.072960	- 2483	.084588	- 3270	.09749	- 432	.1120	- 58	1278
720	.070477	- 2219	.081318	- 2870	.093169	- 3706	.1062	- 48	1296
730	.068258	- 2003	.078448	- 2553	.089463	- 3242	.1014	- 41	1314
740	.066255	- 1825	.075895	- 2296	.086221	- 2872	.09733	- 358	1332
750	.064430	- 1673	.073599	- 2083	.083349	- 2576	.09375	- 317	1350
760	.062757	- 1545	.071516	- 1905	.080773	- 2332	.09058	- 284	1368
770	.061212	- 433	.069611	- 1753	.078441	- 2128	.08774	- 256	1386
780	.059779	- 1336	.067858	- 1623	.076313	- 1955	.08518	- 234	1404
790	.058443	- 1251	.066235	- 1511	.074358	- 1806	.08284	- 214	1422
800	.057192	- 1174	.064724	- 1410	.072552	- 1678	.08070	- 198	1440
810	.056018	- 1108	.063314	- 1323	.070874	- 1565	.07872	- 184	1458
820	.054910	- 1046	.061991	- 1245	.069309	- 1466	.07688	- 171	1476
830	.053864	- 993	.060746	- 1174	.067843	- 1378	.07517	- 160	1494
840	.052871	- 943	.059572	- 1114	.066465	- 1300	.07357	- 151	1512
850	.051928		.058458		.065165		.07206		1530

°K	240 atm		260 atm		280 atm		300 atm		°R
	g/cm³		g/cm³		g/cm³		g/cm³		
660	.2128	− 513							1188
670	.1615	− 206	.2191	− 457					1206
680	.1409	− 127	.1734	− 214	.2223	− 394	.2915	− 671	1224
690	.1282	− 92	.1520	− 137	.1829	− 213	.2244	− 341	1242
700	.1190	− 70	.1383	− 99	.1616	− 141	.1903	− 205	1260
710	.1120	− 58	.1284	− 76	.1475	− 104	.1698	− 141	1278
720	.1062	− 48	.1208	− 62	.1371	− 81	.1557	− 106	1296
730	.1014	− 41	.1146	− 52	.1290	− 66	.1451	− 84	1314
740	.09733	− 358	.1094	− 45	.1224	− 55	.1367	− 69	1332
750	.09375	− 317	.1049	− 39	.1169	− 48	.1298	− 58	1350
760	.09058	− 284	.1010	− 34	.1121	− 41	.1240	− 50	1368
770	.08774	− 256	.09757	− 308	.1080	− 37	.1190	− 44	1386
780	.08518	− 234	.09449	− 278	.1043	− 33	.1146	− 39	1404
790	.08284	− 214	.09171	− 253	.1010	− 30	.1107	− 34	1422
800	.08070	− 198	.08918	− 233	.09803	− 272	.1073	− 32	1440
810	.07872	− 184	.08685	− 214	.09531	− 248	.1041	− 28	1458
820	.07688	− 171	.08471	− 199	.09283	− 229	.1013	− 27	1476
830	.07517	− 160	.08272	− 185	.09054	− 213	.09862	− 243	1494
840	.07357	− 151	.08037	− 173	.08841	− 197	.09619	− 225	1512
850	.07206		.07914		.08644		.09394		1530

°K	1 atm		10 atm		20 atm		40 atm		°R
380	4.462	-64							684
390	4.398	-43							702
400	4.355	-27							720
410	4.328	-16							738
420	4.312	-12							756
430	4.300	-9							774
440	4.291	-7							792
450	4.284	-2							810
460	4.282		5.614	-216					828
470	4.282	3	5.398	-167					846
480	4.285	3	5.231	-132					864
490	4.288	6	5.099	-105	6.574	-363			882
500	4.294	7	4.994	-84	6.211	-284			900
510	4.301	7	4.910	-68	5.927	-224			918
520	4.308	9	4.842	-54	5.703	-180			936
530	4.317	9	4.788	-44	5.523	-145	8.041	-609	954
540	4.326	9	4.744	-36	5.378	-118	7.432	-465	972
550	4.335	11	4.708	-27	5.260	-96	6.967	-365	990
560	4.346	11	4.681	-22	5.164	-79	6.602	-291	1008
570	4.357	10	4.659	-18	5.085	-66	6.311	-237	1026
580	4.367	12	4.641	-13	5.019	-54	6.074	-193	1044
590	4.379	12	4.628	-10	4.965	-44	5.881	-158	1062
600	4.391	13	4.618	-7	4.921	-37	5.723	-132	1080
610	4.404	12	4.611	-5	4.884	-30	5.591	-110	1098
620	4.416	13	4.606	-2	4.854	-25	5.481	-92	1116
630	4.429	13	4.604	-1	4.829	-21	5.389	-78	1134
640	4.442	12	4.603	1	4.808	-16	5.311	-65	1152
650	4.454	13	4.604	2	4.792	-13	5.246	-56	1170
660	4.467	14	4.606	4	4.779	-9	5.190	-46	1188
670	4.481	14	4.610	5	4.770	-8	5.144	-40	1206
680	4.495	13	4.615	5	4.762	-5	5.104	-34	1224
690	4.508	14	4.620	7	4.757	-3	5.070	-27	1242
700	4.522	13	4.627	7	4.754	-2	5.043	-25	1260
710	4.535	15	4.634	8	4.752		5.018	-19	1278
720	4.550	14	4.642	9	4.752	2	4.999	-16	1296
730	4.564	14	4.651	8	4.754	2	4.983	-13	1314
740	4.578	14	4.659	10	4.756	4	4.970	-11	1332
750	4.592	15	4.669	11	4.760	5	4.959	-8	1350
760	4.607	14	4.680	10	4.765	5	4.951	-8	1368
770	4.621	15	4.690	11	4.770	6	4.943	-4	1386
780	4.636	14	4.701	11	4.776	8	4.939	-2	1404
790	4.650	15	4.712	12	4.784	8	4.937		1422
800	4.665	15	4.724	12	4.792	8	4.937	1	1440
810	4.680	14	4.736	12	4.800	9	4.938	1	1458
820	4.694	15	4.748	12	4.809	9	4.939	2	1476
830	4.709	15	4.760	12	4.818	10	4.941	3	1494
840	4.724	15	4.772	13	4.828	10	4.944	5	1512
850	4.739	15	4.785	13	4.838	10	4.949	5	1530

°K	40 atm		60 atm		80 atm		100 atm		°R
530	8.041	-609							954
540	7.432	-465							972
550	6.967	-365	10.328	-1197					990
560	6.602	-291	9.131	- 805					1008
570	6.311	-237	8.326	- 601	12.503	-1929			1026
580	6.074	-193	7.725	- 468	10.574	-1150			1044
590	5.881	-158	7.257	- 371	9.424	- 805	13.879	-2366	1062
600	5.723	-132	6.886	- 301	8.619	- 611	11.513	-1364	1080
610	5.591	-110	6.585	- 247	8.008	- 481	10.149	- 934	1098
620	5.481	- 92	6.338	- 203	7.527	- 386	9.215	- 698	1116
630	5.389	- 78	6.135	- 169	7.141	- 315	8.517	- 547	1134
640	5.311	- 65	5.966	- 141	6.826	- 258	7.970	- 439	1152
650	5.246	- 56	5.825	- 121	6.568	- 217	7.531	- 359	1170
660	5.190	- 46	5.704	- 100	6.351	- 179	7.172	- 294	1188
670	5.144	- 40	5.604	- 86	6.172	- 152	6.878	- 244	1206
680	5.104	- 34	5.518	- 73	6.020	- 127	6.634	- 204	1224
690	5.070	- 27	5.445	- 62	5.893	- 108	6.430	- 171	1242
700	5.043	- 25	5.383	- 54	5.785	- 95	6.259	- 148	1260
710	5.018	- 19	5.329	- 45	5.690	- 80	6.111	- 124	1278
720	4.999	- 16	5.284	- 39	5.610	- 68	5.987	- 106	1296
730	4.983	- 13	5.245	- 34	5.542	- 60	5.881	- 92	1314
740	4.970	- 11	5.211	- 29	5.482	- 50	5.789	- 79	1332
750	4.959	- 8	5.182	- 24	5.432	- 45	5.710	- 69	1350
760	4.951	- 8	5.158	- 23	5.387	- 41	5.641	- 63	1368
770	4.943	- 4	5.135	- 17	5.346	- 32	5.578	- 50	1386
780	4.939	- 2	5.118	- 13	5.314	- 27	5.528	- 43	1404
790	4.937		5.105	- 11	5.287	- 23	5.485	- 37	1422
800	4.937	1	5.094	- 8	5.264	- 19	5.448	- 31	1440
810	4.938	1	5.086	- 8	5.245	- 18	5.417	- 30	1458
820	4.939	2	5.078	- 5	5.227	- 14	5.387	- 24	1476
830	4.941	3	5.073	- 4	5.213	- 12	5.363	- 21	1494
840	4.944	5	5.069	- 2	5.201	- 9	5.342	- 18	1512
850	4.949	5	5.067		5.192	- 6	5.324	- 15	1530

°K	1 atm		10 atm		20 atm		40 atm		°R
380	5.482	162							684
390	5.644	160							702
400	5.804	159							720
410	5.963	158							738
420	6.121	158							756
430	6.279	157							774
440	6.436	157							792
450	6.593	157							810
460	6.750	157	6.306	201					828
470	6.907	156	6.507	195					846
480	7.063	157	6.702	189					864
490	7.220	157	6.891	184	6.432	233			882
500	7.377	158	7.075	182	6.665	222			900
510	7.535	157	7.257	178	6.887	213			918
520	7.692	158	7.435	176	7.100	206			936
530	7.850	158	7.611	175	7.306	199	6.528	283	954
540	8.008	159	7.786	173	7.505	195	6.811	263	972
550	8.167	159	7.959	172	7.700	190	7.074	248	990
560	8.326	159	8.131	171	7.890	188	7.322	236	1008
570	8.485	160	8.302	170	8.078	185	7.558	227	1026
580	8.645	160	8.472	169	8.263	183	7.785	219	1044
590	8.805	160	8.641	170	8.446	181	8.004	212	1062
600	8.965	161	8.811	168	8.627	179	8.216	207	1080
610	9.126	162	8.979	169	8.806	178	8.423	202	1098
620	9.288	162	9.148	169	8.984	177	8.625	199	1116
630	9.450	162	9.317	168	9.161	177	8.824	196	1134
640	9.612	163	9.485	169	9.338	175	9.020	193	1152
650	9.775	163	9.654	168	9.513	176	9.213	191	1170
660	9.938	164	9.822	169	9.689	174	9.404	189	1188
670	10.102	164	9.991	169	9.863	175	9.593	188	1206
680	10.266	165	10.160	169	10.038	174	9.781	186	1224
690	10.431	165	10.329	169	10.212	174	9.967	185	1242
700	10.596	166	10.498	170	10.386	174	10.152	184	1260
710	10.762	166	10.668	170	10.560	174	10.336	184	1278
720	10.928	167	10.838	170	10.734	174	10.520	183	1296
730	11.095	167	11.008	170	10.908	174	10.703	182	1314
740	11.262	168	11.178	171	11.082	174	10.885	181	1332
750	11.430	169	11.349	171	11.256	175	11.066	182	1350
760	11.599	169	11.520	171	11.431	174	11.248	181	1368
770	11.768	169	11.691	172	11.605	175	11.429	181	1386
780	11.937	170	11.863	173	11.780	175	11.610	181	1404
790	12.107	171	12.036	172	11.955	175	11.791	180	1422
800	12.278	171	12.208	173	12.130	176	11.971	181	1440
810	12.449	171	12.381	174	12.306	176	12.152	181	1458
820	12.620	172	12.555	174	12.482	176	12.333	181	1476
830	12.792	173	12.729	174	12.658	176	12.514	181	1494
840	12.965	173	12.903	175	12.834	177	12.695	181	1512
850	13.138		13.078		13.011		12.876		1530

*The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 9-4. ENTHALPY OF STEAM - Cont.* $(H-E_0^0)/RT_0$

