SELECTED VALUES OF CHEMICAL THERMODYNAMIC PROPERTIES

CIRCULAR OF THE NATIONAL BUREAU OF STANDARDS 500

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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by

Frederick D. Rossini, Donald D. Wagman,
William H. Evans, Samuel Levine, and Irving Jaffe

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PREFACE

The assembly of the table of values of heats of formation in the section on Thermochemistry in volume V of the International Critical Tables, compiled by F. R. Bichowsky under the editorship of Edward W. Washburn and published in 1929 (McGraw-Hill Book Co., New York, N. Y.), was the first attempt ever made to collate all the published data involving heats of reaction and to prepare therefrom a self-consistent table of selected values of the heats of formation of the chemical substances. These tables were revised and extended by F. R. Bichowsky and F. D. Rossini and published in book form in 1936 (Reinhold Publishing Corp., New York, N. Y.) under the title "Thermochemistry of the Chemical Substances," and constituted the "assembly of a self-consistent table of 'best' values for the heats of formation of the chemical substances (except carbon compounds containing more than two carbon atoms), including heats of transition, fusion, and vaporization." However, it became obvious that the continued maintenance of a complete thermochemical table is a work too great to be carried on individual shoulders through part-time work as an "extracurricular" activity.

In 1940, the National Bureau of Standards assigned one investigator, D. D. Wagman, to work with F. D. Rossini on the maintenance of tables of thermochemical and chemical thermodynamic data. World War II interrupted the work. In 1946, an additional investigator, E. J. Blau, was assigned. In 1947, additional financial support for the work was received from the Office of Naval Research of the United States Department of the Navy, and two additional investigators, W. H. Evans and S. Levine, joined in the work. In 1948, E. J. Blau left to resume graduate school work and his place was taken by I. Jaffe. After the completion of these tables in June 1950, F. D. Rossini resigned from the National Bureau of Standards to accept a position at the Carnegie Institute of Technology, Pittsburgh, Pa. The project is now being carried on at the Bureau under the direction of D. D. Wagman.

Beginning as of March 31, 1947, and ending as of March 31, 1950, the tables were issued quarterly as prepared, in loose-leaf form, without references, one set to each laboratory in industry, educational institutions, and other organizations having need of and requesting the data. The number of sets so distributed in loose-leaf form as of March 31, 1950, was about 1,700.

The present volume includes all the tables of Series I and II issued in loose-leaf form plus all the references, which were not previously issued.

Grateful acknowledgment is made to Edmund J. Blau for his early work on the tables, and to Alberta L. Kelvie, Marie T. Lynch, Helen Marion Flanagan, Rita M. Braun, Corinne R. DeCelles, Agnes C. Fahl, and others of the staff of the American Petroleum Institute Research Project 44, for assistance in the editorial work on the book.

The authors will greatly appreciate receiving comments regarding errors that have escaped attention.

A. V. Astin, *Acting Director.*

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By Frederick D. Rossini, Donald D. Wagman, William H. Evans, Samuel Levine, and Irving Jaffe

I. INTRODUCTION

Unit of Energy and Fundamental Constants

All the values of energy given in these tables are expressed, insofar as possible, in terms of the thermochemical calorie, now defined in terms of the absolute joule, but formerly defined in terms of the international electrical joule, the relations being such as to keep unchanged, in the transition from the international to the absolute joule, the amount of energy represented by the calorie. These relations, and the values of the fundamental constants used in this work, follow:

1 atm=1,013,250 dynes/cm²; definition; atm=standard atmosphere.

1 mm Hg (pressure)=(1/760) atm=1333.2237 dynes/cm²; definition; mm Hg (pressure)=standard millimeter mercury.

1 abs joule=0.999835±0.000052 int. joule; abs=absolute; int.=international.

1 cal=4.1840 abs joule=4.1833 int. joule; definition; cal=thermochemical calorie.

$T_{0°C}$=273.160±0.010 °K; absolute temperature of the ice point, 0°C.

R=8.31439±0.00034 abs joule/deg mole=1.98719±0.00008 cal/deg mole=82.0567±0.0034 cm³ atm/deg mole; R=gas constant per mole.

F=96485.30±10.0 abs coul/g-equiv, or abs joule/abs volt g-equiv, =96501.2±10.0 int. coul/g-equiv, or int. joule/int. volt g-equiv, =23060.5±2.4 cal/abs volt g-equiv=23068.1±2.4 cal/int. volt g-equiv; F=Faraday constant.

$Z=Nhc$=11.9600±0.0036 abs joule cm/mole=2.85851±0.0009 cal cm/mole; Z=constant relating wave number, ν, and energy per mole, E, in the relation $(\Delta E)=Nhc\,(\Delta\nu)=Z\,(\Delta\nu)$.

$(Z/R)=(hc/k)=c_2$=1.43847±0.00045 cm deg; c_2=second radiation constant.

The reader is referred to Mueller and Rossini–1 [1] for a discussion of the calorie and the joule, and to Rossini–29 for a discussion of the relations among the fundamental constants. In connection with the Faraday constant, the value given above is that which was generally accepted as "best" until last year, when new calculations and data indicated that a higher value was better. However, it was necessary, for preservation of the internal consistency of the present tables, to use the same value throughout.

Scale of Temperature

The values of temperature given in these tables conform to the International Temperature Scale of 1948 (see Stimson–1).

Definition of Symbols

The symbols used in these tables are defined as follows: P=pressure; V=volume; T=absolute temperature; E=energy, internal or intrinsic; S=entropy; $H=E+PV$=heat content (or enthalpy); $F=E+PV-TS=H-TS$=free energy; K=equilibrium constant; $C_p=(dH/dT)_p$=heat capacity at constant pressure.

Circular superscript, °, denotes the standard state (thermodynamic standard reference state).

Numeral subscript, as $_{298.16}$ or $_0$, denotes the absolute temperature in degrees Kelvin.

$S°$=the entropy of the given substance in the standard state at the indicated temperature, omitting nuclear contributions, as isotopic mixing, nuclear spins, etc., which contributions cancel out in all reactions of practical importance.

Δ denotes the increment of a given property for a given process or reaction, taken as the value for the final state (sum of products) less that for the initial state (sum of reactants).

ΔH, ΔF, ΔS, ΔC_p=the increment in heat content, free energy, entropy, and heat capacity, respectively, for the given process or reaction, with each substance in a specified thermodynamic state.

K=the equilibrium constant for a given process or reaction, defined as the proper quotient of activities (a), of the substances involved in the reaction, at thermodynamic equilibrium at the given temperature, pressure, etc. For example, for the reaction

$$bB+cC=mM+nN$$

with each of the reactants and products at equilibrium,

[1] The numbers following a dash after a name in the text (Part I) and in the Tables of Specific References (Parts IV and V) refer to the General List of References, Part VI.

$$K=\frac{(a_M)^m(a_N)^n}{(a_B)^b(a_C)^c}.$$

The equilibrium constant for a given process or reaction is related to the standard change in free energy for that process or reaction by the relation:

$$\log_{10} K=-\Delta F^\circ/(2.302585RT).$$

ΔHf° = the standard heat of formation, which is the increment in heat content associated with the reaction of forming the given compound from its elements, with each substance in its standard state at the given temperature.

ΔFf° = the standard free energy of formation, which is the increment in free energy associated with the reaction of forming the given compound from its elements, with each substance in its standard state at the given temperature.

$\log_{10} Kf$ = the logarithm (to the base 10) of the equilibrium constant of formation, for the reaction of forming 1 mole of the given compound from its elements, with each substance in its standard state at the given temperature. The equilibrium constant of formation is related to the standard free energy of formation, per mole, by the relation:

$$\log_{10} Kf=-\Delta Ff^\circ/(2.302585RT).$$

Abbreviations Regarding Physical States

The physical state of each substance is indicated as gaseous (g), liquid (liq), crystalline (c), glass (gls), amorphous (amorp), colloidal (coll), or in aqueous (aq) or other solution. The composition of a solution is indicated by the number of moles of solvent associated with 1 mole of the substance (solute). When the concentration is not specified, the solution is understood to be "dilute".

Standard States

The standard states used in these tables follow the conventions of Lewis and Randall and are defined as follows:

The standard state for a pure solid or liquid at 25° C is normally taken as the pure substance in its thermodynamically stable modification at a pressure of one atmosphere at 25° C (exceptions will be clearly indicated);

The standard state for a gas at any temperature is taken as the hypothetical reference state of unit fugacity (1 atmosphere) at the given temperature, in which state the heat content (enthalpy) is the same as that of the real gas at zero pressure at the same temperature;

The standard state for a solute in aqueous solution is taken as the hypothetical ideal state of unit molality (indicated as "hyp. m=1"), in which state the partial molal heat content (enthalpy) and heat capacity (also the partial molal volume) of the solute are the same as those in the infinitely dilute solution.

For further description of these standard states, the reader is referred to Lewis and Randall–7 and Rossini–29.

Conventions Regarding Reference States

The values for the heats of formation of substances in aqueous or other solution represent values of the apparent molal heat content, rather than the partial molal heat content at the given concentration. At infinite dilution, the apparent molal heat content and the apparent molal heat capacity are the same as the partial molal heat content and the partial molal heat capacity, respectively.

The values of the chemical thermodynamic properties tabulated for individual ions in aqueous solution are based on the convention that the values of ΔHf°, ΔFf°, S° and C_p° for H^+ (aq, hyp. m=1) are zero. The values of the quantities ΔHf°, ΔFf°, S°, and C_p° for a strong electrolyte in aqueous solution, in the standard state, are equal to the sums of these values for the appropriate kinds and number of individual ions assumed to constitute the undissociated molecule of the given electrolyte.

In connection with the reference states for aqueous ions, it is to be noted that this book follows Latimer–1 in assigning for H^+ (aq) the value zero for S° rather than for ΔSf°. For a discussion of the possible advantages of assigning the value zero to ΔSf° for H^+ (aq), the reader is referred to Rossini–29.

Properties Given in the Tables of Series I

The tables of Series I give the following information, as known, in the order of columns, left to right:

1. The molecular formula of the given substance.
2. Information, as necessary, to complete the description of the given substance, such as the name of a particular crystalline form, or the name of the solvent if the substance is in solution and the solvent is other than water, or the isomeric name if the substance is one of a number of isomers, etc.
3. The physical state of the given substance.
4. The value of ΔHf°, the standard heat of formation of the given substance from its elements, at 0°K.
5. The value of ΔHf°, the standard heat of formation of the given substance from its elements, at the reference temperature, 298.16°K (25°C).
6. The value of ΔFf°, the standard free energy of formation of the given substance from its elements, at the reference temperature, 298.16°K (25°C).
7. The value of $\log_{10} Kf$, the logarithm of the equilibrium constant for the reaction of forming the given substance from its elements, at the reference temperature, 298.16°K (25°C).

8. The value of $S°$, the entropy of the given substance in its thermodynamic standard state, at the reference temperature, 298.16°K (25°C).

9. The value of $C_p°$, the heat capacity of the given substance in its thermodynamic standard state, at the reference temperature, 298.16°K (25°C).

Properties Given in the Tables of Series II

The tables of Series II give the following information, as known, in the order of columns, left to right:

1. The molecular formula of the given substance.
2. Information, as necessary, to complete the description of the given substance.
3. The name of the process, as transition, fusion, vaporization, or sublimation, to which the tabulated thermodynamic properties apply.
4. The initial and final states for the given process.
5. The pressure.
6. The temperature, °K and °C.
7. The value of ΔH, the increment in heat content associated with the given process.
8. The value of ΔS, the increment in entropy associated with the given process.
9. The value of ΔC_p, the heat capacity of the given substance in the final state less that in the initial state.

It is to be noted that when the pressure is 1 atm the values of temperature given for the process of vaporization correspond to values of the normal boiling point. Values of the temperature of the liquid-vapor equilibrium at other pressures may also be given.

The values of the temperature of the solid-liquid equilibrium correspond to values of the freezing (or melting) point of the given substance. When the same values of both temperature and pressure are given for the solid-liquid and the liquid-gas or solid-gas equilibrium, the given values of temperature and pressure are those of the so-called triple point, at which the solid, liquid, and gaseous phases of the given substance are in thermodynamic equilibrium.

Internal Consistency

The tables of values in this volume are internally consistent in the sense that all the known physical and thermodynamic relations existing between different properties for a given substance, or the same property for different substances, are satisfied by the tabulated values of the properties. For example, the value of any thermodynamic property for a reaction must come out the same regardless of the path chosen for the evaluation. In particular, the values of ΔH, ΔF, and ΔS for the same process or reaction must satisfy the well-known thermodynamic relation involving these properties and the temperature.

It is realized that new data will have become available on certain compounds after the selection of values for them was made for these tables. In such cases, it was not always possible to change the selected value to conform to the new information because of the necessity of maintaining the internal consistency of the tables. However, readers encountering such cases can of course rearrange their own particular calculations to take advantage of the new information.

Uncertainties

Following Bichowsky and Rossini–1, all the values given in these tables have been calculated from original experimental data using consistent values for all subsidiary quantities. Heats of reaction, of dilution, of solution, of neutralization, etc., may be calculated from the appropriate tabulated values with an accuracy as good as is known. The number of significant figures in any one value in the table does not indicate the absolute accuracy of that value. The uncertainty in any value will be greater than that of the least accurate determination in the total chain of reactions used to calculate the value. More definite information regarding the uncertainty to be attached to any given tabulated value may be obtained by examination of the material in the cited references.

Methods of Calculation

The methods of calculation which may be employed in the utilization of the values of thermodynamic properties given in these tables are quite varied. For information regarding the calculation of values of ΔH for any process or reaction, the reader is referred to pages 12 and 13 of Bichowsky and Rossini–1, to Lewis and Randall–7, and to Rossini–29. For discussion of the other thermodynamic properties and their interrelations, and for more general methods of thermodynamic calculations, including free energies and entropies, the reader is referred to the latter two references.

References

Part VI of this book gives a complete general list of references in alphabetical order of the first-named author. The references to a given author or authors will follow in numerical suborder in the list, as Lewis and Randall–1, Lewis and Randall–2, etc.

The reader interested in the origin of the value of a given property of a given compound, in either Series I or Series II, will find in the tables of specific references, in Part IV for Series I and in Part V for Series II, reference to the appropriate investigators, as Lewis and Randall–3. Then the complete reference to the literature is obtained from the general list of references in Part VI.

Order of Arrangement of the Chemical Substances

The substances listed in the tables are arranged in a manner similar to that used by Bichowsky and Rossini–1, with some modification. The chemical elements are arranged in the order shown in figure 1 and in table 1, "List of tables and corresponding elements." If the elements are taken to be arranged in the order, a, b, c, d, e, etc., the chemical substances are in the order: a; b, ba; c, ca, cb, cba; d, da, db, dba, dc, dca, dcb, dcba; etc. Table 2, "List of elements and corresponding tables," gives the number of the table corresponding to a given element, listed alphabetically.

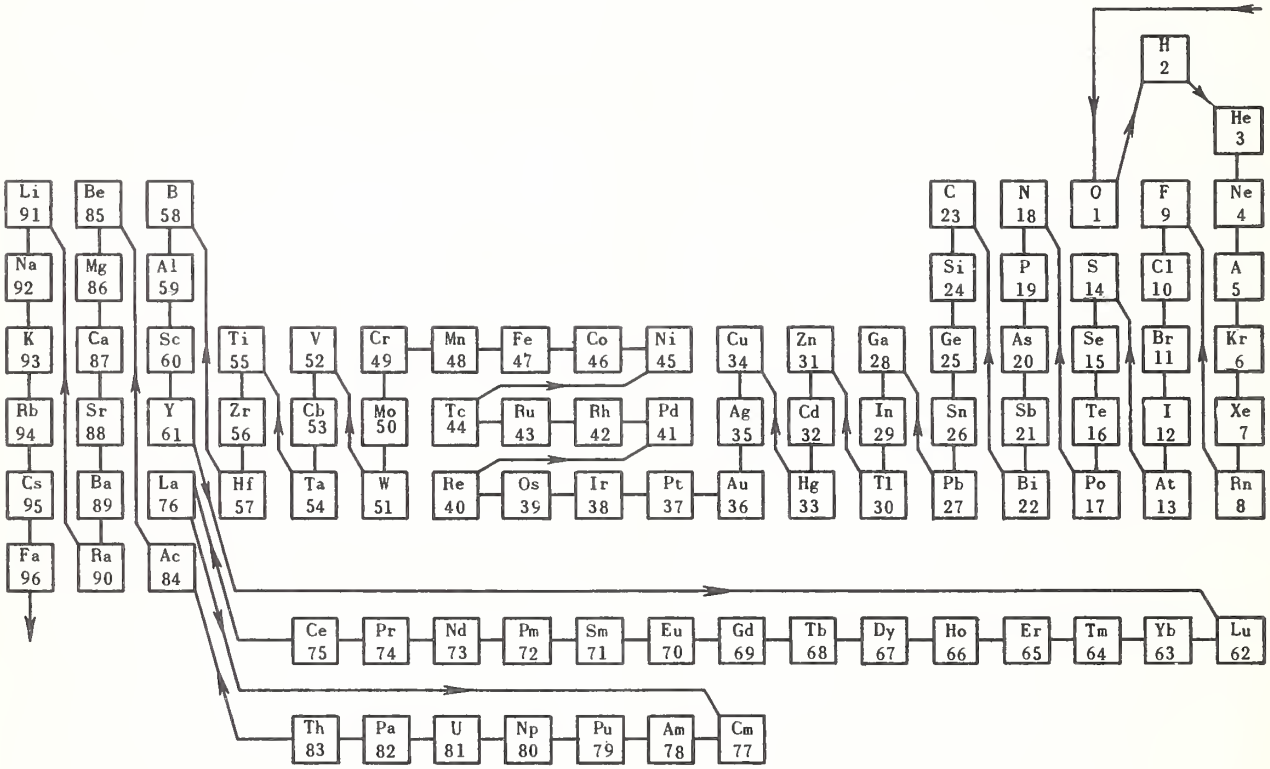

FIGURE 1. *Standard order of arrangement of the chemical elements.*

TABLE 1.—*List of tables and corresponding elements*

Table	Element	Symbol	Atomic number	Table	Element	Symbol	Atomic number
1	Oxygen	O	8	49	Chromium	Cr	24
2	Hydrogen	H	1	50	Molybdenum	Mo	42
3	Helium	He	2	51	Tungsten	W	74
4	Neon	Ne	10	52	Vanadium	V	23
5	Argon	A	18	53	Columbium (Niobium)	Cb	41
6	Krypton	Kr	36	54	Tantalum	Ta	73
7	Xenon	Xe	54	55	Titanium	Ti	22
8	Radon	Rn	86	56	Zirconium	Zr	40
9	Fluorine	F	9	57	Hafnium	Hf	72
10	Chlorine	Cl	17	58	Boron	B	5
11	Bromine	Br	35	59	Aluminum	Al	13
12	Iodine	I	53	60	Scandium	Sc	21
13	Astatine	At	85	61	Yttrium	Y	39
14	Sulfur	S	16	62	Lutetium	Lu	71
15	Selenium	Se	34	63	Ytterbium	Yb	70
16	Tellurium	Te	52	64	Thulium	Tm	69
17	Polonium	Po	84	65	Erbium	Er	68
18	Nitrogen	N	7	66	Holmium	Ho	67
19	Phosphorus	P	15	67	Dysprosium	Dy	66
20	Arsenic	As	33	68	Terbium	Tb	65
21	Antimony	Sb	51	69	Gadolinium	Gd	64
22	Bismuth	Bi	83	70	Europium	Eu	63
23	Carbon	C	6	71	Samarium	Sm	62
24	Silicon	Si	14	72	Promethium	Pm	61
25	Germanium	Ge	32	73	Neodymium	Nd	60
26	Tin	Sn	50	74	Praseodymium	Pr	59
27	Lead	Pb	82	75	Cerium	Ce	58
28	Gallium	Ga	31	76	Lanthanum	La	57
29	Indium	In	49	77	Curium	Cm	96
30	Thallium	Tl	81	78	Americium	Am	95
31	Zinc	Zn	30	79	Plutonium	Pu	94
32	Cadmium	Cd	48	80	Neptunium	Np	93
33	Mercury	Hg	80	81	Uranium	U	92
34	Copper	Cu	29	82	Protactinium	Pa	91
35	Silver	Ag	47	83	Thorium	Th	90
36	Gold	Au	79	84	Actinium	Ae	89
37	Platinum	Pt	78	85	Beryllium	Be	4
38	Iridium	Ir	77	86	Magnesium	Mg	12
39	Osmium	Os	76	87	Calcium	Ca	20
40	Rhenium	Re	75	88	Strontium	Sr	38
41	Palladium	Pd	46	89	Barium	Ba	56
42	Rhodium	Rh	45	90	Radium	Ra	88
43	Ruthenium	Ru	44	91	Lithium	Li	3
44	Technetium	Tc	43	92	Sodium	Na	11
45	Nickel	Ni	28	93	Potassium	K	19
46	Cobalt	Co	27	94	Rubidium	Rb	37
47	Iron	Fe	26	95	Cesium	Cs	55
48	Manganese	Mn	25	96	Francium	Fa	87

TABLE 2.—*List of elements and corresponding tables*

Element	Table	Symbol	Atomic number	Element	Table	Symbol	Atomic number
Actinium	84	Ac	89	Molybdenum	50	Mo	42
Aluminum	59	Al	13	Neodymium	73	Nd	60
Americium	78	Am	95	Neon	4	Ne	10
Antimony	21	Sb	51	Neptunium	80	Np	93
Argon	5	A	18	Nickel	45	Ni	28
Arsenic	20	As	33	Nitrogen	18	N	7
Astatine	13	At	85	Osmium	39	Os	76
Barium	89	Ba	56	Oxygen	1	O	8
Beryllium	85	Be	4	Palladium	41	Pd	46
Bismuth	22	Bi	83	Phosphorus	19	P	15
Boron	58	B	5	Platinum	37	Pt	78
Bromine	11	Br	35	Plutonium	79	Pu	94
Cadmium	32	Cd	48	Polonium	17	Po	84
Calcium	87	Ca	20	Potassium	93	K	19
Carbon	23	C	6	Praseodymium	74	Pr	59
Cerium	75	Ce	58	Promethium	72	Pm	61
Cesium	95	Cs	55	Protactinium	82	Pa	91
Chlorine	10	Cl	17	Radium	90	Ra	88
Chromium	49	Cr	24	Radon	8	Rn	86
Cobalt	46	Co	27	Rhenium	40	Re	75
Columbium (Niobium)	53	Cb	41	Rhodium	42	Rh	45
Copper	34	Cu	29	Rubidium	94	Rb	37
Curium	77	Cm	96	Ruthenium	43	Ru	44
Dysprosium	67	Dy	66	Samarium	71	Sm	62
Erbium	65	Er	68	Scandium	60	Sc	21
Europium	70	Eu	63	Selenium	15	Se	34
Fluorine	9	F	9	Silicon	24	Si	14
Francium	96	Fa	87	Silver	35	Ag	47
Gadolinium	69	Gd	64	Sodium	92	Na	11
Gallium	28	Ga	31	Strontium	88	Sr	38
Germanium	25	Ge	32	Sulfur	14	S	16
Gold	36	Au	79	Tantalum	54	Ta	73
Hafnium	57	Hf	72	Technetium	44	Tc	43
Helium	3	He	2	Tellurium	16	Te	52
Holmium	66	Ho	67	Terbium	68	Tb	65
Hydrogen	2	H	1	Thallium	30	Tl	81
Indium	29	In	49	Thorium	83	Th	90
Iodine	12	I	53	Thulium	64	Tm	69
Iridium	38	Ir	77	Tin	26	Sn	50
Iron	47	Fe	26	Titanium	55	Ti	22
Krypton	6	Kr	36	Tungsten	51	W	74
Lanthanum	76	La	57	Uranium	81	U	92
Lead	27	Pb	82	Vanadium	52	V	23
Lithium	91	Li	3	Xenon	7	Xe	54
Lutetium	62	Lu	71	Ytterbium	63	Yb	70
Magnesium	86	Mg	12	Yttrium	61	Y	39
Manganese	48	Mn	25	Zinc	31	Zn	30
Mercury	33	Hg	80	Zirconium	56	Zr	40

II. TABLES OF SELECTED VALUES OF PROPERTIES OF SERIES I:

Heat of Formation at 25°C

Free Energy of Formation at 25°C

Entropy at 25°C

Heat Capacity at 25°C

Logarithm of the Equilibrium Constant of Formation at 25°C

Heat of Formation at 0°K

SERIES I

National Bureau of Standards — Washington, D.C.

Table 1-1. Oxygen (at. no., 8; at. wt., 16.0000)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
O		g	58.586	59.159	54.994	-40.31022	38.4689	5.2364
O^+		g	372.555	374.609				
O^{++}		g	1183.09	1186.624				
O^{+++}		g	2450.0	2454.98				
O^{++++}		g	4234.8	4241.30				
O^{+++++}		g	6860.9	6868.9				
O^{++++++}		g	10045.	10054.8				
$O^{+++++++}$		g	27091.	27102.				
$O^{++++++++}$		g						
O^-		g	-12.21	-13.12				
O^{--}		g						
O_2		g	0.000	0.000	0.000	0.0000	49.003	7.017
		aq		-3.8				
O_2^+		g	281.6	283.1				
O_3	ozone	g		34.0	39.06	-28.631	56.8	9.12
		aq		32.2				
O_4		g		-0.16				

Table 2-1. Hydrogen (at. no., 1; at. wt., 1.0080)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H		g	51.620	52.089	48.575	-35.60481	27.3927	4.9680
H^+		g	365.138	367.088				
H^+	std. state hyp. m=1	aq		0.000	0.000	0.00000	0.000	0.000
H_2		g	0.000	0.000	0.000	0.00000	31.211	6.892
H_2		aq						
OH		g	10.0	10.06	8.93	-6.546	43.888	7.141
OH^-		g	-75.	-76.4				
OH^-	std. state, hyp. m=1	aq		-54.957	-37.595	27.5566	-2.519	-32.0
H_2O	water	g	-57.107	-57.7979	-54.6357	40.04724	45.106	8.025
		liq		-68.3174	-56.6902	41.55313	16.716	17.996

Table 2-2. Hydrogen (at. no., 1; at. wt., 1.0080)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2O_2		g		-31.83				
		liq		-44.84				
	std. state, hyp. m = 1	aq		-45.68				
	in 1 H_2O	aq		-45.43				
	2 H_2O	aq		-45.55				
	3 H_2O	aq		-45.60				
	5 H_2O	aq		-45.64				
	10 H_2O	aq		-45.66				
	∞ H_2O	aq		-45.68				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 2a-1. Hydrogen isotope of mass 1 (at. no., 1; at. wt., 1.0078)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
^1H		g	51.620	52.089	48.575	-35.6048	27.392	4.9680
$^1H^+$		g	365.138	367.088				
$^1H^-$		g	35.066	34.054				
$^1H_2$		g	0.000	0.000	0.000	0.0000	31.210	6.892
$^1H_2^+$		g	355.67	357.15				
^1H_2O		g	-57.1040	-57.7976	-54.6352	40.04685	45.105	8.025
		liq		-68.3171	-56.6902	41.55314	16.716	17.996

Table 2b-1. Hydrogen isotope of mass 2 (at. no., 1; at. wt., 2.0142)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
^2H		g	52.525	52.982	49.358	-36.1787	29.456	4.9680
$^2H^+$		g	366.128	368.066				
$^2H^-$		g	35.967	34.943				
$^2H_2$		g	0.000	0.000	0.000	0.0000	34.602	6.98
$^1H^2H$		g	0.037	0.037	-0.391	0.2866	34.341	6.98
^2H_2O		g		-59.5628	-56.0670	41.09634	47.379	8.19
		liq		-70.4133	-58.2062	42.66436	18.162	19.70
$^1H^2HO$		g	-58.035	-58.735	-55.828	40.9212	47.66	8.06
		liq		-69.393	-57.926	42.4590	18.95	18.85

889115 O—51——2

Table 3-1. Helium (at. no., 2; at. wt., 4.003)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
He	–	g	0.000	0.000	0.000	0.000	30.126	4.9680
He^+		g	566.86	568.34				
He^{++}		g	1821.48	1824.44				
He_2^+		g						

Table 4-1. Neon (at. no., 10; at. wt., 20.183)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ne		g	0.000	0.000	0.000	0.0000	34.948	4.9680
Ne^+		g	497.19	498.67				
Ne^{++}		g	1444.35	1447.32				
Ne^{+++}		g	2914.0	2918.5				
Ne^{++++}		g	5154.8	5160.7				
Ne^{+++++}		g	8070.3	8077.7				
Ne^{++++++}		g	11712.	11721.				

Table 5-1. Argon (at. no., 18; at. wt., 39.944)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
A		g	0.000	0.000	0.000	0.000	36.983.	4.9680
$A \cdot 5H_2O$		c		-357.2				
A^+		g	363.345	364.826				
A^{++}		g	1000.28	1003.24				
A^{+++}		g	1943.5	1947.9				
A^{++++}		g	3322.	3328.				
A^{+++++}		g	5052.	5056.				
A^{++++++}		g	7158.	7167.				
$A^{+++++++}$		g	10017.	10027.				
$A^{++++++++}$		g	13326.	13338.				

Table 6-1. Krypton (at. no., 36; at. wt., 83.7)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Kr		g	0.000	0.000	0.000	0.0000	39.19	4.9680
$Kr \cdot 5H_2O$		c		-357.1				
Kr^+		g	322.7	324.25				
Kr^{++}		g	889.27	892.23				
Kr^{+++}		g	1741.2	1745.6				

Table 7-1. Xenon (at. no., 54; at. wt., 131.3)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Xe		g	0.000	0.000	0.000	0.000	40.53	4.9680
$Xe \cdot 6H_2O$		c		-428.				
Xe^+		g	279.66	281.14				
Xe^{++}		g	768.66	771.62				
Xe^{+++}		g	1509.3	1513.7				
Xe^{++++}		g	2584.	2590.				

Table 8-1. Radon (at. no., 86; at. wt., 222)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rn		g	0.000	0.000	0.000	0.0000	42.10	4.9680
Rn^+		g	247.8	249.3				

Table 9-1. Fluorine (at. no., 9; at. wt., 19.00)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
F		g	17.8	18.3	14.2	-10.41	37.917	5.436
F^+		g	419.57	421.55				
F^{++}		g	1226.62	1229.68				
F^{+++}		g	2670.9	2675.9				
F^{++++}		g	4682.7	4689.1				
F^{+++++}		g	7316.6	7324.5				
F^{++++++}		g	10940.	10949.				
$F^{+++++++}$		g	15210.	15221.				
$F^{++++++++}$		g	37201.	37214.				
F^-		g	-78.5	-79.5				
F^-	std. state, hyp. m = 1	aq		-78.66	-66.08	48.435	-2.3	-29.5
F_2		g	0.000	0.000	0.000	0.000	48.6	7.52
F_2O		g		5.5	9.7	-7.126	58.95	
HF		g		-64.2	-64.7	47.402	41.47	6.95
HF	std. state, hyp. m = 1	aq		-78.66	-66.08	48.435	-2.3	-29.5
	in 2 H_2O	aq		-75.167				

Table 9-2. Fluorine (at. no., 9; at. wt., 19.00)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HF	in	3 H_2O	aq		-75.385				
		4 H_2O	aq		-75.478				
		5 H_2O	aq		-75.525				
		10 H_2O	aq		-75.605				
		20 H_2O	aq		-75.634				
		30 H_2O	aq		-75.646				
		40 H_2O	aq		-75.654				
		50 H_2O	aq		-75.660				
		100 H_2O	aq		-75.686				
		200 H_2O	aq		-75.704				
		300 H_2O	aq		-75.722				
		400 H_2O	aq		-75.74				
		500 H_2O	aq		-75.760				
		1000 H_2O	aq		-75.872				
		∞ H_2O	aq		-78.66				-29.5
HF_2^-			aq		-153.6				
$(HF)_6$			g		-426.0				

Table 10-1. Chlorine (at. no., 17; at. wt., 36.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cl		g	28.61	29.012	25.192	-18.4651	39.4569	5.2203
Cl^+		g	327.466	329.349				
Cl^{++}		g	876.30	879.66				
Cl^{+++}		g	1796.55	1801.39				
Cl^{++++}		g	3029.21	3035.53				
Cl^{+++++}		g	4592.8	4600.6				
Cl^{++++++}		g						
$Cl^{+++++++}$		g						
$Cl^{++++++++}$		g						
Cl^-		g	-57.2	-58.3				
	std. state, hyp. m=1	aq		-40.023	-31.350	22.9792	13.17	-30.0
Cl_2		g	0.0000	0.0000	0.0000	0.0000	53.286	8.11
	saturated solution	aq		-6.0				
	in CCl_4 (tetrachloromethane)			-4.6				
$Cl_2 \cdot 8H_2O$		c		-564.4				
Cl_3		g		25.				