°K	40 atm		60 atm		80 atm		100 atm		°R
530	6.528	283							954
540	6.811	263							972
550	7.074	248	6.237	355					990
560	7.322	236	6.592	319					1008
570	7.558	227	6.911	293	6.051	420			1026
580	7.785	219	7.204	274	6.471	365			1044
590	8.004	212	7.478	258	6.836	329	6.000	462	1062
600	8.216	207	7.736	247	7.165	304	6.462	395	1080
610	8.432	202	7.983	236	7.469	284	6.857	353	1098
620	8.625	199	8.219	228	7.753	269	7.210	324	1116
630	8.824	196	8.447	222	8.022	255	7.534	302	1134
640	9.020	193	8.669	216	8.277	245	7.836	283	1152
650	9.213	191	8.885	210	8.522	236	8.119	269	1170
660	9.404	189	9.095	207	8.758	230	8.388	257	1188
670	9.593	188	9.302	204	8.988	223	8.645	247	1206
680	9.781	186	9.506	201	9.211	218	8.892	239	1224
690	9.967	185	9.707	198	9.429	213	9.131	233	1242
700	10.152	184	9.905	196	9.642	210	9.364	226	1260
710	10.336	184	10.101	194	9.852	207	9.590	221	1278
720	10.520	183	10.295	193	10.059	204	9.811	217	1296
730	10.703	182	10.488	191	10.263	202	10.028	214	1314
740	10.885	181	10.679	190	10.465	200	10.242	211	1332
750	11.066	182	10.869	190	10.665	198	10.453	207	1350
760	11.248	181	11.059	188	10.863	196	10.660	206	1368
770	11.429	181	11.247	188	11.059	195	10.866	203	1386
780	11.610	181	11.435	187	11.254	194	11.069	201	1404
790	11.791	180	11.622	186	11.448	193	11.270	200	1422
800	11.971	181	11.808	187	11.641	193	11.470	199	1440
810	12.152	181	11.995	186	11.834	191	11.669	198	1458
820	12.333	181	12.181	186	12.025	191	11.867	197	1476
830	12.514	181	12.367	185	12.216	191	12.064	196	1494
840	12.695	181	12.552	186	12.407	190	12.260	195	1512
850	12.876		12.738		12.597		12.455		1530

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 9-5. ENTROPY OF STEAM S/R

°K	1 atm		10 atm		20 atm		40 atm		°R
380	23.628	115							684
390	23.743	111							702
400	23.854	107							720
410	23.961	104							738
420	24.065	101							756
430	24.166	99							774
440	24.265	97							792
450	24.362	94							810
460	24.456	92	21.945	118					828
470	24.548	90	22.063	112					846
480	24.638	88	22.175	106					864
490	24.726	87	22.281	102	21.384	129			882
500	24.813	85	22.383	98	21.513	120			900
510	24.898	84	22.481	95	21.633	113			918
520	24.982	82	22.576	92	21.746	107			936
530	25.064	81	22.668	89	21.853	101	20.837	144	954
540	25.145	79	22.757	87	21.954	98	20.981	132	972
550	25.224	78	22.844	84	22.052	94	21.113	122	990
560	25.302	77	22.928	83	22.146	90	21.235	114	1008
570	25.379	76	23.011	81	22.236	88	21.349	108	1026
580	25.455	75	23.092	79	22.324	86	21.457	102	1044
590	25.530	74	23.171	78	22.410	83	21.559	98	1062
600	25.604	72	23.249	76	22.493	81	21.657	93	1080
610	25.676	72	23.325	75	22.574	79	21.750	90	1098
620	25.748	71	23.400	73	22.653	77	21.840	87	1116
630	25.819	70	23.473	73	22.730	76	21.927	84	1134
640	25.889	69	23.546	71	22.806	75	22.011	82	1152
650	25.958	68	23.617	71	22.881	73	22.093	80	1170
660	26.026	67	23.688	69	22.954	72	22.173	77	1188
670	26.093	66	23.757	68	23.026	70	22.250	76	1206
680	26.159	66	23.825	68	23.096	70	22.326	74	1224
690	26.225	65	23.893	66	23.166	68	22.400	73	1242
700	26.290	64	23.959	66	23.234	67	22.473	72	1260
710	26.354	64	24.025	65	23.301	67	22.545	70	1278
720	26.418	63	24.090	64	23.368	66	22.615	68	1296
730	26.481	62	24.154	63	23.434	64	22.683	68	1314
740	26.543	61	24.217	63	23.498	64	22.751	67	1332
750	26.604	61	24.280	62	23.562	63	22.818	65	1350
760	26.665	61	24.342	61	23.625	62	22.883	65	1368
770	26.726	60	24.403	60	23.687	62	22.948	64	1386
780	26.786	59	24.463	60	23.749	61	23.012	63	1404
790	26.845	58	24.523	60	23.810	60	23.075	62	1422
800	26.903	58	24.583	59	23.870	60	23.137	61	1440
810	26.961	58	24.642	58	23.930	59	23.198	61	1458
820	27.019	57	24.700	57	23.989	58	23.259	60	1476
830	27.076	56	24.757	57	24.047	58	23.319	59	1494
840	27.132	56	24.814	57	24.105	57	23.378	58	1512
850	27.188	55	24.871	56	24.162	56	23.436	58	1530

°K	40 atm		60 atm		80 atm		100 atm		°R
530	20.837	144							954
540	20.981	132							972
550	21.113	122	20.364	175					990
560	21.235	114	20.539	155					1008
570	21.349	108	20.694	139	20.060	200			1026
580	21.457	102	20.833	128	20.260	170			1044
590	21.559	98	20.961	119	20.430	152	19.880	212	1062
600	21.657	93	21.080	111	20.582	137	20.092	178	1080
610	21.750	90	21.191	105	20.719	126	20.270	157	1098
620	21.840	87	21.296	100	20.845	117	20.427	142	1116
630	21.927	84	21.396	95	20.962	110	20.569	130	1134
640	22.011	82	21.491	91	21.072	104	20.699	120	1152
650	22.093	80	21.582	88	21.176	98	20.819	112	1170
660	22.173	77	21.670	85	21.274	95	20.931	106	1188
670	22.250	76	21.755	83	21.369	90	21.037	100	1206
680	22.326	74	21.838	80	21.459	87	21.137	95	1224
690	22.400	73	21.918	78	21.546	84	21.232	91	1242
700	22.473	72	21.996	76	21.630	81	21.323	88	1260
710	22.545	70	22.072	74	21.711	79	21.411	84	1278
720	22.615	68	22.146	72	21.790	77	21.495	82	1296
730	22.683	68	22.218	72	21.867	75	21.577	80	1314
740	22.751	67	22.290	69	21.942	73	21.657	77	1332
750	22.818	65	22.359	69	22.015	72	21.734	75	1350
760	22.883	65	22.428	67	22.087	70	21.809	73	1368
770	22.948	64	22.495	66	22.157	69	21.882	72	1386
780	23.012	63	22.561	65	22.226	68	21.954	70	1404
790	23.075	62	22.626	64	22.294	66	22.024	69	1422
800	23.137	61	22.690	64	22.360	65	22.093	67	1440
810	23.198	61	22.754	62	22.425	64	22.160	67	1458
820	23.259	60	22.816	62	22.489	64	22.227	65	1476
830	23.319	59	22.878	60	22.553	62	22.292	64	1494
840	23.378	58	22.938	60	22.615	61	22.356	63	1512
850	23.436	58	22.998	59	22.676	61	22.419	62	1530

Table 9-6. VISCOSITY OF STEAM AT ATMOSPHERIC PRESSURE

°K	η		°R
	poise x 10^{-5}		
280*	9.09	72	504
300	9.81	72	540
320	10.53	72	576
340	11.25	73	612
360	11.98	72	648
380	12.70	72	684
400	13.42	72	720
420	14.14	72	756
440	14.86	73	792
460	15.59	72	828
480	16.31	72	864
500	17.03	72	900
520	17.75	72	936
540	18.47	73	972
560	19.20	72	1008
580	19.92	72	1044
600	20.64	72	1080
620	21.36	72	1116
640	22.08	73	1152
660	22.81	72	1188
680	23.53	72	1224
700	24.25	72	1260
720	24.97	72	1296
740	25.69	73	1332
760	26.42	72	1368
780	27.14	72	1404
800	27.86	73	1440
820	28.59	73	1476
840	29.32	75	1512
860	30.07	78	1548
880	30.85	85	1584
900	31.70		1620

°K	η		°R
	poise x 10^{-5}		
900	31.70	85	1620
920	32.55	84	1656
940	33.39	83	1692
960	34.22	82	1728
980	35.04	81	1764
1000	35.85	80	1800
1020	36.65	78	1836
1040	37.43	78	1872
1060	38.21	76	1908
1080	38.97	75	1944
1100	39.72	74	1980
1120	40.46	72	2016
1140	41.18	71	2052
1160	41.89	70	2088
1180	42.59	68	2124
1200	43.27	66	2160
1220	43.93	66	2196
1240	44.59	63	2232
1260	45.22	63	2268
1280	45.85	61	2304
1300	46.46	60	2340
1320	47.06	57	2376
1340	47.63	57	2412
1360	48.20	55	2448
1380	48.75	53	2484
1400	49.28	52	2520
1420	49.80	51	2556
1440	50.31	49	2592
1460	50.80	48	2628
1480	51.28	46	2664
1500	51.74		2700

*Entries below 373.16°K refer to the viscosity of the vapor near the saturation pressure.

°K	20 atm		40 atm		60 atm		80 atm		°R
	poises x 10^{-5}		poises x 10^{-5}		poises x 10^{-5}		poises x 10^{-5}		
500	17.17	178							900
550	18.95	180	19.14	176	19.45	167			990
600	20.75	179	20.90	177	21.12	170	21.42	164	1080
650	22.54	180	22.67	179	22.82	178	23.06	172	1170
700	24.34	181	24.46	179	24.60	178	24.78	175	1260
750	26.15	179	26.25	179	26.38	177	26.53	175	1350
800	27.94	184	28.04	183	28.15	182	28.28	181	1440
850	29.78	199	29.87	199	29.97	198	30.09	196	1530
900	31.77	210	31.86	209	31.95	208	32.05	204	1620
950	33.87	205	33.95	204	34.03	204	34.09	207	1710
1000	35.92	196	35.99	196	36.07	196	36.16	195	1800
1050	37.88	190	37.95	190	38.03	189	38.11	188	1890
1100	39.78		39.85		39.92		39.99		1980

°K	100 atm		200 atm		250 atm		300 atm		°R
	poises x 10^{-5}		poises x 10^{-5}		poises x 10^{-5}		poises x 10^{-5}		
600	21.87	147							1080
650	23.34	165	27.90	- 90					1170
700	24.99	171	27.00	127	29.29	2	34.01	-293	1260
750	26.70	173	28.27	136	29.31	108	31.08	42	1350
800	28.43	179	29.63	150	30.39	140	31.50	111	1440
850	30.22	195	31.13	182	31.79	171	32.61	153	1530
900	32.17	206	32.95	197	33.50	188	34.14	177	1620
950	34.23	202	34.92	194	35.38	188	35.91	180	1710
1000	36.25	195	36.86	189	37.26	184	37.71	178	1800
1050	38.20	188	38.75	182	39.10	179	39.49	176	1890
1100	40.08		40.57		40.89		41.25		1980

Table 9-7. THERMAL CONDUCTIVITY OF STEAM k/k_0^o

°K	0 atm limit		1 atm		4 atm		7 atm		°R
300	1.126	47							540
310	1.173	48							558
320	1.221	48							576
330	1.269	49							594
340	1.318	49							612
350	1.367	49							630
360	1.416	49							648
370	1.465	50							666
380	1.515	50	1.547	46					684
390	1.565	50	1.593	48					702
400	1.615	50	1.641	48					720
410	1.665	51	1.689	48					738
420	1.716	51	1.737	49	1.809	41			756
430	1.767	51	1.786	49	1.850	43			774
440	1.818	52	1.835	50	1.893	45	1.962	37	792
450	1.870	51	1.885	50	1.938	47	1.999	42	810
460	1.921	52	1.935	51	1.985	47	2.041	42	828
470	1.973	52	1.986	51	2.032	46	2.083	41	846
480	2.025	52	2.037	51	2.078	47	2.124	42	864
490	2.077	52	2.088	51	2.125	47	2.166	42	882
500	2.129	52	2.139	51	2.172	49	2.208	47	900
510	2.181	52	2.190	52	2.221	50	2.255	47	918
520	2.233	53	2.242	52	2.271	49	2.302	46	936
530	2.286	52	2.294	52	2.320	49	2.348	47	954
540	2.338	53	2.346	52	2.369	50	2.395	47	972
550	2.391	53	2.398	52	2.419	51	2.442	50	990
560	2.444	52	2.450	52	2.470	51	2.492	50	1008
570	2.496	53	2.502	53	2.521	52	2.542	49	1026
580	2.549	53	2.555	53	2.573	51	2.591	50	1044
590	2.602	53	2.608	52	2.624	51	2.641	50	1062
600	2.655	54	2.660	53	2.675	52	2.691	51	1080
610	2.709	53	2.713	53	2.727	52	2.742	51	1098
620	2.762	53	2.766	53	2.779	53	2.793	52	1116
630	2.815	53	2.819	53	2.832	52	2.845	51	1134
640	2.868	54	2.872	53	2.884	52	2.896	51	1152
650	2.922	53	2.925	54	2.936	53	2.947	52	1170
660	2.975	54	2.979	53	2.989	53	2.999	52	1188
670	3.029	53	3.032	53	3.042	52	3.051	53	1206
680	3.082	54	3.085	54	3.094	53	3.104	52	1224
690	3.136	54	3.139	53	3.147	53	3.156	52	1242
700	3.190	53	3.192	53	3.200	53	3.208	53	1260
710	3.243	54	3.245	54	3.253	53	3.261	53	1278
720	3.297	54	3.299	54	3.306	54	3.314	52	1296
730	3.351	53	3.353	53	3.360	53	3.366	53	1314
740	3.404	54	3.406	54	3.413	53	3.419	53	1332
750	3.458	54	3.460	54	3.466	53	3.472	53	1350
760	3.512	54	3.514	53	3.519	54	3.525	54	1368
770	3.566	53	3.567	54	3.573	53	3.579	53	1386
780	3.619	54	3.621	54	3.626	54	3.632	53	1404
790	3.673	53	3.675	53	3.680	53	3.685	52	1422
800	3.726		3.728		3.733		3.737		1440

Table 9-7. THERMAL CONDUCTIVITY OF STEAM - Cont. k/k_0^0

°K	10 atm		40 atm		70 atm		100 atm		°R
450	2.069	31							810
460	2.100	33							828
470	2.133	36							846
480	2.169	38							864
490	2.207	41							882
500	2.248	43							900
510	2.291	44							918
520	2.335	44							936
530	2.379	44							954
540	2.423	44							972
550	2.467	48	2.842	6	3.602	-110			990
560	2.515	49	2.848	13	3.492	- 80			1008
570	2.564	48	2.861	18	3.412	- 57			1026
580	2.612	48	2.879	23	3.355	- 39			1044
590	2.660	48	2.902	26	3.316	- 25	4.020	-132	1062
600	2.708	50	2.928	29	3.291	- 11	3.888	-100	1080
610	2.758	50	2.957	34	3.280	- 6	3.788	- 75	1098
620	2.808	50	2.991	34	3.274	4	3.713	- 53	1116
630	2.858	51	3.025	37	3.278	11	3.660	- 38	1134
640	2.909	50	3.062	39	3.289	16	3.622	- 24	1152
650	2.959	52	3.101	43	3.305	21	3.598	- 13	1170
660	3.011	51	3.144	42	3.326	24	3.585	- 4	1188
670	3.062	52	3.186	43	3.350	28	3.581	3	1206
680	3.114	51	3.229	42	3.378	31	3.584	10	1224
690	3.165	51	3.271	43	3.409	33	3.594	15	1242
700	3.216	53	3.314	47	3.442	35	3.609	20	1260
710	3.269	52	3.361	47	3.477	37	3.629	23	1278
720	3.321	53	3.408	46	3.514	39	3.652	26	1296
730	3.374	52	3.454	47	3.553	40	3.678	30	1314
740	3.426	52	3.501	47	3.593	41	3.708	32	1332
750	3.478	53	3.548	49	3.634	42	3.740	34	1350
760	3.531	53	3.597	49	3.676	43	3.774	36	1368
770	3.584	52	3.646	50	3.719	44	3.810	37	1386
780	3.636	53	3.696	49	3.763	45	3.847	39	1404
790	3.689	52	3.745	49	3.808	47	3.886	40	1422
800	3.741		3.794		3.855		3.926		1440

°K	150 atm		200 atm		250 atm		300 atm		°R
620	5.042	-272							1116
630	4.770	-211							1134
640	4.559	-162	6.338	-482					1152
650	4.397	-126	5.856	-376	8.522	-911	13.388	-2020	1170
660	4.271	- 97	5.480	-294	7.611	-700	11.368	-1516	1188
670	4.174	- 72	5.186	-229	6.911	-539	9.852	-1141	1206
680	4.102	- 54	4.957	-179	6.372	-422	8.711	- 877	1224
690	4.048	- 38	4.778	-141	5.950	-332	7.834	- 680	1242
700	4.010	- 26	4.637	-110	5.618	-262	7.154	- 532	1260
710	3.984	- 15	4.527	- 85	5.356	-208	6.622	- 421	1278
720	3.969	- 6	4.442	- 64	5.148	-164	6.201	- 331	1296
730	3.963	1	4.378	- 48	4.984	-130	5.870	- 266	1314
740	3.964	7	4.330	- 34	4.854	-102	5.604	- 212	1332
750	3.971	13	4.296	- 22	4.752	- 79	5.392	- 166	1350
760	3.984	17	4.274	- 14	4.673	- 61	5.226	- 135	1368
770	4.001	21	4.260	- 5	4.612	- 45	5.091	- 107	1386
780	4.022	24	4.255	2	4.567	- 16	4.984	- 83	1404
790	4.046	27	4.257	7	4.551	- 38	4.901	- 65	1422
800	4.073		4.264		4.513		4.836		1440

Table 9-8. FREE ENERGY FUNCTION OF STEAM $-(F - E_0^o)/RT$

°K	1 atm		10 atm		20 atm		40 atm		°R
380	19.687	103							684
390	19.790	100							702
400	19.890	98							720
410	19.988	96							738
420	20.084	94							756
430	20.178	92							774
440	20.270	89							792
450	20.359	88							810
460	20.447	87	18.200	81					828
470	20.534	84	18.281	80					846
480	20.618	83	18.361	79					864
490	20.701	82	18.440	78	17.798	74			882
500	20.783	79	18.518	77	17.872	72			900
510	20.862	79	18.595	75	17.944	71			918
520	20.941	77	18.670	75	18.015	73			936
530	21.018	76	18.745	73	18.088	70	17.472	64	954
540	21.094	74	18.818	73	18.158	70	17.536	63	972
550	21.168	73	18.891	71	18.228	69	17.599	64	990
560	21.241	72	18.962	70	18.297	69	17.663	64	1008
570	21.313	71	19.032	70	18.366	66	17.727	63	1026
580	21.384	69	19.102	68	18.432	67	17.790	63	1044
590	21.453	69	19.170	67	18.499	66	17.853	63	1062
600	21.522	67	19.237	67	18.565	65	17.916	63	1080
610	21.589	67	19.304	65	18.630	65	17.979	61	1098
620	21.656	66	19.369	65	18.695	63	18.040	61	1116
630	21.722	64	19.434	63	18.758	63	18.101	60	1134
640	21.786	64	19.497	63	18.821	61	18.161	60	1152
650	21.850	62	19.560	62	18.882	62	18.221	59	1170
660	21.912	62	19.622	61	18.944	60	18.280	59	1188
670	21.974	62	19.683	61	19.004	60	18.339	58	1206
680	22.036	60	19.744	60	19.064	59	18.397	58	1224
690	22.096	59	19.804	59	19.123	58	18.455	57	1242
700	22.155	59	19.863	58	19.181	58	18.512	56	1260
710	22.214	58	19.921	57	19.239	57	18.568	56	1278
720	22.272	57	19.978	57	19.296	56	18.624	55	1296
730	22.329	57	20.035	56	19.352	56	18.679	55	1314
740	22.386	55	20.091	55	19.408	55	18.734	54	1332
750	22.441	55	20.146	55	19.463	54	18.788	53	1350
760	22.496	55	20.201	54	19.517	53	18.841	52	1368
770	22.551	54	20.255	54	19.570	53	18.893	53	1386
780	22.605	53	20.309	53	19.623	53	18.946	52	1404
790	22.658	53	20.362	52	19.676	52	18.998	51	1422
800	22.711	52	20.414	52	19.728	51	19.049	51	1440
810	22.763	52	20.466	51	19.779	52	19.100	51	1458
820	22.815	51	20.517	51	19.831	50	19.151	49	1476
830	22.866	50	20.568	50	19.881	50	19.200	49	1494
840	22.916	50	20.618	50	19.931	49	19.249	49	1512
850	22.966		20.668		19.980		19.298		1530

°K	40 atm		60 atm		80 atm		100 atm		°R
530	17.472	64							954
540	17.536	63							972
550	17.599	64	17.267	56					990
560	17.663	64	17.323	58					1008
570	17.727	63	17.381	59	17.161	51			1026
580	17.790	63	17.440	59	17.212	53			1044
590	17.853	63	17.499	59	17.265	54	17.102	48	1062
600	17.916	63	17.558	59	17.319	55	17.150	50	1080
610	17.979	61	17.617	58	17.374	55	17.200	51	1098
620	18.040	61	17.675	58	17.429	55	17.251	51	1116
630	18.101	60	17.733	58	17.484	55	17.302	52	1134
640	18.161	60	17.791	58	17.539	55	17.354	53	1152
650	18.221	59	17.849	57	17.594	56	17.407	52	1170
660	18.280	59	17.906	57	17.650	54	17.459	53	1188
670	18.339	58	17.963	56	17.704	55	17.512	52	1206
680	18.397	58	18.019	56	17.759	55	17.564	52	1224
690	18.455	57	18.075	56	17.814	53	17.616	53	1242
700	18.512	56	18.131	55	17.867	54	17.669	53	1260
710	18.568	56	18.186	54	17.921	53	17.722	52	1278
720	18.624	55	18.240	54	17.974	53	17.774	51	1296
730	18.679	55	18.294	54	18.027	53	17.825	51	1314
740	18.734	54	18.348	53	18.080	52	17.876	51	1332
750	18.788	53	18.401	52	18.132	51	17.927	51	1350
760	18.841	52	18.453	52	18.183	51	17.978	50	1368
770	18.893	53	18.505	52	18.234	50	18.028	49	1386
780	18.946	52	18.557	51	18.284	50	18.077	50	1404
790	18.998	51	18.608	50	18.334	50	18.127	49	1422
800	19.049	51	18.658	50	18.384	50	18.176	49	1440
810	19.100	51	18.708	50	18.434	49	18.225	49	1458
820	19.151	49	18.758	49	18.483	49	18.274	48	1476
830	19.200	49	18.807	49	18.532	48	18.322	47	1494
840	19.249	49	18.856	48	18.580	48	18.369	47	1512
850	19.298		18.904		18.628		18.416		1530