Table 10-2. Chlorine (at. no., 17; at. wt., 35.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ClO		g		33.				
ClO^-	std. state, hyp. m=1	aq					10.3	
ClO_2		g	25.5	24.7	29.5	-21.62	59.6	
		liq						
		aq		18.1				
ClO_2^-	std. state, hyp. m=1	aq		-16.5	3.5	-2.56	24.0	
ClO_3		g		37.0				
ClO_3^-	std. state, hyp. m=1	aq		-23.50	-0.62	0.454	39.0	-18.
ClO_4^-	std. state, hyp. m=1	aq		-31.41	-2.57	1.884	43.5	
Cl_2O		g		18.20	22.40	-16.419	63.70	
	in 400 H_2O	aq		9.2				
Cl_2O_7		g		63.4				
HCl		g	-22.019	-22.063	-22.769	16.6896	44.617	6.96
	std. state, hyp. m=1	aq		-40.023	-31.350	22.9792	13.16	-30.0
	in 1 H_2O	aq		-28.331				

Table 10-3. Chlorine (at. no., 17; at. wt., 35.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HCl	in 2 H_2O	aq		-33.731				
	3 H_2O	aq		-35.651				
	4 H_2O	aq		-36.691				
	5 H_2O	aq		-37.371				
	6 H_2O	aq		-37.811				
	8 H_2O	aq		-38.371				
	10 H_2O	aq		-38.671				
	12 H_2O	aq		-38.847				
	15 H_2O	aq		-39.030				
	20 H_2O	aq		-39.218				
	25 H_2O	aq		-39.335				
	30 H_2O	aq		-39.413				
	40 H_2O	aq		-39.516				
	50 H_2O	aq		-39.577				
	75 H_2O	aq		-39.665				
	100 H_2O	aq		-39.713				
	200 H_2O	aq		-39.798				

Table 10-4. Chlorine (at. no., 17; at. wt., 35.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HCl	in 300 H_2O	aq		-39.837				
	400 H_2O	aq		-39.859				
	500 H_2O	aq		-39.874				
	700 H_2O	aq		-39.895				
	1000 H_2O	aq		-39.913				
	2000 H_2O	aq		-39.946				
	3000 H_2O	aq		-39.960				
	4000 H_2O	aq		-39.968				
	5000 H_2O	aq		-39.972				
	7000 H_2O	aq		-39.982				
	10000 H_2O	aq		-39.987				
	20000 H_2O	aq		-39.998				
	50000 H_2O	aq		-40.007				
	100000 H_2O	aq		-40.012				
	∞ H_2O	aq		-40.023				-30.0
		in CCl_4		-25.6				
		in C_2H_5OH		-32.6				

Table 10-5. Chlorine (at. no., 17; at. wt., 35.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HClO	in 400 H_2O	aq		-28.18				
$HClO_2$		aq		-12.4				
$HClO_3$		aq		-23.4				

Table 10-6. Chlorine (at. no., 17; at. wt., 35.457)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HClO_4$		liq		-11.1				
	std. state, hyp. m = 1	aq		-31.41				
	in 1 H_2O	aq		-19.7				
	3 H_2O	aq		-30.2				
	6 H_2O	aq		-31.08				
	10 H_2O	aq		-31.38				
	50 H_2O	aq		-31.43				
	100 H_2O	aq		-31.47				
	200 H_2O	aq		-31.45				
	600 H_2O	aq		-31.45				
	∞ H_2O	aq		-31.41				
$HClO_4 \cdot H_2O$		c		-92.1				
$HClO_4 \cdot 2H_2O$		liq		-162.8				
ClF		g		-13.3	-13.6	9.97	52.05	7.67
ClF_3		g		-37.0	-27.2	19.94	66.61	15.33

Table 11-1. Bromine (at. no., 35; at. wt., 79.916)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Br		g		26.71	19.69	-14.4325	41.8052	4.9680
Br^+		g		301.32				
Br^{++}		g		800.52				
Br^{+++}		g		1629.62				
Br^{++++}		g		2788.5				
Br^-		g		-55.3				
	std. state, hyp. m=1	aq		-28.90	-24.574	18.0124	19.29	-30.7
Br_2		g		7.34	0.751	-0.5505	58.639	8.60
		liq	0.000	0.000	0.000	0.000	36.4	
		aq		-1.1				
	in CCl_4 (tetrachloromethane)			0.712				
	in $CHCl_3$ (trichloromethane)			0.6				
	in CS_2 (carbon disulfide)			0.01				
$Br_2 \cdot 10H_2O$		c		-700.				
Br_3^-		aq		-32.0				
Br_5^-		aq		-36.5				
BrO^-		aq						
BrO_3^-	std. state, hyp. m=1	aq		-9.6	10.9	-7.99	38.9	-19.

Table 11-2. Bromine (at. no., 35; at. wt., 79.916)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HBr		g		-8.66	-12.72	9.3269	47.437	6.96
	std. state, hyp. m =1	aq		-28.90	-24.574	18.0124	19.29	-30.7
	in 1 H_2O	aq		-18.56				
	2 H_2O	aq		-22.18				
	3 H_2O	aq		-24.36				
	4 H_2O	aq		-25.54				
	5 H_2O	aq		-26.27				
	6 H_2O	aq		-26.78				
	8 H_2O	aq		-27.39				
	10 H_2O	aq		-27.72				
	12 H_2O	aq		-27.90				
	15 H_2O	aq		-28.08				
	20 H_2O	aq		-28.25				
	25 H_2O	aq		-28.34				
	30 H_2O	aq		-28.41				
	40 H_2O	aq		-28.48				

Table 11-3. Bromine (at. no., 35; at. wt., 79.916)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HBr	in 50 H_2O	aq		-28.54				
	75 H_2O	aq		-28.61				
	100 H_2O	aq		-28.65				
	200 H_2O	aq		-28.71				
	300 H_2O	aq		-28.74				
	400 H_2O	aq		-28.76				
	500 H_2O	aq		-28.77				
	700 H_2O	aq		-28.78				
	1000 H_2O	aq		-28.80				
	2000 H_2O	aq		-28.83				
	3000 H_2O	aq		-28.84				
	4000 H_2O	aq		-28.85				
	5000 H_2O	aq		-28.85				
	7000 H_2O	aq		-28.86				
	10000 H_2O	aq		-28.86				
	20000 H_2O	aq		-28.87				
	50000 H_2O	aq		-28.88				

Table 11-4. Bromine (at. no., 35; at. wt., 79.916)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HBr	in 100000 H_2O	aq		-28.89				
	∞ H_2O	aq		-28.90				-30.7
HBrO		aq						
$HBrO_3$		aq		-9.5				
BrCl		g		3.51	-0.210	0.1539	57.34	
		in CCl_4		-2.30				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 12-1. Iodine (at. no., 53; at. wt., 126.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
I		g	25.592	25.482	16.766	-12.2893	43.1841	4.9680
I^+		g	266.366	267.737				
I^{++}		g	704.75	707.60				
I^-		g	-48.6	-50.2				
	std. state, hyp. m=1	aq		-13.37	-12.35	9.052	26.14	-31.0
I_2		g	15.640	14.876	4.63	-3.3937	62.280	8.81
		c	0.000	0.000	0.000	[illegible]	27.9	13.14
		aq		5.0				
	in C_6H_6 (benzene)			6.0				
	in C_2H_6O (ethanol)			1.7				
	in $C_4H_{10}O$ (diethyl ether)			1.5				
	in CCl_4 (tetrachloromethane)			5.99				
	in $CHCl_3$ (trichloromethane)			6.0				
	in CS_2 (carbon disulfide)			5.0				
I_3^-	std. state, hyp. m=1	aq		-12.4	-12.31	9.[illegible]	41.[illegible]	
IO^-		aq		-34.				
IO_3^-	std. state, hyp. m=1	aq		-55.0	-32.4	23.75	[illegible]	-[illegible]
IO_4^-		aq						
IO_6^{-----}		aq						
I_2O_5		c		-42.34				
$3I_2O_5 \cdot H_2O$		c		-201.12				

Table 12-2. Iodine (at. no., 53; at. wt., 126.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HI		g	6.73	6.20	0.31	-0.227	49.314	6.97
		liq						
	std. state, hyp. m=1	aq		-13.37	-12.35	9.052	26.14	-31.0
	in 2 H_2O	aq		-6.4				
	3 H_2O	aq		-8.72				
	5 H_2O	aq		-11.29				
	10 H_2O	aq		-12.48				
	20 H_2O	aq		-12.90				
	30 H_2O	aq		-12.97				
	40 H_2O	aq		-13.04				
	50 H_2O	aq		-13.10				
	100 H_2O	aq		-13.18				
	200 H_2O	aq		-13.22				
	300 H_2O	aq		-13.24				

Table 12-3. Iodine (at. no., 53; at. wt., 126.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HI	in 400 H_2O	aq		-13.25				
	500 H_2O	aq		-13.26				
	1000 H_2O	aq		-13.28				
	2000 H_2O	aq		-13.30				
	∞ H_2O	aq		-13.37				-31.0
HIO		aq		-38.				
HIO_3		c		-57.03				
		aq		-54.9				
HIO_6^{----}		aq		-158.9				
$H_2IO_6^{---}$		aq		-171.8				
$H_3IO_6^{--}$		aq		-182.5				
$H_4IO_6^{-}$		aq		-174.4				
H_5IO_6		c		-184.4				
		aq		-183.0				
$I_2O_5 \cdot HIO_3$		c		-99.7				
ICl		g		4.20	-1.32	0.966	59.12	8.46
		liq						

Table 12-4. Iodine (at. no., 53; at. wt., 126.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1947; June 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ICl	β	c						
	α	c						
		in CCl_4		-3.24				
ICl_3		c		-21.1	-5.36	3.929	41.1	
IBr		g		9.75	0.91	-0.667	61.80	8.69
		liq						
		in CCl_4		1.72	-0.314	0.2302	39.0	

SERIES I

National Bureau of Standards — Washington, D.C.

Table 14-1. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
S		g		53.25	43.57	-31.9362	40.085	5.66
	λ	liq		0.253				6.9
	μ	liq		0.67				6.9
	rhombic	c, II	0.000	0.000	0.000	0.0000	7.62	5.40
	monoclinic	c, I		0.071	0.023	-0.0169	7.78	5.65
	in 2 CS_2			0.402				
	6 CS_2			0.405				
S^+		g		293.586				
S^{++}		g		834.82				
S^{+++}		g		1644.56				
S^{++++}		g		2736.7				
S^{+++++}		g		4409.5				
S^{++++++}		g		6441.1				
$S^{+++++++}$		g		12923.				
$S^{++++++++}$		g		20507.				
S^{--}		g		125.2				

Table 14-2. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
S^{--}	std. state, hyp. m=1	aq		10.0	20.0	-14.660	5.3	
S_2		g		29.86				
S_2^{--}		aq		9.3				
S_3^{--}		aq		7.8				
S_4^{--}		aq		5.3				
S_6		g		25.3				
S_8		g		24.1				
SO		g		19.02	12.78	-9.368	53.04	

SERIES I

National Bureau of Standards — Washington, D.C.

Table 14-3. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SO_2		g		-70.96	-71.79	52.621	59.40	9.51
	in 200 H_2O	aq		-78.5				
	300 H_2O	aq		-78.60				
	400 H_2O	aq		-78.74				
	500 H_2O	aq		-78.85				
	1000 H_2O	aq		-79.27				
	2000 H_2O	aq		-79.74				
	3000 H_2O	aq		-80.05				
	4000 H_2O	aq		-80.26				
	5000 H_2O	aq		-80.41				
	10000 H_2O	aq		-80.86				
$SO_2 \cdot 7H_2O$		c		-568.26				
SO_3		g		-94.45	-88.52	64.884	61.24	12.10
	low-melting, wool-like	c, II		-107.45				
	high-melting, wool-like	c, I		-110.52				
		liq		-104.67				

Table 14-4. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State		At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SO_3^{--}	std. state, hyp. m = 1	aq			-149.2	-118.8	87.08	10.4	
SO_4^{--}	std. state, hyp. m = 1	aq			-216.90	-177.34	129.988	4.1	4.0
$S_2O_3^{--}$	std. state, hyp. m = 1	aq			-154.	-127.2	93.24	29.	
$S_2O_4^{--}$	std. state, hyp. m = 1	aq			-164.	-138.	101.2	57.	
$S_2O_5^{--}$		aq			-231.				
$S_2O_6^{--}$		aq			-280.4				
S_2O_7		c			-194.3				
$S_2O_8^{--}$		aq			-325.3				
$S_3O_6^{--}$		aq			-295.				
$S_4O_6^{--}$	std. state, hyp. m = 1	aq			-290.	-246.3	180.53	62.	
$S_5O_6^{--}$		aq			-281.				

Table 14-5. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HS^-	std. state, hyp. m = 1	aq		-4.22	3.01	-2.206	14.6	
H_2S		g		-4.815	-7.892	5.7847	49.15	8.12
	std. state, hyp. m = 1	aq		-9.4	-6.54	4.797	29.2	
$H_2S \cdot 6H_2O$		c		-431.2				
H_2S_2		liq		-5.5				
H_2S_3		liq						
H_2S_5		liq		+0.7				

Table 14-6. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HSO_3^-	std. state, hyp. m = 1	aq		-150.09	-126.03	92.378	31.64	
HSO_4^-	std. state, hyp. m = 1	aq		-211.70	-179.94	131.893	30.32	
H_2SO_3	in 200 H_2O	aq		-146.82				
	300 H_2O	aq		-146.92				
	400 H_2O	aq		-147.06				
	500 H_2O	aq		-147.17				
	1000 H_2O	aq		-147.59				
	2000 H_2O	aq		-148.06				
	3000 H_2O	aq		-148.37				
	4000 H_2O	aq		-148.58				
	5000 H_2O	aq		-148.73				
	10000 H_2O	aq		-149.18				

Table 14-7. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2SO_4		liq		-193.91				32.88
	std. state, hyp. m = 1	aq		-216.90	-177.34	129.988	4.1	4.0
	in 0.5 H_2O	aq		-197.67				
	1.0 H_2O	aq		-200.62				
	1.5 H_2O	aq		-202.73				
	2 H_2O	aq		-203.93				
	3 H_2O	aq		-205.62				
	4 H_2O	aq		-206.83				
	5 H_2O	aq		-207.78				
	6 H_2O	aq		-208.43				
	7 H_2O	aq		-208.95				
	8 H_2O	aq		-209.35				
	10 H_2O	aq		-209.93				
	12 H_2O	aq		-210.32				
	15 H_2O	aq		-210.68				
	20 H_2O	aq		-211.00				
	25 H_2O	aq		-211.19				

Table 14-8. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2SO_4	30 H_2O	aq		-211.28				
	40 H_2O	aq		-211.38				
	50 H_2O	aq		-211.44				
	75 H_2O	aq		-211.52				
	100 H_2O	aq		-211.59				
	200 H_2O	aq		-211.82				
	300 H_2O	aq		-212.00				
	400 H_2O	aq		-212.13				
	500 H_2O	aq		-212.25				
	600 H_2O	aq		-212.35				
	700 H_2O	aq		-212.45				
	800 H_2O	aq		-212.54				
	900 H_2O	aq		-212.62				
	1000 H_2O	aq		-212.69				
	2000 H_2O	aq		-213.24				
	3000 H_2O	aq		-213.63				

Table 14-9. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2SO_4	in 4000 H_2O	aq		-213.90				
	5000 H_2O	aq		-214.09				
	6000 H_2O	aq		-214.25				
	7000 H_2O	aq		-214.38				
	8000 H_2O	aq		-214.51				
	9000 H_2O	aq		-214.62				
	10000 H_2O	aq		-214.72				
	15000 H_2O	aq		-215.09				
	20000 H_2O	aq		-215.33				
	30000 H_2O	aq		-215.64				
	40000 H_2O	aq		-215.84				
	50000 H_2O	aq		-215.98				
	70000 H_2O	aq		-216.15				
	100000 H_2O	aq		-216.29				
	200000 H_2O	aq		-216.50				
	500000 H_2O	aq		-216.69				
	∞ H_2O	aq		-216.90				4.0

Table 14-10. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2SO_4	in 5 $(C_2H_5)_2O$			-205.29				
	10 $(C_2H_5)_2O$			-205.51				
	20 $(C_2H_5)_2O$			-208.27				
$H_2SO_4 \cdot H_2O$		liq		-269.32				
$H_2SO_4 \cdot 2H_2O$		liq						
$H_2SO_4 \cdot 4H_2O$		liq						
H_2SO_5		c						
$H_2S_2O_4$		aq		-164.				
$H_2S_2O_6$		aq		-280.0				
$H_2S_2O_7$		liq		-302.7				
$H_2S_2O_8$		c						
	in 200 H_2O	aq		-319.3				
$H_2S_4O_6$		aq		-290.				
SF_4		g						
SF_6		g		-262.	-237.	173.7	69.5	
S_2F_2		g						

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Table 14-11. Sulfur (at. no., 16; at. wt., 32.066)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SCl_4		liq		-13.6				
S_2Cl_2		liq		-14.4				30.
S_2Cl_4		liq		-24.0				
$SOCl_2$		liq		-49.2				28.8
SO_2Cl_2		liq		-93.0				31.5
$S_2O_5Cl_2$		liq		-166.6				55.5
HSO_3Cl		liq		-142.7				
S_2Br_2		liq		-3.6				
$SOBr_2$		liq						

SERIES I

National Bureau of Standards — Washington, D.C.

Table 15-1. Selenium (at. no., 34; at. wt., 78.96)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Se		g	48.23	48.37	38.77	-28.418	42.21	4.968
	gray, hexagonal	c, I	0.000	0.000	0.000	0.0000	10.0	5.95
	black, monoclinic	c, II						
	red, monoclinic	c, III		0.2				
	vitreous	gls		1.05				6.13
	precipitated	amorp		1.05				6.13
Se^{+}		g	273.08	274.70				
Se^{++}		g	769.19	772.29				
Se^{+++}		g	1555.06	1559.64				
Se^{++++}		g	2544.37	2550.43				
Se^{+++++}		g	4230.26	4237.80				
Se^{++++++}		g	6113.99	6123.01				
$Se^{+++++++}$		g	9949.81	9960.31				
Se^{--}	std. state, hyp. m=1	aq		31.6	37.2	-27.27	20.0	

SERIES I

National Bureau of Standards — Washington, D.C.

Table 15-2. Selenium (at. no., 34; at. wt., 78.96)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Se_2		g	33.61	33.14	21.15	-15.503	61.22	8.445
SeH_6		g						
SeO		g	10.46	9.48				
SeO_2		c		-55.01				
		aq		-54.07				
SeO_3^{--}	std. state, hyp. m=1	aq		-122.39	-89.32	65.478	5.9	
SeO_4^{--}	std. state, hyp. m=1	aq		-145.3	-105.42	77.271	7.7	
HSe^-	std. state, hyp. m=1	aq		24.6	23.57	-17.276	42.3	
H_2Se		g		21.5	17.0	-12.46	52.9	
	std. state, hyp. m=1	aq		16.1	18.4	-13.49	39.9	
$HSeO_3^-$	std. state, hyp. m=1	aq		-123.5	-98.3	72.05	30.4	
$HSeO_4^-$	std. state, hyp. m=1	aq		-143.1	-108.2	79.31	33.0	
H_2SeO_3		c		-126.5				
	std. state, hyp. m=1	aq		-122.39	-101.8	74.6	45.7	
H_2SeO_4		c		-138.6				
	std. state, hyp. m=1	aq		-145.3	-105.42	77.271	7.7	

Table 15-3. Selenium (at. no., 34; at. wt., 78.96)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2SeO_4	in 100 H_2O	aq		-141.5				
	200 H_2O	aq		-141.7				
	500 H_2O	aq		-142.2				
	1000 H_2O	aq		-142.6				
	1200 H_2O	aq		-142.7				
	2000 H_2O	aq		-142.9				
	5000 H_2O	aq		-143.8				
	∞ H_2O	aq		-145.3				
$H_2SeO_4 \cdot H_2O$		c		-202.0				
$H_2SeO_4 \cdot 4H_2O$		c						
SeF_6		g		-246.	-222.	162.7	75.10	
$SeCl_2$		g		-9.7				
$SeCl_4$		c		-45.0				
Se_2Cl_2		liq		-20.0				
$Se(OH)_3ClO_4$		c		-149.0				
$SeO_2 \cdot SO_3$		c		-167.1				

Table 16-1. Tellurium (at. no., 52; at. wt., 127.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Te		g		47.6	38.1	-27.93	43.64	4.968
		c, II	0.000	0.000	0.000	0.0000	11.88	6.15
	precipitated	amorp		2.7				
Te^+		g		256.80				
Te^{++}		g		755.09				
Te^{+++}		g		1462.50				
Te^{++++}		g		2336.08				
Te^{+++++}		g		3727.50				
Te^{++++++}		g		5396.9				
$Te^{+++++++}$		g		8562.3				
Te_2		g		41.0	29.0	-21.26	64.07	8.72
TeO		g		43.0				
TeO_2		c		-77.69	-64.60	47.353	16.99	15.89
TeO_3^{--}		aq		-142.1				

Table 16-2. Tellurium (at. no., 52; at. wt., 127.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
TeO_4		aq		-170.2				
H_2Te		g		36.9	33.1	-24.26	56.	
H_2TeO_3		c		-144.7	-115.7	84.81	47.7	
		aq		-144.7				
H_2TeO_4		aq		-166.7				
$H_2TeO_4 \cdot 2H_2O$		c		-306.6	-245.3	179.80	47.	
TeF_6		g		-315.	-292.	214.0	80.67	
$TeCl_4$		c		-77.2				
$TeBr_4$		c		-49.8				
$(TeO_2)_2SO_3$		c		-292.8				

Table 17-1. Polonium (at. no., 84; at. wt., 210)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Po		c	0.000	0.000	0.000	0.0000		
Po^{++}		aq			30.	-22.0		
PoO_2		c			-46.	33.7		

Table 18-1. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
N		g	85.120	85.565	81.471	-59.71717	36.6147	4.9680
N^+		g	420.552	422.478				
N^{++}		g	1103.30	1106.71				
N^{+++}		g	2197.04	2201.93				
N^{++++}		g	3983.18	3989.55				
N^{+++++}		g	6240.07	6247.92				
N^{++++++}		g	18968.5	18977.8				
$N^{+++++++}$		g	34347.	34358.				
N_2		g	0.000	0.000	0.000	0.0000	45.767	6.960
N_2^+		g	434.69	436.17				
N_2^{++}		g	1130.	1133.				
N_3^-		aq		58.6				

Table 18-2. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NO		g	21.477	21.600	20.719	-15.18688	50.339	7.137
NO_2		g	8.682	8.091	12.390	-9.0817	57.47	9.06
NO_2^-	std. state, hyp. m = 1	aq		-25.4				
NO_3		g		13.				
NO_3^-	std. state, hyp. m = 1	aq		-49.372	-26.41	19.358	35.0	
N_2O		g	20.31	19.49	24.76	-18.149	52.58	9.251
		aq						
$N_2O \cdot 6H_2O$		c						
$N_2O_2^{--}$	std. state, hyp. m = 1	aq		-2.59	33.0	-24.19	6.6	
N_2O_3		g		20.0				
N_2O_4		g	4.489	2.309	23.491	-17.2186	72.73	18.90
N_2O_5		q		3.6				
		c		-10.0				

Table 18-3. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NH		g	59.	59.				6.96
NH_3		g	-9.368	-11.04	-3.976	2.9144	46.01	8.523
	std. state, hyp. m=1	aq		-19.32	-6.37	4.669	26.3	
	in 1 H_2O	aq		-18.1				
	2 H_2O	aq		-18.7				
	3 H_2O	aq		-18.87				
	4 H_2O	aq		-18.99				
	5 H_2O	aq		-19.07				
	10 H_2O	aq		-19.23				
	20 H_2O	aq		-19.27				
	30 H_2O	aq		-19.28				
	40 H_2O	aq		-19.28				
	50 H_2O	aq		-19.29				
	100 H_2O	aq		-19.30				
	200 H_2O	aq		-19.32				
	∞ H_2O	aq		-19.32				

Table 18-4. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NH_4^+		g		150.				
	std. state, hyp. m=1	aq		-31.74	-19.00	13.927	26.97	
N_2H_4	hydrazine	liq		12.05				
	in 300 H_2O	aq		8.16				
$N_2H_4 \cdot H_2O$		liq		-57.95				
$N_2H_4H^+$		aq		-1.7				
$N_2H_4H_2^{++}$		aq		-4.0				
HN_3	hydrogen azide	g		70.3	78.5	-57.54	56.74	10.62
	in 100 H_2O	aq		61.51				
	200 H_2O	aq		60.84				
	300 H_2O	aq		60.61				
	400 H_2O	aq		60.50				
NH_4N_3		c		20.4				
		aq		26.90				
$N_2H_4N_3H$	hydrazine hydrazide	c						

Table 18-5. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HNO_2	std. state, hyp. m = 1	aq		-28.4				
HNO_3		g					63.62	
		liq		-41.404	-19.100	14.0000	37.19	26.26
	std. state, hyp. m = 1	aq		-49.372	-26.41	19.358	35.0	
	in 1 H_2O	aq		-44.538				
	2 H_2O	aq		-46.204				
	3 H_2O	aq		-47.212				
	4 H_2O	aq		-47.852				
	5 H_2O	aq		-48.270				
	6 H_2O	aq		-48.535				
	8 H_2O	aq		-48.843				
	10 H_2O	aq		-49.014				
	15 H_2O	aq		-49.162				
	20 H_2O	aq		-49.212				
	25 H_2O	aq		-49.230				
	30 H_2O	aq		-49.234				
	40 H_2O	aq		-49.232				

Table 18-6. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HNO_3	in 50 H_2O	aq		-49.230				
	75 H_2O	aq		-49.229				
	100 H_2O	aq		-49.231				
	200 H_2O	aq		-49.244				
	300 H_2O	aq		-49.255				
	500 H_2O	aq		-49.267				
	700 H_2O	aq		-49.277				
	1000 H_2O	aq		-49.286				
	2000 H_2O	aq		-49.303				
	5000 H_2O	aq		-49.323				
	10000 H_2O	aq		-49.336				
	50000 H_2O	aq		-49.355				
	∞ H_2O	aq		-49.372				
	in $(C_2H_5)_2O$							

Table 18-7. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HNO_3 \cdot H_2O$		liq		-112.960	-78.410	57.4735	51.83	43.60
$HNO_3 \cdot 3H_2O$		liq		-252.203	-193.701	141.9802	82.92	77.71
NH_2OH		c		-25.5				
		aq		-21.7				
$NH_2OH \cdot H^+$		aq		-30.7				
$NH_2OH \cdot H_2O$								
NH_4OH	std. state, hyp. m=1	aq		-87.64				
	in 2 H_2O	aq		-87.2				
	3 H_2O	aq		-87.31				
	4 H_2O	aq		-87.39				
	5 H_2O	aq		-87.42				
	10 H_2O	aq		-87.55				
	20 H_2O	aq		-87.59				
	30 H_2O	aq		-87.60				
	40 H_2O	aq		-87.60				
	50 H_2O	aq		-87.61				
	100 H_2O	aq		-87.62				

Table 18-8. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NH_4OH	in 200 H_2O	aq		-87.64				
	∞ H_2O	aq		-87.64				
$HN_2O_2^-$	std. state, hyp. m = 1	aq		-9.4	18.0	-13.19	34.	
$H_2N_2O_2$	std. state, hyp. m = 1	aq		-13.7	8.4	-6.16	52.	
NH_4NO_2		c		-63.1				
	std. state, hyp. m = 1	aq		-57.1				
NH_4NO_3		c, IV		-87.27				43.5
	std. state, hyp. m = 1	aq		-81.11				
	in 3 H_2O	aq		-83.30				
	4 H_2O	aq		-83.20				
	5 H_2O	aq		-83.03				
	10 H_2O	aq		-82.46				
	20 H_2O	aq		-81.95				
	30 H_2O	aq		-81.72				
	40 H_2O	aq		-81.58				
	50 H_2O	aq		-81.49				
	100 H_2O	aq		-81.30				

Table 18-9. Nitrogen (at. no., 7. at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NH_4NO_3	in 200 H_2O	aq		-81.19				
	500 H_2O	aq		-81.12				
	1000 H_2O	aq		-81.10				
	∞ H_2O	aq		-81.11				
$NH_4NO_3 \cdot 1\frac{1}{2}NH_3$		liq		-93.6				
$NH_2OH \cdot HNO_3$		c		-86.3				
		aq		-80.5				
$N_2H_4 \cdot HNO_3$	stable	c, I						
		aq		-51.1				
$N_2H_4 \cdot 2HNO_3$		c						
		aq		-102.7				

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Table 18-10. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NF_3		g		-27.2				
NOF		g						
NO_2F		g						
NO_3F		g						
NHF_2		g						
NH_2F		g						
NH_4F		c		-111.6				
	in 200 H_2O	aq		-110.14				
	in H_2O	aq		-110.40				
$NH_4F \cdot HF$		c						
$N_2H_4 \cdot 2HF$		c						

Table 18-11. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NCl_3		liq						
	in CCl_4			54.7				
NOCl		g	13.25	12.57	15.86	-11.625	63.0	
NO_2Cl		g						
NH_2Cl		g						
NH_4Cl		c, II		-75.38	-48.73	35.718	22.6	20.1
	std. state, hyp. m=1	aq		-71.76				
	in 10 H_2O	aq		-71.57				
	25 H_2O	aq		-71.597				
	50 H_2O	aq		-71.624				
	100 H_2O	aq		-71.628				
	200 H_2O	aq		-71.646				
	300 H_2O	aq		-71.656				
	400 H_2O	aq		-71.664				
	500 H_2O	aq		-71.671				
	1000 H_2O	aq		-71.691				
	2000 H_2O	aq		-71.710				

Table 18-12. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NH_4Cl	in 3000 H_2O	aq		-71.718				
	4000 H_2O	aq		-71.724				
	5000 H_2O	aq		-71.728				
	10000 H_2O	aq		-71.737				
	∞ H_2O	aq		-71.76				
$NH_4Cl \cdot 3NH_3$		liq		-133.9				
$NH_4Cl \cdot 6NH_3$		liq		-183.9				
$N_2H_4 \cdot HCl$		c		-46.93				
	in 50 H_2O	aq		-41.775				
	100 H_2O	aq		-41.73				
	200 H_2O	aq		-41.712				
	300 H_2O	aq		-41.711				
	400 H_2O	aq		-41.710				
	500 H_2O	aq		-41.710				
	1000 H_2O	aq		-41.708				

Table 18-13. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$N_2H_4 \cdot 2HCl$		c		-90.0				
		aq		-84.0				
$NH_2OH \cdot HCl$		c		-74.0				22
		aq		-70.7				
NH_4ClO_4		c, II		-69.42				
	in 500 H_2O	aq		-63.2				
	∞ H_2O	aq		-63.15				

Table 18-14. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NBr_3								
NOBr		g		19.56	19.70	-14.440	65.16	
NH_4Br		c, II		-64.61				
	in 200 H_2O	aq		-60.51				
	∞ H_2O	aq		-60.74				
$NH_4Br \cdot NH_3$		liq		-83.6				
$NH_4Br \cdot 3NH_3$		liq		-122.3				
$NH_4Br \cdot 6NH_3$		liq		-172.0				
N_2H_4HBr		c						
N_2H_42HBr		c						

Table 18-15. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NI_3		c						
NH_4I		c, I		-48.30				
	in 200 H_2O	aq		-44.98				
	∞ H_2O	aq		-45.11				
$NH_4I \cdot NH_3$		liq		-69.1				
$NH_4I \cdot 3NH_3$		liq		-104.5				
$NH_4I \cdot 4NH_3$		liq						
$NH_4I \cdot 6NH_3$		liq		-154.7				
$N_2H_4 \cdot HI$		c						
$N_2H_4 \cdot 2HI$		c						

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Table 18-16. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NS		g						
N_2S_5		liq						
N_4S_4		c		127.6				
$N_2O_3 \cdot 2SO_3$		c						
NH_4HS		c		-38.10				
		aq		-35.1				
$(NH_4)_2S$		aq		-54.5				
$(NH_4)_2S_4$		c		-67.4				
		aq		-60.0				
$(NH_4)_2S_5$		c		-68.8				
		aq		-61.2				

Table 18-17. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NO_2SO_2OH		c						
NH_4HSO_3		c		-183.8				
	std. state, hyp. m = 1	aq		-181.83				
		aq		-181.5				
NH_4HSO_4		c		-244.83				34.2
	in 10 H_2O	aq		-244.34				
	20 H_2O	aq		-244.76				
	50 H_2O	aq		-244.93				
	100 H_2O	aq		-245.05				
	200 H_2O	aq		-245.26				
	400 H_2O	aq		-245.53				
	800 H_2O	aq		-245.86				

Table 18-18. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NH_2OH \cdot H_2SO_4$		c		-245.1				
		aq		-244.4				
$N_2H_4 \cdot H_2SO_4$		c		-231.6				
	in 1000 H_2O	aq		-223.44				
$(NH_4)_2SO_3$		c		-212.0				
		aq		-211.3				
$(NH_4)_2SO_3 \cdot H_2O$		c		-284.22				
$(NH_4)_2SO_4$		c		-281.86	-215.19	157.732	52.65	44.81
	in 20 H_2O	aq		-280.47				
	30 H_2O	aq		-280.40				
	40 H_2O	aq		-280.35				
	50 H_2O	aq		-280.31				
	100 H_2O	aq		-280.212				
	200 H_2O	aq		-280.150				
	300 H_2O	aq		-280.135				

Table 18-19. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)_2SO_4$	in 400 H_2O	aq		-280.124				
	500 H_2O	aq		-280.116				
	1000 H_2O	aq		-280.122				
	5000 H_2O	aq		-280.196				
	∞ H_2O	aq		-280.38				
$(NH_2OH)_2 \cdot H_2SO_4$		c		-282.5				
		aq		-276.7				

Table 18-20. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)_2S_2O_5$		c						
	std. state, hyp. m = 1	aq		-295.3				
$(NH_4)_2S_2O_8$		c		-396.4				
		aq		-387.8				
$NH(SO_2NH_2)_2$		c						
$(N_2H_4)_2H_2SO_4$		aq		-217.8				
$NOSO_3F$		c						
NSe		g						
N_4Se_4		c		169.2				
NH_4HSe	std. state, hyp. m = 1	aq		-5.3				
		aq		-5.6				
$(NH_4)_2Se$	std. state, hyp. m = 1	aq		-26.2				

Table 19-1. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
P		g		75.18	66.71	-48.897	38.98	4.9680
	white	c, III		0.000	0.000	0.0000	10.6	5.55
	red	c, II		-4.4				
	black	c, I		-10.3				
P^+		g		329.81				
P^{++}		g		784.51				
P^{+++}		g		1481.43				
P^{++++}		g		2667.2				
P^{+++++}		g		4167.9				
P_2		g		33.82	24.60	-18.031	52.13	7.63
P_4		g		13.12	5.82	-4.266	66.90	16.0
		liq		0.601				24.2

Table 19-2. Phosphorus (at. no., 15; at. wt. 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PO		g		-9.7				
PO_3^-	std. state, hyp. m =1	aq		-235.6				
PO_4^{---}	std. state, hyp. m =1	aq		-306.9	-245.1	179.65	-52.	
$P_2O_7^{----}$	std. state, hyp. m =1	aq		-543.9				
P_4O_6		liq						
P_4O_{10}		c, II		-720.0				
		amorp		-734.0				
PH_3		g		2.21	4.36	-3.196	50.2	
$PH_3 \cdot 6H_2O$		c		-422.7				
P_2H		c		-14.5				
P_2H_4		liq						

Table 19-3. Phosphorus (at. no., 15; at. wt., 30.96)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HPO_3		c		-228.2				
		aq		-234.9				
HPO_3^{--}		aq		-233.0				
HPO_4^{--}	std. state, hyp. m=1	aq		-310.4	-261.5	191.68	-8.6	
$H_2PO_3^-$		aq		-233.3				
$H_2PO_4^-$	std. state, hyp. m=1	aq		-311.3	-271.3	198.86	21.3	
H_3PO_2		c		-145.5				
		liq		-143.2				
		aq		-145.6				
H_3PO_3		c		-232.2				
		liq		-229.1				
		aq		-232.2				

Table 19-4. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_3PO_4		c		-306.2				
	in 1 H_2O	aq		-305.6				
	2 H_2O	aq		-306.4				
	3 H_2O	aq		-307.2				
	4 H_2O	aq		-307.7				
	5 H_2O	aq		-308.0				
	10 H_2O	aq		-308.56				
	20 H_2O	aq		-308.82				
	30 H_2O	aq		-308.97				
	40 H_2O	aq		-309.04				
	50 H_2O	aq		-309.06				
	100 H_2O	aq		-309.18				
	200 H_2O	aq		-309.28				
	300 H_2O	aq		-309.30				
	400 H_2O	aq		-309.32				