Table 9-9. VAPOR PRESSURE OF ICE

T	P		T
°K	atm		°R
154	.0000000001	2	277.2
155	.0000000003		279.0
156	.0000000003		280.8
157	.0000000003	1	282.6
158	.0000000004	1	284.4
159	.0000000005	3	286.2
160	.0000000008	1	288.0
161	.0000000009		289.8
162	.000000001		291.6
163	.000000001		293.4
164	.000000001	2	295.2
165	.000000003		297.0
166	.000000003	1	298.8
167	.000000004		300.6
168	.000000004	1	302.4
169	.000000005	2	304.2
170	.000000007	1	306.0
171	.000000008		307.8
172	.00000001		309.6
173	.00000001		311.4
174	.00000001		313.2
175	.00000001	2	315.0
176	.00000003		316.8
177	.00000003	1	318.6
178	.00000004		320.4
179	.00000004	1	322.2
180	.00000005	2	324.0
181	.00000007	1	325.8
182	.00000008	1	327.6
183	.00000009		329.4
184	.0000001	3	331.2
185	.00000013	3	333.0
186	.00000016	2	334.8
187	.00000018	4	336.6
188	.00000022	4	338.4
189	.00000026	6	340.2
190	.00000032	5	342.0
191	.00000037	6	343.8
192	.00000043	8	345.6
193	.00000051	10	347.4
194	.00000061	11	349.2
195	.00000072	12	351.0
196	.00000084	15	352.8
197	.00000099	2	354.6
198	.0000012	1	356.4
199	.00000134	24	358.2
200	.00000158	26	360.0
201	.00000184	30	361.8
202	.00000214	35	363.6
203	.00000249	40	365.4
204	.00000289	47	367.2
205	.00000336	52	369.0
206	.00000388	61	370.8
207	.00000449	69	372.6
208	.00000518	79	374.4
209	.00000597	90	376.2
210	.00000687	104	378.0
211	.00000791	114	379.8
212	.00000905	13	381.6
213	.0000104	15	383.4
214	.0000119	18	385.2
215	.0000137	18	387.0
216	.0000155	23	388.8
217	.0000178	25	390.6
218	.0000203	26	392.4
219	.0000229	33	394.2
220	.0000262	34	396.0
221	.0000296	41	397.8
222	.0000337	45	399.6
223	.0000382	50	401.4
224	.0000432	56	403.2
225	.0000488	62	405.0
226	.0000550	71	406.8
227	.0000621	78	408.6
228	.0000699	88	410.4
229	.0000787	96	412.2
230	.0000883	109	414.0
231	.0000992	12	415.8
232	.000111	14	417.6
233	.000125	15	419.4
234	.0001397	166	421.2
235	.0001563	183	423.0
236	.0001746	202	424.8
237	.0001948	226	426.6
238	.0002174	248	428.4
239	.0002422	274	430.2
240	.0002696	303	432.0
241	.0002999	333	433.8
242	.0003332	368	435.6
243	.0003700	41	437.4
244	.000411	43	439.2
245	.000454	50	441.0
246	.000504	53	442.8
247	.000557	59	444.6
248	.000616	66	446.4
249	.000682	69	448.2
250	.000751	78	450.0
251	.000829	84	451.8
252	.000913	10	453.6
253	.00101	10	455.4
254	.00111	10	457.2

Table 9-9. VAPOR PRESSURE OF ICE - Cont.

T	P		T
°K	atm		°R
254.0	.00111	5	457.2
254.5	.00116	6	458.1
255.0	.00122	6	459.0
255.5	.00128	6	459.9
256.0	.001337	63	460.8
256.5	.001400	67	461.7
257.0	.001467	70	462.6
257.5	.001537	72	463.5
258.0	.001609	77	464.4
258.5	.001686	78	465.3
259.0	.001764	83	466.2
259.5	.001847	86	467.1
260.0	.001933	91	468.0
260.5	.002024	92	468.9
261.0	.002116	97	469.8
261.5	.002213	101	470.7
262.0	.002314	106	471.6
262.5	.002420	110	472.5
263.0	.002530	115	473.4
263.5	.002645	119	474.3
264.0	.002764	124	475.2
264.5	.002888	129	476.1
265.0	.003017	134	477.0
265.5	.003151	141	477.9
266.0	.003292	145	478.8
266.5	.003437	152	479.7
267.0	.003589	158	480.6
267.5	.003747	164	481.5
268.0	.003911	169	482.4
268.5	.004080	178	483.3
269.0	.004258	184	484.2
269.5	.004442	191	485.1
270.0	.004633	199	486.0
270.5	.004832	206	486.9
271.0	.005038	215	487.8
271.5	.005253	222	488.7
272.0	.005475	232	489.6
272.5	.005707	239	490.5
273.0	.005946		491.4

Table 9-9/a. VAPOR PRESSURE OF WATER

T	P		T	T	P		T
°K	atm		°R	°K	atm		°R
274	.006406	477	493.2				
275	.006883	508	495.0	325	.13329	667	585.0
276	.007391	542	496.8	326	.13996	695	586.8
277	.007933	576	498.6	327	.14691	724	588.6
278	.008509	614	500.4	328	.15415	755	590.4
279	.009123	651	502.2	329	.16170	786	592.2
280	.009774	692	504.0	330	.16956	819	594.0
281	.010466	735	505.8	331	.17775	852	595.8
282	.011201	781	507.6	332	.18627	887	597.6
283	.011982	827	509.4	333	.19514	922	599.4
284	.012809	878	511.2	334	.20436	959	601.2
285	.013687	930	513.0	335	.21395	997	603.0
286	.014617	986	514.8	336	.22392	1036	604.8
287	.015603	1043	516.6	337	.23428	1077	606.6
289	.016646	1104	518.4	338	.24505	1118	608.4
289	.017750	1167	520.2	339	.25623	1162	610.2
290	.018917	1235	522.0	340	.26785	1206	612.0
291	.020152	1305	523.8	341	.27991	1251	613.8
292	.021457	1378	525.6	342	.29242	1299	615.6
293	.022835	1455	527.4	343	.30541	1346	617.4
294	.024290	1535	529.2	344	.31887	1398	619.2
295	.025825	1620	531.0	345	.33285	1448	621.0
296	.027445	1707	532.8	346	.34733	1501	622.8
297	.029152	1800	534.6	347	.36234	1555	624.6
298	.030952	1896	536.4	348	.37789	1611	626.4
299	.032848	1996	538.2	349	.39400	1669	628.2
300	.034844	2101	540.0	350	.41069	1728	630.0
301	.036945	2210	541.8	351	.42797	1789	631.8
302	.039155	2325	543.6	352	.44586	1851	633.6
303	.041480	2444	545.4	353	.46437	1915	635.4
304	.043924	2568	547.2	354	.48352	1981	637.2
305	.046492	2697	549.0	355	.50333	2049	639.0
306	.049189	2832	550.8	356	.52382	2119	640.8
307	.052021	2972	552.6	357	.54501	2189	642.6
308	.054993	3119	554.4	358	.56690	2263	644.4
309	.058112	3270	556.2	359	.58953	2337	646.2
310	.061382	3428	558.0	360	.61290	2415	648.0
311	.064810	3593	559.8	361	.63705	2493	649.8
312	.068403	3764	561.6	362	.66198	2574	651.6
313	.072167	3941	563.4	363	.68772	2658	653.4
314	.076108	4126	565.2	364	.71430	2742	655.2
315	.080234	4317	567.0	365	.74172	2829	657.0
316	.084551	4516	568.8	366	.77001	2919	658.8
317	.089067	4723	570.6	367	.79920	3010	660.6
318	.093790	4939	572.4	368	.82930	3104	662.4
319	.098729	515	574.2	369	.86034	3199	664.2
320	.10388	539	576.0	370	.89233	3298	666.0
321	.10927	563	577.8	371	.92531	3398	667.8
322	.11490	587	579.6	372	.95929	3501	669.6
323	.12077	613	581.4	373	.99430	361	671.4
324	.12690	639	583.2	374	1.0304	371	673.2

T	P		T	T	P		T
°K	atm		°R	°K	atm		°R
375	1.0675	382	675.0	425	4.9338	1325	765.0
376	1.1057	394	676.8	426	5.0663	1352	766.8
377	1.1451	405	678.6	427	5.2015	1382	768.6
378	1.1856	417	680.4	428	5.3397	1410	770.4
379	1.2273	429	682.2	429	5.4807	1440	772.2
380	1.2702	441	684.0	430	5.6247	1470	774.0
381	1.3143	454	685.8	431	5.7717	1500	775.8
382	1.3597	466	687.6	432	5.9217	1531	777.6
383	1.4063	480	689.4	433	6.0748	1563	779.4
384	1.4543	493	691.2	434	6.2311	1595	781.2
385	1.5036	506	693.0	435	6.3906	1626	783.0
386	1.5542	521	694.8	436	6.5532	1660	784.8
387	1.6063	535	696.6	437	6.7192	1693	786.6
388	1.6598	549	698.4	438	6.8885	1727	788.4
389	1.7147	564	700.2	439	7.0612	1760	790.2
390	1.7711	579	702.0	440	7.2372	1796	792.0
391	1.8290	595	703.8	441	7.4168	1830	793.8
392	1.8885	610	705.6	442	7.5998	1867	795.6
393	1.9495	626	707.4	443	7.7865	1902	797.4
394	2.0121	643	709.2	444	7.9767	1939	799.2
395	2.0764	659	711.0	445	8.1706	1976	801.0
396	2.1423	676	712.8	446	8.3682	2014	802.8
397	2.2099	693	714.6	447	8.5696	2051	804.6
398	2.2792	711	716.4	448	8.7747	2091	806.4
399	2.3503	729	718.2	449	8.9838	2130	808.2
400	2.4232	748	720.0	450	9.1968	2170	810.0
401	2.4980	766	721.8	451	9.4138	2210	811.8
402	2.5746	785	723.6	452	9.6348	2250	813.6
403	2.6531	804	725.4	453	9.8598	229	815.4
404	2.7335	824	727.2	454	10.089	234	817.2
405	2.8159	844	729.0	455	10.323	237	819.0
406	2.9003	865	730.8	456	10.560	242	820.8
407	2.9868	885	732.6	457	10.802	246	822.6
408	3.0753	906	734.4	458	11.048	250	824.4
409	3.1659	927	736.2	459	11.298	256	826.2
410	3.2586	950	738.0	460	11.554	259	828.0
411	3.3536	971	739.8	461	11.813	264	829.8
412	3.4507	994	741.6	462	12.077	268	831.6
413	3.5501	1018	743.4	463	12.345	273	833.4
414	3.6519	1042	745.2	464	12.618	279	835.2
415	3.7561	1063	747.0	465	12.897	282	837.0
416	3.8624	1088	748.8	466	13.179	288	838.8
417	3.9712	1114	750.6	467	13.467	292	840.6
418	4.0826	1138	752.4	468	13.759	298	842.4
419	4.1964	1163	754.2	469	14.057	302	844.2
420	4.3127	1189	756.0	470	14.359	307	846.0
421	4.4316	1215	757.8	471	14.666	313	847.8
422	4.5531	1242	759.6	472	14.979	317	849.6
423	4.6773	1269	761.4	473	15.296	323	851.4
424	4.8042	1296	763.2	474	15.619	328	853.2

T °K	P atm		T °R
475	15.947	334	855.0
476	16.281	339	856.8
477	16.620	344	858.6
478	16.964	350	860.4
479	17.314	356	862.2
480	17.670	361	864.0
481	18.031	367	865.8
482	18.398	372	867.6
483	18.770	379	869.4
484	19.149	384	871.2
485	19.533	391	873.0
486	19.924	396	874.8
487	20.320	402	876.6
488	20.722	409	878.4
489	21.131	415	880.2
490	21.546	421	882.0
491	21.967	428	883.8
492	22.395	433	885.6
493	22.828	441	887.4
494	23.269	447	889.2
495	23.716	453	891.0
496	24.169	460	892.8
497	24.629	466	894.6
498	25.095	474	896.4
499	25.569	481	898.2
500	26.050	487	900.0
501	26.537	495	901.8
502	27.032	501	903.6
503	27.533	508	905.4
504	28.041	516	907.2
505	28.557	523	909.0
506	29.080	530	910.8
507	29.610	538	912.6
508	30.148	545	914.4
509	30.693	553	916.2
510	31.246	560	918.0
511	31.806	568	919.8
512	32.374	575	921.6
513	32.949	584	923.4
514	33.533	592	925.2
515	34.125	599	927.0
516	34.724	608	928.8
517	35.332	615	930.6
518	35.947	624	932.4
519	36.571	632	934.2
520	37.203	641	936.0
521	37.844	649	937.8
522	38.493	657	939.6
523	39.150	666	941.4
524	39.816	674	943.2
525	40.490	684	945.0
526	41.174	692	946.8
527	41.866	700	948.6
528	42.566	710	950.4
529	43.276	719	952.2
530	43.995	728	954.0
531	44.723	737	955.8
532	45.460	746	957.6
533	46.206	756	959.4
534	46.962	766	961.2
535	47.728	774	963.0
536	48.502	784	964.8
537	49.286	793	966.6
538	50.079	804	968.4
539	50.883	813	970.2
540	51.696	824	972.0
541	52.520	833	973.8
542	53.353	843	975.6
543	54.196	853	977.4
544	55.049	864	979.2
545	55.913	874	981.0
546	56.787	884	982.8
547	57.671	894	984.6
548	58.565	906	986.4
549	59.471	916	988.2
550	60.387	927	990.0
551	61.314	937	991.8
552	62.251	948	993.6
553	63.199	960	995.4
554	64.159	971	997.2
555	65.130	982	999.0
556	66.112	993	1000.8
557	67.105	1004	1002.6
558	68.109	1016	1004.4
559	69.125	1028	1006.2
560	70.153	1039	1008.0
561	71.192	1050	1009.8
562	72.242	1063	1011.6
563	73.305	1074	1013.4
564	74.379	1087	1015.2
565	75.466	1099	1017.0
566	76.565	1110	1018.8
567	77.675	1123	1020.6
568	78.798	1136	1022.4
569	79.934	1148	1024.2
570	81.082	1161	1026.0
571	82.243	1174	1027.8
572	83.417	1186	1029.6
573	84.603	1199	1031.4
574	85.802	1212	1033.2

T	P		T	T	P		T
°K	atm		°R	°K	atm		°R
575	87.014	1226	1035.0	610	138.55	176	1098.0
576	88.240	1238	1036.8	611	140.31	178	1099.8
577	89.478	1251	1038.6	612	142.09	179	1101.6
578	90.729	1266	1040.4	613	143.88	182	1103.4
579	91.995	1279	1042.2	614	145.70	183	1105.2
580	93.274	1292	1044.0	615	147.53	185	1107.0
581	94.566	1306	1045.8	616	149.38	187	1108.8
582	95.872	1319	1047.6	617	151.25	189	1110.6
583	97.191	1334	1049.4	618	153.14	191	1112.4
584	98.525	1349	1051.2	619	155.05	193	1114.2
585	99.874	137	1053.0	620	156.98	195	1116.0
586	101.24	137	1054.8	621	158.93	197	1117.8
587	102.61	139	1056.6	622	160.90	199	1119.6
588	104.00	141	1058.4	623	162.89	201	1121.4
589	105.41	142	1060.2	624	164.90	203	1123.2
590	106.83	144	1062.0	625	166.93	205	1125.0
591	108.27	145	1063.8	626	168.98	207	1126.8
592	109.72	146	1065.6	627	171.05	209	1128.6
593	111.18	148	1067.4	628	173.14	212	1130.4
594	112.66	150	1069.2	629	175.26	213	1132.2
595	114.16	151	1071.0	630	177.39	216	1134.0
596	115.67	153	1072.8	631	179.55	219	1135.8
597	117.20	155	1074.6	632	181.74	220	1137.6
598	118.75	156	1076.4	633	183.94	223	1139.4
599	120.31	157	1078.2	634	186.17	226	1141.2
600	121.88	159	1080.0	635	188.43	228	1143.0
601	123.47	161	1081.8	636	190.71	230	1144.8
602	125.08	162	1083.6	637	193.01	232	1146.6
603	126.70	164	1085.4	638	195.33	235	1148.4
604	128.34	166	1087.2	639	197.68	238	1150.2
605	130.00	168	1089.0	640	200.06	241	1152.0
606	131.68	169	1090.8	641	202.47	244	1153.8
607	133.37	171	1092.6	642	204.91	247	1155.6
608	135.08	172	1094.4	643	207.38	249	1157.4
609	136.80	175	1096.2	644	209.87	253	1159.2
				645	212.40	256	1161.0
				646	214.96	260	1162.8
				647	217.56		1164.6

Table 9-10 IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR STEAM

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		$\frac{S^\circ}{R}$		°R
50	4.0072	− 9	.7149	1467	11.6321	7137	15.5379	7305	90
60	4.0063	− 4	.8616	1467	12.3458	6056	16.2684	6176	108
70	4.0059	− 2	1.0083	1466	12.9514	5260	16.8860	5349	126
80	4.0057		1.1549	1467	13.4774	4649	17.4209	4718	144
90	4.0057	1	1.3016	1466	13.9423	4165	17.8927	4220	162
100	4.0058	2	1.4482	1467	14.3588	3773	18.3147	3819	180
110	4.0060	2	1.5949	1466	14.7361	3448	18.6966	3485	198
120	4.0062	3	1.7415	1467	15.0809	3174	19.0451	3207	216
130	4.0065	3	1.8882	1467	15.3983	2941	19.3658	2969	234
140	4.0068	4	2.0349	1466	15.6924	2740	19.6627	2765	252
150	4.0072	4	2.1815	1468	15.9664	2565	19.9392	2586	270
160	4.0076	4	2.3283	1467	16.2229	2410	20.1978	2430	288
170	4.0080	6	2.4750	1467	16.4639	2274	20.4408	2291	306
180	4.0086	7	2.6217	1468	16.6913	2152	20.6699	2167	324
190	4.0093	9	2.7685	1468	16.9065	2042	20.8866	2057	342
200	4.0102	11	2.9153	1468	17.1107	1943	21.0923	1957	360
210	4.0113	14	3.0621	1469	17.3050	1853	21.2880	1866	378
220	4.0127	18	3.2090	1469	17.4903	1771	21.4746	1784	396
230	4.0145	21	3.3559	1470	17.6674	1697	21.6530	1709	414
240	4.0166	25	3.5029	1471	17.8371	1627	21.8239	1641	432
250	4.0191	30	3.6500	1472	17.9998	1565	21.9880	1577	450
260	4.0221	36	3.7972	1473	18.1563	1506	22.1457	1518	468
270	4.0257	40	3.9445	1474	18.3069	1451	22.2975	1465	486
280	4.0297	46	4.0919	1476	18.4520	1401	22.4440	1415	504
290	4.0343	51	4.2395	1478	18.5921	1354	22.5855	1368	522
300	4.0394	57	4.3873	1480	18.7275	1311	22.7223	1326	540
310	4.0451	63	4.5353	1482	18.8586	1269	22.8549	1285	558
320	4.0514	68	4.6835	1484	18.9855	1230	22.9834	1248	576
330	4.0582	73	4.8319	1487	19.1085	1194	23.1082	1212	594
340	4.0655	78	4.9806	1490	19.2279	1161	23.2294	1180	612
350	4.0733	83	5.1296	1493	19.3440	1128	23.3474	1148	630
360	4.0816	88	5.2789	1495	19.4568	1097	23.4622	1120	648
370	4.0904	92	5.4284	1500	19.5665	1069	23.5742	1092	666
380	4.0996	96	5.5784	1502	19.6734	1042	23.6834	1066	684
390	4.1092	100	5.7286	1506	19.7776	1017	23.7900	1042	702
400	4.1192	547	5.8792	7589	19.8793	4737	23.8942	4882	720
450	4.1739	606	6.6381	7695	20.3530	4254	24.3824	4429	810
500	4.2345	644	7.4076	7809	20.7784	3866	24.8253	4066	900
550	4.2989	670	8.1885	7930	21.1650	3548	25.2319	3769	990
600	4.3659	691	8.9815	8055	21.5198	3282	25.6088	3522	1080
650	4.4350	709	9.7870	8182	21.8480	3058	25.9610	3312	1170
700	4.5059	726	10.6052	8314	22.1538	2864	26.2922	3134	1260
750	4.5785	740	11.4366	8448	22.4402	2697	26.6056	2978	1350
800	4.6525	753	12.2814	8585	22.7099	2551	26.9034	2843	1440
850	4.7278	760	13.1399	8723	22.9650	2422	27.1877	2724	1530
900	4.8038	766	14.0122	8863	23.2072	2308	27.4601	2618	1620
950	4.8804	765	14.8985	9004	23.4380	2205	27.7219	2523	1710
1000	4.9569	761	15.7989	9143	23.6585	2114	27.9742	2436	1800
1050	5.0330	754	16.7132	9281	23.8699	2030	28.2178	2359	1890
1100	5.1084	742	17.6413	9419	24.0729	1955	28.4537	2287	1980
1150	5.1826	729	18.5832	9553	24.2684	1885	28.6824	2222	2070

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

Table 9-10 IDEAL-GAS THERMODYNAMIC FUNCTIONS FOR STEAM - Cont.

°K	$\frac{C_p^\circ}{R}$		$\frac{(H^\circ - E_0^\circ)^*}{RT_0}$		$\frac{-(F^\circ - E_0^\circ)}{RT}$		$\frac{S^\circ}{R}$		°R
1200	5.2555	1405	19.5385	19499	24.4569	3587	28.9046	4262	2160
1300	5.3960	1326	21.4884	19999	24.8156	3371	29.3308	4048	2340
1400	5.5286	1240	23.4883	20470	25.1527	3185	29.7356	3857	2520
1500	5.6526	1152	25.5353	20907	25.4712	3022	30.1213	3686	2700
1600	5.7678	1065	27.6260	21312	25.7734	2879	30.4899	3529	2880
1700	5.8743	982	29.7572	21688	26.0613	2751	30.8428	3386	3060
1800	5.9725	903	31.9260	22031	26.3364	2636	31.1814	3253	3240
1900	6.0628	832	34.1291	22350	26.6000	2532	31.5067	3132	3420
2000	6.1460	764	36.3641	22641	26.8532	2438	31.8199	3017	3600
2100	6.2224	704	38.6282	22910	27.0970	2350	32.1216	2911	3780
2200	6.2928	648	40.9192	23158	27.3320	2271	32.4127	2812	3960
2300	6.3576	598	43.2350	23385	27.5591	2196	32.6939	2718	4140
2400	6.4174	553	45.5735	23596	27.7787	2128	32.9657	2631	4320
2500	6.4727	511	47.9331	23789	27.9915	2063	33.2288	2549	4500
2600	6.5238	474	50.3120	23971	28.1978	2004	33.4837	2471	4680
2700	6.5712	441	52.7091	24139	28.3982	1948	33.7308	2398	4860
2800	6.6153	410	55.1230	24293	28.5930	1894	33.9706	2329	5040
2900	6.6563	382	57.5523	24439	28.7824	1845	34.2035	2263	5220
3000	6.6945	691	59.9962	49273	28.9669	3552	34.4298	4343	5400
3200	6.7636	608	64.9235	49748	29.3221	3382	34.8641	4119	5760
3400	6.8244	538	69.8983	50168	29.6603	3229	35.2760	3916	6120
3600	6.8782	481	74.9151	50539	29.9832	3091	35.6676	3732	6480
3800	6.9263	431	79.9690	50872	30.2923	2964	36.0408	3564	6840
4000	6.9694	389	85.0562	51173	30.5887	2848	36.3972	3410	7200
4200	7.0083	353	90.1735	51444	30.8735	2740	36.7382	3269	7560
4400	7.0436	322	95.3179	51691	31.1475	2642	37.0651	3138	7920
4600	7.0758	295	100.4870	51917	31.4117	2550	37.3789	3018	8280
4800	7.1053	272	105.6787	52124	31.6667	2464	37.6807	2906	8640
5000	7.1325		110.8911		31.9131		37.9713		9000

* The enthalpy function is divided here by a constant RT_0 where T_0 = 273.16°K (491.688°R).