Table 19-5. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_3PO_4	in 500 H_2O	aq		-309.34				
	1000 H_2O	aq		-309.36				
	2000 H_2O	aq		-309.39				
	3000 H_2O	aq		-309.4				
$H_3PO_4 \cdot \frac{1}{2}H_2O$		c		-342.9				
		liq		-339.3				
$HP_2O_7^{---}$		aq		-546.7				
$H_2P_2O_7^{--}$		aq		-547.0				
$H_3P_2O_7^{-}$		aq		-546.7				
$H_4P_2O_5$		aq		-391.2				
$H_4P_2O_6$		c						
$H_4P_2O_6 \cdot 2H_2O$		c						

Table 19-6. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$H_4P_2O_7$		c		-538.0				
		aq		-545.9				
$H_4P_2O_7 \cdot 1\frac{1}{2}H_2O$		c		-643.9				
		liq		-640.8				
$H_6P_4O_{13}$		c						
PF_3		g					64.12	
PF_5		g						
POF_3		g						
HPO_2F_2		liq						

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Table 19-7. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PCl_3		liq		-81.0				
		g		-73.22	-68.42	50.151	74.49	
PCl_5		c		-110.7				
		g		-95.35	-77.59	56.872	84.3	
P_2Cl_4		liq						
$POCl_3$		liq		-151.0				
		g		-141.5	-130.3	95.508	77.59	
PH_4Cl		g		-36.2				
PF_2Cl		g						
$PFCl_2$		g						
POF_2Cl		g						
$POFCl_2$		liq						

Table 19-8. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PBr_3		g		-35.9	-41.2	30.20	83.11	
		liq		-47.5				
		in CS_2		-46.9				
PBr_5		c		-66.				
$POBr_3$		c		-114.6				
PH_4Br		c		-29.5				
PF_2Br		g						
$PFBr_2$		liq						
PF_3Br_2		liq						
POF_2Br		liq						
$POFBr_2$		liq						
$POCl_2Br$		liq						
$POClBr_2$		c						
$POFClBr$		liq						

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Table 19-9. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PI_3		c		-10.9				
P_2I_4		c		-19.76				
PH_4I		c		-15.8				26.5
P_2S_3		c						
P_4S_3		c						
P_4S_7		c						
P_4S_{10}		c						
$P_4S_6O_4$		c						
PSF_3		g						
$PSCl_3$		g					79.34	
PSF_2Cl		g						
$PSFCl_2$		liq						
$PSBr_3$		c						

Table 19-10. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PSF_2Br		liq						
$PSFBr_2$		liq						
$PSCl_2Br$		liq						
$PSClBr_2$		liq						
PN		g		-20.2	-25.3	18.54	50.45	7.097
$1/n\ (PN)_n$		c		-16.8				
P_3N_5		c		-75.7				35.6
$NH_2OH \cdot H_3PO_2$		c						
$NH_4H_2PO_3$		c						

Table 19-11. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NH_4H_2PO_4$		c		-346.75	-290.46	212.903	36.32	34.0
	in 20 H_2O	aq		-343.07				
	25 H_2O	aq		-343.06				
	30 H_2O	aq		-343.05				
	40 H_2O	aq		-343.03				
	50 H_2O	aq		-343.01				
	100 H_2O	aq		-342.97				
	200 H_2O	aq		-342.95				
	300 H_2O	aq		-342.93				
	400 H_2O	aq		-342.92				
	500 H_2O	aq		-342.91				
	600 H_2O	aq		-342.9				
	700 H_2O	aq		-342.89				

Table 19-12. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$N_2H_4 \cdot H_3PO_3$		c						
$NH_4NH_2HPO_2$		c						
$N_2H_4 \cdot H_3PO_4$		c						
$(NH_4)_2HPO_4$		c		-376.12				43.5
	in 11 H_2O	aq		-374.07				
	12 H_2O	aq		-374.06				
	13 H_2O	aq		-374.05				
	14 H_2O	aq		-374.04				
	15 H_2O	aq		-374.03				
	20 H_2O	aq		-373.96				
	30 H_2O	aq		-373.82				
	40 H_2O	aq		-373.71				
	50 H_2O	aq		-373.63				

Table 19-13. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)_2HPO_4$	in 100 H_2O	aq		-373.39				
	200 H_2O	aq		-373.21				
	300 H_2O	aq		-373.12				
	400 H_2O	aq		-373.07				
	500 H_2O	aq		-373.04				
	600 H_2O	aq		-373.0				
	700 H_2O	aq		-372.99				
$(NH_4)_3PO_4$		c		-401.8				
	in 660 H_2O	aq		-394.0				
$(NH_4)_3PO_4 \cdot 3H_2O$		c		-612.8				

Table 20-1. Arsenic (at. no., 33; at. wt., 74.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State		At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
As		g			60.64	50.74	-37.192	41.62	4.968
	α, gray, metallic	c		0.000	0.000	0.000	0.0000	8.4	5.97
	β	amorp			1.0				
	γ, yellow, cubic	c			3.53				
As^+		g			304.24				
As^{++}		g			771.03				
As^{+++}		g			1402.0				
As^{++++}		g			2559.4				
As^{+++++}		g			4004.8				
As^{++++++}		g			6948.				
As_2		g			29.6	17.5	-12.83	57.3	8.366
As_4		g			35.7	25.2	-18.47	69.	

Table 20-2. Arsenic (at. no., 33; at. wt., 74.91)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1947; March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AsO		g		4.79				
AsO^+	std. state, hyp. m =1	aq			-39.1	28.69		
AsO_2^-	std. state, hyp. m =1	aq			-83.7	61.33		
AsO_4^{---}	std. state, hyp. m =1	aq		-208.	-152.	111.4	-34.6	
As_2O_5		c		-218.6	-184.6	135.41	25.2	27.85
		aq		-224.6				
$As_2O_5 \cdot 4H_2O$		c		-500.3				
$3As_2O_5 \cdot 5H_2O$		c		-1007.5				
As_4O_6	octahedral	c, II		-313.94	-275.36	201.835	51.2	45.72
	monoclinic	c, I		-312.8				
		aq		-299.4				
$As_2O_3 \cdot As_2O_5$		c		-351.1				

Table 20-3. Arsenic (at. no., 33; at. wt., 74.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AsH_3		g		41.0				
$AsH_3 \cdot 6H_2O$		c		-386.7				
$HAsO_2$	std. state, hyp. m = 1	aq		-109.0	-96.25	70.550	30.3	
$HAsO_3^{--}$		aq		-157.1				
$HAsO_4^{--}$	std. state, hyp. m = 1	aq		-214.8	-169.	123.9	0.9	
$H_2AsO_3^-$		aq		-170.3				
$H_2AsO_4^-$	std. state, hyp. m = 1	aq		-216.2	-178.9	131.13	28.	
H_3ASO_3	std. state, hyp. m = 1	aq		-177.3	-152.9	112.07	47.0	
H_3ASO_4		c		-215.2				
	std. state, hyp. m = 1	aq		-214.8	-183.8	134.72	49.3	
$H_3AsO_4 \cdot \frac{1}{2}H_2O$		c						

Table 20-4. Arsenic (at. no., 33; at. wt., 74.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947, March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AsF_3		g		-218.3	-214.7	157.37	69.08	
		liq		-226.8	-215.5	157.96	43.31	30.3
AsF_5		g						
$AsCl_2$		g		7.35				
$AsCl_3$		g		-71.5	-68.5	50.21	78.2	
		liq		-80.2	-70.5	51.68	55.8	
$AsBr_3$		c		-46.61				
AsI_2		c						
AsI_3		c		-13.7				

Table 20–5. Arsenic (at. no., 33; at. wt., 74.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
As_2S_2		g		-4.22				
		c		-31.9				
As_2S_3		c		-35.				
$As_2O_3 \cdot SO_3$		c		-285.26				
AsN		g		7.				7.274
$NH_4H_2AsO_4$		c		-251.47	-197.24	144.574	41.12	
		aq		-247.9				
$(NH_4)_2HAsO_4$		c		-280.24				
		aq		-278.3				
$(NH_4)_3AsO_4$		c		-306.11				
		aq		-303.				
$(NH_4)_3AsO_4 \cdot 3H_2O$		c		-516.6				

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Table 21-1. Antimony (at. no., 51; at. wt., 121.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sb		g		60.8	51.1	-37.46	43.06	4.968
		c, III	0.000	0.000	0.000	0.0000	10.5	6.08
	explosive	c, IV		2.44				
Sb^+		g		261.52				
Sb^{++}		g		678.1				
Sb^{+++}		g		1249.				
Sb^{++++}		g		2263.				
Sb^{+++++}		g		3542.				
Sb^{++++++}		g		6013.				
Sb_2		g		52.	40.	-29.3	60.9	8.684
Sb_4		g		48.8				
SbO		g		45.				
SbO^+	std. state, hyp. m = 1	aq			-42.0	30.79		

Table 21-2. Antimony (at. no., 51; at. wt., 121.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sb_2O_3		aq		-166.5				
Sb_2O_4		c		-214.	-188.	137.8	30.3	27.4
Sb_2O_5		c		-234.4	-200.6	146.96	29.9	28.1
		aq		-226.4				
Sb_4O_6		c, II		-336.8	-298.0	218.43	58.8	48.46
Sb_6O_{13}		c		-670.				
SbH_3		g						
H_3SbO_4		aq		-215.7				

Table 21-3. Antimony (at. no., 51; at. wt., 121.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SbF		g		0.				
SbF_3		c		-217.2				
		aq		-216.1				
SbF_5		liq						
$2SbF_3 \cdot SbF_5$		liq						
H_3SbF_6		aq		-444.3				
SbCl		g		-4.				
$SbCl_3$		g		-75.2	-72.3	52.99	80.8	18.5
		c		-91.34	-77.62	56.894	44.5	
$SbCl_5$		g		-93.9				
		liq		-104.8				

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Table 21-4. Antimony (at. no., 51; at. wt., 121.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SbOCl		c		-90.8				
$Sb_4O_5Cl_2$		c		-350.				
$SbCl_3F_2$		c						
$SbBr_3$		c		-62.1				
	in CS_2			-58.4				
SbI_3		c		-23.0				
		aq		-22.6				
SbS_3^{---}		aq		-4.				
Sb_2S_3	black	c		-43.5				
	orange	amorp		-36.0				
$Sb_2(SO_4)_3$		c		-575.3				
Sb_2Se_3								
Sb_2Te_3								

Table 21-5. Antimony (at. no., 51; at. wt., 121.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SbN		g		74.4				
$SbF_3 \cdot NH_3$		c		-242.3				
$SbF_3 \cdot 2NH_3$		c		-265.5				
$SbF_3 \cdot 3NH_3$		c		-285.7				
$SbF_3 \cdot 4NH_3$		c		-304.4				
$SbF_3 \cdot 6NH_3$		c		-341.4				
$3NH_4Cl \cdot 2SbCl_3$		c						

Table 22-1. Bismuth (at. no., 83; at. wt., 209.00)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Bi		g		49.7	40.4	-29.61	44.67	4.968
		c	0.000	0.000	0.000	0.0000	13.6	6.1
Bi^+		g		219.1				
Bi^{++}		g		605.3				
Bi^{+++}		g		1196.				
Bi^{++++}		g		2242.				
Bi^{+++++}		g		3535.				
Bi^{++++++}		g		5715.				
Bi_2		g		59.4	48.0	-35.18	65.4	8.830
BiO		g		16.				
		c		-49.85				
BiO^+	std. state, hyp. m = 1	aq			-34.54	25.317		
Bi_2O_3		c		-137.9	-118.7	87.01	46.2	27.2

Table 22-2. Bismuth (at. no., 83; at. wt., 209.00)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947: March 31, 1949

Substance			ΔH_f°	ΔH_f°	ΔF_f°	$\log_{10} K_f$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BiH		g		43.				
$Bi(OH)_3$		c		-169.6				
BiF		g		7.				
BiF_3		c						
BiF_5		c						
BiCl		g		10.7	5.2	-3.81	58.9	
$BiCl_3$		g		-64.7	-62.2	45.59	85.3	19.02
		c		-90.61	-76.23	55.876	45.3	
	in aq HCl	aq		-101.6				
$BiCl_4$		c						
BiOCl		c		-87.3	-77.0	56.44	20.6	
BiBr		g		12.7	3.8	-2.79	61.6	
$BiBr_3$		c, II						
BiI		g		16.	11.	-8.06	63.4	

Table 22-3. Bismuth (at. no., 83; at. wt., 209.00)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1947; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BiS		c						
Bi_2S_3		c		-43.8	-39.4	28.88	35.3	
$Bi_2(SO_4)_3$		c		-607.				
BiSe		c, II						
Bi_2Se_3		c						
Bi_2Te_3		c						
$Bi_2Te_3 \cdot Bi_2S_3$		c						

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Table 23-1. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C		g	170.39	171.698	160.845	-117.8971	37.7611	4.98
	diamond	c	0.5766	0.4532	0.6850	-0.50210	0.5829	1.449
	graphite	c	0.000	0.000	0.000	0.0000	1.3609	2.066
C^+		g	430.167	431.648				
C^{++}		g	992.318	995.281				
C^{+++}		g	2096.16	2100.60				
C^{++++}		g	3583.09	3589.02				
C^{+++++}		g	12623.0	12360.4				
C^{++++++}		g	23920.	23930.				

Table 23-2. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CO		g	-27.2019	-26.4157	-32.8079	24.04778	47.301	6.965
CO^+		g	291.	292.5				
CO_2		g	-93.9686	-94.0518	-94.2598	69.09124	51.061	8.874
	std. state, hyp. m = 1	aq		-98.69	-92.31	67.662	28.0	
$CO_2 \cdot 6H_2O$		c		-520.				
CO_2^+		g	222.6	224.1				
CO_3^{--}		g						
	std. state, hyp. m = 1	aq		-161.63	-126.22	92.517	-12.7	

Table 23-3. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH		g	142.0	142.1				
CH^+		g						
CH_2		g						
CH_2^+		g						
CH_3		g	33.4	32.0				
CH_3^+		g						
CH_4		g	-15.987	-17.889	-12.140	8.8985	44.50	8.536
$CH_4 \cdot 6H_2O$		c		-445.				

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Table 23-4. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HCOO^-$	formate ion, std. state, hyp. m = 1	aq		-98.0	-80.0	58.64	21.9	
HCO_3^-	bicarbonate ion std. state, hyp. m = 1	aq		-165.18	-140.31	102.845	22.7	
CH_2O	formaldehyde	g		-27.7	-26.3	19.28	52.26	8.45
	in 60 H_2O	aq		-42.5				
	in 40 H_3OH			-42.7				
CH_2O_2	formic acid, monomer	g		-86.67	-80.24	58.815	60.0	
	formic acid	liq		-97.8	-82.7	60.62	30.82	23.67
	std. state, hyp. m = 1	aq		-98.0	-85.1	62.36	39.1	
	in 0.2 H_2O	aq		-97.86				
	0.5 H_2O	aq		-97.93				
	1.0 H_2O	aq		-98.00				
	1.5 H_2O	aq		-98.01				
	2.0 H_2O	aq		-98.01				
	3.0 H_2O	aq		-97.99				
	4 H_2O	aq		-97.98				
	5 H_2O	aq		-97.96				

Table 23-5. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_2O_2	formic acid, in 10 H_2O	aq		-97.94				
	15 H_2O	aq		-97.93				
	25 H_2O	aq		-97.94				
	50 H_2O	aq		-97.95				
	100 H_2O	aq		-97.96				
	200 H_2O	aq		-97.97				
	∞ H_2O	aq		-98.0				
H_2CO_3	carbonic acid, std. state, hyp. m=1	aq		-167.0	-149.00	109.215	45.7	
CH_3O^-	methylate ion	aq						

Table 23-6. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
	Formula	Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
	CH_3OH	methanol	g		-48.08	-38.69	28.359	56.8	
			liq		-57.02	-39.73	29.122	30.3	19.5
		std. state, hyp. m=1	aq		-58.77	-41.88	30.697	31.6	
		in 0.25 H_2O	aq		-57.15				
		0.5 H_2O	aq		-57.24				
		1.0 H_2O	aq		-57.40				
		1.5 H_2O	aq		-57.53				
		2.0 H_2O	aq		-57.65				
		3 H_2O	aq		-57.84				
		4 H_2O	aq		-58.00				
		5 H_2O	aq		-58.13				
		10 H_2O	aq		-58.45				
		25 H_2O	aq		-58.61				
		∞ H_2O	aq		-58.77				
	CH_4O_2	methyl hydrogen peroxide	liq						

Table 23-7. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CF_4	tetrafluoromethane	g		-162.5	-151.8	111.27	62.7	
COF_2	carbonyl fluoride	g						
CH_3F	fluoromethane	g					53.30	8.95
CH_2F_2	difluoromethane	g						10.24
CHF_3	trifluoromethane	g						12.68
CCl_4	tetrachloromethane	g		-25.5	-15.3	11.21	73.95	19.96
		liq		-33.3	-16.4	12.02	51.25	31.49
$COCl_2$	carbonyl chloride	g		-53.30	-50.31	36.877	69.13	14.51
CH_3Cl	chloromethane	g		-19.6	-14.0	10.26	55.97	9.75
$CH_3Cl \cdot 9H_2O$		c		-650.				
CH_2Cl_2	dichloromethane	g		-21.	-14.	10.3	64.68	12.28
		liq		-28.0	-15.1	11.07	42.7	23.9
$CHCl_3$	trichloromethane	g		-24.	-16.	11.7	70.86	15.73
		liq		-31.5	-17.1	12.53	48.5	27.8

Table 23-8. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CF_3Cl	trifluorochloromethane	g						15.24
CF_2Cl_2	difluorodichloromethane	g						16.56
$CFCl_3$	fluorotrichloromethane	g					74.06	18.73
		liq						29.0[illegible]
$COFCl$	carbonyl fluorochloride	g						
CH_2FCl	fluorochloromethane	g						11.[illegible]7
CHF_2Cl	difluorochloromethane	g						13.79
$CHFCl_2$	fluorodichloromethane	g						14.64

Table 23-9. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CBr_4	tetrabromomethane	g		12.	8.6	-6.30	85.6	21.84
		c, II						35.0
$COBr_2$	carbonyl bromide	g		-23.				
		liq		-30.				
CH_3Br	bromomethane	g		-8.5	-6.2	4.54	58.74	10.18
CH_2Br_2	dibromomethane	g		-1.	-1.4	1.03	70.16	13.15
$CHBr_3$	tribromomethane	g		6.	3.8	-2.78	79.18	17.08
		liq		-4.8	0.7	-0.51	53.0	
CF_3Br	trifluorobromomethane	g						16.8
CF_2Br_2	difluorodibromomethane	g						18.5
$CFBr_3$	fluorotribromomethane	g						19.4

Table 23-10. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_2FBr	fluorobromomethane	g						11.8
CHF_2Br	difluorobromomethane	g						13.9
$CHFBr_2$	fluorodibromomethane	g						15.41
CCl_3Br	trichlorobromomethane	g						20.60
CCl_2Br_2	dichlorodibromomethane	g						20.92
$CClBr_3$	chlorotribromomethane	g						21.24
CH_2ClBr	chlorobromomethane	g						12.8
$CHCl_2Br$	dichlorobromomethane	g						16.08
$CHClBr_2$	chlorodibromomethane	g						16.52
$CHFClBr$	fluorochlorobromomethane	g						15.1

Table 23-11. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CI_4	tetraiodomethane	c						
CH_3I	iodomethane	g		4.9	5.3	-3.88	60.85	10.55
		liq		-2.0	4.9	-3.59	38.9	
CH_2I_2	diiodomethane	g						13.81
		liq		15.9				
CHI_3	triiodomethane	c		33.6				
CHF_2I	difluoroiodomethane	g						
$CHFI_2$	fluorodiiodomethane	liq						

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Table 23-12. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CS		g					50.4	7.11
$\frac{1}{n}(CS)_n$		c		13.				
CS_2	carbon disulfide	g		27.55	15.55	-11.398	56.84	10.91
		liq		21.0	15.2	-11.14	36.10	18.1
COS	carbon oxysulfide	g		-32.80	-40.45	29.649	55.34	9.92
CH_4S	methanethiol	g		-2.97	0.21	-0.154	60.90	12.1
$CSCl_2$	carbon sulfochloride	g					70.17	15.45
CSe_2	carbon diselenide	liq		37.1				

Table 23-13. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CN		g					48.40	6.96
CN^-		g						
	cyanide ion, std. state, hyp. m = 1	aq		36.1	39.6	-29.03	28.2	
CN_4	cyanogen azide	c		92.6				
$\frac{1}{n}(CN_4)_n$		c		82.2				
CNO^-	cyanate ion, std. state, hyp. m = 1	aq		-33.5	-23.6	17.30	31.1	
$C(NO_2)_4$	tetranitromethane	liq		8.8				
HCN	hydrogen cyanide	g		31.2	28.7	-21.04	48.23	8.58
		liq		25.2	29.0	-21.26	26.97	16.88
	hydrocyanic acid, std. state, hyp. m = 1	aq		25.2	26.8	-19.64	30.8	

Table 23-14. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_5N	methyl amine	g		-6.7	6.6	-4.84	57.73	12.9
	in 400 H_2O	aq		-17.84				
	600 H_2O	aq		-17.88				
	800 H_2O	aq		-17.93				
	1000 H_2O	aq		-17.99				
CH_6N^+	methyl ammonium ion, std. state, hyp. m=1	aq		-29.853				
CH_2N_2	cyanamide	c		9.2				
	in 800 H_2O	aq		12.9				
NH_4CN	ammonium cyanide	c		0.0				32.3
		aq		4.6				

Table 23-15. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_5N_3	guanidine	c		-17.0				
		aq		-18.3				
$CH_6N_3^+$	guanidine ion	aq		-32.2				
HCNO	cyanic acid, std. state, hyp. m = 1	aq		-35.1	-28.9	21.18	43.6	
HNCO	hydrogen isocyanate	g						
$CH_2O_2N^-$	nitromethane ion of nitro form	aq		-14.5				
CH_3ON	formamide	liq		-61.6				
		aq		-56.0				
CH_3O_2N	nitromethane	liq		-21.28	2.26	-1.656	41.1	25.3
		aq		-20.7				

Table 23-16. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_3O_2N	methyl nitrite	g						
CH_3O_3N	methyl nitrate	liq						
CH_5O_2N	ammonium formate	c		-132.8				
		aq		-129.83				
NH_4HCO_3	ammonium bicarbonate	c		-203.7				
	std. state, hyp. m=1	aq		-196.92	-159.31	116.772	49.7	
CH_4ON_2	urea	c		-79.634	-47.1[illegible]	34.5383	25.[illegible]	[illegible]
	std. state, hyp. m=1	aq		-76.30	-48.72	35.711	41.[illegible]	
	in 5 H_2O	aq		-75.790				
	7 H_2O	aq		-75.879				
	10 H_2O	aq		-75.970				

Table 23-17. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_4ON_2	in 15 H_2O	aq		-76.056				
	20 H_2O	aq		-76.107				
	25 H_2O	aq		-76.142				
	50 H_2O	aq		-76.219				
	100 H_2O	aq		-76.259				
	200 H_2O	aq		-76.281				
	400 H_2O	aq		-76.29				
	∞ H_2O	aq		-76.301				
NH_4CNO	ammonium cyanate	c		-74.7				
		aq		-68.5				

Table 23-18. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CH_6O_2N_2$	ammonium carbamate	c		-154.21	-109.47	80.240	39.70	
		aq		-150.4				
$(NH_4)_2CO_3$	ammonium carbonate, std. state, hyp. m=1	aq		-225.11	-164.22	120.371	41.2	
CHO_6N_3	trinitromethane	liq		-18.6				
$CH_5O_4N_3$	urea nitrate	c		-114.8				
$CH_4O_2N_4$	nitroguanidine	c		-22.14				
$CH_6O_3N_4$	guanidine nitrate	c		-91.1				
		aq		-81.6				
CNF	cyanogen fluoride	g						
COF_3N	N,N-difluorofluoroformamide	g						
COF_3N	trifluoronitrosomethane	g						

Table 23-19. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CNCl	cyanogen chloride	g		34.5	32.9	-24.12	56.31	10.70
CH_6NCl	methylamine hydrochloride	c		-68.31	-35.09	25.720	33.13	21.75
	std. state, hyp. m = 1	aq		-69.876				
	in 1 H_2O	aq		-69.737				
	2 H_2O	aq		-69.756				
	3 H_2O	aq		-69.765				
	5 H_2O	aq		-69.78				
	10 H_2O	aq		-69.798				
	20 H_2O	aq		-69.818				
	50 H_2O	aq		-69.837				
	100 H_2O	aq		-69.848				

Table 23-20. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CH_6NCl	methylamine hydrochloride							
	in 200 H_2O	aq		-69.855				
	500 H_2O	aq		-69.864				
	1000 H_2O	aq		-69.866				
	∞ H_2O	aq		-69.876				
CH_6ON_3Cl	semicarbazide hydrochloride	c						34.
CNBr	cyanogen bromide	g					59.05	11.11
CNI	cyanogen iodide	g		54.6	47.7	-34.96	61.26	11.54
		c		40.4	42.6	-31.23	30.8	
	std. state, hyp. m = 1	aq		43.2	43.3	-31.74	37.9	

Table 23-21. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CNS^-	thiocyanate ion	aq		17.2				
HCNS	hydrogen thiocyanate	liq						
	thiocyanic acid	aq		17.7				
CH_4N_2S	thiourea	c		-22.1				
		aq		-16.8				
NH_4CNS	ammonium thiocyanate	c		-20.0				
		aq		-14.5				
$CH_5O_3N_3S$	thiourea nitrate	c		-74.5				

Table 23-22. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CP		g					51.92	7.14
$CONPF_2$	phosphorus difluoroisocyanate	g						
$CNPSF_2$	phosphorus difluoroisothiocyanate	liq						
$CNPSCl_2$	phosphorus dichlorothiocyanate	liq						
CH_5As	methyl arsine	g						
CH_3F_2As	methyl difluoroarsine	liq						
CH_3Cl_2As	methyl dichloroarsine	liq						

Table 23-23. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2		g	233.1	234.7				
$C_2O_4^{--}$	oxalate ion; std. state, hyp. m=1	aq		-197.0	-161.3	118.23	12.2	
C_2H_2	ethyne (acetylene)	g	54.329	54.194	50.000	-36.6490	47.997	10.499
		aq		50.6				
$C_2H_2 \cdot 6H_2O$		c		-371.1				
C_2H_4	ethene (ethylene)	g	14.522	12.496	16.282	-11.9345	52.45	10.41
$C_2H_4 \cdot 6H_2O$		c		-412.8				
C_2H_6	ethane	g	-16.517	-20.236	-7.860	5.7613	54.85	12.585
$HC_2O_4^-$	bioxalate ion; std. state, hyp. m=1	aq		-195.5	-167.1	122.48	36.7	
C_2H_2O	ketene	g		-14.6				
$C_2H_2O_2$	glyoxal	c		-83.7				
		aq		-82.3				

Table 23-24. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_2O_4$	oxalic acid	c		-197.6	-166.8	122.28	28.7	26.
	in 300 H_2O	aq		-195.34				
	2100 H_2O	aq		-195.57				
	in CH_4O (methanol)			-196.7				
	in C_2H_6O (ethanol)			-196.3				
	in C_3H_8O (1-propanol)			-195.7				
$C_2H_2O_4 \cdot 2H_2O$	oxalic acid dihydrate	c		-340.9				

Table 23-25. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948 (corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_3O_2^-$	acetate ion, std. state, hyp. m = 1	aq		-116.843				
$C_2H_3O_3^-$	glycollate ion	aq		-155.2				
C_2H_4O	acetaldehyde	g	-37.4	-39.76	-31.96	23.426	63.5	15.0
	in 50 H_2O	aq		-49.88				
$C_2H_4O \cdot H_2O$	acetaldehyde monohydrate	c						
C_2H_4O	ethylene oxide	g		-12.19	-2.79	2.045	58.1	11.5
$C_2H_4O_2$	acetic acid	liq		-116.4	-93.8	68.75	38.2	29.5
	std. state, hyp. m = 1	aq						
	in 0.5 H_2O	aq		-116.27				
	1 H_2O	aq		-116.25				
	1.5 H_2O	aq		-116.23				
	2.0 H_2O	aq		-116.24				
	3 H_2O	aq		-116.26				
	5 H_2O	aq		-116.31				
	8 H_2O	aq		-116.40				
	10 H_2O	aq		-116.450				

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Table 23-26. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_4O_2$	acetic acid, in 25 H_2O	aq		-116.605				
	50 H_2O	aq		-116.67				
	100 H_2O	aq		-116.705				
	200 H_2O	aq		-116.724				
	300 H_2O	aq		-116.730				
	400 H_2O	aq		-116.733				
	500 H_2O	aq		-116.735				
	800 H_2O	aq		-116.738				
	1000 H_2O	aq		-116.739				
	3000 H_2O	aq		-116.741				
	5000 H_2O	aq		-116.742				
	∞ H_2O (undissociated)	aq		-116.743				
	in 5 H_2SO_4			-126.0				
	10 H_2SO_4			-126.3				
	15 H_2SO_4			-126.5				
	20 H_2SO_4			-126.6				
	25 H_2SO_4			-126.7				
	30 H_2SO_4			-126.8				
	50 H_2SO_4			-127.2				

Table 23-27. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_4O_2$	acetic acid, in 5 C_3H_6O (acetone)			-117.05				
	10 C_3H_6O			-117.14				
	15 C_3H_6O			-117.21				
	25 C_3H_6O			-117.30				
	50 C_3H_6O			-117.38				
	in 5 $C_4H_{10}O$ (diethyl ether)			-116.45				
	10 $C_4H_{10}O$			-116.43				
	15 $C_4H_{10}O$			-116.42				
	in 5 C_5H_{12} (n-pentane)			-115.40				
	10 C_5H_{12}			-115.18				
	15 C_5H_{12}			-115.04				
	25 C_5H_{12}			-114.89				
	50 C_5H_{12}			-114.74				
	in 5 C_6H_6 (benzene)			-115.9				
	10 C_6H_6			-115.7				
	15 C_6H_6			-115.6				
	25 C_6H_6			-115.4				

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Table 23-28. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_4O_2$	methyl formate	g		-83.6				
		liq		-90.4				29.
	in 33 H_2O	aq		-91.6				
$C_2H_4O_2$	hydroxyacetaldehyde							
$C_2H_4O_3$	hydroxyacetic acid (glycollic acid)	c, I		-158.2				
		c, II		-158.1				
	in 400 H_2O	aq		-155.3				
$C_2H_4O_4$	dihydroxyacetic acid (glyoxylic acid)	c		-199.6				
		aq		-197.0				
$C_2H_4O_4$	formic acid dimer	g		-187.7	-163.8	120.09	83.1	

Table 23-29. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_5O^-$	ethylate ion							
C_2H_6O	ethanol	g		-56.24	-40.30	29.536	67.4	
		liq		-66.356	-41.77	30.617	38.4	26.64
	in 0.05 H_2O	aq		-66.364				
	0.1 H_2O	aq		-66.379				
	0.2 H_2O	aq		-66.397				
	0.5 H_2O	aq		-66.448				
	1 H_2O	aq		-66.550				
	1.5 H_2O	aq		-66.660				
	2 H_2O	aq		-66.786				
	3 H_2O	aq		-67.022				
	4 H_2O	aq		-67.254				
	5 H_2O	aq		-67.478				
	6 H_2O	aq		-67.674				
	7 H_2O	aq		-67.822				
	8 H_2O	aq		-67.932				
	9 H_2O	aq		-68.034				
	10 H_2O	aq		-68.116				

Table 23-30. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_6O	ethanol, in 15 H_2O	aq		-68.37				
	25 H_2O	aq		-68.58				
	50 H_2O	aq		-68.74				
	100 H_2O	aq		-68.81				
	200 H_2O	aq		-68.85				
	in 5 H_2SO_4			-77.96				
	10 H_2SO_4			-78.59				
	15 H_2SO_4			-78.86				
	20 H_2SO_4			-79.02				
	25 H_2SO_4			-79.14				
	30 H_2SO_4			-79.24				
	50 H_2SO_4			-79.52				

Table 23-31. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔH_f°	ΔH_f°	ΔF_f°	$\log_{10} K_f$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_6O	ethanol, in 0.2 C_6H_6 (benzene)			-66.50				
	0.5 C_6H_6			-66.65				
	1 C_6H_6			-66.90				
	3 C_6H_6			-67.50				
	5 C_6H_6			-67.90				
	10 C_6H_6			-68.50				
	25 C_6H_6			-69.15				
	50 C_6H_6			-69.75				
	100 C_6H_6			-70.00				
C_2H_6O	dimethyl ether	g		-44.3	-27.3	19.98	63.72	15.76
	in 200 H_2O	aq		-52.5				

Table 23-32. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_6O_2$	1,2-ethanediol (ethylene glycol)	liq		-108.58	-77.12	56.528	39.9	
	in 0.1 H_2O	aq		-108.61				
	0.2 H_2O	aq		-108.66				
	0.3 H_2O	aq		-108.70				
	0.5 H_2O	aq		-108.76				
	0.7 H_2O	aq		-108.82				
	1 H_2O	aq		-108.88				
	1.5 H_2O	aq		-108.98				
	2 H_2O	aq		-109.08				
	3 H_2O	aq		-109.25				
	4 H_2O	aq		-109.39				
	5 H_2O	aq		-109.50				
	7 H_2O	aq		-109.64				
	10 H_2O	aq		-109.77				
	15 H_2O	aq		-109.88				
	25 H_2O	aq		-109.97				
	50 H_2O	aq		-110.04				
$C_2H_6O_2$	ethyl hydrogen peroxide	liq		-58.1				

Table 23-33. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔPf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2F_4	tetrafluoroethene	g						
C_2F_6	hexafluoroethane	g		-240.				
C_2OF_4	trifluoroacetyl fluoride	g						
C_2H_3F	fluoroethene	g						
C_2H_5F	fluoroethane	g						
$C_2H_4F_2$	1,1-difluoroethane	g						
C_2HF_3	trifluoroethene	g						
$C_2H_3F_3$	1,1,1-trifluoroethane	g					66.87	
C_2H_3OF	acetyl fluoride	g						
$C_2H_3O_2F$	fluoroacetic acid	c		-150.9				
C_2H_5OF	2-fluoroethanol	liq		-109.7				
$C_2H_2O_2F_2$	difluoroacetic acid	liq		-134.4				
$C_2H_4OF_2$	2,2-difluoroethanol	liq		-161.4				
$C_2HO_2F_3$	trifluoroacetic acid	liq						
$C_2H_3OF_3$	2,2,2-trifluoroethanol	liq						

Table 23-34. Carbon (at. no., 6; at. wt.. 12.010)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY. AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30. 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2Cl_2	dichloroethyne	liq						
C_2Cl_4	tetrachloroethene	liq		-3.				35.8
C_2Cl_6	hexachloroethane	c		-48.				41.
$C_2O_2Cl_3^-$	trichloroacetate ion	aq		-128.0				
C_2OCl_4	trichloroacetyl chloride	liq		-89.3				
$C_2O_2Cl_4$	trichloromethyl chloroformate							

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Table 23-35. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_3Cl	chloroethene	g		7.5				
C_2H_5Cl	chloroethane	g		-25.1	-12.7	9.331	65.90	15.
$C_2H_2Cl_2$	1,1-dichloroethene	liq						
$C_2H_2Cl_2$	*cis*-1,2-dichloroethene	liq						27.
$C_2H_2Cl_2$	*trans*-1,2-dichloroethene	liq						27.
$C_2H_4Cl_2$	1,1-dichloroethane	liq		-36.4				
$C_2H_4Cl_2$	1,2-dichloroethane	liq		-39.7	-19.2	14.11	49.84	30.83
C_2HCl_3	trichloroethene	liq						29.
$C_2H_3Cl_3$	1,1,1-trichloroethane	liq					54.36	34.5
$C_2H_3Cl_3$	1,1,2-trichloroethane	liq						
$C_2H_2Cl_4$	1,1,1,2-tetrachloroethane	liq						
$C_2H_2Cl_4$	1,1,2,2-tetrachloroethane	liq						45.
C_2HCl_5	pentachloroethane	liq						54.