°K	°C	°F	°R	°K	°C	°F	°R
0.	-273.16	-459.69	0.	100.	-173.16	-279.69	180.
3.16	-270.	-454.00	5.69	103.16	-170.	-274.00	185.69
5.38	-267.78	-450.	9.69	105.38	-167.78	-270.	189.69
5.55	-267.61	-449.69	10.	105.56	-167.60	-269.69	190.
10.	-263.16	-441.69	18.00	110.	-163.16	-261.69	198.00
10.94	-262.22	-440.	19.69	110.96	-162.20	-260.	199.69
11.11	-262.05	-439.69	20.	111.11	-162.05	-259.69	200.
13.16	-260.	-436.00	23.69	113.16	-160.	-256.00	203.69
16.49	-256.67	-430.	29.69	116.49	-156.67	-250.	209.69
16.67	-256.49	-429.69	30.	116.67	-156.49	-249.69	210.
20.	-253.16	-423.69	36.00	120.	-153.16	-243.69	216.00
22.05	-251.11	-420.	39.69	122.05	-151.11	-240.	219.69
22.22	-250.94	-419.69	40.	122.22	-150.94	-239.69	220.
23.16	-250.	-418.00	41.69	123.16	-150.	-238.00	221.69
27.60	-245.56	-410.	49.69	127.60	-145.56	-230.	229.69
27.78	-245.38	-409.69	50.	127.78	-145.38	-229.69	230.
30.	-243.16	-405.69	54.00	130.	-143.16	-225.69	234.00
33.16	-240.	-400.	59.69	133.16	-140.	-220.	239.69
33.33	-239.83	-399.69	60.	133.33	-139.83	-219.69	240.
38.72	-234.44	-390.	69.69	138.72	-134.44	-210.	249.69
38.89	-234.27	-389.69	70.	138.89	-134.27	-209.69	250.
40.	-233.16	-387.69	72.00	140.	-133.16	-207.69	252.00
43.16	-230.	-382.00	77.69	143.16	-130.	-202.00	257.69
44.27	-228.89	-380.	79.69	144.27	-128.89	-200.	259.69
44.44	-228.72	-379.69	80.	144.44	-128.62	-199.69	260.
49.83	-223.33	-370.	89.69	149.83	-123.33	-190.	269.69
50.	-223.16	-369.69	90.	150.	-123.16	-189.69	270.
53.16	-220.	-364.00	95.69	153.16	-120.	-184.00	275.69
55.38	-217.78	-360.	99.69	155.38	-117.78	-180.	279.69
55.56	-217.60	-359.69	100.	155.56	-117.60	-179.69	280.
60.	-213.16	-351.69	108.00	160.	-113.16	-171.69	288.00
60.94	-212.22	-350.	109.69	160.94	-112.22	-170.	289.69
61.11	-212.05	-349.69	110.	161.11	-112.05	-169.69	290.
63.16	-210.	-346.00	113.69	163.16	-110.	-166.00	293.69
66.49	-206.67	-340.	119.69	166.49	-106.67	-160.	299.69
66.67	-206.49	-339.69	120.	166.67	-106.49	-159.69	300.
70.	-203.16	-333.69	126.00	170.	-103.16	-153.69	306.00
72.05	-201.11	-330.	129.69	172.05	-101.11	-150.	309.69
72.22	-200.94	-329.69	130.	172.22	-100.94	-149.69	310.
73.16	-200.	-328.00	131.69	173.16	-100.	-148.00	311.69
77.60	-195.56	-320.	139.69	177.60	-95.56	-140.	319.69
77.78	-195.38	-319.69	140.	177.78	-95.38	-139.69	320.
80.	-193.16	-315.69	144.00	180.	-93.16	-135.69	324.00
83.16	-190.	-310.	149.69	183.16	-90.	-130.	329.69
83.33	-189.83	-309.69	150.	183.33	-89.83	-129.69	330.
88.72	-184.44	-300.	159.69	188.72	-84.44	-120.	339.69
88.89	-184.27	-299.69	160.	188.89	-84.27	-119.69	340.
90.	-183.16	-297.69	162.00	190.	-83.16	-117.69	342.00
93.16	-180.	-292.00	167.69	193.16	-80.	-112.00	347.69
94.27	-178.89	-290.	169.69	194.27	-78.89	-110.	349.69
94.44	-178.72	-289.69	170.	194.44	-78.72	-109.69	350.
99.83	-173.33	-280.	179.69	199.83	-73.33	-100.	359.69
100.	-173.16	-279.69	180.	200.	-73.16	-99.69	360.

°K °C	°R °F
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°R °F	°K °C
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8	4.44
9	5.00
10	5.56
11	6.11
12	6.67
13	7.22
14	7.78
15	8.33
16	8.89
17	9.44
18	10.00

°K	°C	°F	°R	°K	°C	°F	°R
200.	-73.16	-99.69	360.	300.	26.84	80.31	540.
203.16	-70.	-94.00	365.69	303.16	30.	86.00	545.69
205.38	-67.78	-90.	369.69	305.38	32.22	90.	549.69
205.56	-67.60	-89.99	370.	305.56	32.40	90.31	550.
210.	-63.16	-81.69	378.00	310.	36.84	98.31	558.00
210.94	-62.22	-80.	379.69	310.94	37.78	100.	559.69
211.11	-62.05	-79.69	380.	311.11	37.95	100.31	560.
213.16	-60.	-76.00	383.69	313.16	40.	104.00	563.69
216.41	-56.67	-70.	389.69	316.41	43.33	110.	569.69
216.67	-56.49	-69.69	390.	316.67	43.51	110.31	570.
220.	-53.16	-63.69	396.00	320.	46.84	116.31	576.00
222.05	-51.11	-60.	399.69	322.05	48.89	120.	579.69
222.22	-50.94	-59.69	400.	322.22	49.06	120.31	580.
223.16	-50.	-58.00	401.69	323.16	50.	122.00	581.69
227.60	-45.56	-50.	409.69	327.60	54.44	130.	589.69
227.78	-45.38	-49.69	410.	327.78	54.62	130.31	590.
230.	-43.16	-45.69	414.00	330.	56.84	134.31	594.00
233.16	-40.	-40.	419.69	333.16	60.	140.	599.69
233.33	-39.83	-39.69	420.	333.33	60.17	140.31	600.
238.72	-34.44	-30.	429.69	338.72	65.56	150.	609.69
238.89	-34.27	-29.69	430.	338.89	65.73	150.31	610.
240.	-33.16	-27.69	432.00	340.	66.84	152.31	612.00
243.16	-30.	-22.00	437.69	343.16	70.	158.00	617.69
244.27	-28.89	-20.	439.69	344.27	71.11	160.	619.69
244.44	-28.72	-19.69	440.	344.44	71.28	160.31	620.
249.83	-23.33	-10.	449.69	349.83	76.67	170.	629.69
250.	-23.16	-9.69	450.	350.	76.84	170.31	630.
253.16	-20.	-4.00	455.69	353.16	80.	176.00	635.69
255.38	-17.78	0.	459.69	355.38	82.22	180.	639.69
255.56	-17.60	+.31	460.	355.56	82.40	180.31	640.
260.	-13.16	+8.31	468.00	360.	86.84	188.31	648.00
260.94	-12.22	10.	469.69	360.94	87.78	190.	649.69
261.11	-12.05	10.31	470.	361.11	87.95	190.31	650.
263.16	-10.	14.00	473.69	363.16	90.	194.00	653.69
266.49	-6.67	20.	479.69	366.49	93.33	200.	659.69
266.67	-6.49	20.31	480.	366.67	93.51	200.31	660.
270.	-3.16	26.31	486.00	370.	96.84	206.31	666.00
272.05	-1.11	30.	489.69	372.05	98.89	210.	669.69
272.22	-.94	30.31	490.	372.22	99.06	210.31	670.
273.16	0.	32.00	491.69	373.16	100.	212.00	671.69
277.60	+4.44	40.	499.69	377.60	104.44	220.	679.69
277.78	4.62	40.31	500.	377.78	104.62	220.31	680.
280.	6.84	44.31	504.00	380.	106.84	224.31	684.00
283.16	10.	50.	509.69	383.16	110.	230.	689.69
283.33	10.17	50.31	510.	383.33	110.17	230.31	690.
288.72	15.56	60.	519.69	388.72	115.56	240.	699.69
288.89	15.73	60.31	520.	388.89	115.73	240.31	700.
290.	16.84	62.31	522.00	390.	116.84	242.31	702.00
293.16	20.	68.00	527.69	393.16	120.	248.00	707.69
294.27	21.11	70.	529.69	394.27	121.11	250.	709.69
294.44	21.28	70.31	530.	394.44	121.28	250.31	710.
299.83	26.67	80.	539.69	399.83	126.67	260.	719.69
300.	26.84	80.31	540.	400.	126.84	260.31	720.

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3	1.67
4	2.22
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7	3.89
8	4.44
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16	8.89
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°K	°C	°F	°R	°K	°C	°F	°R
400.	126.84	260.31	720.	500.	226.84	440.31	900.
403.16	130.	266.00	725.69	503.16	230.	446.00	905.69
405.38	132.22	270.	729.69	505.38	232.22	450.	909.69
405.56	132.40	270.31	730.	505.56	232.40	450.31	910.
410.	136.84	278.31	738.00	510.	236.84	458.31	918.00
410.94	137.78	280.	739.69	510.94	237.78	460.	919.69
411.11	137.95	280.31	740.	511.11	237.95	460.31	920.
413.16	140.	284.00	743.69	513.16	240.	464.00	923.69
416.41	143.33	290.	749.69	516.41	243.33	470.	929.69
416.67	143.51	290.31	750.	516.67	243.51	470.31	930.
420.	146.84	296.31	756.00	520.	246.84	476.31	936.00
422.05	148.89	300.	759.69	522.05	248.89	480.	939.69
422.22	149.06	300.31	760.	522.22	249.06	480.31	940.
423.16	150.	302.00	761.69	523.16	250.	482.00	941.69
427.60	154.44	310.	769.69	527.60	254.44	490.	949.69
427.78	154.62	310.31	770.	527.78	254.62	490.31	950.
430.	156.84	314.31	774.00	530.	256.84	494.31	954.00
433.16	160.	320.	779.69	533.16	260.	500.	959.69
433.33	160.17	320.31	780.	533.33	260.17	500.31	960.
438.72	165.56	330.	789.69	538.72	265.56	510.	969.69
438.89	165.73	330.31	790.	538.89	265.73	510.31	970.
440.	166.84	332.31	792.00	540.	266.84	512.31	972.00
443.16	170.	338.00	797.69	543.16	270.	518.00	977.69
444.27	171.11	340.	799.69	544.27	271.11	520.	979.69
444.44	171.28	340.31	800.	544.44	271.28	520.31	980.
449.83	176.66	350.	809.69	549.83	276.66	530.	989.69
450.	176.84	350.31	810.	550.	276.84	530.31	990.
453.16	180.	356.00	815.69	553.16	280.	536.00	995.69
455.38	182.22	360.	819.69	555.38	282.22	540.	999.69
455.56	182.40	360.31	820.	555.56	282.40	540.31	1000.
460.	186.84	368.31	828.00	560.	286.84	548.31	1008.00
460.94	187.78	370.	829.69	560.94	287.78	550.	1009.69
461.11	187.95	370.31	830.	561.11	287.95	550.31	1010.
463.16	190.	374.00	833.69	563.16	290.	554.00	1013.69
466.49	193.33	380.	839.69	566.49	293.33	560.	1019.69
466.67	193.51	380.31	840.	566.67	293.51	560.31	1020.
470.	196.84	386.31	846.00	570.	296.84	566.31	1026.00
472.05	198.89	390.	849.69	572.05	298.89	570.	1029.69
472.22	199.06	390.31	850.	527.22	299.06	570.31	1030.
473.16	200.	392.00	851.69	573.16	300.	572.00	1031.69
477.60	204.44	400.	859.69	577.60	304.44	580.	1039.69
477.78	204.62	400.31	860.	577.78	304.62	580.31	1040.
480.	206.84	404.31	864.00	580.	306.84	584.31	1044.00
483.16	210.	410.	869.69	583.16	310.	590.	1049.69
483.33	210.17	410.31	870.	583.33	310.17	590.31	1050.
488.72	215.56	420.	879.69	588.72	315.56	600.	1059.69
488.89	215.73	420.31	880.	588.89	315.73	600.31	1060.
490.	216.84	422.31	882.00	590.	316.84	602.31	1062.00
493.16	220.	428.00	887.69	593.16	320.	608.00	1067.69
494.27	221.11	430.	889.69	594.27	321.11	610.	1069.69
494.44	221.28	430.31	890.	594.44	321.28	610.31	1070.
499.83	226.67	440.	899.69	599.83	326.67	620.	1079.69
500.	226.84	440.31	900.	600.	326.84	620.31	1080.