Table 23-36. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_2O_2Cl^-$	chloroacetate ion	aq		-121.2				
C_2H_3OCl	acetyl chloride	liq		-65.8				27.
C_2H_3OCl	chloroacetaldehyde	liq		-61.3				
$C_2H_3O_2Cl$	chloroacetic acid	c, I		-124.2				34.4
		c, II		-124.1				
		c, III		-123.4				
		aq		-120.6				
C_2H_5OCl	2-chloroethanol	liq		-70.3				
C_2H_5OCl	chloromethyl methyl ether							
C_2H_7OCl	dimethyl ether hydrochloride	g		-71.1	-49.1	36.00	89.3	
$C_2HO_2Cl_2^-$	dichloroacetate ion	aq		-123.4				
$C_2H_2OCl_2$	chloroacetyl chloride	liq		-68.9				
$C_2H_2OCl_2$	dichloroacetaldehyde							

Table 23-37. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_2O_2Cl_2$	dichloroacetic acid	liq		-120.2				47.
	in 200 H_2O	aq		-122.33				
	300 H_2O	aq		-122.50				
	500 H_2O	aq		-122.68				
	800 H_2O	aq		-122.80				
$C_2H_4O_2Cl_2$	dichloroacetaldehyde monohydrate	c						
C_2HOCl_3	trichloroacetaldehyde (chloral)	liq		-51.1				36.0
	in 80 H_2O	aq		-63.0				
$C_2HO_2Cl_3$	trichloroacetic acid	c		-122.8				75.0
	in 200 H_2O	aq		-124.80				
	500 H_2O	aq		-125.11				

Table 23-38. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2HO_2Cl_3$	trichloroacetic acid,							
	in 10 C_2H_6O (ethanol)			-122.67				
	20 C_2H_6O			-122.85				
	30 C_2H_6O			-122.97				
	50 C_2H_6O			-123.16				
	100 C_2H_6O			-123.58				
	in 5 C_3H_6O (acetone)			-126.45				
	10 C_3H_6O			-126.57				
	20 C_3H_6O			-126.72				
	30 C_3H_6O			-126.81				
	50 C_3H_6O			-126.92				
	in 20 $C_4H_{10}O$ (diethyl ether)			-122.71				
	50 $C_4H_{10}O$			-123.18				
	100 $C_4H_{10}O$			-123.40				
	in 10 C_5H_{12} (n-pentane)			-115.15				
	20 C_5H_{12}			-115.40				
	30 C_5H_{12}			-115.55				
	50 C_5H_{12}			-115.73				
	100 C_5H_{12}			-116.08				

Table 23-39. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_3OCl_3$	2,2,2-trichloroethanol	liq						
$C_2H_3O_2Cl_3$	trichloroacetaldehyde monohydrate	c		-132.2				35.
		aq		-131.3				
	in 45 $CHCl_3$ (trichloromethane)			-126.2				
C_2F_3Cl	trifluorochloroethene	g						
$C_2F_4Cl_2$	1,1,2,2-tetrafluoro-1,2-dichloroethane	g						
$C_2F_3Cl_3$	1,1,2-trifluoro-1,2,2-trichloroethane	liq						42.
$C_2F_2Cl_4$	1,2-difluoro-1,1,2,2-tetrachloroethane	c						

Table 23-40. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_5Br	bromoethane	g		-13.0				17.
		liq		-20.4				24.
$C_2H_4Br_2$	1,2-dibromoethane	liq		-19.30	-4.94	3.621	53.37	32.51
C_2H_3OBr	acetyl bromide	liq		-51.9				
$C_2H_3O_2Br$	bromoacetic acid	c						
$C_2H_2O_2Br_2$	dibromoacetic acid	c						
$C_2HO_2Br_3$	tribromoacetic acid	c						
$C_2H_3O_2Br_3$	tribromoacetaldehyde monohydrate	c		-113.				77.
		aq		-111.				
C_2H_4ClBr	1-chloro-2-bromoethane	liq						31.

Table 23-41. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2I_4	tetraiodoethene	c		73.				
C_2H_5I	iodoethane	liq		-7.4				26.
$C_2H_4I_2$	1,2-diiodoethane	c		0.1				
C_2H_3OI	acetyl iodide	liq		-38.3				
$C_2H_3O_2I$	iodoacetic acid	c						
C_2H_4BrI	1-bromo-2-iodoethane	c		-11.3				

Table 23-42. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_6S	ethanethiol	liq		-16.				
C_2H_6S	dimethyl sulfide	g		-6.9	3.7	-2.74	68.28	
		liq		-13.6	3.4	-2.50	46.94	28.23
C_2H_6OS	dimethyl sulfoxide	liq		-46.9				
$C_2H_6O_2S$	dimethyl sulfone	c		-105.9				
$C_2H_6O_3S$	dimethyl sulfite	liq						
$C_2H_6O_4S$	ethylsulfuric acid	aq		-208.7				
$C_2H_6O_4S$	dimethyl sulfate	liq						

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Table 23-43. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2N_2	cyanogen	g		73.60	70.81	-51.903	57.86	13.60
C_2H_3N	acetonitrile	g		21.0	25.2	-18.47	58.18	12.48
		liq		12.7	24.0	-17.59	34.5	
C_2H_3N	methyl isocyanide	g		35.9	40.0	-29.32	58.78	12.76
		liq		28.1				
C_2H_7N	ethylamine	g		-11.6				16.7
	in 400 H_2O	aq		-24.5				
C_2H_7N	dimethylamine	g		-6.6	14.1	-10.34	65.30	
	in 500 H_2O	aq		-19.3				
	1000 H_2O	aq		-19.5				
$C_2H_8N^+$	ethylammonium ion	aq		-37.4				
$C_2H_8N^+$	dimethylammonium ion	aq		-30.81				
$C_2H_8N_2$	1,2-ethanediamine (ethylenediamine)	liq		-6.36				
		aq		-13.86				
$C_2H_8N_2 \cdot H_2O$	1,2-ethanediamine monohydrate	c		-77.1				
$C_2H_4N_4$	dicyandiamide	c		4.4				38.
		aq		10.2				

Table 23-44. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_2O_3N^-$	oxamate ion	aq		-154.5				
C_2H_3ON	methyl isocyanate	liq		-21.5				
C_2H_3ON	glycollonitrile	liq		-34.1				
$C_2H_3O_3N$	oxamic acid	c		-161.4				
	in 800 H_2O	aq		-154.9				
$C_2H_4O_2N^-$	aminoacetate ion	aq		-112.13				
$C_2H_4O_2N^-$	nitroethane ion	aq		-27.				
C_2H_5ON	acetamide	c		-76.60				15.9
	in 20 H_2O	aq		-74.36				
	200 H_2O	aq		-74.40				
	in C_2H_6O (ethanol)			-79.13				
C_2H_5ON	acetaldehyde oxime	c		-18.2				

Table 23-45. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_5O_2N$	aminoacetic acid (glycine)	c		-126.33	-88.61	64.950	26.1	24.0
	in 50 H_2O	aq		-122.817				
	100 H_2O	aq		-122.775				
	200 H_2O	aq		-122.75				
	500 H_2O	aq		-122.733				
	∞ H_2O (undissociated)	aq		-122.721				
$C_2H_5O_2N$	nitroethane	liq		-30.				33.
	nitro form	aq		-29.				
	aci form	aq		-28.				
$C_2H_5O_2N$	ethyl nitrite	g		-24.8				
$C_2H_5O_3N$	ethyl nitrate	liq		-44.3				

Table 23-46. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_7O_2N$	ammonium acetate	c		-147.8				
	in 5 H_2O	aq		-146.97				
	10 H_2O	aq		-147.32				
	15 H_2O	aq		-147.51				
	25 H_2O	aq		-147.70				
	50 H_2O	aq		-147.90				
	100 H_2O	aq		-148.00				
	200 H_2O	aq		-148.06				
	400 H_2O	aq		-148.1				
$C_2H_7O_3N$	methylammonium bicarbonate	aq		-195.				
$C_2H_7O_3N$	ammonium glycollate	c		-189.8				
		aq		-186.8				
$C_2H_5O_4N$	ammonium bioxalate	c		-186.8				36.
		aq		-227.02				
$C_2H_6O_2N^+$	glycinium ion	aq		-123.74				
$C_2H_7O_4N$	ammonium glyoxylate	aq		-226.0				

Table 23-47. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_4O_2N_2$	glyoxime	c		-21.1				
$C_2H_4O_2N_2$	oxamide	c		-121.2				
$C_2H_4O_2N_2$	formylurea	c		-117.5				
		aq		-110.8				
$C_2H_4O_3N_2$	nitroacetamide	c						
$C_2H_4O_6N_2$	glycol dinitrate	liq		58.				
$C_2H_6ON_2$	dimethylnitrosamine	liq		0.7				
$C_2H_6O_2N_2$	ethylnitramine	liq		-20.2				
$C_2H_8O_4N_2$	ammonium oxalate	c		-268.72				54.
	in 2100 H_2O	aq		-260.6				
$C_2H_8O_4N_2 \cdot H_2O$	ammonium oxalate monohydrate	c		-340.62				
$C_2H_7O_4N_5$	guanylurea nitrate	c		-99.8				

Table 23-48. Carbon (at. no., 6; at. wt., 12.010)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$C_2H_5F_2N$	2,2-difluoroethylamine	liq		-115.5				
C_2H_4OFN	fluoroacetamide	c		-116.3				
$C_2H_3OF_2N$	difluoroacetamide	c		-165.0				
$C_2H_2OF_3N$	trifluoroacetamide	c						
$C_2H_4O_2F_2N_2$	2,2-difluoroethylnitramine	liq		-116.1				
C_2H_8ClN	ethylamine hydrochloride	aq		-77.4				
C_2H_8ClN	dimethylamine hydrochloride, in 100 H_2O	aq		-70.73				
	200 H_2O	aq		-70.74				
	500 H_2O	aq		-70.751				
	1000 H_2O	aq		-70.764				
	5000 H_2O	aq		-70.794				
	∞ H_2O	aq		-70.833				
$C_2H_{10}Cl_2N_2$	1,2-ethanediamine dihydrochloride	c		-123.14				
		aq		-116.49				

Table 23-49. Carbon (at. no., 6; at. wt., 12.010)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
C_2H_4OClN	chloroacetamide	c		-81.7				
	in 2500 H_2O	aq		-76.4				
$C_2H_6O_2ClN$	glycine hydrochloride	aq		-163.76				
$C_2H_6O_2ClN$	ammonium chloroacetate, in 200 H_2O	aq		-152.5				
$C_2H_3OCl_2N$	dichloroacetamide	c						
	in 5000 H_2O	aq		-77.7				
$C_2H_2OCl_3N$	trichloroacetamide	c		-87.				
		aq		-78.7				
$C_2H_4O_2Cl_3N$	ammonium trichloroacetate, in 200 H_2O	aq		-157.2				
C_2H_3SN	methyl thiocyanate	liq		25.				
C_2H_3SN	methyl isothiocyanate	c		18.				
$C_2H_7O_3SN$	2-aminoethylsulfonic acid (taurine)	c		-187.8	-136.7	100.20	36.8	33.6
	in 50 H_2O	aq		-181.66				
	100 H_2O	aq		-181.72				
	500 H_2O	aq		-181.80				
	∞ H_2O	aq		-181.82				

Table 24-1. Silicon (at. no., 14; at. wt., 28.06)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Si		g	87.	88.04	77.41	-56.740	40.120	5.318
		c	0.000	0.000	0.000	0.0000	4.47	4.75
		amorp		1.0				
Si^+		g	274.93	277.45				
Si^{++}		g	650.04	654.04				
Si^{+++}		g	1421.6	1427.1				
Si^{++++}		g	2462.4	2469.4				
Si^{+++++}		g	6307.	6316.				
Si^{++++++}		g	11037.	11047.				
$Si^{+++++++}$		g	16718.	16730.				
$Si^{++++++++}$		g	23708.	23721.				
$Si^{+++++++++}$		g	31802.	31817.				

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Table 24-2. Silicon (at. no., 14; at. wt., 28.06)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SiO		g	-27.	-26.72	-32.77	24.020	49.26	7.14
SiO_2	quartz, II	c		-205.4	-192.4	141.03	10.00	10.62
	cristobalite, II	c		-205.0	-192.1	140.81	10.19	10.56
	tridymite, IV	c		-204.8	-191.9	140.66	10.36	10.66
	vitreous	gls		-202.5	-190.9	139.92	11.2	10.60
		aq		-201.0				
SiH_4		g		-14.8	-9.4	6.89	48.7	10.24
Si_2H_6		g						
Si_3H_8		liq						
H_2SiO_3		c		-270.7				
H_4SiO_4		c		-340.6				

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Table 24-3. Silicon (at. no., 14; at. wt. 28.06)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			$\Delta Hf°$	$\Delta Hf°$	$\Delta Ff°$	$\log_{10} Kf$	$S°$	$C_p°$
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SiF_4		g		-370.	-360.	263.9	68.0	18.2
SiF_6^{--}		aq		-558.5				
$HSiF_6^-$		aq						
H_2SiF_6		aq		-557.2				
$SiCl_4$		g		-145.7	-136.2	99.83	79.2	21.7
		liq		-153.0	-136.9	100.34	57.2	34.7
Si_2Cl_6		liq						
SiH_3Cl		g						
SiH_2Cl_2		g						
$SiHCl_3$		liq						
$SiBr_4$		liq		-95.1				
Si_2Br_6		c						
SiH_3Br		g						
SiH_2Br_2		g						
$SiHBr_3$		liq						

Table 24-4. Silicon (at. no., 14; at. wt., 28.06)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SiI_4		c		-31.6				
SiH_3I		liq						
SiH_2I_2		liq						
$SiHI_3$		liq						
SiS_2	white	c		-34.7				
Si_3N_4		c		-179.3	-154.7	113.39	22.4	
$(NH_4)_2SiF_6$		c		-629.7				
		aq		-622.0				
SiC		c	-26.46	-26.7	-26.1	19.13	3.935	6.37
$(CH_3)SiH_3$	methyl silane	g						
$(CH_3)_2SiH_2$	dimethyl silane	g						
$Si(C_2H_5O)_4$	tetraethoxy silane	liq		-318.				

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Table 25-1. Germanium (at. no., 32; at. wt., 72.60)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔPf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ge		g	78.0	78.44	69.50	-50.943	40.106	7.346
		c	0.000	0.000	0.000	0.0000	10.14	6.24
Ge^+		g	265.40	267.32				
Ge^{++}		g	633.10	636.50				
Ge^{+++}		g	1422.2	1427.0				
Ge^{++++}		g	2476.1	2482.4				
Ge^{+++++}		g	4631.	4639.				
GeO		g	-22.5	-22.8	-28.2	20.63	52.56	7.39
GeO_2	tetragonal	c,II						
	glassy	amorp		-128.3				
		aq		-131.				

Table 25-2. Germanium (at. no., 32; at. wt., 72.60)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
GeH_4		g					51.21	10.76
Ge_2H_6		liq						
Ge_3H_8		liq						
$HGeO_3^-$		aq						
H_2GeO_3		aq		-199.3				
GeF_4		g						
GeCl		g	32.6	32.45				8.41
$GeCl_4$		liq		-130.				

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Table 25-3. Germanium (at. no., 32; at. wt., 72.60)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
GeBr		g		34.8				8.64
$GeBr_4$		c						
GeI_4		c						
GeS		g		1.35				8.05
GeSe		g						9.41
GeTe		g						9.58
Ge_3N_4		c		-14.8				

Table 26-1. Tin (at. no., 50; at. wt., 118.70)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sn		g		72.	64.	-47.6	40.245	5.081
	gray, cubic	c, III		0.6	1.1	-0.806	10.7	6.16
	white, tetragonal	c, II		0.000	0.000	0.0000	12.3	6.30
Sn^+		g		242.57				
Sn^{++}		g		581.4				
Sn^{+++}		g		1289.8				
Sn^{++++}		g		2231.				
Sn^{+++++}		g		4094.				
SnO		g					54.98	21.05
		c		-68.4	-61.5	45.08	13.5	10.6
SnO_2		c		-138.8	-124.2	91.037	12.5	12.57

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Table 26-2. Tin (at. no., 50; at. wt., 118.70)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SnH_4		g						
$Sn(OH)^+$	std. state, hyp. m=1	aq			-61.1	44.79		
$HSnO_2^-$	std. state, hyp. m=1	aq			-97.9	71.76		
$Sn(OH)_2$		c		-138.3	-117.6	86.199	23.1	
$Sn(OH)_4$		c		-270.5				
SnF_4		c						
SnF_6^{--}	std. state, hyp. m=1	aq		-474.7				
H_2SnF_6		aq		-473.1				
$SnCl_2$		c		-83.6				
	in aq HCl	aq		-84.0				
$SnCl_2 \cdot 2H_2O$		c		-225.9				
$SnCl_4$		liq		-130.3	-113.3	83.047	61.8	39.5
	in aq HCl	aq		-160.2				
$SnOCl_2$		aq		-147.5				

Table 26-3. Tin (at. no., 50; at. wt., 118.70)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SnBr_2$		c		-63.6				
		aq		-62.0				
$SnBr_4$		c, I		-97.1				
		aq		-113.0				
$SnBr_4 \cdot 8H_2O$		liq		-656.6				
SnI_2		c		-34.4				
		aq		-28.6				
SnS		c		-18.6	-19.7	14.44	23.6	
$Sn(SO_4)_2$		c		-393.4				
$SnCl_2 \cdot 2\frac{1}{2}NH_3$		c		-149.6				
$SnCl_2 \cdot 4NH_3$		c		-180.1				
$SnCl_2 \cdot 9NH_3$		c		-273.3				

Table 26-4. Tin (at. no., 50; at. wt., 118.70)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SnBr_2 \cdot NH_3$		c		-93.8				
$SnBr_2 \cdot 2NH_3$		c		-118.4				
$SnBr_2 \cdot 3NH_3$		c		-142.3				
$SnBr_2 \cdot 5NH_3$		c		-184.0				
$SnBr_2 \cdot 9NH_3$		c		-258.3				
$SnI_2 \cdot NH_3$		c		-61.4				
$SnI_2 \cdot 2NH_3$		c		-85.7				
$SnI_2 \cdot 3NH_3$		c		-109.0				
$SnI_2 \cdot 5NH_3$		c		-151.5				
$SnI_2 \cdot 9NH_3$		c		-227.2				
$SnCl_4 \cdot 1\frac{1}{2}PH_3$		c		-153.6				
$SnH_{12}C_4$	tetramethyltin	liq						
$SnH_{20}C_8$	tetraethyltin	liq		-49.				
$SnH_{28}C_{12}$	tetra-n-propyltin	liq		-56.				
$SnH_{36}C_{16}$	tetra-n-butyltin	liq		-94.				
$SnH_{44}C_{20}$	tetra-n-amyltin	liq		-132.				

Table 27-1. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pb		g	46.5	46.34	38.47	-28.198	41.890	4.968
		c	0.000	0.000	0.000	0.0000	15.51	6.41
Pb^+		g	217.50	218.82				
Pb^{++}		g	564.09	566.89				
	std. state, hyp. m=1	aq		0.39	-5.81	4.259	5.1	
Pb^{+++}		g	1303.8	1308.1				
Pb^{++++}		g	2278.2	2284.0				
Pb^{+++++}		g	3886.	3894.				
Pb_2		g	79.	78.				
PbO		g					57.4	
	red	c, II		-52.40	-45.25	33.168	16.2	
	yellow	c, I		-52.07	-45.05	33.021	16.6	11.60
PbO_2		c		-66.12	-52.34	38.364	18.3	15.4
Pb_2O		c		-51.2				
Pb_3O_4		c		-175.6	-147.6	108.19	50.5	35.14

Table 27-2. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HPbO_2^-$	std. state, hyp. m = 1	aq		-81.00				
$Pb(OH)_2$		c		-123.0	-100.6	73.738	21.	
PbF_2		c		-158.5	-148.1	108.55	29.	
		aq		-155.7				
PbF_4		c		-222.3				
$PbCl_2$		c		-85.85	-75.04	55.003	32.6	18.4
	std. state, hyp. m = 1	aq		-79.65	-68.51	50.217	31.4	
$PbCl_2 \cdot PbO$		c		-144.5				
$PbCl_2 \cdot 2PbO$		c		-199.2				
$PbCl_2 \cdot 3PbO$		c		-252.7				

Table 27-3. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$PbBr_2$		c		-66.21	-62.24	45.621	38.6	19.15
	std. state, hyp. m=1	aq		-57.41	-54.95	40.278	43.7	
$Pb(BrO_3)_2$		c						
	std. state, hyp. m=1	aq						
$PbBr_2 \cdot PbO$		c		-122.3				
$PbBr_2 \cdot 2PbO$		c		-176.4				
$PbBr_2 \cdot 3PbO$		c		-230.8				
PbI_2		c		-41.85	-41.53	30.441	42.3	
	std. state, hyp. m=1	aq		-26.35	-30.51	22.363	57.8	
PbI_3^-	std. state, hyp. m=1	aq			-48.55			
PbI_4^{--}	std. state, hyp. m=1	aq			-63.02			
$Pb(IO_3)_2$		c						
	std. state, hyp. m=1	aq						
$PbI_2 \cdot HI \cdot 5H_2O$		c		-400.1				

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Table 27-4. Lead (at. no., 82; at. wt., 207.21)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PbS		c		-22.54	-22.15	16.236	21.8	11.83
$PbSO_4$		c, II		-219.50	-193.89	142.119	35.2	24.9
PbS_2O_3		c		-158.				
PbS_3O_6		c		-289.				
		aq		-295.				
$PbSO_4 \cdot PbO$		c		-282.5				
$PbSO_4 \cdot 2PbO$		c		-344.				
$PbSO_4 \cdot 3PbO$		c		-403.				
$PbSO_4 \cdot 2HCl$		c						
PbSe		c		-18.				
$PbSeO_4$		c		-148.				
PbTe		c		-17.5				

Table 27-5. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Pb(N_3)_2$		c		104.3				
$Pb(NO_3)_2$		c		-107.35				
	std. state, hyp. m = 1	aq		-98.35	-58.64	42.982	75.1	
	in 400 H_2O	aq		-100.10				
	∞ H_2O	aq		-98.35				
$Pb(OH)NO_3$		c		-117.9				
$PbCl_2 \cdot NH_3$		c		-109.9				
$PbCl_2 \cdot 1\frac{1}{2}NH_3$		c		-121.1				
$PbCl_2 \cdot 2NH_3$		c		-132.1				
$PbCl_2 \cdot 8NH_3$		c		-249.0				
$2PbCl_2 \cdot NH_4Cl$		c		-247.4				
$PbBr_2 \cdot NH_3$		c		-92.3				
$PbBr_2 \cdot 2NH_3$		c		-114.7				
$PbBr_2 \cdot 3NH_3$		c		-135.3				
$PbBr_2 \cdot 5\frac{1}{2}NH_3$		c		-186.0				
$PbBr_2 \cdot 8NH_3$		c		-234.7				

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Table 27-6. Lead (at. no., 82; at. wt., 207.21)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$PbI_2 \cdot \frac{1}{2}NH_3$		c		-54.8				
$PbI_2 \cdot NH_3$		c		-66.8				
$PbI_2 \cdot 2NH_3$		c		-89.1				
$PbI_2 \cdot 5NH_3$		c		-149.8				
$PbI_2 \cdot 8NH_3$		c		-205.1				
$3PbI_2 \cdot 4NH_4I$		c		-314.3				
$3PbI_2 \cdot 4NH_4I \cdot 6H_2O$		c		-734.3				
$PbSO_4 \cdot (NH_4)_2SO_4$		c		-503.34				
$Pb_3(PO_4)_2$		c		-620.3	-581.4	426.16	84.45	61.2
$PbHPO_3$		c		-234.5				
$3PbI_2 \cdot PI_3$		c		-131.8				
$3PbI_2 \cdot PI_3 \cdot 12H_2O$		c		-977.7				

Table 27-7. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$3PbI_2 \cdot AsI_3$		c		-111.3				
$3PbI_2 \cdot AsI_3 \cdot 12H_2O$		c		-952.8				
$3PbI_2 \cdot SbI_3$		c		-127.7				
$3PbI_2 \cdot SbI_3 \cdot 12H_2O$		c		-977.6				
$3PbI_2 \cdot BiI_3$		c						
$3PbI_2 \cdot BiI_3 \cdot 12H_2O$		c						
$PbCO_3$		c		-167.3	-149.7	109.73	31.3	20.9
PbC_2O_4	lead oxalate	c		-205.1				
$PbO \cdot PbCO_3$		c		-220.0	-195.6	143.37	48.5	32.2
$2PbO \cdot PbCO_3$		c		-273.	-242.	177.4	65.	
$Pb(C_2H_5)_4$	tetraethyllead	liq		52.				
$Pb(CHO_2)_2$	lead formate	c		-200.1				
		aq		-194.0				

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Table 27-8. Lead (at. no., 82; at. wt., 207.21)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Pb(C_2H_3O_2)_2$	lead acetate	c		-230.5				
		aq		-232.6				
$Pb(C_2H_3O_2)_2 \cdot 3H_2O$		c		-443.1				
$Pb(C_2H_3O_3)_2$	lead glycollate	c		-316.3				
		aq		-311.5				
$Pb(CN)_2 \cdot 2PbO \cdot H_2O$		c		-123.0				
$Pb(CNS)_2$		c		27.5				
$PbSiO_3$		c		-258.8	-239.0	175.18	27.	
		amorp		-256.9				
Pb_2SiO_4		c		-312.7	-285.7	209.41	43.	
		amorp		-309.0				
$PbI_2 \cdot SnI_2$		c		-64.2				
$PbI_2 \cdot SnI_2 \cdot 8H_2O$		c		-631.6				

Table 28-1. Gallium (at. no., 31; at. wt., 69.72)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ga			g		66.0	57.0	-41.78	40.38	6.053
			c, I	0.000	0.000	0.000	0.0000	10.2	6.35
Ga^+			g		205.77				
Ga^{++}			g		680.21				
Ga^{+++}			g		1388.5				
		std. state, hyp. m=1	aq		-50.4	-36.6	26.83	-83.	
Ga^{++++}			g		2868.				
GaO			g		66.				
GaO_3^{---}		std. state, hyp. m=1	aq			-148.	108.5		
Ga_2O			c		-82.				
Ga_2O_3			c		-258.				20.

Table 28-2. Gallium (at. no., 31; at. wt., 69.72)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ga(OH)^{++}$	std. state, hyp. m=1	aq			-89.8	65.82		
$HGaO_3^{--}$	std. state, hyp. m=1	aq			-164.	120.2		
$Ga(OH)_2^{+}$	std. state, hyp. m=1	aq			-142.1	104.16		
$H_2GaO_3^{-}$	std. state, hyp. m=1	aq			-178.	130.5		
$Ga(OH)_3$		c			-199.	145.9		
GaCl		g		9.				
$GaCl_3$		c		-125.4				
	std. state, hyp. m=1	aq		-170.5	-130.7	95.801	-43.	
	in aq HCl	aq		-164.4				
GaBr		g		11.				
$GaBr_3$		c		-92.4				
	in aq HCl	aq		-130.8				

Table 28-3. Gallium (at. no., 31; at. wt., 69.72)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
GaI			g		27.				
GaI_3			c		-51.2				
		in aq HCl	aq		-84.2				
$Ga_2(SO_4)_3$			c						62.
GaN			c		-25.				
$GaCl_3 \cdot NH_3$			c		-170.8				
$GaCl_3 \cdot 3NH_3$			c		-231.3				
$GaCl_3 \cdot 5NH_3$			c		-285.6				
$GaCl_3 \cdot 6NH_3$			c		-308.0				
$GaCl_3 \cdot 7NH_3$			c		-328.5				
$GaCl_3 \cdot 14NH_3$			c		-459.7				

Table 28-4. Gallium (at. no., 31; at. wt., 69.72)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$GaBr_3 \cdot NH_3$		c		-135.2				
$GaBr_3 \cdot 5NH_3$		c		-256.1				
$GaBr_3 \cdot 6NH_3$		c		-280.4				
$GaBr_3 \cdot 7NH_3$		c		-301.8				
$GaBr_3 \cdot 9NH_3$		c		-340.5				
$GaBr_3 \cdot 14NH_3$		c		-433.7				
$GaI_3 \cdot NH_3$		c		-90.6				
$GaI_3 \cdot 5NH_3$		c		-211.5				
$GaI_3 \cdot 6NH_3$		c		-237.7				
$GaI_3 \cdot 7NH_3$		c		-259.6				
$GaI_3 \cdot 9NH_3$		c		-298.7				
$GaI_3 \cdot 13NH_3$		c		-374.8				
$GaI_3 \cdot 20NH_3$		c		-506.0				
$Ga_2(C_2O_4)_3$	gallium oxalate	c		-515.				
$Ga_2(C_2O_4)_3 \cdot 2H_2O$		c		-689.				
$Ga_2(C_2O_4)_3 \cdot 4H_2O$		c		-847.				

Table 29-1. Indium (at. no., 49; at. wt., 114.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
In		g		58.2	49.6	-36.36	41.51	6.015
		c	0.000	0.000	0.000	0.0000	12.5	6.55
In^+		g		193.09				
In^{++}		g		629.62				
In^{+++}		g		1277.5				
	std. state, hyp. m=1	aq		-23.7	-32.0	23.46	-62.	
In^{++++}		g		2616.				
In^{+++++}		g						
InO		g		91.				
In_2O_3		c		-222.5				22.
InH		g		51.	45.	-33.0	49.6	7.06
$In(OH)^{++}$	std. state, hyp. m=1	aq			-55.5	40.68		
$In(OH)_3$		c		-214.	-182.	133.4	25.	

Table 29-2. Indium (at. no., 49; at. wt., 114.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
InCl		g		-18.	-23.	16.9	59.3	8.60
		c, II		-44.5				
$InCl_2$		c		-86.8				
$InCl_3$		c		-128.4				
		aq		-152.0				
	in aq HCl	aq		-147.2				
InBr		g		10.	1.	-0.73	62.0	8.77
$InBr_3$		c		-96.5				
	in aq HCl	aq		-113.9				
InI		g		20.	9.	-6.6	63.8	8.83
InI_3		c		-55.0				
	in aq HCl	aq		-67.3				
$In_2(SO_4)_3$		c		-695.				67.
InN		c		-4.8				

Table 29-3. Indium (at. no., 49; at. wt., 114.76)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$InCl_3 \cdot NH_3$		c		-163.1				
$InCl_3 \cdot 2NH_3$		c		-195.5				
$InCl_3 \cdot 3NH_3$		c		-227.9				
$InCl_3 \cdot 5NH_3$		c		-276.6				
$InCl_3 \cdot 7NH_3$		c		-315.9				
$InCl_3 \cdot 15NH_3$		c		-465.4				
$InBr_3 \cdot 3NH_3$		c		-193.3				
$InBr_3 \cdot 5NH_3$		c		-246.9				
$InBr_3 \cdot 7NH_3$		c		-289.4				
$InBr_3 \cdot 15NH_3$		c		-444.9				
$InI_3 \cdot NH_3$		c		-87.6				
$InI_3 \cdot 2NH_3$		c		-117.7				
$InI_3 \cdot 5NH_3$		c		-201.9				
$InI_3 \cdot 7NH_3$		c		-251.0				
$InI_3 \cdot 9NH_3$		c		-290.9				
$InI_3 \cdot 13NH_3$		c		-365.6				
$InI_3 \cdot 21NH_3$		c		-513.2				

Table 30-1. Thallium (at. no., 81; at. wt., 204.39)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Tl		g		43.34	35.05	-25.691	43.23	4.968
		c, II	0.000	0.000	0.000	0.0000	15.4	6.35
Tl^+		g		185.64				
	std. state, hyp. m=1	aq		1.38	-7.755	5.6843	30.4	
Tl^{++}		g		657.6				
Tl^{+++}		g		1346.9				
	std. state, hyp. m=1	aq		27.7	50.0	-36.65	-106.	
Tl^{++++}		g		2514.				
Tl_2O		c		-41.9	-32.5	23.82	23.8	
TlH		g		48.	42.	-30.8	51.39	
TlOH		c		-56.9	-45.5	33.35	17.3	
	in 500 H_2O	aq		-53.7				
	2000 H_2O	aq		-54.0				
$Tl(OH)_3$		c		-122.6				

Table 30-2. Thallium (at. no., 81; at. wt., 204.39)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
TlF		g		-33.				
		aq		-77.3				
$HTlF_2$		aq		-152.5				
TlCl		g		-16.	-22.	16.1	61.1	8.66
		c		-48.99	-44.19	32.391	25.9	
	std. state, hyp. m=1	aq		-38.64	-39.105	28.6634	43.6	
$TlCl_3$		c		-83.9				
		aq		-92.3				
$TlCl_3 \cdot 4H_2O$		c		-367.7				
TlBr		g		-5.	-14.	10.3	63.8	8.81
		c		-41.2	-39.7	29.10	28.6	
	std. state, hyp. m=1	aq		-27.5	-32.3	23.68	49.7	
$TlBr_3$		c		-59.0				
$TlBr_3 \cdot 4H_2O$		c		-334.6				
$TlBrO_3$		c		-24.0				
	std. state, hyp. m=1	aq		-10.2	1.3	-0.953	68.6	

Table 30-3. Thallium (at. no., 81; at. wt., 204.39)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$TlClBr_2$		aq		-70.1				
$TlClBr_2 \cdot 4H_2O$		c		-346.3				
TlI		g		7.	-4.	2.9	65.6	8.86
	yellow	c, II		-29.7	-29.7	21.77	29.4	
	std. state, hyp. m=1	aq		-12.0	-19.9	14.59	56.5	
$TlIO_3$		c			-47.6	34.89		
	std. state, hyp. m=1	aq		-53.5	-40.1	29.39	58.1	
Tl_2S		c		-20.8				
Tl_2SO_4		c		-221.7				
	std. state, hyp. m=1	aq		-214.14	-192.85	141.356	65.1	
$TlHSO_4$		aq		-210.3				
Tl_2Se		c		-18.				
Tl_2Te		c		-7.				