°K °C	°R °F
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°R °F	°K °C
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16	8.89
17	9.44
18	10.00

°K	°C	°F	°R	°K	°C	°F	°R
600.	326.84	620.31	1080.	700.	426.84	800.31	1260.
603.16	330.	626.00	1085.69	703.16	430.	806.00	1265.69
605.38	332.22	630.	1089.69	705.38	432.22	810.	1269.69
605.56	332.40	630.31	1090.	705.56	432.40	810.31	1270.
610.	336.84	638.31	1098.00	710.	436.84	818.31	1278.00
610.94	337.78	640.	1099.69	710.94	437.78	820.	1279.69
611.11	337.95	640.31	1100.	711.11	437.95	820.31	1280.
613.16	340.	644.00	1103.69	713.16	440.	824.00	1283.69
616.41	343.33	650.	1109.69	716.41	443.33	830.	1289.69
616.67	343.51	650.31	1110.	716.67	443.51	830.31	1290.
620.	346.84	656.31	1116.00	720.	446.84	836.31	1296.00
622.05	348.89	660.	1119.69	722.05	448.89	840.	1299.69
622.22	349.06	660.31	1120.	722.22	449.06	840.31	1300.
623.16	350.	662.00	1121.69	723.16	450.	842.00	1301.69
627.60	354.44	670.	1129.69	727.60	454.44	850.	1309.69
627.78	354.62	670.31	1130.	727.78	454.62	850.31	1310.
630.	356.84	674.31	1134.00	730.	456.84	854.31	1314.00
633.16	360.	680.	1139.69	733.16	460.	860.	1319.69
633.33	360.17	680.31	1140.	733.33	460.17	860.31	1320.
638.72	365.56	690.	1149.69	738.72	465.56	870.	1329.69
638.89	365.73	690.31	1150.	738.89	465.73	870.31	1330.
640.	366.84	692.31	1152.00	740.	466.84	872.31	1332.00
643.16	370.	698.00	1157.69	743.16	470.	878.00	1337.69
644.27	371.11	700.	1159.69	744.27	471.11	880.	1339.69
644.44	371.28	700.31	1160.	744.44	471.28	880.31	1340.
649.83	376.66	710.	1169.69	749.83	476.66	890.	1349.69
650.	376.84	710.31	1170.	750.	476.84	890.31	1350.
653.16	380.	716.00	1175.69	753.16	480.	896.00	1355.69
655.38	382.22	720.	1179.69	755.38	482.22	900.	1359.69
655.56	382.40	720.31	1180.	755.56	482.40	900.31	1360.
660.	386.84	728.31	1188.00	760.	486.84	908.31	1368.00
660.94	387.78	730.	1189.69	760.94	487.78	910.	1369.69
661.11	387.95	730.31	1190.	761.11	487.95	910.31	1370.
663.16	390.	734.00	1193.69	763.16	490.	914.00	1373.69
666.49	393.33	740.	1199.69	766.49	493.33	920.	1379.69
666.67	393.51	740.31	1200.	766.67	493.51	920.31	1380.
670.	396.84	746.31	1206.00	770.	496.84	926.31	1386.00
672.05	398.89	750.	1209.69	772.05	498.89	930.	1389.69
672.22	399.06	750.31	1210.	772.22	499.06	930.31	1390.
673.16	400.	752.00	1211.69	773.16	500.	932.00	1391.69
677.60	404.44	760.	1219.69	777.60	504.44	940.	1399.69
677.78	404.62	760.31	1220.	777.78	504.62	940.31	1400.
680.	406.84	764.31	1224.00	780.	506.84	944.31	1404.00
683.16	410.	770.	1229.69	783.16	510.	950.	1409.69
683.33	410.17	770.31	1230.	783.33	510.17	950.31	1410.
688.72	415.56	780.	1239.69	788.72	515.56	960.	1419.69
688.89	415.73	780.31	1240.	788.89	515.73	960.31	1420.
690.	416.84	782.31	1242.00	790.	516.84	962.31	1422.00
693.16	420.	788.00	1247.69	793.16	520.	968.00	1427.69
694.27	421.11	790.	1249.69	794.87	521.11	970.	1429.69
694.44	421.28	790.31	1250.	794.44	521.28	970.31	1430.
699.83	426.67	800.	1259.67	799.83	526.67	980.	1439.69
700.	426.84	800.31	1260.	800.	526.84	980.31	1440.

°K °C	°R °F
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°R °F	°K °C
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9	5.00
10	5.56
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13	7.22
14	7.78
15	8.33
16	8.89
17	9.44
18	10.00

°K	°C	°F	°R	°K	°C	°F	°R
800.	526.84	980.31	1440.	900.	626.84	1160.31	1620
803.16	530.	986.00	1445.69	903.16	630.	1166.00	1625.69
805.38	532.22	990.	1449.69	905.38	632.22	1170.	1629.69
805.56	532.40	990.31	1450.	905.56	632.40	1170.31	1630.
810.	526.84	998.31	1458.00	910.	636.84	1178.31	1638.00
810.94	537.78	1000.	1459.69	910.94	637.78	1180.	1639.69
811.11	537.95	1000.31	1460.	911.11	637.95	1180.31	1640.
813.16	540.	1004.00	1463.69	913.16	640.	1184.00	1643.69
816.41	543.33	1010.	1469.69	916.41	643.33	1190.	1649.69
816.67	543.51	1010.31	1470.	916.67	643.51	1190.31	1650.
820.	546.84	1016.31	1476.00	920.	646.84	1196.31	1656.00
822.05	548.89	1020.	1479.69	922.05	648.89	1200.	1659.69
822.22	549.06	1020.31	1480.	922.22	649.06	1200.31	1660.
823.16	550.	1022.00	1481.69	923.16	650.	1202.00	1661.69
827.60	554.44	1030.	1489.69	927.60	654.44	1210.	1669.69
827.78	554.62	1030.31	1490.	927.78	654.62	1210.31	1670.
830.	556.84	1034.31	1494.00	930.	656.84	1214.31	1674.00
833.16	560.	1040.	1499.69	933.16	660.	1220.	1679.69
833.33	560.17	1040.31	1500.	933.33	660.17	1220.31	1680.
838.72	565.56	1050.	1509.69	938.72	665.56	1230.	1689.69
838.89	565.73	1050.31	1510.	938.89	665.73	1230.31	1690.
840.	566.84	1052.31	1512.00	940.	666.84	1232.31	1692.00
843.16	570.	1058.00	1517.69	943.16	670.	1238.00	1697.69
844.27	571.11	1060.	1519.69	944.27	671.11	1240.	1699.69
844.44	571.28	1060.31	1520.	944.44	671.28	1240.31	1700.
849.83	576.66	1070.	1529.69	949.83	676.66	1250.	1709.69
850.	576.84	1070.31	1530.	950.	676.84	1250.31	1710.
853.16	580.	1076.00	1535.69	953.16	680.	1256.00	1715.69
855.38	582.22	1080.	1539.69	955.38	682.22	1260.	1719.69
855.56	582.40	1080.31	1540.	955.56	682.40	1260.31	1720.
860.	586.84	1088.31	1548.00	960.	686.84	1262.31	1722.00
860.94	587.78	1090.	1549.69	960.94	687.78	1270.	1729.69
861.11	587.95	1090.31	1550.	961.11	687.95	1270.31	1730.
863.16	590.	1094.00	1553.69	963.16	690.	1274.00	1733.69
866.48	593.33	1100.	1559.69	966.49	693.33	1280.	1739.69
866.67	593.51	1100.31	1560.	966.67	693.51	1280.31	1740.
870.	596.84	1106.31	1566.00	970.	696.84	1286.31	1746.00
872.05	598.89	1110.	1569.69	972.05	698.89	1290.	1749.69
872.22	599.06	1110.31	1570.	972.22	699.06	1290.31	1750.
873.16	600.	1112.00	1571.69	973.16	700.	1292.00	1751.69
877.60	604.44	1120.	1579.69	977.60	704.44	1300.	1759.69
877.78	604.62	1120.31	1580.	977.78	704.62	1300.31	1760.
880.	606.84	1124.31	1584.00	980.	706.84	1304.31	1764.00
883.16	610.	1130.	1589.69	983.16	710.	1310.	1769.69
883.33	610.17	1130.31	1590.	983.33	710.17	1310.31	1770.
888.72	615.56	1140.	1599.69	988.72	715.56	1320.	1779.69
888.89	615.73	1140.31	1600.	988.89	715.73	1320.31	1780.
890.	616.84	1142.31	1602.00	990.	716.84	1322.31	1782.00
893.16	620.	1148.00	1607.69	993.16	720.	1328.00	1787.69
894.27	621.11	1150.	1609.69	994.27	721.11	1330.	1789.69
894.44	621.28	1150.31	1610.	994.44	721.28	1330.31	1790.
899.83	626.67	1160.	1619.69	999.83	726.67	1340.	1799.69
900.	626.84	1160.31	1620.	1000.	726.84	1340.31	1800.

°K °C	°R °F
1	1.8
2	3.6
3	5.4
4	7.2
5	9.0
6	10.8
7	12.6
8	14.4
9	16.2
10	18.0

°R °F	°K °C
1	0.56
2	1.11
3	1.67
4	2.22
5	2.78
6	3.33
7	3.89
8	4.44
9	5.00
10	5.56
11	6.11
12	6.67
13	7.22
14	7.78
15	8.33
16	8.89
17	9.44
18	10.00

CONVERSION FACTORS FOR UNITS OF LENGTH

Multiply by appropriate entry to obtain →	cm	mm	μ	mμ	Å
1 Centimeter (cm)	1	10	10^4	10^7	10^8
1 Millimeter (mm)	10^{-1}	1	10^3	10^6	10^7
1 Micron (μ)	10^{-4}	10^{-3}	1	10^3	10^4
1 Millimicron (mμ)	10^{-7}	10^{-6}	10^{-3}	1	10
1 Angstrom Unit (Å)	10^{-8}	10^{-7}	10^{-4}	10^{-1}	1

CONVERSION FACTORS FOR UNITS OF LENGTH - Cont.

Multiply by appropriate entry to obtain →	cm	m	in	ft	yd
1 cm	1	0.01	0.3937	0.032808333	0.010936111
1 m	100.	1	39.37	3.2808333	1.0936111
1 in	2.5400051	0.025400051	1	0.083333333	0.027777778
1 ft	30.480061	0.30480061	12.	1	0.33333333
1 yd	91.440183	0.91440183	36.	3.	1

CONVERSION FACTORS FOR UNITS OF AREA

Multiply by appropriate entry to obtain →	cm^2	m^2	sq in	sq ft	sq yd
1 cm^2	1	10^{-4}	0.15499969	1.0763867 x 10^{-3}	1.1959853 x 10^{-4}
1 m^2	10^4	1	1549.9969	10.763867	1.1959853
1 sq in	6.4516258	6.4516258 x 10^{-4}	1	6.9444444 x 10^{-3}	7.7160494 x 10^{-4}
1 sq ft	929.03412	0.092903412	144.	1	0.11111111
1 sq yd	8361.3070	0.83613070	1296.	9.	1

CONVERSION FACTORS FOR UNITS OF VOLUME

Multiply by appropriate entry to obtain →	ml	liter	gal
1 cm^3	0.9999720	0.9999720×10^{-3}	2.6417047×10^{-4}
1 cu in	16.38670	1.638670×10^{-2}	4.3290043×10^{-3}
1 cu ft	28316.22	28.31622	7.4805195
1 ml	1	0.001	2.641779×10^{-4}
1 liter	1000.	1	0.2641779
1 gal	3785.329	3.785329	1

CONVERSION FACTORS FOR UNITS OF VOLUME - Cont.

Multiply by appropriate entry to obtain →	cm^3	cu in	cu ft
1 cm^3	1	0.061023378	3.5314455×10^{-5}
1 cu in	16.387162	1	5.7870370×10^{-4}
1 cu ft	28317.017	1728.	1
1 ml	1.000028	0.06102509	3.531544×10^{-5}
1 liter	1000.028	61.02509	0.03531544
1 gal	3785.4345	231.	0.13368056

CONVERSION FACTORS FOR UNITS OF MASS

Multiply ↓ by appropriate entry to obtain →	g	kg	lb	metric ton	ton
1 g	1	10^{-3}	2.2046223×10^{-3}	10^{-6}	1.1023112×10^{-6}
1 kg	10^{3}	1	2.2046223	10^{-3}	1.1023112×10^{-3}
1 lb	453.59243	0.45359243	1	4.5359243×10^{-4}	0.0005
1 metric ton	10^{6}	10^{3}	2204.6223	1	1.1023112
1 ton	907184.86	907.18486	2000.	0.90718486	1

CONVERSION FACTORS FOR UNITS OF DENSITY

Multiply ↓ by appropriate entry to obtain →	g/cm^3	g/ml	lb/cu in	lb/cu ft	lb/gal
1 g/cm^3	1	1.000028	0.036127504	62.428327	8.3454535
1 g/ml	0.9999720	1	0.03612649	62.42658	8.345220
1 lb/cu in	27.679742	27.68052	1	1728.	231.
1 lb/cu ft	0.016018369	0.01601882	5.7870370×10^{-4}	1	0.13368056
1 lb/gal	0.11982572	0.1198291	4.3290043 10^{-3}	7.4805195	1