Table 30-4. Thallium (at. no., 81; at. wt., 204.39)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
	Formula	Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
	TlN_3	thallous azide	c		56.3				
	$TlNO_3$		c, III		-58.01	-36.07	26.439	38.2	
		std. state, hyp. m=1	aq		-47.99	-34.22	25.083	65.6	
	$TlCl \cdot 3NH_3$		c		-103.4				
	$TlCl_3 \cdot 3NH_3$		c		-145.				
	$TlBr \cdot 3NH_3$		c		-95.6				
	$TlI \cdot 3NH_3$		c		-84.1				
	$Tl(C_2H_3O_2)$	thallous acetate	aq		-115.5				
	$TlOC_2H_5$	thallous ethoxide	liq		-56.5				
		in C_2H_6O (ethanol)			-56.0				
	TlONC	thallous fulminate	c		27.6				

Table 31-1. Zinc (at. no., 30; at. wt. 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Zn		g		31.19	22.69	-16.631	38.45	4.968
		c	0.000	0.000	0.000	0.0000	9.95	5.99
	in Hg			0.00	0.000	0.0000		
Zn^+		g		249.251				
Zn^{++}		g		664.902				
	std. state, hyp. m=1	aq		-36.43	-35.184	25.7894	-25.45	
Zn^{+++}		g		1581.				
Zn^{++++}		g						
ZnO		c		-83.17	-76.05	55.744	10.5	9.62
$ZnO_2 \cdot 2H_2O$		c		-207.9				
$Zn_3O_5 \cdot 2H_2O$		c		-371.1				
$Zn_3O_5 \cdot 3H_2O$		c		-437.7				
ZnH		g		54.4	47.5	-34.82	48.70	7.71
$Zn(OH)_2$	stable	c, I		-153.5				17.3
	unstable	c, II		-153.1				

Table 31-2. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ZnF_2		aq		-187.9				
ZnCl		g		1.	-5.	3.7	58.3	8.45
$ZnCl_2$		c		-99.40	-88.255	64.6897	25.9	18.3
	std. state, hyp. m=1	aq		-116.48	-97.884	71.7476	0.89	
	in 4 H_2O	aq		-106.30				
	5 H_2O	aq		-107.21				
	7 H_2O	aq		-108.13				
	10 H_2O	aq		-108.98				
	15 H_2O	aq		-109.88				
	25 H_2O	aq		-111.00				
	50 H_2O	aq		-112.55				
	100 H_2O	aq		-114.00				
	200 H_2O	aq		-114.86				
	400 H_2O	aq		-115.23				
	800 H_2O	aq		-115.43				
	∞ H_2O	aq		-116.48				
	in C_2H_6O (ethanol)			-109.2				

Table 31-3. Zinc (at. no., 30; at. wt., 65.38)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zn(ClO_3)_2$		c						
$Zn(ClO_4)_2$		c						
$ZnCl_2 \cdot 3ZnO \cdot 5H_2O$		c		-708.1				
$ZnCl_2 \cdot 4ZnO \cdot 11H_2O$		c		-1206.6				
$ZnCl_2 \cdot 5ZnO \cdot 8H_2O$		c		-1086.4				
$ZnCl_2 \cdot 8ZnO \cdot 10H_2O$		c		-1483.4				
ZnBr		g					60.8	8.57
$ZnBr_2$		c		-78.17	-74.142	54.3450	32.84	
	std. state, hyp. m=1	aq		-94.23	-84.332	61.8142	13.13	
$ZnBr_2 \cdot 2H_2O$		c		-220.9	-190.6	139.71	56.2	
$ZnBr_2 \cdot 4ZnO \cdot 13H_2O$		c		-1324.7				
ZnI		g		15.	3.	-2.2	63.0	8.76
ZnI_2		c		-49.98	-50.01	36.657	38.0	
	std. state, hyp. m=1	aq		-63.17	-59.884	43.8941	26.83	
$Zn(IO_3)_2$		c						
$ZnI_2 \cdot 5ZnO \cdot 11H_2O$		c		-1218.5				

Table 31-4. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ZnS		g		-14.				
	sphalerite	c, II		-48.5	-47.4	34.74	13.8	10.8
	wurtzite	c, I		-45.3				
$ZnSO_3$		c						
$ZnSO_4$		c		-233.88	-208.31	152.688	29.8	28.
	std. state, hyp. m=1	aq		-253.33	-212.52	155.774	-21.3	
	in 18 H_2O	aq		-251.58				
	20 H_2O	aq		-251.71				
	25 H_2O	aq		-251.88				
	30 H_2O	aq		-251.95				
	40 H_2O	aq		-252.01				
	50 H_2O	aq		-252.057				
	100 H_2O	aq		-252.139				
	200 H_2O	aq		-252.233				
	300 H_2O	aq		-252.283				
	500 H_2O	aq		-252.349				
	1000 H_2O	aq		-252.462				

Table 31-5. Zinc (at. no., 30; at. wt., 65.38)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ZnSO_4$	in 1500 H_2O	aq		-252.532				
	2000 H_2O	aq		-252.585				
	3000 H_2O	aq		-252.661				
	5000 H_2O	aq		-252.750				
	10,000 H_2O	aq		-252.866				
	20,000 H_2O	aq		-252.987				
	30,000 H_2O	aq		-253.050				
	50,000 H_2O	aq		-253.120				
	100,000 H_2O	aq		-253.198				
	200,000 H_2O	aq		-253.254				
	500,000 H_2O	aq		-253.290				
	1,000,000 H_2O	aq		-253.302				
	∞ H_2O	aq		-253.33				
$ZnSO_4 \cdot H_2O$		c		-310.6	-269.9	197.83	34.9	34.7
$ZnSO_4 \cdot 6H_2O$		c		-663.3	-555.0	406.81	86.8	80.8
$ZnSO_4 \cdot 7H_2O$		c		-735.1	-611.9	448.51	92.4	93.7

Table 31-6. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
	Formula	Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
	ZnS_2O_3		c						
	ZnS_2O_4		aq		-200.4				
	ZnS_2O_6		c						
			aq		-316.8				
	$ZnS_2O_6 \cdot 6H_2O$		c		-728.9				
	ZnS_4O_6		c						
	$Zn(HSO_3)_2$		aq		-336.6				
	ZnSe		c		-34.				
	ZnTe		g		30.				
			c		-30.	-29.	21.3	19.	
	$Zn(N_3)_2$	zinc azide	c		50.8				
	Zn_3N_2		c		-6.9				25.7

Table 31-7. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zn(NO_2)_2$		c						
$Zn(NO_3)_2$		c		-115.12				
	in 1.5 H_2O	aq		-120.9				
	2 H_2O	aq		-122.8				
	3 H_2O	aq		-125.6				
	4 H_2O	aq		-127.9				
	5 H_2O	aq		-129.63				
	6 H_2O	aq		-131.05				
	7 H_2O	aq		-132.13				
	8 H_2O	aq		-132.93				
	10 H_2O	aq		-133.88				
	15 H_2O	aq		-134.79				
	20 H_2O	aq		-135.03				
	30 H_2O	aq		-135.13				
	50 H_2O	aq		-135.08				
	100 H_2O	aq		-134.99				
	200 H_2O	aq		-135.03				
	400 H_2O	aq		-135.18				

Table 31-8. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zn(NO_3)_2 \cdot H_2O$		c		-191.99				
$Zn(NO_3)_2 \cdot 2H_2O$		c		-264.94				
$Zn(NO_3)_2 \cdot 4H_2O$		c		-405.76				
$Zn(NO_3)_2 \cdot 6H_2O$		c		-550.92				
$Zn(NH_2)_2$		c		-38.8				
$ZnCl_2 \cdot NH_3$		c		-135.5				
$ZnCl_2 \cdot 2NH_3$		c		-165.7				
$ZnCl_2 \cdot 2NH_4Cl$		c						
$ZnCl_2 \cdot 3NH_4Cl$		c						
$ZnCl_2 \cdot 4NH_3$		c		-211.5				
$ZnCl_2 \cdot 2N_2H_4$		c		-117.8				
$ZnCl_2 \cdot 5NH_3 \cdot \frac{1}{2}H_2O$		c		-295.3				
$ZnCl_2 \cdot 6NH_3$		c		-255.2				
$ZnCl_2 \cdot 10NH_3$		c		-327.6				
$2ZnCl_2 \cdot 4NH_3 \cdot \frac{1}{2}H_2O$		c		-362.4				
$3ZnCl_2 \cdot 6NH_4Cl \cdot H_2O$		c		-831.3				

Table 31-9. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$2ZnCl_2 \cdot 8NH_4Cl \cdot ZnO$		c		-891.4				
$3ZnCl_2 \cdot 10NH_4Cl \cdot ZnO$		c		-1140.8				
$6ZnCl_2 \cdot 12NH_3 \cdot ZnO$		c		-1349.1				
$ZnBr_2 \cdot NH_3$		c		-113.3				
$ZnBr_2 \cdot 2NH_3$		c		-144.3				
$ZnBr_2 \cdot 2N_2H_4$		c		-94.2				
$ZnBr_2 \cdot 4NH_3$		c		-193.3				
$ZnBr_2 \cdot 6NH_3$		c		-237.4				
$ZnI_2 \cdot NH_3$		c		-80.9				
$ZnI_2 \cdot 2NH_3$		c		-114.1				
$ZnI_2 \cdot 2N_2H_4$		c		-65.7				
$ZnI_2 \cdot 4NH_3$		c		-166.1				
$ZnI_2 \cdot 6NH_3$		c		-210.1				

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Table 31-10. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ZnSO_4 \cdot \frac{1}{2}NH_3$		c		-251.9				
$ZnSO_4 \cdot NH_3$		c		-268.6				
$ZnSO_4 \cdot 2NH_3$		c		-298.6				
$Zn(NH_4)_2(SO_4)_2 \cdot 2H_2O$		c		-662.8				
$Zn(NH_4)_2(SO_4)_2 \cdot 6H_2O$		c		-955.6				
$ZnSO_4 \cdot 3NH_3$		c		-325.1				
$ZnSO_4 \cdot 4NH_3$		c		-349.8				
$ZnSO_4 \cdot 5NH_3$		c		-371.7				
$Zn(NH_4)_2(SeO_4)_2$		c						
ZnSb		c		-36.				12.4
$ZnCO_3$		c		-194.2	-174.8	128.13	19.7	19.16
$Zn(CH_3)_2$	dimethylzinc	liq		6.0				
$Zn(C_2H_5)_2$	diethylzinc	liq		5.0				

Table 31-11. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ZnC_2O_4 \cdot 2H_2O$	zinc oxalate dihydrate	c		-373.8				
$Zn(CHO_2)_2$	zinc formate	c		-225.0				
		aq		-229.0				
$Zn(CHO_2)_2 \cdot 2H_2O$	zinc formate dihydrate	c		-367.9				
$Zn(C_2H_3O_2)_2$	zinc acetate	c		-258.1				
	in 50 H_2O	aq		-264.30				
	100 H_2O	aq		-265.49				
	200 H_2O	aq		-266.55				
	400 H_2O	aq		-267.43				
	800 H_2O	aq		-267.9				
$Zn(C_2H_3O_2)_2 \cdot H_2O$	zinc acetate hydrate	c		-329.2				
$Zn(C_2H_3O_2)_2 \cdot 2H_2O$	zinc acetate dihydrate	c		-398.8				
$Zn(C_2H_3O_3)_2$	zinc glycollate	c		-350.7				
		aq		-348.7				
$Zn(C_2H_3O_3)_2 \cdot 2H_2O$	zinc glycollate dihydrate	c		-490.4				

Table 31-12. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zn(CN)_2$		c		18.4				
$Zn(CN)_2 \cdot ZnO$		c		-33.1				
$Zn(CN)_4^{--}$		aq		82.0				
$ZnCl_2 \cdot C_2H_4(NH_2)_2$	zinc chloride ethylenediamine	c		-138.0				
$ZnCl_2 \cdot 3C_2H_4(NH_2)_2$	zinc chloride trisethylenediamine	c		-179.4				
$ZnBr_2 \cdot C_2H_4(NH_2)_2$	zinc bromide ethylenediamine	c		-112.5				
$ZnBr_2 \cdot 3C_2H_4(NH_2)_2$	zinc bromide trisethylenediamine	c		-157.1				
$ZnI_2 \cdot C_2H_4(NH_2)_2$	zinc iodide ethylenediamine	c		-86.9				
$ZnI_2 \cdot 3C_2H_4(NH_2)_2$	zinc iodide trisethylenediamine	c		-133.3				

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Table 31-13. Zinc (at. no., 30; at. wt., 65.38)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zn(CHO_2)_2 \cdot 2NH_3$		c		-273.1				
$Zn(CHO_2)_2 \cdot 2\frac{1}{2}NH_3$		c		-283.9				
$Zn(CHO_2)_2 \cdot 4NH_3$		c		-316.2				
$Zn(CHO_2)_2 \cdot 5NH_3$		c		-337.8				
$Zn(CHO_2)_2 \cdot 6NH_3$		c		-354.9				
$Zn(CNS)_2$		c						
$ZnSiO_3$		c		-294.6				
Zn_2SiO_4		c		-360.8				
		gls		-351.8				
$2ZnI_2 \cdot PbI_2$		c		-142.9				

Table 32-1. Cadmium (at. no., 48; at. wt., 112.41)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cd		g	26.97	26.97	18.69	-13.700	40.067	4.968
		c, α		0.000	0.000	0.0000	12.3	6.19
		c, γ			0.140	-0.1026		
	in Hg (saturated)				-2.188	1.6038		
Cd^+		g	234.321	235.802				
Cd^{++}		g	624.155	627.117				
	std. state, hyp. m=1	aq		-17.30	-18.58	13.619	-14.6	
Cd^{+++}		g	1431.	1436.				
Cd^{++++}		g						
Cd_2		g	51.93	51.04				
CdO		c		-60.86	-53.79	39.427	13.1	10.38
CdH		g	62.96	62.54	55.73	-40.849	50.76	
$(CdH)^+$		g	238.	239.1				
$Cd(OH)_2$		c		-133.26	-112.46	82.432	22.8	

Table 32-2. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CdF_2		c		-164.9	-154.8	113.47	27.	
		aq		-173.6				
CdCl		g	5.	4.6	-1.8	1.32	60.36	
$CdCl_2$		c		-93.00	-81.88	60.017	28.3	
	std. state, hyp m=1	aq		-97.39	-81.28	59.577	11.6	
	in 200 H_2O	aq		-96.290				
	300 H_2O	aq		-96.341				
	400 H_2O	aq		-96.38				
	500 H_2O	aq		-96.410				
	1000 H_2O	aq		-96.520				
	2000 H_2O	aq		-96.650				
	3000 H_2O	aq		-96.725				
	4000 H_2O	aq		-96.780				
	5000 H_2O	aq		-96.830				
	10000 H_2O	aq		-96.965				
	50000 H_2O	aq		-97.225				
	100000 H_2O	aq		-97.270				
	∞ H_2O	aq		-97.39				

Table 32-3. Cadmium (at. no., 48; at. wt., 112.41)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdCl_2 \cdot H_2O$		c		-164.13	-140.13	102.713	40.8	
$CdCl_2 \cdot 2\frac{1}{2}H_2O$		c		-269.97	-225.47	165.266	55.6	
$CdCl_2 \cdot 4H_2O$		c						
$CdCl_2 \cdot 2HCl \cdot 7H_2O$		c		-656.1				
$CdCl_2 \cdot CdO \cdot H_2O$		c		-236.46				
CdBr		g		-12.	-22.	16.1	63.09	
$CdBr_2$		c		-75.15	-70.14	51.412	31.9	
	std. state, hyp. m=1	aq		-75.822				
	in 100 H_2O	aq		-75.827				
	200 H_2O	aq		-75.874				
	300 H_2O	aq		-75.900				
	400 H_2O	aq		-75.915				
	500 H_2O	aq		-75.926				
	1000 H_2O	aq		-75.958				
	2000 H_2O	aq		-75.955				
	3000 H_2O	aq		-75.941				

Table 32-4. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdBr_2$	in 4000 H_2O	aq		-75.930				
	5000 H_2O	aq		-75.919				
	10000 H_2O	aq		-75.890				
	50000 H_2O	aq		-75.830				
	100000 H_2O	aq		-75.820				
	∞ H_2O	aq		-75.822				
$CdBr_2 \cdot 4H_2O$		c		-356.32	-297.64	218.166	74.7	
$CdBr_2 \cdot CdO \cdot H_2O$		c		-216.10				
CdI		g	21.	19.6	8.1	-5.94	64.97	
CdI_2		c		-48.0	-48.00	35.183	40.2	
	std. state, hyp m = 1	aq						
	in 400 H_2O	aq		-47.46				
	500 H_2O	aq		-47.345				
	1000 H_2O	aq		-47.000				
	2000 H_2O	aq		-46.680				

Table 32-5. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°k	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CdI_2	in 3000 H_2O	aq		-46.470				
	4000 H_2O	aq		-46.320				
	5000 H_2O	aq		-46.190				
	10000 H_2O	aq		-45.840				
	50000 H_2O	aq		-45.390				
	100000 H_2O	aq		-44.990				
	∞ H_2O	aq		-44.660				
$CdI_2 \cdot CdO \cdot H_2O$		c		-178.7				
CdS		c		-34.5	-33.6	24.63	17.	
$CdSO_4$		c		-221.36	-195.99	143.657	32.8	
	std. state, hyp. m=1	aq		-234.20	-195.92	143.607	-10.47	
	in 50 H_2O	aq		-232.190				
	100 H_2O	aq		-232.413				
	200 H_2O	aq		-232.578				
	300 H_2O	aq		-232.670				
	400 H_2O	aq		-232.735				
	500 H_2O	aq		-232.785				

Table 32-6. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdSO_4$	in 700 H_2O	aq		-232.855				
	1000 H_2O	aq		-232.935				
	2000 H_2O	aq		-233.085				
	3000 H_2O	aq		-233.180				
	4000 H_2O	aq		-233.250				
	5000 H_2O	aq		-233.315				
	10000 H_2O	aq		-233.500				
	20000 H_2O	aq		-233.675				
	30000 H_2O	aq		-233.760				
	40000 H_2O	aq		-233.865				
	50000 H_2O	aq		-233.905				
	100000 H_2O	aq		-233.950				
	500000 H_2O	aq		-234.080				
	∞ H_2O	aq		-234.20				
$CdSO_4 \cdot H_2O$		c		-294.37	-254.84	186.794	41.1	
$CdSO_4 \cdot \frac{8}{3} H_2O$		c		-411.82	-349.63	256.274	57.9	

Table 32-7. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdSO_4 \cdot 2\frac{2}{3}H_2SO_4$		c		-766.4				
CdS_2O_6	in 800 H_2O	aq		-297.2				
	in H_2O	aq		-297.7				
CdSe		g	2.2	1.6				
CdTe		c		-24.30	-23.82	17.460	22.6	
$Cd(N_3)_2$	cadmium azide	c		107.8				
Cd_3N_2		c		38.6				
$Cd(NO_3)_2$		c		-107.98				
	std. state, hyp. m=1	aq		-116.04	-71.41	52.342	20.4	
		aq						
$Cd(NO_3)_2 \cdot 2H_2O$		c		-251.19				
$Cd(NO_3)_2 \cdot 4H_2O$		c		-394.02				
$Cd(NH_2)_2$		c		-14.71				

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Table 32-8. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdCl_2 \cdot NH_3$		c		-122.5				
$CdCl_2 \cdot NH_4Cl \cdot \frac{1}{2}H_2O$		c		-206.7				
$CdCl_2 \cdot 2NH_3$		c		-150.5				
$CdCl_2 \cdot 4NH_3$		c		-194.0				
$CdCl_2 \cdot 4NH_4Cl$		c		-395.0				
$CdCl_2 \cdot 6NH_3$		c		-236.5				
$CdCl_2 \cdot 10NH_3$		c		-310.3				
$CdBr_2 \cdot NH_3$		c		-103.5				
$CdBr_2 \cdot NH_4Br \cdot \frac{1}{2}H_2O$		c		-177.1				
$CdBr_2 \cdot 2NH_3$		c		-131.1				
$CdBr_2 \cdot 6NH_3$		c		-218.1				
$CdBr_2 \cdot 12NH_3$		c		-329.9				
$CdI_2 \cdot NH_4I \cdot \frac{1}{2}H_2O$		c		-133.9				
$CdI_2 \cdot 2NH_3$		c		-98.5				
$CdI_2 \cdot 6NH_3$		c		-189.4				

Table 32-9. Cadmium (at. no., 48; at. wt., 112.41)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CdSO_4 \cdot 4NH_3$		c		-316.8				
$CdSO_4 \cdot 6NH_3$		c		-362.6				
CdSb		c		-3.29				
Cd_3Sb_2		c		7.83	1.59	-1.165	78.8	
$CdCO_3$		c		-178.7	-160.2	117.42	25.2	
		amorp		-177.5				
$Cd(CH_3)_2$		liq		16.5				
$Cd(C_2H_5)_2$		liq		14.5				
$Cd(CN)_2$		c		39.0				
		aq		30.3				
$Cd(ONC)_2$	cadmium fulminate	c		37.7				
$2Cd(CN)_2 \cdot CdC \cdot 5H_2O$		c		-358.0				
$2CdI_2 \cdot PbI_2$		c		-128.9				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 33-1. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Hg		g	15.02	14.54	7.59	-5.563	41.80	4.968
		liq	0.000	0.000	0.000	0.0000	18.5	6.65
Hg^+		g	255.645	257.126				
Hg^{++}		g	688.08	689.56				
	std. state, hyp. m=1	aq			39.38	-28.865		
Hg^{+++}		g						
Hg_2		g	28.6	27.1				
Hg_2^{++}	std. state, hyp. m=1	aq			36.79	-26.967		
HgO	red	c, II		-21.68	-13.990	10.2545	17.2	10.93
	yellow	c, I		-21.56	-13.959	10.2317	17.5	
Hg_2O		c		-21.8				
HgH		g	58.07	58.06	52.60	-38.555	52.42	7.147
$HHgO_2^-$	std. state, hyp. m=1	aq			-45.42	33.292		
$Hg(OH)_2$	std. state, hyp. m=1	aq			-66.0	48.38		

Table 33-2. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HgF		g	15.	14.				
HgF_2		c						
Hg_2F_2		c						
HgCl		g	19.	19.	14.	-10.3	62.2	8.65
$HgCl_2$		c		-55.0				18.3
		aq		-51.8				
$HgCl_3^-$		aq		-93.7				
Hg_2Cl_2		c		-63.32	-50.350	36.9058	46.8	24.3
$HgCl_2 \cdot HgO$		c		-80.9				
$HgCl_2 \cdot 2HgO$		c		-105.3				
$HgCl_2 \cdot 3HgO$		c		-128.4				
$HgCl_2 \cdot 4HgO$		c		-151.3				
HgBr		g		23.	18.	-13.2	65.0	8.82
$HgBr_2$		c		-40.5				
		aq		-37.1				

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Table 33-3. Mercury (at. no., 80; at. wt., 200.61)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HgBr_4^{--}$		aq		-99.9				
Hg_2Br_2		c		-49.42	-42.714	31.3088	50.9	
$HgBr_2 \cdot HgO$		c		-59.6				
$HgBr_2 \cdot 2HgO$		c		-78.5				
$HgBr_2 \cdot 3HgO$		c		-98.3				
$HgBr_2 \cdot 4HgO$		c		-117.6				
HgI		g	34.	33.	23.	-16.9	67.1	8.89
HgI_2	red	c, II		-25.2				
	yellow	c, I		-24.55				
HgI_3^-		aq						
HgI_4^{--}		aq		-55.4				
Hg_2I_2	yellow	c		-28.91	-26.60	19.497	57.2	25.3

Table 33-4. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HgS		g		3.				
	red, cinnabar	c, II		-13.90	-11.67	8.5539	18.6	
	black, metacinnabarite	c, I		-12.90	-11.05	8.0995	19.9	
$HgSO_4$		c		-168.3				
Hg_2SO_4		c		-177.34	-149.12	109.303	47.98	31.55
$HgSO_4 \cdot 2HgO$		c		-222.3				
HgSe		g	17.	16.				
		c		-5.1				
$Hg_2(N_3)_2$	mercurous azide	c		133.				
$Hg(NO_3)_2$		aq		-58.0				
$Hg(NO_3)_2 \cdot \frac{1}{2}H_2O$		c		-93.0				
$Hg_2(NO_3)_2$		aq		-58.4				
$Hg_2(NO_3)_2 \cdot 2H_2O$		c		-206.9				
$Hg(NO_3)_2 \cdot 2HgO \cdot H_2O$		c		-178.2				

Table 33-5. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(Hg_2N)_2O$	Millon's oxide	c		76.3				
Hg_2NOH	Millon's hydroxide	c		2.5				
$Hg_2NOH \cdot 1\frac{1}{2}H_2O$		c		-103.9				
$Hg_2NOH \cdot 2H_2O$	Millon's base	c		-139.2				
Hg_2NCl	Millon's chloride	c						
$Hg_2NCl \cdot \frac{1}{2}H_2O$		c		-28.0				
$Hg_2NCl \cdot H_2O$		c		-63.5				
$Hg_2NCl \cdot \frac{1}{2}HgCl_2$		c		-24.6				
$HgCl_2 \cdot 2NH_3$		c		-112.0				
$HgCl_2 \cdot 8NH_3$		c		-226.8				
$HgCl_2 \cdot 9\frac{1}{2}NH_3$		c		-254.2				
$Hg_2NCl \cdot \frac{1}{2}NH_3$		c		-5.5				
$Hg_2NCl \cdot NH_3$		c		-13.6				
$Hg_2NCl \cdot NH_4Cl$		c		-73.8				
$Hg_2NCl \cdot 3NH_4Cl$		c		-222.9				

Table 33-6. Mercury (at. no., 80; at. wt., 200.61)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Hg_2NBr	Millon's bromide	c		15.0				
$HgBr_2 \cdot 2NH_3$		c		-94.7				
$HgBr_2 \cdot 8NH_3$		c		-207.7				
$Hg_2NBr \cdot NH_4Br$		c		-55.9				
$Hg_2NBr \cdot 3NH_4Br$		c		-180.5				
$Hg_2NBr \cdot \frac{1}{4}HgBr_2$		c		1.0				
$Hg_2NBr \cdot \frac{1}{2}HgBr_2$		c		-11.8				
$HgI_2 \cdot 1\frac{1}{3}NH_3$		c		-56.6				
$HgI_2 \cdot 2NH_3$		c		-71.6				
$HgI_2 \cdot 6NH_3$		c		-146.0				
$Hg(CH_3)_2$	dimethylmercury	liq		18.				
$Hg(C_2H_5)_2$	diethylmercury	liq		15.				
HgC_2O_4	mercuric oxalate	c		-161.8				

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Table 33-7. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Hg(C_2H_3O_2)_2$	mercuric acetate	c		-199.4				
		aq		-195.2				
$Hg_2(C_2H_3O_2)_2$	mercurous acetate	c		-201.1				
$HgCl_2 \cdot CH_3OH$		c		-113.3				
$Hg(CN)_2$		c		62.5				
		aq		66.1				
$Hg(CN)_4^{--}$		aq		126.0				
$Hg(ONC)_2$	mercuric fulminate	c		64.				
$Hg(CN)_2 \cdot HgO$		c		41.2				
$3Hg(CN)_2 \cdot HgO$		c		173.4				
$HgCl_2 \cdot C_2H_4(NH_2)_2$		c		-88.5				
$HgBr_2 \cdot C_2H_4(NH_2)_2$		c		-65.7				
$HgI_2 \cdot C_2H_4(NH_2)_2$		c		-47.8				

Table 33-8. Mercury (at. no., 80; at. wt., 200.61)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1948

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Hg(CN)_2 \cdot NH_4Cl \cdot \frac{3}{2}H_2O$		c		-64.5				
$Hg(CN)_2 \cdot NH_4Br \cdot \frac{1}{2}H_2O$		c		-77.8				
$Hg(CN)_2 \cdot NH_4I \cdot \frac{1}{4}H_2O$		c		-10.0				
$Hg(CNS)_2$		c		48.0				
Hg_5Tl_2		c		-2.5				
$Hg(CN)_2 \cdot ZnCl_2 \cdot 7H_2O$		c		-475.2				
$2Hg(CN)_2 \cdot ZnBr_2 \cdot 8H_2O$		c		-530.7				
$Hg(CN)_2 \cdot CdCl_2 \cdot 2H_2O$		c		-176.6				
$Hg(CN)_2 \cdot CdBr_2 \cdot 3H_2O$		c		-228.0				
$2Hg(CN)_2 \cdot CdI_2 \cdot 8H_2O$		c		-486.1				

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Table 34-1. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cu		g	81.24	81.52	72.04	-52.804	39.744	4.968
		c	0.000	0.000	0.000	0.0000	7.96	5.848
	in Hg (two phase)				-0.236	0.1730		
Cu^+		g	259.627	260.828				
	std. state, hyp. m =1	aq		12.4	12.0	-8.796	-6.3	
Cu^{++}		g	727.436	730.118				
	std. state, hyp. m =1	aq		15.39	15.53	-11.383	-23.6	
Cu^{+++}		g						
Cu^{++++}		g						
CuO		g	36.	35.				
		c		-37.1	-30.4	22.28	10.4	10.6
CuO_2^{--}	std. state, hyp. m =1	aq			-43.3	31.74		
Cu_2O		c		-39.84	-34.98	25.640	24.1	16.7

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Table 34-2. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CuH		g	71.	71.	64.	-46.9	46.89	6.98
$HCuO_2^-$	std. state, hyp. m=1	aq			-61.2	44.86		
$Cu(OH)_2$		c		-107.2				
CuF		g	44.	44.				
CuF_2		c		-126.9				
$CuF_2 \cdot 2H_2O$		c		-274.5	-235.2	172.40	36.2	
CuCl		g	32.	32.	25.	-18.3	56.50	8.40
		c		-32.2	-28.4	20.82	21.9	
	in aq HCl	aq		-25.8				
$CuCl_2$		c		-49.2				
	in 10 H_2O	aq		-55.48				
	20 H_2O	aq		-57.48				
	30 H_2O	aq		-58.36				
	50 H_2O	aq		-59.18				
	100 H_2O	aq		-59.98				
	200 H_2O	aq		-60.52				
	400 H_2O	aq		-60.94				
	1000 H_2O	aq		-61.24				
	2000 H_2O	aq		-61.4				

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Table 34-3. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CuCl_2$	in 10 C_2H_6O (ethanol)			-53.19				
	20 C_2H_6O			-53.55				
	50 C_2H_6O			-53.89				
	100 C_2H_6O			-54.08				
	200 C_2H_6O			-54.20				
	in $HCl \cdot 8H_2O$	aq		-55.5				
$CuCl_2 \cdot 2H_2O$		c		-193.0				
$CuCl_2^-$	std. state, hyp. m = 1	aq		-65.8	-58.1	42.59	[illegible]	
$Cu(ClO_3)_2$		aq		-31.6				
$Cu(ClO_4)_2$		aq		-19.0				
$CuCl_2 \cdot CuO$		c		-85.3				
$CuCl_2 \cdot 3CuO$		c		-154.9				
$CuCl_2 \cdot 3CuO \cdot 4H_2O$		c		-450.0				

Table 34-4. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CuBr		g		38.	28.	-20.5	59.22	8.61
		c		-25.1	-23.81	17.452	21.9	
$CuBr_2$		c		-33.2				
	in 400 H_2O	aq		-42.0				
$CuBr_2 \cdot 4H_2O$		c		-316.4				
$CuBr_2^-$	std. state, hyp. m = 1	aq			-45.2	31.31		
$CuBr_2 \cdot 3Cu(OH)_2$		c		-373.6				
CuI		c	63.	62.	50.	-36.6	21.05	8.70
		c		-16.2	-16.62	12.182	23.1	12.92
CuI_2		c, II		-1.7				20.1
		aq		-7.9				

Table 34-5. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CuS		c		-11.6	-11.7	8.576	15.9	11.43
Cu_2S		c, II		-19.0	-20.6	15.10	28.9	18.24
$CuSO_4$		c		-184.00	-158.2	115.96	27.1	24.1
	std. state, hyp m=1	aq		-201.51	-161.81	118.604	-19.5	
	in 50 H_2O	aq		-199.998				
	100 H_2O	aq		-200.110				
	200 H_2O	aq		-200.201				
	500 H_2O	aq		-200.342				
	1000 H_2O	aq		-200.491				
	2000 H_2O	a		-200.641				
	3000 H_2O	aq		-200.723				
	5000 H_2O	aq		-200.825				
	10,000 H_2O	aq		-200.964				

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Table 34-6. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CuSO_4$	in 20,000 H_2O	aq		-201.110				
	30,000 H_2O	aq		-201.192				
	50,000 H_2O	aq		-201.281				
	100,000 H_2O	aq		-201.364				
	200,000 H_2O	aq		-201.427				
	500,000 H_2O	aq		-201.469				
	∞ H_2O	aq		-201.51				
$CuSO_4 \cdot H_2O$		c		-259.00	-219.2	160.67	35.8	31.3
$CuSO_4 \cdot 3H_2O$		c		-402.27	-334.6	245.26	53.8	49.0
$CuSO_4 \cdot 5H_2O$		c, II		-544.45	-449.3	329.33	73.0	67.2
CuS_2O_6		aq		-265.0				
$CuS_2O_6 \cdot 5H_2O$		c		-611.5				
Cu_2SO_4		c		-179.2				
		aq		-190.8				
$CuSO_4 \cdot 3CuO \cdot 4H_2O$		c		-592.6				

Table 34-7. Copper (at. no., 29; at. wt., 63.54)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CuSe		c		-15.1				
Cu_2Se		c, II		-5.5				21.2
$CuSeO_4$		aq		-129.3				
$CuSeO_4 \cdot 5H_2O$		c		-473.8				
CuN_3	cuprous azide	c		60.5				
Cu_3N		c		17.8				21.7
$Cu(NO_3)_2$		c		-73.4				
	in 10 H_2O	aq		-83.11				
	12 H_2O	aq		-83.57				
	15 H_2O	aq		-83.85				
	20 H_2O	aq		-84.05				
	50 H_2O	aq		-84.01				
	100 H_2O	aq		-83.88				
	200 H_2O	aq		-83.84				
	400 H_2O	aq		-83.80				
	800 H_2O	aq		-83.8				

Table 34-8. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Cu(NO_3)_2 \cdot 3H_2O$		c		-291.3				
$Cu(NO_3)_2 \cdot 6H_2O$		c		-504.3				
$Cu(NO_3)_2 \cdot 3CuO \cdot 3H_2O$		c		-415.7				
$4CuO \cdot 3N_2O_5$		c		-236.				
$Cu(NH_3)^+$	std. state, hyp. m=1	aq			-26.5	19.42		
$Cu(NH_3)^{++}$	std. state, hyp. m=1	aq			-29.8	21.84		
$Cu(NH_3)_2^+$	std. state, hyp. m=1	aq			-39.2	28.73		
$Cu(NH_3)_2^{++}$	std. state, hyp. m=1	aq		-36.1	-41.2	30.20	133.3	
$Cu(NH_3)_3^{++}$	std. state, hyp. m=1	aq			-51.7	37.90		
$Cu(NH_3)_4^{++}$	std. state, hyp. m=1	aq		-79.9	-61.2	44.86	192.8	
$Cu(NH_3)_5^{++}$	std. state, hyp. m=1	aq			-67.0	49.11		

Table 34-9. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Cu(NO_3)_2 \cdot 2NH_3$		c		-139.7				
$Cu(NO_3)_2 \cdot 4NH_3$		c		-196.6				
$Cu(NO_3)_2 \cdot 6NH_3$		c		-238.3				
$CuCl \cdot NH_3$		c		-60.3				
$CuCl \cdot 1\frac{1}{2}NH_3$		c		-72.1				
$CuCl_2 \cdot 2NH_3$		c		-114.1				
$CuCl_2 \cdot 2NH_3 \cdot \frac{1}{4}H_2O$		c		-130.5				
$CuCl_2 \cdot 2NH_4Cl$		c		-199.7				
$CuCl_2 \cdot 2NH_4Cl \cdot 2H_2O$		c		-334.4				
$CuCl \cdot 3NH_3$		c		-102.9				
$CuCl_2 \cdot 3\frac{1}{3}NH_3$		c		-147.6				
$CuCl_2 \cdot 4NH_3 \cdot 2H_2O$		c		-307.0				
$CuCl_2 \cdot 5NH_3$		c		-186.4				
$CuCl_2 \cdot 5NH_3 \cdot \frac{1}{2}H_2O$		c		-200.9				
$CuCl_2 \cdot 5NH_3 \cdot 1\frac{1}{2}H_2O$		c		-269.4				
$CuCl_2 \cdot 6NH_3$		c		-212.4				
$CuCl_2 \cdot 10NH_3$		c		-286.9				

Table 34-10. Copper (at. no., 29; at. wt., 63.54)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CuBr \cdot NH_3$		c		-50.8				
$CuBr \cdot 1\frac{1}{2}NH_3$		c		-62.9				
$CuBr_2 \cdot 2NH_3$		c		-96.5				
$CuBr \cdot 3NH_3$		c		-93.6				
$CuBr_2 \cdot 3\frac{1}{3}NH_3$		c		-132.0				
$CuBr_2 \cdot 5NH_3$		c		-171.9				
$CuBr_2 \cdot 10NH_3$		c		-266.1				
$CuI \cdot \frac{1}{2}NH_3$		c		-29.5				
$CuI \cdot NH_3$		c		-42.4				
$CuI \cdot 2NH_3$		c		-64.7				
$CuI_2 \cdot 2NH_3$		c		-61.8				
$CuI \cdot 3NH_3$		c		-86.1				
$CuI_2 \cdot 3\frac{1}{3}NH_3$		c		-96.8				
$CuI_2 \cdot 5NH_3$		c		-137.2				
$CuI_2 \cdot 10NH_3$		c		-227.4				

Table 34-11. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CuSO_4 \cdot NH_3$		c		-218.4				
$CuSO_4 \cdot 2NH_3$		c		-248.8				
$CuSO_4 \cdot (NH_4)_2SO_4$		c		-470.6				
$CuSO_4 \cdot (NH_4)_2SO_4 \cdot 2H_2O$		c		-606.3				
$CuSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$		c		-900.9				100.
$CuSO_4 \cdot 4NH_3$		c		-300.2				
$CuSO_4 \cdot 4NH_3 \cdot 1\frac{1}{2}H_2O$		c		-406.9				
$CuSO_4 \cdot 5NH_3$		c		-325.6				
$CuSO_4 \cdot 6NH_3$		c		-352.7				
CuP_2		c		-28.9				
Cu_3P		c		-36.4				
$CuCl \cdot PH_3$		c		-42.7				
$CuCl \cdot 2PH_3$		c		-49.1				

Table 34-12. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CuBr \cdot PH_3$		c		-34.6				
$CuBr \cdot 2PH_3$		c		-42.3				
$CuI \cdot PH_3$		c		-24.5				
$CuI \cdot 2PH_3$		c		-31.8				
Cu_2Sb		c						18.3
Cu_3Sb		c		-2				24.5
$CuCO_3$		c		-142.2	-123.8	90.744	21.	
$Cu(CHO_2)_2$	cupric formate	c		-178.6				
	in 200 H_2O	aq		-179.7				
$Cu(CHO_2)_2 \cdot 4H_2O$		c		-460.8				
$Cu(C_2H_3O_2)_2$	cupric acetate	c		-214.3				
	in 400 H_2O	aq		-217.0				
$Cu(C_2H_3O_2)_2 \cdot H_2O$		c		-285.3				

Table 34-13. Copper (at. no., 29; at. wt., 63.54)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Cu(C_2H_3O_3)_2$	cupric glycollate	c		-297.4				
		aq		-295.8				
$2CuCl \cdot CO$		aq		-89.4				
$2CuCl \cdot CO \cdot 2H_2O$		c		-229.4				
$2CuCl \cdot C_2H_2$		c		2.3				
$CuCl_2 \cdot 2CH_3OH$		c		-166.4				
$Cu(C_2H_5SO_4)_2$	cupric ethylsulfate	aq		-402.0				
CuCN		aq		23.1				
CuONC	cuprous fulminate	c		26.3				
$Cu(CHO_2)_2 \cdot 2NH_3$	cupric formate diammine	c		-228.8				
$Cu(CHO_2)_2 \cdot 4NH_3$		c		-275.7				
$Cu(CHO_2)_2 \cdot 6NH_3$		c		-314.8				
$Cu(CHO_2)_2 \cdot 8NH_3$		c		-352.5				

Table 34-14. Copper (at. no., 29; at. wt., 63.54)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Cu(C_2H_3O_2)_2 \cdot 2NH_3$	cupric acetate diammine	c		-269.5				
$Cu(C_2H_3O_2)_2 \cdot 4NH_3$		c		-314.3				
$Cu(C_2H_3O_2)_2 \cdot 5NH_3$		c		-335.3				
$Cu(C_2H_3O_2)_2 \cdot 8NH_3$		c		-394.8				
$Cu(C_2H_3O_3)_2 \cdot 2NH_3$	cupric glycollate diammine	c		-351.5				
$Cu(C_2H_3O_3)_2 \cdot 4NH_3$		c		-397.2				
$Cu(C_2H_3O_3)_2 \cdot 6NH_3$		c		-440.0				
$Cu(C_2H_3O_3)_2 \cdot 8NH_3$		c		-480.3				
$CuCl_2 \cdot C_2H_4(NH_2)_2$	cupric chloride ethylenediamine	c		-89.3				
$CuCl_2 \cdot 2C_2H_4(NH_2)_2$	cupric chloride bisethylenediamine	c		-114.7				
$CuBr_2 \cdot C_2H_4(NH_2)_2$	cupric bromide ethylenediamine	c		-71.8				
$CuBr_2 \cdot 2C_2H_4(NH_2)_2$	cupric bromide bisethylenediamine	c		-102.4				

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Table 34-15. Copper (at. no., 29; at. wt., 63.54)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cu_3Si		c						23.0
$CuSiO_3 \cdot H_2O$		c						29.
Cu_3Sn		c		-8.				
Cu_2Zn_3		c		-16.				
Cu_2Cd_3		c		-4.7				

Table 35-1. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ag		g	69.02	69.12	59.84	-43.862	41.3221	4.9680
		c	0.000	0.000	0.000	0.0000	10.206	6.092
Ag^+		g	243.693	245.274				
	std. state, hyp. m=1	aq		25.31	18.430	-13.5089	17.67	9.
Ag^{++}		g	738.99	742.05				
Ag^{+++}		g	1571.5	1576.0				
Ag_2O		c	-6.940	-7.306	-2.586	1.8955	29.09	15.67
Ag_2O_2		c		-6.3				
AgH		g	68.	67.7	60.8	-44.56	48.86	6.99

Table 35-2. Silver (at. no., 47; at. wt., 107.880)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AgF		c		-48.5	-44.2	32.40	20.	
	std. state, hyp. m =1	aq		-53.35	-47.65	34.927	15.4	
	in 3 H_2O	aq		-52.50				
	4 H_2O	aq		-52.70				
	5 H_2O	aq		-52.83				
	7 H_2O	aq		-52.955				
	10 H_2O	aq		-53.015				
	15 H_2O	aq		-53.053				
	20 H_2O	aq		-53.072				
	30 H_2O	aq		-53.080				
	40 H_2O	aq		-53.085				
	50 H_2O	aq		-53.088				
	100 H_2O	aq		-53.091				
	400 H_2O	aq		-53.1				
	∞ H_2O	aq		-53.35				

Table 35-3. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$AgF \cdot H_2O$		c		-120.4				
$AgF \cdot 2H_2O$		c		-191.2	-159.0	116.54	38.	
$AgF \cdot 4H_2O$		c		-331.5				
Ag_2F		c		-50.4				
AgF_2		c		-88.5				
$AgHF_2$		aq		-130.8				
AgCl		g		23.23	16.79	-12.307	58.5	8.54
		c		-30.362	-26.224	19.2218	22.97	12.14
Ag_2Cl		c		-30.9				
$AgClO_2$		c		0.0	16.0	-11.73	32.16	20.87
$AgClO_3$		c		-5.73				
		aq		1.81				
$AgClO_4$		c		-7.75				
		aq		-6.10				

Table 35-4. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AgBr		c, II		-23.78	-22.930	16.8074	25.60	12.52
$AgBrO_3$		c						
AgI		c, II		-14.91	-15.85	11.618	27.3	13.01
$AgIO_3$		c					35.7	24.6
$Ag_2H_3IO_6$		c, I					59.44	47.34
$3AgI \cdot HI \cdot 7H_2O$		c		-538.7				
Ag_2S	rhombic, α	c, II		-7.60	-9.62	7.051	34.8	
	β	c, I		-7.01	-9.36	6.860	35.9	
Ag_2SO_4		c, II		-170.50	-147.17	107.873	47.8	31.4
		aq		-166.0				
$Ag_2S_2O_6$		aq		-229.8				
$Ag_2S_2O_6 \cdot 2H_2O$		c		-376.8				
$Ag(S_2O_3)_2^{---}$		aq		-302.				
$Ag_2SO_4 \cdot 2HCl$		c		-244.6				

Table 35-5. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ag_2Se		c, II		-2.9				
Ag_2SeO_4		c		-94.7	-68.5	50.21	48.3	
Ag_2Te		c, II						
AgN_3	silver azide	c		66.8				
$AgNO_2$		c		-10.605	4.744	-3.4773	30.62	18.8
	std. state, hyp. m=1	aq		-0.09	9.79	-7.176	49.0	
$AgNO_3$		c, II		-29.43	-7.69	5.637	33.68	22.24
	std. state, hyp. m=1	aq		-24.06	-7.98	5.849	52.67	
$Ag_2N_2O_2$		c		14.				
$Ag(NH_3)_2^+$		aq		-26.724				
$AgNO_3 \cdot 2NH_3$		c		-84.5				
		aq		-76.3				
$AgNO_3 \cdot 3NH_3$		c		-105.0				
		aq		-95.6				

Table 35-6. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$AgCl \cdot NH_3$		c		-52.5				
$AgCl \cdot 1\frac{1}{2}NH_3$		c		-64.3				
$AgCl \cdot 3NH_3$		c		-95.1				
$AgClO_4 \cdot 2NH_3$		c		-67.5				
	in 1000 H_2O	aq		-57.4				
$AgClO_4 \cdot 3NH_3$		c		-89.2				
		aq		-78.7				
$AgBr \cdot NH_3$		c		-45.4				
$AgBr \cdot 1\frac{1}{2}NH_3$		c		-55.8				
$AgBr \cdot 3NH_3$		c		-85.6				
$AgI \cdot \frac{1}{2}NH_3$		c		-26.2				
$AgI \cdot NH_3$		c		-36.1				
$AgI \cdot 1\frac{1}{2}NH_3$		c		-45.5				
$AgI \cdot 2NH_3$		c		-54.9				
$AgI \cdot 3NH_3$		c		-73.2				

Table 35-7. Silver (at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AgP_2		c		-9.8				
AgP_3		c		-15.0				
Ag_2C_2	silver acetylide	c		81.9				
Ag_2CO_3		c		-120.97	-104.48	76.5824	40.0	26.8
$Ag_2C_2O_4$	silver oxalate	c		-159.1				
$AgC_2H_3O_2$	silver acetate	c		-93.41				
		aq		-89.0				
$Ag_2C_2 \cdot AgCl$		c		50.4				
$(Ag_2C_2)_2 \cdot AgCl$		c		130.8				
$Ag_2C_2 \cdot AgI$		c		67.9				
$Ag_2C_2 \cdot 2AgI$		c		51.8				
$Ag_2C_2 \cdot Ag_2SO_4$		c		-90.1				
$(Ag_2C_2)_2 \cdot Ag_2SO_4$		c		-15.4				

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Table 35-8. Silver.(at. no., 47; at. wt., 107.880)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AgCN		c		34.94	39.20	-28.733	20.0	
$Ag(CN)_2^-$	std. state, hyp. m=1	aq		64.5	72.05	-52.812	49.0	
Ag_2CN_2	silver cyanamide	c		51.5				
AgCNO	silver cyanate	c		-21.1				
AgONC	silver fulminate	c		43.				
$Ag_2C_2 \cdot AgNO_3$		c		51.				
$AgCl \cdot CH_3NH_2$		c		-49.6				
$AgBr \cdot CH_3NH_2$		c		-42.8				
$AgI \cdot \frac{1}{2}CH_3NH_2$		c		-22.5				
$AgI \cdot CH_3NH_2$		c		-32.1				
AgSCN		c		21.0				
		aq		42.5				
Ag_2Zn_3		c		-9.5				
Ag_3Hg_4		c		0.7				
Ag_2HgI_4		c						47.5

Table 36-1. Gold (at. no., 79; at. wt., 197.2)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Au		g		82.29	72.83	-53.383	43.120	4.9680
		c	0.000	0.000	0.000	0.0000	11.4	6.03
Au^+		g		296.62				
Au^{++}		g						
AuO_3^{---}	std. state, hyp. m=1	aq			-5.8	4.25		
Au_2O_3		c		19.3	39.0	-28.6	30.	
$HAuO_3^{--}$	std. state, hyp. m=1	aq			-27.6	20.23		
$H_2AuO_3^-$	std. state, hyp. m=1	aq			-45.8	33.57		
$Au(OH)_3$	H_3AuO_3	c		-100.0	-69.3	50.80	29.	
	std. state, hyp. m=1	aq			-61.8	45.30		

Table 36-2. Gold (at. no., 79; at. wt., 197.2)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AuCl		c		-8.4				
$AuCl_3$		c		-28.3				
		aq		-32.8				
$AuCl_3 \cdot 2H_2O$		c		-167.7				
$AuCl_4^-$	std. state, hyp. m=1	aq		-77.8	-56.2	41.19	61.	
$HAuCl_4$	std. state, hyp. m=1	aq		-77.8	-56.2	41.19	61.	
$HAuCl_4 \cdot 3H_2O$		c		-279.2				
$HAuCl_4 \cdot 4H_2O$		c		-356.9				
AuBr		c		-4.4				
$AuBr_2^-$	std. state, hyp. m=1	aq			-27.1	19.86		
$AuBr_3$		c		-13.0				
		aq		-9.2				
$AuBr_4^-$	std. state, hyp. m=1	aq		-45.5	-38.1	27.93	75.	
$HAuBr_4$	std. state, hyp. m=1	aq		-45.5	-38.1	27.93	75.	
$HAuBr_4 \cdot 5H_2O$		c		-398.5				

Table 36-3. Gold (at. no., 79; at. wt., 197.2)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AuI		c		0.2				
$AuCl \cdot NH_3$		c		-43.9				
$AuCl \cdot 2NH_3$		c		-69.0				
$AuCl \cdot 6NH_3$		c		-142.0				
$AuBr \cdot NH_3$		c		-38.0				
$AuBr \cdot 2NH_3$		c		-61.1				
$AuBr \cdot 3NH_3$		c		-80.4				
$AuBr \cdot 4NH_3$		c		-99.6				
$AuBr \cdot 6NH_3$		c		-137.6				
$AuI \cdot NH_3$		c		-26.3				
$AuI \cdot 2NH_3$		c		-46.4				
$AuI \cdot 3NH_3$		c		-66.4				
$AuI \cdot 6NH_3$		c		-123.5				
$AuI \cdot 8NH_3$		c		-158.				

Table 36-4. Gold (at. no., 79; at. wt., 197.2)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Au_2P_3		c		-24.1				
$AuI \cdot PH_3$		c		-8.4				
$AuSb_2$		c, III		-4.8				19.0
$Au(CN)_2^-$	std. state, hyp. m=1	aq		58.4	51.5	-37.75	99.	
AuSn		c						12.5

Table 37-1. Platinum (at. no., 78; at. wt., 195.23)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pt			g		121.6	110.9	-81.288	45.96	6.102
			c	0.000	0.000	0.000	0.0000	10.0	6.35
Pt^+			g		328.				
$Pt(OH)_2$			c		-87.2	-68.2	49.99	26.5	
PtCl			c		-17.7				
$PtCl_2$			c		-35.5				
$PtCl_3$			c		-49.9				
$PtCl_4$			c		-62.9				
			aq		-82.4				
$PtCl_4 \cdot 5H_2O$			c		-425.8				
$PtCl_4^{--}$		std. state, hyp. m=1	aq		-123.4	-91.9	67.36	42.	
$PtCl_6^{--}$		std. state, hyp. m=1	aq		-167.4	-123.1	90.231	52.6	

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Table 37-2. Platinum (at. no., 78; at. wt., 195.23)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HPtCl_5 \cdot 2H_2O$		c		-249.8				
H_2PtCl_6		aq		-167.3				
$H_2PtCl_6 \cdot 6H_2O$		c		-572.9				
$PtBr_4$		c		-41.3				
		aq		-51.1				
$PtBr_4^{--}$		aq		-91.1				
$PtBr_6^{--}$		aq		-117.1				
H_2PtBr_6		aq		-117.0				
$H_2PtBr_6 \cdot 9H_2O$		c		-734.7				
PtI_2		c						
PtI_4		c		-21.6				
PtI_6^{--}		aq		-55.7				
PtS		c		-20.8				
PtS_2		c		-27.8				

Table 37-3. Platinum (at. no., 78; at. wt., 195.23)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)_2PtCl_4$		c		-195.3				
		aq		-186.9				
$Pt(OH)_2 \cdot 4NH_3$		c		-202.9				
$PtCl_2 \cdot 2NH_3$		c		-120.3				
$PtCl_2 \cdot 4NH_3$		c		-184.0				
		aq		-172.9				
$PtCl_2 \cdot 4NH_3 \cdot H_2O$		c		-250.				
$PtCl_2 \cdot 5NH_3$		c		-205.3				
$PtI_2 \cdot 2NH_3$		c						
$PtI_2 \cdot 4NH_3$		c						
$PtI_2 \cdot 6NH_3$		c						
$PtSO_4 \cdot 4NH_3$		c		-309.0				
$PtSb_2$		c, II						17.
PtSn		c						12.
Ag_2PtCl_6		c		-131.6				
Ag_2PtBr_6		c		-98.8				

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Table 38-1. Iridium (at. no., 77; at. wt., 193.1)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ir		g		165.	154.	-112.9	46.25	4.968
		c	0.000	0.000	0.000	0.0000	8.7	5.9
Ir^+		g		378.				
IrO_2		c		-40.1				13.7
IrF_6		liq		-130.				
IrCl		c		-22.3				
$IrCl_2$		c		-42.8				
$IrCl_3$		c		-61.5				
$IrCl_6^{--}$		aq		-154.				
$IrCl_6^{---}$		aq		-189.				
IrS_2		c		-30.				
Ir_2S_3		c		-51.				

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Table 39-1. Osmium (at. no., 76; at. wt., 190.2)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Os		g		174.	163.	-119.5	45.97	4.968
		c	0.000	0.000	0.000	0.0000	7.8	5.9
Os^+		g		376.				
OsO_4		g		-79.9	-67.9	49.77	65.6	
	white	c, I		-91.7	-70.5	51.68	34.7	
	yellow	c, II		-93.4	-70.7	51.82	29.7	
	std. state, hyp. m=1	aq			-68.59	50.276		
$HOsO_5^-$	std. state, hyp. m=1	aq			-108.78	79.7342		
H_2OsO_5	std. state, hyp. m=1	aq			-125.28	91.8285		
OsS_2		c		-35.				
OsP_2		c		-40.				

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Table 40–1. Rhenium (at. no., 75; at. wt., 186.31)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Re		g		189.	179.	-131.2	45.13	4.968
		c	0.000	0.000	0.000	0.0000	10.	6.1
ReO_3		c		-83.				
ReO_4^-		aq		-190.3				
Re_2O_7		c		-297.5				
Re_2O_8		c		-148.3				
$HReO_4$	in 5000 H_2O	aq		-188.6				
	7000 H_2O	aq		-188.9				
	10,000 H_2O	aq		-189.2				
	20,000 H_2O	aq		-189.4				
ReF_6		g		-273.				
ReS_2		c		-44.3				
$ReAs_2$		c		1.				

Table 41-1. Palladium (at. no., 46; at. wt., 106.7)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949; March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pd			g		93.	84.	-61.6	39.91	4.968
			c	0.000	0.000	0.000	0.0000	8.9	6.3
Pd^+			g		276.				
Pd^{++}			g		734.				
PdO			c		-20.4				7.5
Pd_2H			c		-8.9				
$Pd(OH)_2$			c		-92.1				
$Pd(OH)_4$			c		-169.4				
$PdCl_2$			c		-45.4				
$PdCl_4^{--}$		std. state, hyp. m =1	aq		-128.3	-96.7	70.88	41.	
$PdCl_6^{--}$			aq		-152.				
H_2PdCl_4			aq		-129.3				
H_2PdCl_6			aq		-152.				

Table 41-2. Palladium (at. no., 46; at. wt., 106.7)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$PdBr_2$		c		-24.9				
$PdBr_4^{--}$		aq		-85.5				
PdI_2		c						
$PdI_2 \cdot H_2O$		c		-87.3				
$PdCl_2 \cdot 2NH_3$		c		-107.				
$PdCl_2 \cdot 4NH_3$		c		-160.				
$PdI_2 \cdot 2NH_3$		c						
$PdI_2 \cdot 4NH_3$		c						
PdSb		c						11.9
$PdSb_2$		c						17.3
$PdSb_3$		c						24.8
$Pd(CN)_2$		c		52.1				
PdCu		c						10.6
$PdCu_3$		c						22.2

Table 42-1. Rhodium (at. no., 45; at. wt., 102.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rh		g		138.	127.	-93.09	44.39	5.001
		c	0.000	0.000	0.000	0.0000	7.6	6.1
Rh^+		g		306.				
Rh^{++}		g						
RhO		c		-21.7				11.5
Rh_2O		c		-22.7				17.5
Rh_2O_3		c		-68.3				24.9
RhCl		c		-16.				
$RhCl_2$		c		-36.				
$RhCl_3$		c		-56.				
$RhCl_6^{---}$		aq		-207.8				
Rh_2S_3		c						
Rh_2S_5		c						
Rh_3S_4		c						
Rh_9S_8		c						
RhP_2		c						
RhP_3		c						

Table 43-1. Ruthenium (at. no., 44; at. wt., 101.7)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ru		g		160.	149.	-109.2	44.57	
		c, IV	0.000	0.000	0.000	0.0000	6.9	5.6
Ru^+		g						
Ru^{++}		g						
RuO_2		c		-52.5				
$RuCl_3$		c		-63.				
RuS_2		c		-48.1				

Table 44-1. Technetium (at. no., 43; at. wt., 99)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Tc		c	0.000	0.000	0.000	0.0000	9.	

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Table 45-1. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ni		g	101.14	101.61	90.77	-66.533	43.592	5.5986
		c, II	0.000	0.000	0.000	0.0000	7.20	6.21
Ni^+		g	277.16	279.11				
Ni^{++}		g	697.4	700.8				
	std. state, hyp. m=1	aq		-15.3	-11.1	8.136	-38.1	
Ni^{+++}		g						
NiO		g	59.3	59.3	51.8	-37.97	57.	
		c	-57.8	-58.4	-51.7	37.90	9.22	10.60
NiH		g	93.	93.				
		c		-2.7				
NiH_2		c		-6.2				
$Ni(OH)_2$		c		-128.6	-108.3	79.382	19.	
$Ni(OH)_3$		c		-162.1				

Table 45-2. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NiF_2		c		-159.5				
		aq		-171.5				
$NiF_2 \cdot 4H_2O$		c			-379.9	278.46		
NiCl		g	15.	15.				
$NiCl_2$		c		-75.5	-65.1	47.72	25.6	18.6
	in 25 H_2O	aq		-93.20				
	50 H_2O	aq		-93.88				
	100 H_2O	aq		-94.20				
	200 H_2O	aq		-94.44				
	500 H_2O	aq		-94.70				
	800 H_2O	aq		-94.8				
	1000 H_2O	aq		-94.84				
	2000 H_2O	aq		-94.96				
	5000 H_2O	aq		-95.08				
	10000 H_2O	aq		-95.13				
$NiCl_2 \cdot 2H_2O$		c		-220.8				
$NiCl_2 \cdot 4H_2O$		c		-364.7				
$NiCl_2 \cdot 6H_2O$		c		-505.8	-410.5	300.89	75.2	

Table 45-3. Nickel (at. no., 28; at. wt., 58.69)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NiBr_2$		c		-54.2				
		aq		-73.1				
$NiBr_2 \cdot 3H_2O$		c		-277.8				
NiI_2		c		-20.5				
		aq		-42.0				
$Ni(IO_3)_2$		c		-124.5				
		aq		-125.1				
$Ni(IO_3)_2 \cdot 2H_2O$		c, I		-264.9				
		c, II		-263.9				
$Ni(IO_3)_2 \cdot 4H_2O$		c		-401.7				
NiS		c, I		-17.5				
	precipitated	c, II		-18.6				
Ni_3S_2		c		-43.4				

Table 45-4. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NiSO_4$		c		-213.0	-184.9	135.53	18.6	33.4
	std. state, hyp. m=1	aq		-232.2	-188.4	138.09	-34.0	
	in 200 H_2O	aq		-230.3				
	500 H_2O	aq		-230.41				
	1000 H_2O	aq		-230.52				
	2000 H_2O	aq		-230.63				
	5000 H_2O	aq		-230.78				
	10000 H_2O	aq		-230.90				
	20000 H_2O	aq		-231.03				
	50000 H_2O	aq		-231.14				
	∞ H_2O	aq		-232.2				
$NiSO_4 \cdot 6H_2O$	green	c, I		-644.98				
	blue	c, II		-642.5	-531.0	389.22	73.1	82.
$NiSO_4 \cdot 7H_2O$		c		-712.9				
$Ni_2S_2O_6$		aq		-295.6				
$Ni_2S_2O_6 \cdot 6H_2O$		c		-707.9				

Table 45-5. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NiSe		c		-10.				
NiTe		c		-9.				12.3
$Ni(N_3)_2 \cdot H_2O$	nickel azide hydrate	c		45.3				
$Ni(NO_3)_2$		c		-102.2				
		aq		-114.0				
$Ni(NO_3)_2 \cdot 6H_2O$		c		-531.4				
$Ni(NH_3)_4^{++}$	std. state, hyp. m=1	aq			-46.6	34.16		
$Ni(NH_3)_6^{++}$	std. state, hyp. m=1	aq			-59.8	43.83		
$Ni(NO_3)_2 \cdot 6NH_3$		c, I						96.0
$NiCl_2 \cdot NH_3$		c		-108.4				
$NiCl_2 \cdot 2NH_3$		c		-140.0				
$NiCl_2 \cdot 6NH_3$		c		-241.9				
$NiBr_2 \cdot NH_3$		c		-86.6				
$NiBr_2 \cdot 2NH_3$		c		-118.6				
$NiBr_2 \cdot 6NH_3$		c		-225.9				

Table 45-6. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NiI_2 \cdot 2NH_3$		c		-83.1				
$NiI_2 \cdot 6NH_3$		c		-192.4				
$NiSO_4 \cdot \frac{1}{2}NH_3$		c		-231.0				
$NiSO_4 \cdot 2NH_3$		c		-275.8				
$NiSO_4 \cdot 4NH_3$		c		-330.6				
$NiSO_4 \cdot 6NH_3$		c		-382.1				
Ni_2P		c		-44.				
Ni_3P		c		-53.				
Ni_5P_2		c		-105.				
NiSb		c		-15.6				
Ni_5Sb_2		c		-36.4				
Ni_3C		c		11.0				
$NiCO_3$		c			-146.7	107.53		
$Ni(CO)_4$		g					97.	
		liq					74.	

Table 45-7. Nickel (at. no., 28; at. wt., 58.69)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NiBr_2 \cdot 6CH_3OH$		c		-453.4				
$Ni(CN)_2$		c		27.1				
$Ni(CN)_4^{--}$		aq		86.9				
NiSi		c		-20.6				10.9
Ni_2Si		c		-33.6				16.8
NiSn		c		-14.8				
Ni_3Sn		c						23.8
Ni_3Sn_2		c		-37.5				
$2NiI_2 \cdot PbI_2$		c		-85.7				
$2NiI_2 \cdot PbI_2 \cdot 3H_2O$		c		-341.9				

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Table 46-1. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State		At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Co		g			105.	94.	-68.9	42.881	5.5043
		c, III		0.000	0.000	0.000	0.0000	6.8	6.11
Co^+		g			287.27				
Co^{++}		g			687.7				
	std. state, hyp. m=1	aq			-16.1	-12.3	9.016	-37.1	
Co^{+++}		g							
	std. state, hyp. m=1	aq				29.6	-21.70		
CoO		c			-57.2	-51.0	37.38	10.5	
Co_3O_4		c			-210.				
CoH		c			-4.1				
CoH_2		c			-10.2				
$Co(OH)_2$		c			-131.2				
$Co(OH)_3$		c			-176.6				

Table 46-2. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CoF_2		c		-159.				
		aq		-173.6				
$CoF_2 \cdot 4H_2O$		c			-380.9	279.19		
CoF_3		c		-187.				
$CoCl_2$		c		-77.8	-67.5	49.48	25.4	18.8
		aq		-96.1				
$CoCl_2 \cdot 2H_2O$		c		-222.9				
$CoCl_2 \cdot 4H_2O$		c		-367.2				
$CoCl_2 \cdot 6H_2O$		c		-508.9				
$CoBr_2$		c		-55.5				
		aq		-73.9				
$CoBr_2 \cdot 6H_2O$		c		-485.1				
CoI_2		c		-24.4				
		aq		-42.8				

Table 46-3. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Co(IO_3)_2$		c		-124.3				
		aq		-125.9				
$Co(IO_3)_2 \cdot 2H_2O$		c		-264.9				
$Co(IO_3)_2 \cdot 4H_2O$		c		-401.9				
CoS		c, I		-20.2				11.4
	precipitated	c, II		-21.4				
Co_2S_3		c		-51.				
$CoSO_4$		c		-207.5	-182.1	133.48	27.1	
		aq		-232.0				
$CoSO_4 \cdot 6H_2O$		c		-643.2				
$CoSO_4 \cdot 7H_2O$		c		-713.8				96.
CoSe		c		-10.				
CoTe		c		-9.				