CONVERSION FACTORS FOR UNITS OF PRESSURE

Multiply by appropriate entry to obtain →	$dyne/cm^2$	bar	atm	$kg(wt)/cm^2$	mm Hg	in Hg	lb(wt)/sq in
1 $dyne/cm^2$	1	10^{-6}	0.9869233×10^{-6}	1.0197162×10^{-6}	7.500617×10^{-4}	2.952993×10^{-5}	1.4503830×10^{-5}
1 bar	10^6	1	0.9869233	1.0197162	750.0617	29.52993	14.503830
1 atm	1013250.	1.013250	1	1.0332275	760.	29.92120	14.696006
1 $kg(wt)/cm^2$	980665.	0.980665	0.9678411	1	735.5592	28.95897	14.223398
1 mm Hg	1333.2237	1.3332237×10^{-3}	1.3157895×10^{-3}	1.3595098×10^{-3}	1	0.03937	0.019336850
1 in Hg	33863.95	0.03386395	0.03342112	0.03453162	25.40005	1	0.4911570
1 lb(wt)/sq in	68947.31	0.06894731	0.06804570	0.07030669	51.71473	2.036009	1

CONVERSION FACTORS FOR UNITS OF ENERGY

Multiply by appropriate entry to obtain →	g mass (energy equiv)	abs. joule	int. joule	cal	I. T. cal	BTU	int. kilowatt -hr
1 g mass (energy equiv)	1	8.98656×10^{13}	8.98508×10^{13}	2.14784×10^{13}	2.14644×10^{13}	8.51775×10^{10}	2.49586×10^{7}
1 abs. joule	1.112772×10^{-14}	1	0.999835	0.239006	0.238849	0.947831×10^{-3}	2.77732×10^{-7}
1 int. joule	1.112956×10^{-14}	1.000165	1	0.239045	0.238889	0.947988×10^{-3}	2.777778×10^{-7}
1 cal	4.65584×10^{-14}	4.1840	4.1833	1	0.999346	3.96573×10^{-3}	1.162030×10^{-6}
1 I. T. cal	4.65888×10^{-14}	4.18674	4.18605	1.000654	1	3.96832×10^{-3}	1.162791×10^{-6}
1 BTU	1.174019×10^{-11}	1055.040	1054.866	252.161	251.996	1	2.93018×10^{-4}
1 int. kilowatt-hr	4.00664×10^{-8}	3,600,594.	3,600,000.	860,563.	860,000.	3412.76	1
1 horsepower-hr	2.98727×10^{-8}	2,684,525.	2,684,082.	641,617.	641,197.	2544.48	0.745578
1 ft-lb(wt)	1.508720×10^{-14}	1.355821	1.355597	0.324049	0.323837	1.285089×10^{-3}	3.76555×10^{-7}
1 cu ft - lb(wt)/sq in	2.17256×10^{-12}	195.2382	195.2060	46.6630	46.6325	0.1850529	5.42239×10^{-5}
1 liter-atm	1.127548×10^{-12}	101.3278	101.3111	24.2179	24.2021	0.0960417	2.81420×10^{-5}

CONVERSION FACTORS FOR UNITS OF ENERGY - Cont.

Multiply by appropriate entry to obtain →	ft-lb(wt)	cu ft-lb(wt)/sq in.	liter-atm	horsepower-hr
1 g mass(energy equiv)	6.62814 x 10^{13}	4.60287 x 10^{11}	8.86880 x 10^{11}	3.34754 x 10^{7}
1 abs. joule	0.737561	5.12195 x 10^{-3}	9.86896 x 10^{-3}	3.72505 x 10^{-7}
1 int. joule	0.737682	5.12279 x 10^{-3}	9.87058 x 10^{-3}	3.72567 x 10^{-7}
1 cal	3.08595	2.14302 x 10^{-2}	4.12917 x 10^{-2}	1.558562 x 10^{-6}
1 I.T. cal	3.08797	2.14443 x 10^{-2}	4.13187 x 10^{-2}	1.559582 x 10^{-6}
1 BTU	778.156	5.40386	10.41215	3.93008 x 10^{-4}
1 int. kilowatt-hr	2,655,656.	18442.06	35534.1	1.341241
1 horsepower-hr	1,980,000.	13750.	26493.5	1
1 ft-lb(wt)	1	6.94444 x 10^{-3}	1.338054 x 10^{-2}	5.05051 x 10^{-7}
1 cu ft - lb(wt)/sq in	144.	1	1.926797	7.27273 x 10^{-5}
1 liter-atm	74.7354	5.18996	1	3.77452 x 10^{-5}

CONVERSION FACTORS FOR UNITS OF MOLECULAR ENERGY

Multiply by appropriate entry to obtain →	erg/molecule	abs. joule/mole	int. joule/mole	cal/mole	abs. electron-volt/molecule	int. electron-volt/molecule	wave no. (cm^{-1})
1 erg/molecule	1	6.02283×10^{16}	6.02184×10^{16}	1.439491×10^{16}	6.24222×10^{11}	6.24017×10^{11}	5.03581×10^{15}
1 abs. joule/mole	1.660349×10^{-17}	1	0.999835	0.239006	1.036427×10^{-5}	1.036086×10^{-5}	8.36121×10^{-2}
1 int. joule/mole	1.660623×10^{-17}	1.000165	1	0.239046	1.036599×10^{-5}	1.036257×10^{-5}	8.36259×10^{-2}
1 cal/mole	6.94690×10^{-17}	4.18400	4.1833	1	4.33641×10^{-5}	4.33498×10^{-5}	0.349833
1 abs. electron-volt/molecule	1.601992×10^{-12}	96485.3	96469.4	23060.5	1	0.999670	8067.34
1 int. electron-volt/molecule	1.602521×10^{-12}	96517.1	96501.2	23068.1	1.000330	1	8070.00
1 wave no. (cm^{-1})	1.985776×10^{-16}	11.95999	11.95802	2.85851	1.239567×10^{-4}	1.239158×10^{-4}	1

CONVERSION FACTORS FOR UNITS OF SPECIFIC ENERGY

Multiply by appropriate entry to obtain →	abs. joule/g	int. joule/g	cal/g	I. T. cal/g	BTU/lb
1 abs. joule/g	1	0.999835	0.239006	0.238849	0.429929
1 int. joule/g	1.000165	1	0.239045	0.238889	0.430000
1 cal/g	4.1840	4.1833	1	0.999346	1.798823
1 I. T. cal/g	4.18674	4.18605	1.000654	1	1.8
1 BTU/lb	2.32597	2.32558	0.555919	0.555556	1

CONVERSION FACTORS FOR UNITS OF SPECIFIC ENERGY PER DEGREE

Multiply by appropriate entry to obtain →	abs. joule/ g deg C	int. joule/ g deg C	cal/ g deg C	I. T. cal/ g deg C	BTU/ lb deg F
1 abs. joule/g deg C	1	0.999835	0.239006	0.238849	0. 238849
1 int. joule/g deg C	1.000165	1	0.239045	0.238889	0.238889
1 cal/g deg C	4.1840	4.1833	1	0.999346	0.999346
1 I. T. cal/g deg C	4.18674	4.18605	1.000654	1	1
1 BTU/lb deg F	4.18674	4.18605	1.000654	1	1

CONVERSION FACTORS FOR UNITS OF VISCOSITY *

Multiply by appropriate entry to obtain →	Centipoise	Poise	g_F sec cm^{-2}	lb_F sec in^{-2}	lb_F sec ft^{-2}	lb_F hr in^{-2}	lb_F hr ft^{-2}
Centipoise	1	1×10^{-2}	1.0197×10^{-5}	1.4504×10^{-7}	2.0886×10^{-5}	4.0289×10^{-11}	5.8016×10^{-9}
Poise	$1. \times 10^{2}$	1	1.0197×10^{-3}	1.4504×10^{-5}	2.0886×10^{-3}	4.0289×10^{-9}	5.8016×10^{-7}
g_F sec cm^{-2}	9.8067×10^{4}	9.8067×10^{2}	1	1.4224×10^{-2}	2.0482	3.9510×10^{-6}	5.6895×10^{-4}
lb_F sec in^{-2}	6.8947×10^{6}	6.8947×10^{4}	7.0305×10^{1}	1	1.4400×10^{2}	2.7778×10^{-4}	4.0000×10^{-2}
lb_F sec ft^{-2}	4.7880×10^{4}	4.7880×10^{2}	4.8823×10^{-1}	6.9445×10^{-3}	1	1.9290×10^{-6}	2.7778×10^{-4}
lb_F hr in^{-2}	2.4821×10^{10}	2.4821×10^{8}	2.5310×10^{5}	3.6000×10^{3}	5.1841×10^{5}	1	1.4400×10^{2}
lb_F hr ft^{-2}	1.7237×10^{8}	1.7237×10^{6}	1.7577×10^{31}	2.5001×10^{1}	3.6001×10^{3}	6.9446×10^{-3}	1
g_M sec^{-1} cm^{-1}	1×10^{2}	1	1.0197×10^{-3}	1.4504×10^{-5}	2.0886×10^{-3}	4.0289×10^{-9}	5.8016×10^{-7}
lb_M sec^{-1} in^{-1}	1.7858×10^{4}	1.7858×10^{2}	1.8210×10^{-1}	2.5901×10^{-3}	3.7298×10^{-1}	7.1948×10^{-7}	1.0360×10^{-4}
lb_M sec^{-1} ft^{-1}	1.4882×10^{3}	1.4882×10^{1}	1.5175×10^{-2}	2.1585×10^{-4}	3.1083×10^{-2}	5.9958×10^{-8}	8.6339×10^{-6}
lb_M hr^{-1} in^{-1}	4.9605	4.9605×10^{-2}	5.0582×10^{-5}	7.1947×10^{-7}	1.0361×10^{-4}	1.9985×10^{-10}	2.8779×10^{-8}
lb_M hr^{-1} ft^{-1}	4.1338×10^{-1}	4.1338×10^{-3}	4.2152×10^{-6}	5.9957×10^{-8}	8.6339×10^{-6}	1.6655×10^{-11}	2.3983×10^{-9}

* The conversion factors for viscosity are based on a tabulation by Hawkins, Solberg, and Sibbitt, Power Plant Eng. 45, 62 (1941).

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CONVERSION FACTORS FOR UNITS OF VISCOSITY - Cont.

Multiply by appropriate entry to obtain →	$lb_M sec^{-1} in^{-1}$	$lb_M hr^{-1} ft^{-1}$	$slug\ sec^{-1} in^{-1}$	$slug\ hr^{-1} ft^{-1}$	$g_M sec^{-1} cm^{-1}$
Centipoise	5.5998×10^{-5}	2.4191	1.7405×10^{-6}	7.5188×10^{-2}	1×10^{-2}
Poise	5.5998×10^{-3}	2.4191×10^{2}	1.7405×10^{-4}	7.5188	1
$g_F\ sec\ cm^{-2}$	5.4916	2.3723×10^{5}	1.7068×10^{-1}	7.3733×10^{3}	9.8067×10^{2}
$lb_F\ sec\ in^{-2}$	3.8609×10^{2}	1.6679×10^{7}	1.2000×10^{1}	5.1840×10^{5}	6.8947×10^{4}
$lb_F\ sec\ ft^{-2}$	2.6812	1.1583×10^{5}	8.3335×10^{-2}	3.6000×10^{3}	4.7880×10^{2}
$lb_F\ hr\ in^{-2}$	1.3899×10^{6}	6.0044×10^{10}	4.3199×10^{4}	1.8662×10^{9}	2.4821×10^{8}
$lb_F\ hr\ ft^{-2}$	9.6524×10^{3}	4.1698×10^{8}	3.0000×10^{2}	1.2960×10^{7}	1.7237×10^{6}
$g_M\ sec^{-1}\ cm^{-1}$	5.5998×10^{-3}	2.4191×10^{2}	1.7405×10^{-4}	7.5188	1
$lb_M\ sec^{-1}\ in^{-1}$	1	4.3200×10^{4}	3.1081×10^{-2}	1.3427×10^{3}	1.7858×10^{2}
$lb_M\ sec^{-1}\ ft^{-1}$	8.3333×10^{-2}	3.6000×10^{3}	2.5902×10^{-3}	1.1189×10^{2}	1.4882×10^{1}
$lb_M\ hr^{-1}\ in^{-1}$	2.7778×10^{-4}	1.2000×10^{1}	8.6337×10^{-6}	3.7297×10^{-1}	4.9605×10^{-2}
$lb_M\ hr^{-1}\ ft^{-1}$	2.3148×10^{-5}	1	7.1946×10^{-7}	3.1081×10^{-2}	4.1336×10^{-3}

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