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Table 46-4. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Co(NO_3)_2$		c		-102.9				
		aq		-114.8				
$Co(NO_3)_2 \cdot 6H_2O$		c		-529.7				
$Co(NH_3)_6^{++}$	std. state, hyp. m =1	aq			-57.2	41.93		
$Co(NH_3)_6^{+++}$	std. state, hyp. m =1	aq			-54.5	39.95		
$[Co(NH_3)_5H_2O]^{+++}$	std. state, hyp. m =1	aq		-192.9	-106.2	77.843	73.4	
$[Co(NH_3)_5NO_3]^{++}$		aq		-173.0				
$[Co(NH_3)_5NO_3](NO_3)_2$		c		-288.0				
		aq		-271.7				
$[Co(NH_3)_5H_2O](NO_3)_3$		c		-357.4				
		aq		-340.7				
$[Co(NH_3)_5H_2O]F_3$		c		-435.7				

Table 46-5. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CoCl_2 \cdot NH_3$		c		-110.3				
$CoCl_2 \cdot 2NH_3$	rose	c, I		-140.2				
	blue	c, II						
$CoCl_2 \cdot 2N_2H_4$		c		-100.4				
$[Co(NH_3)_4Cl_2]^+$	*cis*	aq		-171.4				
	trans	aq		-173.3				
$[Co(NH_3)_4Cl_2]Cl$	*cis*	c		-220.9				
		aq		-211.4				
	trans	c		-221.6				
		aq		-213.3				
$[Co(NH_3)_5Cl]^{++}$	std. state, hyp. m=1	aq		-162.1	-86.2	63.18	96.1	
$[Co(NH_3)_5Cl]Cl_2$		c		-254.5				
		aq		-242.1				
$CoCl_2 \cdot 6NH_3$		c		-240.2				
$CoCl_3 \cdot 6NH_3$		c						76.7
$[Co(NH_3)_5H_2O]Cl_3$		c		-319.0				
		aq		-312.5				

Table 46-6. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CoBr_2 \cdot NH_3$		c		-88.2				
$CoBr_2 \cdot 2NH_3$	rose	c, I		-120.1				
	blue	c, II						
$CoBr_2 \cdot 2N_2H_4$		c		-80.2				
$[Co(NH_3)_5Br]^{++}$		aq		-152.7				
$[Co(NH_3)_5Br]Br_2$		c		-223.2				
		aq		-210.5				
$CoBr_2 \cdot 6NH_3$		c		-222.8				
$[Co(NH_3)_5H_2O]Br_3$		c		-289.7				
		aq		-280.5				
$CoI_2 \cdot 2NH_3$	blue	c, I		-87.6				
	green	c, II						
$CoI_2 \cdot 6NH_3$		c		-193.1				69.2
$CoI_3 \cdot 6NH_3$		c						74.3

Table 46-7. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CoSO_4 \cdot \frac{1}{2}NH_3$		c		-292.5				
$CoSO_4 \cdot 2NH_3$		c		-338.2				
$CoSO_4 \cdot 3NH_3$		c		-366.0				
$CoSO_4 \cdot 4NH_3$		c		-391.9				
$[Co(NH_3)_5SO_4]^+$	std. state, hyp. m=1	aq			-231.9	169.98		
$CoSO_4 \cdot 6NH_3$		c		-441.7				
CoP		c		-35.				
CoP_3		c		-65.				
Co_2P		c		-47.3				
$CoAs_2 \cdot CoS_2$		c						32.9
CoSb		c		-10.0				12.2
$CoSb_2$		c		-13.2				
Co_3C		c		9.5	7.1	-5.20	29.8	
$CoCO_3$		c		-172.7				

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Table 46-8. Cobalt (at. no., 27; at. wt., 58.94)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CoCl_2 \cdot 2C_2H_5OH$		c		-221.9				
$CoCl_2 \cdot 3C_2H_5OH$		c		-295.1				
$CoCl_2 \cdot 3C_2H_4(OH)_2$		c		-422.1				
$CoBr_2 \cdot 2CH_3OH$		c		-183.3				
$CoBr_2 \cdot 2C_2H_5OH$		c		-199.8				
$CoBr_2 \cdot 2C_2H_4(OH)_2$		c		-290.2				
$CoBr_2 \cdot 3C_2H_5OH$		c		-255.8				
$CoBr_2 \cdot 3C_2H_4(OH)_2$		c		-401.8				
$CoCl_2 \cdot C_2H_4(NH_2)_2$		c		-114.2				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]^+$	*cis*	aq		-127.1				
	trans	aq		-128.9				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl$	*cis*	c		-175.1				
		aq		-167.1				
	trans	c		-174.2				
		aq		-168.9				

Table 46-9. Cobalt (at. no., 27; at. wt., 58.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl \cdot NH_3$	*cis*	c		-202.				
	trans	c		-198.				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl \cdot 2NH_3$	*cis*	c		-226.				
	trans	c		-219.				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl \cdot 4NH_3$	*cis*	c		-268.				
	trans	c		-259.				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl \cdot 6NH_3$	*cis*	c		-308.				
$CoCl_2 \cdot 3C_2H_4(NH_2)_2$		c		-160.5				
$CoBr_2 \cdot 1\frac{1}{2}C_2H_4(NH_2)_2$		c		-109.2				
$CoBr_2 \cdot 3C_2H_4(NH_2)_2$		c		-145.3				
$CoI_2 \cdot 3C_2H_4(NH_2)_2$		c		-116.9				
$Co(C_2H_5SO_4)_2$	cobalt ethylsulfate	aq		-433.7				
CoSi		c		-24.0				
$CoSi_2$		c		-24.6				
$CoSi_3$		c		-25.6				
Co_2Si		c		-27.6				
Co_2Sn		c						19.

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Table 47-1. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Fe			g		96.68	85.76	-62.861	43.11	6.13
			c	0.000	0.000	0.000	0.0000	6.49	6.03
Fe^+			g		277.9				
Fe^{++}			g		650.7				
		std. state, hyp. m=1	aq		-21.0	-20.30	14.880	-27.1	
Fe^{+++}			g		1354.				
		std. state, hyp. m=1	aq		-11.4	-2.52	1.847	-70.1	
Fe^{++++}			g						
$Fe_{0.95}O$		"FeO" wustite	c		-63.7	-58.4	42.81	12.9	
Fe_2O_3		hematite	c		-196.5	-177.1	129.81	21.5	25.0
Fe_3O_4		magnetite	c		-267.0	-242.4	177.68	35.0	

Table 47-2. Iron (at. no., 26; at. wt., 55.85)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State		At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
FeH_2		c							
FeH_3		c							
$Fe(OH)^{++}$	std. state, hyp. m=1	aq			-67.4	-55.91	40.981	-23.2	
FeO(OH)		c							
$Fe(OH)_2$		c			-135.8	-115.57	84.7112	19.	
$Fe(OH)_2^+$	std. state, hyp. m=1	aq				-106.2	77.843		
$Fe(OH)_3$		c			-197.0				
FeF_2		aq			-177.8				
FeF_3		aq			-243.1				

Table 47-3. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$FeCl^{++}$	std. state, hyp. m=1	aq		-42.9	-35.9	26.31	-22.	
$FeCl_2$		c		-81.5	-72.2	52.92	28.6	18.25
	std. state, hyp. m=1	aq		-101.0				
	in 200 H_2O	aq		-100.40				
	500 H_2O	aq		-100.6				
	1000 H_2O	aq		-100.70				
	5000 H_2O	aq		-100.95				
$FeCl_2 \cdot 2H_2O$		c		-228.2				
$FeCl_2 \cdot 4H_2O$		c		-370.7				
$FeCl_3$		c		-96.8				
		aq		-127.9				
$FeCl_3 \cdot 6H_2O$		c		-532.0				

Table 47-4. Iron (at. no., 26; at. wt., 55.85)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$FeBr^{++}$	std. state, hyp. m =1	aq		-34.2	-27.9	20.45	-28.	
$FeBr_2$		c		-60.02				
		aq		-79.1				
$FeBr_3$		aq		-98.1				
FeI_2		c		-29.98				
		aq		-49.03				
FeS	α	c		-22.72	-23.32	17.093	16.1	13.1
	β	c		-21.35				
FeS_2	pyrites	c		-42.52	-39.84	29.202	12.7	14.8
	markasite	c		-36.88				

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Table 47-5. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$FeSO_4$		c		-220.5				
	in 200 H_2O	aq		-236.0				
$FeSO_4 \cdot H_2O$		c		-296.3				
$FeSO_4 \cdot 4H_2O$		c		-507.5				
$FeSO_4 \cdot 7H_2O$		c		-718.7				
$Fe_2(SO_4)_3$		c						
	in 400 H_2O	aq		-653.0				
	1000 H_2O	aq		-653.20				
	2000 H_2O	aq		-653.41				
	3000 H_2O	aq		-653.62				

Table 47-6. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Fe(HSO_4)_3$		aq		-645.7				
FeSe		c		-16.5				
	preciptated	amorp		-13.9				
FeTe		c		-18.6				
Fe_2N		c		-0.9	2.6	-1.91	24.2	16.8
Fe_4N		c		-2.55	0.89	-0.652	37.3	29.3
$Fe(NO_3)_3$		aq		-160.4				
$Fe(NO_3)_3 \cdot 9H_2O$		c		-784.4				
$Fe(NO)Cl_2$		aq		-89.7				

Table 47-7. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$FeCl_2 \cdot NH_3$		c		-115.0				
$FeCl_2 \cdot 2NH_3$		c		-144.3				
$FeCl_2 \cdot 6NH_3$		c		-237.8				
$FeCl_3 \cdot 6NH_3$		c		-214.7				
$FeCl_2 \cdot 10NH_3$		c		-312.4				
$FeBr_2 \cdot NH_3$		c		-91.84				
$FeBr_2 \cdot 2NH_3$		c		-122.75				
$FeBr_2 \cdot 6NH_3$		c		-220.3				
$FeBr_3 \cdot 6NH_3$		c						
$FeI_2 \cdot 2NH_3$		c		-92.98				
$FeI_2 \cdot 6NH_3$		c		-195.1				
$Fe(NO)SO_4$		aq		-224.5				

Table 47-8. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$FeSO_4 \cdot NH_3$		c		-252.0				
$FeSO_4 \cdot 2NH_3$		c		-280.9				
$FeSO_4 \cdot 3NH_3$		c		-306.0				
$FeSO_4 \cdot 4NH_3$		c		-330.6				
$FeSO_4 \cdot 6NH_3$		c		-378.2				
$Fe_2(SO_4)_3 \cdot 12NH_3$		c						
FeP		c		-28.				
FeP_2		c		-42.				
Fe_2P		c		-36.				
Fe_3P		c		-40.				
$FePO_4$		c		-299.6				
$FePO_4 \cdot 2H_2O$		c		-440.8				
$FePO_4 \cdot 4H_2O$		c		-578.8				

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Table 47-9. Iron (at. no., 26; at. wt. 55.85)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
FeSb		c		2.4				
$FeSb_2$		c		3.6				
Fe_3C	cementite	c		5.0	3.5	-2.56	25.7	25.3
$FeCO_3$	siderite	c		-178.70	-161.06	118.055	22.2	19.63
$Fe(CO)_5$		liq		-187.8				
$Fe_2(C_2O_4)_3$	ferric oxalate in 100 H_2O	aq		-611.7				
	400 H_2O	aq		-611.4				
$Fe(HC_2O_4)_3$	ferric bioxalate	aq		-600.1				
$Fe(C_2H_3O_2)_3$	ferric acetate in 300 H_2O	aq		-355.5				
	600 H_2O	aq		-355.2				
	1800 H_2O	aq		-353.8				

Table 47-10. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Fe(CO)_4Cl_2$		c						
$Fe(CO)_4Br_2$		c		-195.7				
	in 1700 H_2O	aq		-188.0				
$Fe(CO)_4I_2$		c		-178.5				
$Fe(CN)_6^{----}$		aq		126.7				
$Fe_4[Fe(CN)_6]_3$		c		338.6				
$FeCO(CN)_5^{---}$		aq		47.2				
$Fe_2CO(CN)_5$		c		98.5				

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Table 47-11. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$HFe(CN)_6^{---}$		aq		126.9				
$H_2Fe(CN)_6^{--}$		aq		127.1				
$H_3Fe(CN)_6$		aq		153.				
$H_3Fe(CN)_6^-$		aq		127.1				
$H_4Fe(CN)_6$		c		127.8				
		aq		127.4				
$(NH_4)_4Fe(CN)_6$		aq		1.4				
$(NH_4)_4Fe(CN)_6 \cdot 6H_2O$		c		-415.3				
$HFeCO(CN)_5^{--}$		aq		47.3				
$H_2FeCO(CN)_5^-$		aq		47.4				
$H_3FeCO(CN)_5$		aq		47.6				
$H_3FeCO(CN)_5 \cdot H_2O$		c		-15.7				

Table 47-12. Iron (at. no., 26; at. wt., 55.85)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Fe(CNS)^{++}$		aq						
FeSi		c		-19.2				11.8
Fe_3Si		c		-20.				
$FeSiO_3$		c		-276.				
Fe_2SiO_4		c		-343.7	-319.8	234.41	35.4	31.75
$2FeI_2 \cdot PbI_2$		c		-101.5				
$Zn_2Fe(CN)_6$		c		49.4				

Table 48-1. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949 (Corrected)

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Mn			g	68.05	68.34	58.23	-42.682	41.493	4.9680
		α	c, IV	0.000	0.000	0.000	0.0000	7.59	6.29
		γ	c, II	0.342	0.37	0.33	-0.242	7.72	6.59
Mn^+			g	239.382	240.863				
Mn^{++}			g	599.97	601.45				
		std. state, hyp. m=1	aq		-52.3	-53.4	39.14	-20.	
Mn^{+++}			g						
			aq		-24.				
MnO			g	34.4	34.6				
			c, I		-92.0	-86.8	63.62	14.4	10.27
MnO_2			c, I		-124.5	-111.4	81.655	12.7	12.91
MnO_4^-			aq		-123.9	-101.6	74.471	45.4	

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Table 48-2. Manganese (at. no., 25; at. wt., 54.93)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Mn_2O_3		c, II		-232.1				25.8
Mn_3O_4		c, I		-331.4	-306.0	224.29	35.5	33.29
$HMnO_4$		aq						
$Mn(OH)_2$	precipitated	amorp		-165.8	-145.9	106.94	21.1	
$Mn(OH)_3$	precipitated	amorp		-212.				
MnF_2		c, I		-189.	-179.	131.2	22.2	16.24
		aq		-209.2				
MnF_3		aq		-260.				
$MnCl_2$		c		-115.3	-105.5	77.330	28.0	17.42
	in 400 H_2O	aq		-132.0				
$MnCl_2 \cdot H_2O$		c		-188.5				
$MnCl_2 \cdot 2H_2O$		c		-276.7				
$MnCl_2 \cdot 4H_2O$		c		-407.0				
H_2MnCl_6		aq		-219.2				

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Table 48-3. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance		ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	State	At 0°K	At 298.16°K (25°C)				
		kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MnBr_2$	c		-90.7				
	aq		-110.1				
$MnBr_2 \cdot H_2O$	c		-164.4				
$MnBr_2 \cdot 4H_2O$	c		-367.5				
$MnBr_3$	aq		-111.				
MnI_2	c		-59.3				
	aq		-79.0				
$MnI_2 \cdot H_2O$	c		-127.9				
$MnI_2 \cdot 2H_2O$	c		-194.5				
$MnI_2 \cdot 4H_2O$	c		-327.5				
$MnI_2 \cdot 6H_2O$	c		-451.				

Table 48-4. Manganese (at. no., 25; at. wt., 54.93)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MnS	green	c, I		-48.8	-49.9	36.58	18.7	11.94
	red	c, II		-47.6				
$MnSO_4$		c		-254.24	-228.48	167.473	26.8	23.94
	std. state, hyp. m=1	aq		-269.2	-230.7	169.10	-16.	
	in 30 H_2O	aq		-266.52				
	50 H_2O	aq		-267.08				
	100 H_2O	aq		-267.47				
	200 H_2O	aq		-267.76				
	400 H_2O	aq		-268.0				
	1000 H_2O	aq		-268.28				
	2000 H_2O	aq		-268.41				
	3000 H_2O	aq		-268.48				
	5000 H_2O	aq		-268.58				

Table 48-5. Manganese (at. no., 25; at. wt., 54.93)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MnSO_4$	in 10000 H_2O	aq		-268.74				
	20000 H_2O	aq		-268.88				
	50000 H_2O	aq		-269.02				
	100000 H_2O	aq		-269.10				
	∞ H_2O	aq		-269.2				
$MnSO_4 \cdot H_2O$		c, I		-328.5				
		c, II		-322.4				
$MnSO_4 \cdot 4H_2O$		c		-539.3				
$MnSO_4 \cdot 5H_2O$		c		-609.6				78.
$MnSO_4 \cdot 7H_2O$		c		-750.0				
MnS_2O_6		aq		-332.7				
$MnS_2O_6 \cdot 2H_2O$		c					66.7	57.68
$MnS_2O_6 \cdot 6H_2O$		c		-744.5				

Table 48-6. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Mn_2(SO_4)_3$		c		-666.9				
		aq		-699.				
MnSe		c, I		-28.0	-29.2	21.40	21.7	12.20
MnTe		c, I					22.4	17.3
$Mn(N_3)_2$	manganese azide	c		92.2				
Mn_5N_2		c		-57.8				43.8
Mn_8N_2		c		-81.				61.0
$Mn(NO_3)_2$		c		-166.32				
	in 2.5 H_2O	aq		-142.58				
	3 H_2O	aq		-143.59				
	4 H_2O	aq		-145.16				
	5 H_2O	aq		-146.21				
	6 H_2O	aq		-146.99				

Table 48-7. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949 (Corrected)

Substance			$\Delta Hf°$	$\Delta Hf°$	$\Delta Ff°$	$\log_{10} Kf$	$S°$	$C_p°$
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Mn(NO_3)_2$	in 8 H_2O	aq		-148.03				
	10 H_2O	aq		-148.69				
	15 H_2O	aq		-149.66				
	25 H_2O	aq		-150.47				
	50 H_2O	aq		-151.08				
	100 H_2O	aq		-151.41				
	200 H_2O	aq		-151.53				
	400 H_2O	aq		-151.59				
	1000 H_2O	aq		-151.65				
$Mn(NO_3)_2 \cdot 3H_2O$		c		-355.1				
$Mn(NO_3)_2 \cdot 6H_2O$		c		-566.50				
		liq		-556.89				146.7

Table 48-8. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MnCl_2 \cdot NH_3$		c		-148.1				
$MnCl_2 \cdot 2NH_3$		c		-175.9				
$MnCl_2 \cdot 2NH_4Cl \cdot 2H_2O$		c		-428.5				
$MnCl_2 \cdot 6NH_3$		c		-267.8				
$MnBr_2 \cdot NH_3$		c		-123.7				
$MnBr_2 \cdot 2NH_3$		c		-155.2				
$MnBr_2 \cdot 6NH_3$		c		-256.5				
$MnI_2 \cdot 2NH_3$		c		-124.7				
$MnI_2 \cdot 6NH_3$		c		-233.4				

Table 48-9. Manganese (at. no., 25; at. wt., 54.93)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MnSO_4 \cdot \frac{1}{2}NH_3$		c		-269.6				
$MnSO_4 \cdot NH_3$		c		-280.6				
$MnSO_4 \cdot 2NH_3$		c		-308.9				
$MnSO_4 \cdot (NH_4)_2SO_4 \cdot 2H_2O$		c		-692.				
$MnSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$		c		-968.				
$MnSO_4 \cdot 5NH_3$		c		-379.2				
$MnSO_4 \cdot 6NH_3$		c		-402.0				
$Mn_2(PO_4)_3$	precipitated	c		-771.				
Mn_3C		c, II		-1.	-1.	0.73	23.6	22.34
$MnCO_3$		c		-213.9	-195.4	143.23	20.5	19.48
	precipitated	c		-211.0				
	std. state, hyp. m =1	aq		-213.9	-179.6	131.64	-32.7	

Table 48-10. Manganese (at. no., 25; at. wt., 54.93)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MnC_2O_4	manganese oxalate	c		-258.2				
$MnC_2O_4 \cdot 2H_2O$		c		-388.6				
$MnC_2O_4 \cdot 3H_2O$		c		-455.4				
$Mn(CHO_2)_2$	manganese formate	c		-242.2				
		aq		-246.5				
$Mn(CHO_2)_2 \cdot 2H_2O$		c		-386.0				
$Mn(C_2H_3O_2)_2$	manganese acetate	c		-273.0				
		aq		-285.2				
$Mn(C_2H_3O_2)_2 \cdot 4H_2O$		c		-556.9				

Table 48-11. Manganese (at. no., 25; at. wt., 54.93)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MnSiO_3$		c		-302.5	-283.3	207.65	21.3	20.64
		gl		-294.0				
$MnI_2 \cdot PbI_2$		c		-156.0				
$MnI_2 \cdot PbI_2 \cdot 3H_2O$		c		-413.3				
$ZnMnO_4$	std. state, hyp. m = 1	aq						-66.0

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Table 49-1. Chromium (at. no., 24; at. wt., 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cr		g	80.	80.5	69.8	-51.16	41.637	4.9680
		c	0.000	0.000	0.000	0.0000	5.68	5.58
Cr^+		g	235.91	237.39				
Cr^{++}		g	618.7	621.7				
		aq		-33.2				
Cr^{+++}		g	1306.	1310.				
$[Cr(6H_2O)]^{+++}$	violet	aq		-471.0				
Cr^{++++}		g	2468.	2474.				
Cr^{+++++}		g	4151.	4158.				
Cr^{++++++}		g	6231.	6240.				
$Cr^{+++++++}$		g	9946.	9956.				

Table 49-2. Chromium (at. no., 24; at. wt., 52.01)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CrO		g	65.	65.				
CrO_3		c		-138.4				
	in 2 H_2O	aq		-139.37				
	3 H_2O	aq		-139.65				
	4 H_2O	aq		-139.87				
	5 H_2O	aq		-140.03				
	6 H_2O	aq		-140.14				
	8 H_2O	aq		-140.32				
	10 H_2O	aq		-140.43				
	15 H_2O	aq		-140.60				
	25 H_2O	aq		-140.78				
	50 H_2O	aq		-140.88				
	80 H_2O	aq		-140.9				
CrO_4^{--}	std. state, hyp. m=1	aq		-206.3	-168.8	123.73	9.2	

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Table 49-3. Chromium (at. no., 24; at. wt., 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cr_2O_3		c		-269.7	-250.2	183.39	19.4	28.38
$Cr_2O_3 \cdot H_2O$		c		-358.				
$Cr_2O_3 \cdot 2H_2O$		c		-439.				
$Cr_2O_3 \cdot 3H_2O$		c		-517.				
$Cr_2O_7^{--}$	std. state, hyp. m=1	aq		-349.1	-300.5	220.26	51.1	
$Cr_2O_9^{--}$		aq		-305.				
Cr_7H_2		c		-3.7				
$[Cr(5H_2O)(OH)]^{++}$		aq		-456.7				
$HCrO_4^-$	std. state, hyp. m=1	aq		-212.8	-177.5	130.10	16.5	
$[Cr(4H_2O)(OH)_2]^+$		aq		-448.9				

Table 49-4. Chromium (at. no., 24; at. wt., 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
H_2CrO_4	std. state, hyp. m=1	aq		-213.5	-178.5	130.84	17.5	
	in 80 H_2O	aq		-209.2				
	∞ H_2O	aq		-213.5				
$Cr(OH)_3$		c		-247.1				
$[Cr(4H_2O)(OH)_2](OH)$		c		-507.5				
$[Cr(5H_2O)(OH)](OH)_2$		c		-579.8				
$HCr_2O_9^{--}$		aq		-322.				
CrF_2		c		-181.0				
CrF_3		c		-265.2				
$[Cr(6H_2O)]F_3$		aq		-704.3				
$H_3[Cr(6H_2O)]F_6$		aq		-931.9				

Table 49-5. Chromium (at. no., 24; at. wt., 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$[Cr(5H_2O)Cl]^{++}$	blue green	aq		-477.7				
$CrCl_2$		c		-94.56	-85.15	62.414	27.4	16.87
		aq		-113.2				
$CrCl_2 \cdot 2H_2O$	light green	c		-237.				
$CrCl_2 \cdot 3H_2O$	pale blue	c		-309.0				
$CrCl_2 \cdot 4H_2O$	dark blue	c		-384.5				
$[Cr(4H_2O)Cl_2]^+$	green	aq		-404.4				
$CrCl_3$		c		-134.6	-118.0	86.492	30.0	21.53
$[Cr(4H_2O)Cl_2]Cl$	green	c		-436.0				
	green	aq		-444.4				
$[Cr(4H_2O)Cl_2]Cl \cdot 2H_2O$	green	c		-581.1				
$[Cr(4H_2O)Cl_2]Cl \cdot 6H_2O$	green	c		-854.3				

Table 49-6. Chromium (at. no., 24; at. wt., 52.01)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$[Cr(5H_2O)Cl]Cl_2$	blue green	aq		-517.7				
$[Cr(6H_2O)]Cl_3$	violet	c		-579.0				
	violet	aq		-591.0				
$CrCl_4$		g		-104.				
CrO_2Cl_2		liq		-135.7				
$[Cr(4H_2O)(OH)_2]Cl$		aq		-488.9				
$[Cr(5H_2O)(OH)]Cl_2$		aq		-536.7				
$[Cr(4H_2O)Br_2]Br$	green	aq		-409.5				
$[Cr(4H_2O)Br_2]Br \cdot 2H_2O$	green	c		-545.5				
$[Cr(6H_2O)]Br_3$	violet	c		-543.3				
	violet	aq		-557.7				
CrI_2		c		-54.2				
		aq		-59.9				

Table 49-7. Chromium (at. no., 24; at. wt., 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$[Cr_2(6H_2O)(SO_4)_3]$	green	aq		-1164.7				
$[Cr_2(6H_2O)(SO_4)_3]\cdot 2H_2O$	green	c		-1287.7				
$[Cr_2(8H_2O)(SO_4)_2](SO_4)$		aq		-1304.9				
$[Cr_2(10H_2O)(SO_4)](SO_4)_2$		aq		-1447.4				
$[Cr_2(12H_2O)](SO_4)_3$	violet	aq		-1589.5				
$[Cr_2(12H_2O)](SO_4)_3\cdot 2H_2O$	violet	c		-1716.0				
$[Cr_2(12H_2O)](SO_4)_3\cdot 3H_2O$	violet	c		-1786.2				
$[Cr_2(12H_2O)](SO_4)_3\cdot 4H_2O$		c		-1855.3				
$[Cr_2(12H_2O)](SO_4)_3\cdot 5H_2O$		c		-1924.8				
$[Cr_2(12H_2O)](SO_4)_3\cdot 6H_2O$		c		-1993.2				
CrN		c		-29.8				
Cr_2N		c		-23.4				

Table 49–8. Chromium (at. no., 24; at. wt. 52.01)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)_2CrO_4$		c		-275.2				
	in 300 H_2O	aq		-269.4				
$(NH_4)_2Cr_2O_7$		c		-425.5				
		aq		-412.6				
CrP		c						
CrP_2		c						
CrSb		c						12.4
$CrSb_2$		c						19.8
Cr_3C_2		c		-21.0	-21.2	15.54	20.4	23.38
Cr_4C		c		-16.4	-16.8	12.31	25.3	25.89
Cr_7C_3		c		-42.5	-43.8	32.10	48.0	49.92

Table 49-9. Chromium (at. no.. 24; at. wt., 52.01)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf^o	ΔHf^o	ΔFf^o	$\log_{10} Kf$	S^o	C_p^o
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$PbCrO_4$		c		-217.7				
$2CrI_2 \cdot PbI_2$		c		-140.2				
$2CrI_2 \cdot PbI_2 \cdot 3H_2O$		c		-368.9				
Ag_2CrO_4		c		-170.15	-148.57	108.900	51.8	34.00
$FeCr_2O_4$		c		-341.9	-317.7	232.87	34.9	31.9

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Table 50-1. Molybdenum (at. no., 42; at. wt., 95.95)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Mo		g		155.5	144.2	-105.70	43.462	4.9680
		c	0.000	0.000	0.000	0.0000	6.83	5.61
Mo^+		g		327.23				
Mo^{++}		g						
MoO_2		c		-130.				
MoO_3		c		-180.33	-161.95	118.707	18.68	17.59
		aq		-188.1				
MoO_4		aq		-173.5				
MoO_4^{--}		aq		-254.3				
MoO_5		aq		-155.1				
H_2MoO_4	$MoO_3 \cdot H_2O$ white	c		-256.9				
		aq		-256.4				
$H_2MoO_4 \cdot H_2O$	$MoO_3 \cdot 2H_2O$ yellow	c		-331.4				

Table 50-2. Molybdenum (at. no., 42; at. wt., 95.95)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MoCl_2$		c		-44.				
$MoCl_3$		c		-65.				
$MoCl_4$		c		-79.				
$MoCl_5$		c		-90.8				
$MoCl_6$		c		-90.				
$MoBr_2$		c		-29.				
$MoBr_3$		c		-41.				
$MoBr_4$		c		-45.				
$MoBr_5$		c		-51.				
MoI_2		c		-12.				
MoI_3		c		-15.				
MoI_4		c		-18.				
MoI_5		c		-18.				

Table 50-3. Molybdenum (at. no., 42; at. wt., 95.95)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MoS_2		c		-55.5	-53.8	39.43	15.1	15.17
MoS_3		c		-61.2				
MoP		c						
MoP_2		c						
Mo_2C		c		4.3	2.9	-2.13	19.7	
$PbMoO_4$		c		-265.8				
$CuMoO_4$		c		-226.6				
$FeMoO_4$		c		-257.5				
$Fe_2(MoO_4)_3$		c		-708.2				

Table 51-1. Tungsten (at. no., 74; at. wt., 183.92)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
W		g		201.6	191.6	-140.44	41.552	5.0903
		c	0.000	0.000	0.000	0.0000	8.0	5.97
W^+		g		387.2				
W^{++}		g						
WO_2		c		-136.3				
WO_3	yellow	c		-200.84	-182.47	133.748	19.90	19.48
WO_4^{--}		aq		-266.6				
W_2O_5		c		-337.9				
H_2WO_4	$WO_3 \cdot H_2O$	c		-279.6				

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Table 51-2. Tungsten (at. no., 74; at. wt., 183.92)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
WCl_2		c		-38.				
WCl_4		c		-71.				
WCl_5		c		-84.				
WCl_6		c		-98.7				
WBr_2		c		-19.				
WBr_4		c		-35.				
WBr_5		c		-42.				
WBr_6		c		-44.				
WI_2		c		-1.				
WI_4		c		0.				
WI_5		c		27.				

Table 51-3. Tungsten (at. no., 74; at. wt., 183.92)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
WS_2		c		-46.3	-46.2	33.86	23.	
WP		c						
WP_2		c						
WC		c		-9.09				
$CuWO_4$		c		-250.0				
$CuWO_4 \cdot 2H_2O$		c		-393.6				
$FeWO_4$		c		-274.1				
$FeWO_4 \cdot 3H_2O$		c		-486.7				
$Fe_2(WO_4)_3 \cdot 8H_2O$		c		-1352.8				

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Table 52-1. Vanadium (at. no., 23; at. wt., 50.95)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
V		g	119.2	120.	109.	-79.90	43.546	6.2166
		c	0.000	0.000	0.000	0.0000	7.05	5.85
V^+		g	274.17	275.65				
V^{++}		g	601.8	604.8				
V^{+++}		g	1213.5	1217.9				
V^{++++}		g	2331.2	2337.1				
V^{+++++}		g	3817.6	3825.0				
V^{++++++}		g	6776.3	6785.2				
$V^{+++++++}$		g	10235.	10245.				
$V^{++++++++}$		g	14220.	14232.				
$V^{+++++++++}$		g						
VO		g	51.	52.				

Table 52-2. Vanadium (at. no., 23; at. wt., 50.95)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
VO_4^-		aq		-210.9				
VO_5^-		aq		-194.9				
V_2O_2		c		-200.				
V_2O_3		c	-288.86	-290.	-271.	198.6	23.58	24.83
V_2O_4		c, II	-341.94	-344.	-318.	233.1	24.65	28.30
$V_2O_4 \cdot 2H_2O$	red	c						
V_2O_5		c	-370.71	-373.	-344.	252.1	31.3	31.00
$V_3O_9^{---}$		aq		-673.5				
$HV_6O_{17}^{---}$	std. state, hyp. m=1	aq			-1127.3	826.295		
$H_2V_6O_{17}^{--}$	std. state, hyp. m=1	aq			-1130.	828.27		
VF_3		aq						

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Table 52-3. Vanadium (at. no., 23; at. wt., 50.95)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
VCl_2		c		-108.	-97.	71.1	23.2	17.26
VCl_3		c		-137.	-120.	87.96	31.3	22.27
VCl_4		liq		-138.				
$VOCl_3$		c		-172.				
$VOSO_4$		c		-312.5				
VN		c		-41.	-35.	25.7	8.91	9.08
NH_4VO_3		c		-251.2	-211.8	155.25	33.6	30.91
VC		c					6.77	7.37

Table 53-1. Columbium (at. no., 41; at. wt., 92.91)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cb		g		184.5	173.7	-127.32	44.492	7.2082
		c	0.000	0.000	0.000	0.0000	8.3	
Cb_2O_4		c		-387.8				
Cb_2O_5		c		-463.2				30.3

Table 54-1. Tantalum (at. no., 73; at. wt., 180.88)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ta		g	184.9	185.	175.	-128.3	44.244	5.0054
		c	0.000	0.000	0.000	0.0000	9.9	6.05
Ta_2O_5		c		-499.9	-470.6	344.94	34.2	32.30
TaN		c		-58.2				9.7
TaP		c						
TaP_2		c						
TaC		c					10.1	8.79

Table 55-1. Titanium (at. no., 22; at. wt., 47.90)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ti		g		112.	101.	-74.0	43.069	5.8385
		c, II	0.000	0.000	0.000	0.0000	7.24	6.010
Ti^+		g		271.09				
Ti^{++}		g		587.0				
Ti^{+++}		g		1225.0				
Ti^{++++}		g		2223.5				
Ti^{+++++}		g		4527.4				
Ti^{++++++}		g		7290.				
$Ti^{+++++++}$		g		10538.				
$Ti^{++++++++}$		g						
TiO		g		43.				
		c, II					8.31	9.55

Table 55-2. Titanium (at. no., 22; at. wt., 47.90)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949; March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
TiO_2	rutile, III	c		-218.0	-203.8	149.38	12.01	13.16
	anatase, III	c					11.93	13.22
	hydrated precipitate	amorp		-207.				
Ti_2O_3		c, II		-367.	-346.	253.6	18.83	23.27
Ti_3O_5		c, II		-584.	-550.	403.1	30.92	37.00
TiF_2		c		-198.				
TiF_3		c		-315.				
TiF_4		c		-370.				
H_2TiF_6		aq		-555.1				
TiCl		g		122.				
$TiCl_2$		c		-114.				
$TiCl_3$		c		-165.				
$TiCl_4$		g					84.4	22.88
		liq		-179.3	-161.2	118.16	60.4	37.5
	hydrolysed	aq		-236.5				

Table 55-3. Titanium (at. no., 22; at. wt., 47.90)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$TiBr_2$		c		-95.				
$TiBr_3$		c		-132.				
$TiBr_4$		c		-155.				
TiI_2		c		-61.				
TiI_3		c		-80.				
TiI_4		c		-102.				
$TiCl_4 \cdot H_2S$		c		-193.0				
$TiCl_4 \cdot 2H_2S$		c		-205.3				
$TiBr_4 \cdot H_2S$		c		-168.4				
$TiBr_4 \cdot 2H_2S$		c		-180.4				
TiN		c		-73.0	-66.1	48.45	7.20	8.86

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Table 55-4. Titanium (at. no., 22; at. wt., 47.90)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$TiCl_4 \cdot PH_3$		c		-195.7				
$TiCl_4 \cdot 2PH_3$		c		-204.3				
$TiBr_4 \cdot PH_3$		c		-168.8				
$TiBr_4 \cdot 2PH_3$		c		-178.4				
TiC		c		-54.	-53.	38.8	5.8	8.04
$FeTiO_3$		c		-288.5	-268.9	197.10	25.3	23.78

Table 56-1. Zirconium (at. no., 40; at. wt., 91.22)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Zr		g		125.	115.	-84.29	43.313	6.3624
		c, II	0.000	0.000	0.000	0.0000	9.18	
Zr^+		g		286.78				
Zr^{++}		g		611.84				
Zr^{+++}		g		1169.0				
Zr^{++++}		g		1953.9				
Zr^{+++++}		g						
ZrO^{++}		aq		-223.1				
ZrO_2		c, III		-258.2	-244.4	179.14	12.03	
$ZrO_2 \cdot 5H_2O$		amorp		-625.3				
$ZrO(OH)_2$		c		-338.0				

Table 56-2. Zirconium (at. no., 40; at. wt., 91.22)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Zr(OH)_4$		c		-411.2				
$Zr(OH)_4 \cdot H_2O$		c		-482.9				
$Zr(OH)_4 \cdot 2H_2O$		c		-554.2				
ZrF_2		c		-230.				
ZrF_3		c		-350.				
ZrF_4		c		-445.				
$ZrCl_2$		c		-145.				
$ZrCl_3$		c		-208.				
$ZrCl_4$		c		-230.	-209.	153.2	44.5	
$ZrOCl_2$		aq		-303.1				
$ZrOCl_2 \cdot 2H_2O$		c		-423.7				
$ZrOCl_2 \cdot 3\frac{1}{2}H_2O$		c		-533.2				
$ZrOCl_2 \cdot 6H_2O$		c		-712.3				
$ZrOCl_2 \cdot 8H_2O$		c		-852.7				

Table 56-3. Zirconium (at. no., 40; at. wt., 91.22)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
June 30, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ZrBr_2$		c		-120.				
$ZrBr_3$		c		-174.				
$ZrBr_4$		c		-192.				
$ZrOBr_2$		aq		-280.9				
$ZrOBr_2 \cdot 3\frac{1}{2}H_2O$		c		-511.0				
$ZrOBr_2 \cdot 8H_2O$		c		-829.5				
ZrI_2		c		-90.				
ZrI_3		c		-128.				
ZrI_4		c		-130.				
$ZrOSO_4$		aq		-486.3				
$Zr(SO_4)_2$		c		-597.4				26.7
$Zr(SO_4)_2 \cdot H_2O$		c		-677.9				
$Zr(SO_4)_2 \cdot 4H_2O$		c		-893.1				

Table 56-4. Zirconium (at. no., 40; at. wt., 91.22)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ZrN		c		-82.2	-75.4	55.27	9.23	
$ZrO(NO_3)_2$		aq		-321.8				
$ZrO(NO_3)_2 \cdot 2H_2O$		c		-456.3				
$ZrO(NO_3)_2 \cdot 3H_2O$		c		-527.3				
$ZrO(NO_3)_2 \cdot 3\frac{1}{2}H_2O$		c		-562.8				
$ZrO(NO_3)_2 \cdot 6H_2O$		c		-737.6				
ZrC		c		-45.				
$ZrSiO_4$		c					20.1	23.53

Table 57-1. Hafnium (at. no., 72; at. wt., 178.6)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

June 30, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Hf			g					44.65	
			c	0.000	0.000	0.000	0.0000	13.1	6.15
HfO_2			c		-271.5				

Table 58-1. Boron (at. no., 5; at. wt., 10.82)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
B		g	96.	97.2	86.7	-63.55	36.649	4.971
		c	0.000	0.000	0.000	0.0000	1.56	2.66
		amorp		0.4			1.56 + x[a]	2.859
B^+		g	287.32	290.00				
B^{++}		g	867.30	871.46				
B^{+++}		g	1741.81	1747.45				
B^{++++}		g	7721.70	7728.82				
B^{+++++}		g	15565.6	15574.2				
B_2		g	123.	124.5				

[a] x = entropy of randomness of arrangement of B (amorp) at 0°K

Table 58-2. Boron (at. no., 5; at. wt., 10.82)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BO		g	-6.	-5.3	-11.6	8.50	47.22	6.95
BO_2^-		aq		-183.5				
B_2O_3		c		-302.0	-283.0	207.44	12.91	14.88
		gls		-297.6	-280.4	205.53	18.8	14.6
$B_4O_7^{--}$		aq						
BH		g	73.	73.8	67.1	-49.18	39.62	6.95
B_2H_6	diborane	g		7.5	19.8	-14.51	55.66	13.48
B_4H_{10}	tetraborane	g						
B_5H_9	pentaborane	g		15.0	39.6	-29.03	65.88	19.
		liq		7.8	38.8	-28.44	44.16	35.8
B_5H_{11}		liq						
$B_{10}H_{14}$	decaborane	c		8.				

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Table 58-3. Boron (at. no., 5; at. wt., 10.82)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
HBO_2		c		-186.9	-170.5	124.97	11.	
		aq		-186.9				
$H_2BO_3^-$	std. state, hyp. m = 1	aq		-251.8	-217.63	159.520	7.3	
H_3BO_3		c		-260.2	-230.2	168.73	21.41	19.61
	std. state, hyp. m = 1	aq		-255.2	-230.24	168.762	38.2	
	in 50 H_2O	aq		-255.28				
	700 H_2O	aq		-255.21				
	∞ H_2O	aq		-255.2				
$H_2B_4O_7$		c		-676.5				

Table 58-4. Boron (at. no., 5; at. wt., 10.82)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BF		g	-18.	-17.4				
BF_3		g		-265.4	-261.3	191.53	60.70	12.06
		aq		-289.8				
BF_4^-	std. state, hyp. m=1	aq		-365.	-343.	251.4	40.	
$H8F_4$		aq		-365.				
BCl		g	25.	25.6				5.59
BCl_3		g		-94.5	-90.9	66.63	69.29	14.97
		liq		-100.0	-90.6	66.41	50.0	
BBr		g		25.				
BBr_3		g		-44.6	-51.0	37.38	77.49	16.25
		liq		-52.8	-52.4	38.41	54.7	
B_2H_5Br		g						

Table 58-5. Boron (at. no., 5; at. wt., 10.82)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
B_2S_3		c		-57.0				
BN		g	90.	90.6				
		c		-32.1	-27.2	19.94	8.	5.9
$B_3N_3H_6$	hexahydro-s-triazatriborine, borazole	g					73.7	23.3
NH_4BO_2		aq		-215.2				
NH_4BO_3		aq		-193.7				
$NH_4BO_3 \cdot H_2O$		c		-270.8				
$(NH_4)_2HBO_3$		aq		-305.5				
B_4C		c					6.47	12.55
$B(CH_3)_3$		liq		-31.4				

Table 59-1. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Al		g	74.4	75.0	65.3	-47.86	39.303	5.112
		c	0.000	0.000	0.000	0.0000	6.769	5.817
Al^+		g	212.406	214.487				
Al^{++}		g	646.500	650.062				
Al^{+++}		g	1302.40	1307.44				
	std. state, hyp. m=1	aq		-125.4	-115.0	84.29	-74.9	
Al^{++++}		g	4068.82	4075.34				
Al^{+++++}		g	7615.09	7623.09				
Al^{++++++}		g	12006.6	12016.1				
$Al^{+++++++}$		g	17585.9	17596.9				
$Al^{++++++++}$		g	24162.	24174.				
$Al^{+++++++++}$		g	31775.	31789.				
$Al^{++++++++++}$		g	40966.	40982.				
$Al^{+++++++++++}$		g	51156.	51173.				

Table 59-2. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AlO		g	45.	45.3				
AlO_2^-		aq		-218.6				
Al_2O_3	α, corundum	c	-396.19	-399.09	-376.77	276.167	12.186	18.88
	γ	c		-384.84				
$Al_2O_3 \cdot H_2O$		c		-471.	-435.	318.8	23.15	31.37
$Al_2O_3 \cdot 3H_2O$	hydrargillite	c		-613.7	-547.9	401.60	33.51	44.49
AlH		g	59.	59.2				
$Al(OH)_3$		amorp		-304.2				

Table 59-3. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AlF		g	51.	51.4				
		c						
AlF_3		c		-311.	-294.	215.5	23.	
		aq		-361.4				
$AlF_3 \cdot \frac{1}{2}H_2O$		c		-357.4	-333.6	244.52	28.	
$AlF_3 \cdot 3H_2O$		c		-549.1	-490.4	359.46	50.	
H_3AlF_6		aq		-597.2				
AlCl		g	-5.	-4.9				
$AlCl_3$		c		-166.2	-152.2	111.56	40.	21.3
	in 600 H_2O	aq		-245.5				
$AlCl_3 \cdot 6H_2O$		c		-641.1	-542.4	397.57	90.	
Al_2Cl_6		g		-303.6				

Table 59-4. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AlBr		g		1.8				
$AlBr_3$		c		-125.8	-120.7	88.47	44.	24.5
		aq		-211.9				
AlI		g	31.	30.6				
AlI_3		c		-75.2	-75.0	54.97	48.	
		aq		-165.8				

Table 59-5. Aluminum (at. no., 13; at. wt., 26.97)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Al_2S_3		c		-121.6	-117.7	86.27	23.	
$Al_2(SO_4)_3$		c		-820.98	-738.99	541.670	57.2	62.00
		aq		-897.1				
$Al_2(SO_4)_3 \cdot 6H_2O$		c		-1268.14	-1105.14	810.054	112.1	117.8
$Al_2(SO_4)_3 \cdot 18H_2O$		c		-2118.5				
$AlCl_3 \cdot \frac{1}{2}SO_2$		c		-210.8				
$AlCl_3 \cdot SO_2$		c		-251.6				
$AlCl_3 \cdot \frac{1}{2}H_2S$		c		-173.3				
$AlCl_3 \cdot H_2S$		c		-180.2				
$AlBr_3 \cdot H_2S$		c		-140.3				
$AlI_3 \cdot 2H_2S$		c		-103.1				
$AlI_3 \cdot 4H_2S$		c		-125.7				

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Table 59-6. Aluminum (at. no., 13; at. wt., 26.97)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AlN		c		-57.7	-50.1	36.72	5.	7.67
$Al(NO_3)_3$		aq		-273.65				
$Al(NO_3)_3 \cdot 6H_2O$		c		-680.65	-525.82	385.419	111.8	103.5
$Al(NO_3)_3 \cdot 9H_2O$		c		-897.34	-700.2	513.24	136.	
$AlF_3 \cdot 2NH_4F \cdot \frac{3}{2}H_2O$		c		-673.7				
$AlCl_3 \cdot NH_3$		c		-211.3				
$AlCl_3 \cdot NH_4Cl$		c		-255.0				
$AlCl_3 \cdot 3NH_3$		c		-283.1				
$AlCl_3 \cdot 5NH_3$		c		-341.5				
$AlCl_3 \cdot 6NH_3$		c		-366.5				94.2
$AlCl_3 \cdot 7NH_3$		c		-387.7				
$AlCl_3 \cdot NH_4Cl \cdot 6NH_3$		c		-444.2				
$AlCl_3 \cdot 14NH_3$		c		-519.6				

Table 59-7. Aluminum (at. no., 13; at. wt., 26.97)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$AlBr_3 \cdot NH_3$		c		-178.1				
$AlBr_3 \cdot 3NH_3$		c		-254.8				
$AlBr_3 \cdot 5NH_3$		c		-319.8				
$AlBr_3 \cdot 6NH_3$		c		-347.2				
$AlBr_3 \cdot 7NH_3$		c		-368.9				
$AlBr_3 \cdot 9NH_3$		c		-407.8				
$AlBr_3 \cdot 14NH_3$		c		-501.6				
$AlI_3 \cdot NH_3$		c		-119.9				
$AlI_3 \cdot 3NH_3$		c		-208.3				
$AlI_3 \cdot 5NH_3$		c		-291.8				
$AlI_3 \cdot 6NH_3$		c		-317.2				
$AlI_3 \cdot 7NH_3$		c		-339.9				
$AlI_3 \cdot 9NH_3$		c		-379.2				
$AlI_3 \cdot 13NH_3$		c		-454.4				
$AlI_3 \cdot 20NH_3$		c		-585.4				

Table 59-8. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$(NH_4)Al(SO_4)_2$		c		-561.24	-485.95	356.195	51.7	54.12
	in 1500 H_2O	aq		-591.00				
	2000 H_2O	aq		-591.23				
	2500 H_2O	aq		-591.46				
	3000 H_2O	aq		-591.60				
	3500 H_2O	aq		-591.74				
$(NH_4)Al(SO_4)_2 \cdot 12H_2O$		c		-1419.40	-1179.02	864.207	166.6	163.3
$(NH_4)_2O \cdot 3Al_2O_3 \cdot 4SO_3 \cdot 6H_2O$	ammonium alunite	c		-2406.45				
$(NH_4)_2O \cdot 3Al_2O_3 \cdot 5SO_3 \cdot 9H_2O$	ammonium basic alum	c		-2758.65				
$AlCl_3 \cdot PH_3$		c		-173.9				
$AlBr_3 \cdot PH_3$		c		-137.9				
$AlI_3 \cdot PH_3$		c		-91.				

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Table 59-9. Aluminum (at. no., 13; at. wt., 26.97)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Al_4C_3		c		-30.9	-29.0	21.26	25.	33.6
$Al(CH_3)_3$		liq		-26.9				
Al_2SiO_5	andalusite	c		-642.2	-607.8	445.51	25.0	32.14
	disthene	c		-642.7	-607.0	444.92	20.7	29.0
	sillimanite	c		-648.9	- 615.0	450.79	27.0	30.45
$2AlI_3 \cdot 3PbI_2$		c		-234.				
$2AlI_3 \cdot 3PbI_2 \cdot 10H_2O$		c		-1122.				
AlCu		c		-10.				
$AlCu_2$		c		-16.				
Al_2Cu		c		-10.				
$AlCl_3 \cdot AgCl$		c		-198.9				

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Table 59-10. Aluminum (at. no., 13; at. wt., 26.97)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

September 30, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
AlNi		c		-34.				
$AlNi_3$		c		-38.				
Al_2Ni		c		-38.				
Al_3Ni		c		-38.				
AlCo		c		-26.				
Al_4Co		c		-38.				
Al_5Co_2		c		-70.				
AlFe		c		-12.				
Al_2Fe		c		-20.				
Al_3Fe		c		-27.				

Table 60-1. Scandium (at. no., 21; at. wt., 45.10)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sc			g		93.			41.76	5.282
			c	0.000	0.000	0.000	0.0000		
Sc^+			g		245.75				
Sc^{++}			g		544.51				
Sc^{+++}			g		1116.81				
		std. state, hyp. m=1	aq		-148.8	-143.7	105.33		
Sc^{++++}			g		2822.8				
Sc^{+++++}			g		4942.				
Sc^{++++++}			g		7505.				
$Sc^{+++++++}$			g						
Sc_2O_3			c						21.

Table 60-2. Scandium (at. no., 21; at. wt., 45.10)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ScCl_3$		c		-220.8				
	std. state, hyp. m=1	aq		-268.9	-237.7	174.23		
$ScBr_3$		c		-179.4				
	std. state, hyp. m=1	aq		-235.5	-217.4	159.35		
$Sc_2(SO_4)_3$		c						62.
$ScF_3 \cdot 3NH_4F$		c						90.0
$Sc_2(C_2O_4)_3$	scandium oxalate	c						114.1
$Sc(CHO_2)_3$	scandium formate	c						53.8

Table 61-1. Yttrium (at. no., 39· at. wt., 88.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Y			g		103.			42.87	6.181
			c	0.000	0.000	0.000	0.0000		
Y^+			g		255.04				
Y^{++}			g		542.37				
Y^{+++}			g		1016.33				
		std. state, hyp. m=1	aq		-168.0	-164.1	120.28		
Y^{++++}			g						
Y_2O_3			c						23.
$Y(OH)_3$			c		-337.6	-308.3	225.98		

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Table 61-2. Yttrium (at. no., 39; at. wt., 88.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
YCl_3	Y	c		-234.8				
	std. state, hyp. m=1	aq		-288.1	-258.1	189.18		
YI_3	β	c		-143.2				
	std. state, hyp. m=1	aq		-208.1	-201.1	147.40		
$Y_2(SO_4)_3$		c						61.
	std. state, hyp. m=1	aq		-986.7	-860.2	630.51		
$Y_2(SO_4)_3 \cdot 8H_2O$		c		-1512.6	-1327.3	972.89		138.
$Y(NO_3)_3$		c						75.7
$Y_2(MoO_4)_3$		c						105.

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Table 62-1. Lutetium (at. no., 71; at. wt., 174.99)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Lu		g		87.			44.14	4.988
		c	0.000	0.000	0.000	0.0000		
Lu^+		g		203.8				
Lu^{++}		g						
Lu^{+++}	std. state, hyp. m=1	aq		-160.1	-155.0	113.61		
$LuCl_3$	γ	c		-227.9				
	std. state, hyp. m=1	aq		-280.2	-249.0	182.51		
LuI_3	β	c		-133.2				
	std. state, hyp. m=1	aq		-200.2	-192.0	140.73		
$Lu_2(SO_4)_3$	std. state, hyp. m=1	aq		-970.9	-842.0	617.17		
$Lu_2(SO_4)_3 \cdot 8H_2O$		c			-1308.1	958.82		

Table 63-1. Ytterbium (at. no., 70; at. wt., 173.04)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Yb		g		87.			41.30	4.968
		c	0.000	0.000	0.000	0.0000		
Yb^+		g		231.5				
Yb^{++}		g		511.				
	std. state, hyp. m=1	aq			-129.0	94.56		
Yb^{+++}		g						
	std. state, hyp. m=1	aq		-160.6	-155.5	113.98		
$YbCl_3$	Y	c		-228.7				
	std. state, hyp. m=1	aq		-280.7	-249.5	182.88		
$Yb_2(SO_4)_3$	std. state, hyp. m=1	aq		-971.9	-843.0	617.91		
$Yb_2(SO_4)_3 \cdot 8H_2O$		c			-1308.8	959.33		

Table 64-1. Thulium (at. no., 69; at. wt., 169.4)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Tm		g					45.2	
		c	0.000	0.000	0.000	0.000		
Tm^+		g						
Tm^{+++}	std. state, hyp. m=1	aq		-161.3	-156.5	114.71		
$TmCl_3$	γ	c		-229.5				
	std. state, hyp. m=1	aq		-281.4	-250.5	183.61		
TmI_3	β	c		-137.8				
	std. state, hyp. m=1	aq		-201.4	-193.5	141.83		

Table 65-1. Erbium (at. no., 68; at. wt., 167.2)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949 (Corrected)

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Er		g						
		c	0.000	0.000	0.000	0.000		
Er^+		g						
Er^{+++}	std. state, hyp. m=1	aq		-162.3	-157.5	115.45		
Er_2O_3		c						25.
$Er(OH)_3$		c		-340.5				
$ErCl_3$	γ	c		-231.8				
	std. state, hyp. m=1	aq		-282.4	-251.5	184.35		
ErI_3	β	c		-140.0				
	std. state, hyp. m=1	aq		-202.4	-194.5	142.57		
$Er_2(SO_4)_3$		c						65.
	std. state, hyp. m=1	aq		-975.3	-847.0	620.84		
$Er_2(SO_4)_3 \cdot 8H_2O$		c			-1313.9	963.07		139.
$Er(C_2H_3O_2)_3$	erbium acetate	aq		-512.8				
$Er(C_2H_3O_2)_3 \cdot 4H_2O$		c		-785.6				

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Table 66-1. Holmium (at. no., 67; at. wt., 164.94)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ho		g						
		c	0.000	0.000	0.000	0.0000		
Ho^+		g						
Ho^{+++}	std. state, hyp. m=1	aq		-163.7	-159.2	116.69		
$HoCl_3$	Y	c		-232.8				
	std. state, hyp. m=1	aq		-283.8	-253.2	185.59		
HoI_3	β	c		-141.7				
	std. state, hyp. m=1	aq		-203.8	-196.2	143.81		
$Ho_2(SO_4)_3$	std. state, hyp. m=1	aq		-978.1	-850.4	623.33		
$Ho_2(SO_4)_3 \cdot 8H_2O$		c			-1318.0	966.08		

Table 67-1. Dysprosium (at. no., 66; at. wt., 162.46)
HEAT DF FDRMATION AT D°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CDNSTANT DF FORMATIDN, ENTRDPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At D°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Dy		g		87.				
		c	0.000	0.000	0.000	0.000		
Dy^+		g		245.8				
Dy^{++}		g						
Dy^{+++}	std. state, hyp. m=1	aq		-166.0	-161.2	118.16		
$Dy(DH)_3$		c			-305.8	224.15		
$DyCl_3$	β	c		-237.8				
	γ	c		-234.8				
	std. state, hyp. m=1	aq		-286.1	-255.2	187.06		
DyI_3	β	c		-144.5				
	std. state, hyp. m=1	aq		-206.1	-198.2	145.28		
$Dy_2(SO_4)_3$	std. state, hyp. m=1	aq		-982.7	-854.4	626.26		
$Dy_2(SO_4)_3 \cdot 8H_2O$		c			-1322.0	969.01		

Table 68-1. Terbium (at. no., 65; at. wt., 159.2)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Tb		g		87.				
		c	0.000	0.000	0.000	0.0000		
Tb^+		g		244.0				
Tb^{++}		g						
Tb^{+++}	std. state, hyp. m = 1	aq		-168.4	-163.9	120.14		
$TbCl_3$	β	c		-241.6				
	std. state, hyp. m = 1	aq		-288.5	-257.9	189.04		
$Tb_2(SO_4)_3$	std. state, hyp. m = 1	aq		-987.5	-859.8	630.22		
$Tb_2(SO_4)_3 \cdot 8H_2O$		c			-1328.2	973.55		

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Table 69-1. Gadolinium (at. no., 64; at. wt., 156.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Gd		g		87.	77.	-56.4	46.41	6.586
		c	0.000	0.000	0.000	0.000	14.	
Gd^+		g		230.55				
Gd^{++}		g						
Gd^{+++}	std. state, hyp. m=1	aq		-168.8	-164.6	120.65	-47.1	
$Gd(OH)_3$		c			-308.1	225.83		
$GdCl_3$	α	c		-245.5				
	std. state, hyp. m=1	aq		-288.9	-258.6	189.55	-7.6	
GdI_3	β	c		-147.6				
	std. state, hyp. m=1	aq		-208.9	-201.6	147.77	-31.3	
$Gd_2(SO_4)_3$	std. state, hyp. m=1	aq		-988.3	-861.2	631.25	-81.9	
$Gd_2(SO_4)_3 \cdot 8H_2O$		c		-1518.9	-1329.8	974.72	155.8	140.5

Table 70-1. Europium (at. no., 63; at. wt., 152.0)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Eu		g		87.			45.10	4.968
		c	0.000	0.000	0.000	0.0000		
Eu^+		g		219.23				
Eu^{++}		g		480.0				
	std. state, hyp. m=1	aq			-155.2	113.76		
Eu^{+++}		g						
	std. state, hyp. m=1	aq		-169.3	-165.1	121.02		
$EuCl_3$	α	c		-247.1				
	std. state, hyp. m=1	aq		-289.4	-259.2	189.99		
$Eu_2(SO_4)_3$	std. state, hyp. m=1	aq		-989.3	-862.2	631.98		
$Eu_2(SO_4)_3 \cdot 8H_2O$		c			-1331.0	975.60		146.3

Table 71-1. Samarium (at. no., 62; at. wt., 150.43)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sm		g		87.			43.74	7.254
		c	0.000	0.000	0.000	0.0000		
Sm^+		g		217.7				
Sm^{++}		g		482.				
Sm^{+++}		g						
	std. state, hyp. m = 1	aq		-169.8	-165.9	121.60		
$Sm(OH)_3$		c			-308.8	226.35		
$SmCl_3$	α	c		-249.8				
	std. state, hyp. m = 1	aq		-289.9	-259.9	190.50		
SmI_3	β	c		-153.4				
	std. state, hyp. m = 1	aq		-209.9	-202.9	148.72		

Table 71-2. Samarium (at. no., 62; at. wt., 150.43)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Sm_2(SO_4)_3$	std. state, hyp. m=1	aq		-990.3	-863.8	633.15		
$Sm_2(SO_4)\cdot 8H_2O$		c			-1332.6	976.78		
$SmCl_3\cdot NH_3$		c		-282.3				
$SmCl_3\cdot 2NH_3$		c		-310.3				
$SmCl_3\cdot 3NH_3$		c		-336.8				
$SmCl_3\cdot 4NH_3$		c		-361.9				
$SmCl_3\cdot 5NH_3$		c		-385.2				
$SmCl_3\cdot 8NH_3$		c		-452.2				
$SmCl_3\cdot 9\frac{1}{2}NH_3$		c		-483.8				
$SmCl_3\cdot 11\frac{1}{2}NH_3$		c		-524.3				

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Table 72-1. Promethium (at. no., 61; at. wt., 147.)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pm		g						
		c	0.000	0.000	0.000	0.0000		
Pm^+		g						
Pm^{+++}	std. state, hyp. m = 1	aq		-170.4				
$PmCl_3$		c		-251.9				
	std. state, hyp. m = 1	aq		-290.6				

Table 73-1. Neodymium (at. no., 60; at. wt., 144.27)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Nd		g		87.				
		c, III	0.000	0.000	0.000	0.000		7.2
Nd^+		g		234.1				
Nd^{++}		g						
Nd^{+++}	std. state, hyp. m = 1	aq		-171.2	-167.6	122.85		
Nd_2O_3		c		-442.0				
$Nd(OH)_3$		c			-309.6	226.93		
$NdCl_3$	α	c		-254.3				
	std. state, hyp. m = 1	aq		-291.3	-261.6	191.75		
$NdCl_3 \cdot 6H_2O$		c		-692.3				
NdI_3	α	c		-158.9				
	std. state, hyp. m = 1	aq		-211.3	-204.6	149.97		

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Table 73-2. Neodymium (at. no., 60; at. wt., 144.27)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Nd_2S_3		c		-281.8				
$Nd_2(SO_4)_3$		c		-948.1				
	std. state, hyp. m=1	aq		-993.1	-867.2	635.65		
$Nd_2(SO_4)_3 \cdot 5H_2O$		c		-1318.4				
$Nd_2(SO_4)_3 \cdot 8H_2O$		c		-1524.7	-1334.5	978.17		
$NdCl_3 \cdot NH_3$		c		-286.0				
$NdCl_3 \cdot 2NH_3$		c		-314.5				
$NdCl_3 \cdot 4NH_3$		c		-364.6				
$NdCl_3 \cdot 5NH_3$		c		-388.3				
$NdCl_3 \cdot 8NH_3$		c		-444.2				
$NdCl_3 \cdot 11NH_3$		c		-505.8				
$NdCl_3 \cdot 12NH_3$		c		-525.1				

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Table 74-1. Praseodymium (at. no., 59; at. wt., 140.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf^o	ΔHf^o	ΔFf^o	$\log_{10} Kf$	S^o	C_p^o
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pr		g		87.				
		c	0.000	0.000	0.000	0.0000		6.8
Pr^+		g		221.4				
Pr^{++}		g						
Pr^{+++}	std. state, hyp. m=1	aq		-172.7	-169.1	123.95		
PrO_2		c		-234.0				
Pr_2O_3		c		-444.5				
Pr_6O_{11}		c		-1391.				
$Pr(OH)_3$		c			-310.7	227.74		
$PrCl_3$	"	c		-257.8				
	std. state, hyp. m=1	aq		-292.8	-263.1	192.85		
$PrCl_3 \cdot H_2O$		c		-330.8				
$PrCl_3 \cdot 7H_2O$		c		-764.5				

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Table 74-2. Praseodymium (at. no., 59; at. wt., 140.92)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
PrI_3	α	c		-162.0				
	std. state, hyp. m=1	aq		-212.8	-206.1	151.07		
$Pr_2(SO_4)_3$	std. state, hyp. m=1	aq		-996.1	-870.2	637.84		
$Pr_2(SO_4)_3 \cdot 8H_2O$		c			-1337.0	980.00		
$Pr(NO_3)_3$		aq		-318.8				
$PrAl_4$		c		-52.1				

Table 75-1. Cerium (at. no., 58; at. wt., 140.13)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ce		g		85.				
		c, III	0.000	0.000	0.000	0.000	13.8	6.19
Ce^+		g		245.9				
Ce^{++}		g		531.1				
Ce^{+++}		g		994.				
	std. state, hyp. m=1	aq		-173.8	-170.5	124.97	-44.	
Ce^{++++}		g		1842.				
	in $HClO_4$(aq)	aq		-134.4				
Ce^{+++++}		g						
CeO_2		c		-233.				15.1
$CeO_3 \cdot 2H_2O$		c		-389.				
Ce_3H_8		c		-170.				

Table 75-2. Cerium (at. no., 58; at. wt., 140.13)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ce(OH)^{+++}$	std. state, hyp. m=1	aq			-187.7	137.58		
$Ce(OH)_2^{++}$	std. state, hyp. m=1	aq			-244.0	178.85		
$CeCl_3$	α	c		-260.3				
	std. state, hyp. m=1	aq		-293.9	-264.5	193.87	-5.	
CeI_3	α	c		-164.4				
	std. state, hyp. m=1	aq		-213.9	-207.5	152.09	34.	
CeS_2		c		-153.9				
Ce_2S_3		c		-298.7				
$Ce(SO_4)_2$		c		-560.				
$Ce_2(SO_4)_3$		c						66.
	std. state, hyp. m=1	aq		-998.3	-873.0	639.90	-76.	
$Ce_2(SO_4)_3 \cdot 5H_2O$		c		-1308.				132.
$Ce_2(SO_4)_3 \cdot 8H_2O$		c			-1340.2	982.35		
$Ce_2(SO_4)_3 \cdot 9H_2O$		c			-1396.8	1023.83		

Table 75-3. Cerium (at. no., 58; at. wt., 140.13)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CeN		c		-78.3				11.2
$CeCl_3 \cdot 2NH_3$		c		-322.0				
$CeCl_3 \cdot 4NH_3$		c		-375.1				
$CeCl_3 \cdot 8NH_3$		c		-455.2				
$CeCl_3 \cdot 12NH_3$		c		-525.4				
$CeCl_3 \cdot 20NH_3$		c		-657.7				
$CeHg_4$		c		-21.5				
$Ce_2(MoO_4)_3$		c						96.
$CeAl_4$		c, II		-39.				
Ce_3Al		c		-22.				

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Table 76-1. Lanthanum (at. no., 57; at. wt., 138.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
La		g		88.	79.	-57.9	43.57	5.438
		c, III	0.000	0.000	0.000	0.0000	13.7	6.6
La^+		g		218.95				
La^{++}		g		484.10				
La^{+++}		g		927.59				
	std. state, hyp. m=1	aq		-176.2	-172.9	126.73	-44.	
La^{++++}		g						
La_2O_3		c		-458.				24.2
La_3H_8		c		-382.				37.
$La(OH)_3$		c			-312.8	229.28		

Table 76-2. Lanthanum (at. no., 57; at. wt., 138.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LaCl_3$		α	c		-263.6				
		std. state, hyp. m = 1	aq		-296.3	-266.9	195.63	-5.	
		in 400 H_2O	aq		-294.984				
		500 H_2O	aq		-295.062				
		600 H_2O	aq		-295.112				
		700 H_2O	aq		-295.158				
		800 H_2O	aq		-295.194				
		1000 H_2O	aq		-295.254				
		1500 H_2O	aq		-295.358				
		2000 H_2O	aq		-295.430				
		3000 H_2O	aq		-295.522				
		5000 H_2O	aq		-295.638				
		10000 H_2O	aq		-295.784				
		20000 H_2O	aq		-295.914				
		50000 H_2O	aq		-296.044				
		100000 H_2O	aq		-296.114				
		200000 H_2O	aq		-296.168				
		500000 H_2O	aq		-296.216				
		1000000 H_2O	aq		-296.234				
		∞ H_2O	aq		-296.3				

Table 76-3. Lanthanum (at. no., 57; at. wt., 138.92)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LaI_3	α	c		-167.4				
	std. state, hyp. m=1	aq		-216.3	-209.9	153.85	34.	
LaS_2		c		-156.7				
La_2S_3		c		-306.8				
$La_2(SO_4)_3$		c						67.
	std. state, hyp. m=1	aq		-1003.1	-877.8	643.41	-76.	
	in 1800 H_2O	aq		-994.06				
	2000 H_2O	aq		-994.14				
	3000 H_2O	aq		-994.41				
	4000 H_2O	aq		-994.58				
	5000 H_2O	aq		-994.68				
	7500 H_2O	aq		-994.87				
	10000 H_2O	aq		-995.02				
	20000 H_2O	aq		-995.54				
	50000 H_2O	aq		-996.60				

Table 76-4. Lanthanum (at. no., 57; at. wt., 138.92)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$La_2(SO_4)_3$	in 100000 H_2O	aq		-997.61				
	200000 H_2O	aq		-998.60				
	500000 H_2O	aq		-999.73				
	1000000 H_2O	aq		-1000.72				
	2000000 H_2O	aq		-1001.58				
	∞ H_2O	aq		-1003.1				
$La_2(SO_4)_3 \cdot 9H_2O$		c			-1403.1	1028.45		152.
LaN		c		-72.1				11.1
$La(NO_3)_3 \cdot 6H_2O$		c, II						100.7
$La(CHO_2)_3$	lanthanum formate	c						79.7
$La_2(CN_2)_3$	lanthanum cyanamide	c		-229.				
$La_2(MoO_4)_3$		c						86.
$LaAl_2$		c		-36.1				
$LaAl_4$		c, II		-42.2				

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Table 79-1. Plutonium (at. no., 94; at. wt., 239.)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Pu		g						
		c	0.000	0.000	0.000	0.0000		
Pu^+		g						
Pu^{+++}		aq		-141.8				
Pu^{++++}	in $HClO_4 \cdot 55H_2O$	aq		-127.0				
PuO_2		c		-251.				
PuO_2^+	in $HClO_4 \cdot 55H_2O$	aq		-213.				
PuO_2^{++}	in $HClO_4 \cdot 55H_2O$	aq		-196.3				
PuH_2		c		-31.7				
$Pu(OH)_4$		c						
PuF_3		aq		-374.6				
$PuCl_3$		c		-230.0				
		aq		-261.9				
PuOCl		c		-222.8				
$PuBr_3$		c		-187.8				
		aq		-228.5				
PuI_3		c		-133.				

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Table 80-1. Neptunium (at. no., 93; at. wt., 237)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Np		g						
		c	0.000	0.000	0.000	0.0000		
Np^+		g						
Np^{+++}	in $HCl \cdot 55H_2O$	aq		-127.3				
Np^{++++}	in $HCl \cdot 55H_2O$	aq		-133.2				
NpO_2^+	in $HCl \cdot 55H_2O$	aq		-230.8				
NpO_2^{++}	in $HCl \cdot 55H_2O$	aq		-208.5				
NpF_3		c		-360.				
NpF_4		c		-428.				
$NpCl_3$		c		-216.				
	in $HCl \cdot 55H_2O$	aq		-291.2				
$NpCl_4$		c		-237.				
$NpCl_5$		c		-246.				
$NpBr_3$		c		-174.				
$NpBr_4$		c		-183.				
NpI_3		c		-120.				

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Table 81-1. Uranium (at. no., 92; at. wt., 238.07)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
U		g		125.				
		c, III	0.000	0.000	0.000	0.0000	12.03	6.57
U^+		g		218.				
U^{++}		g						
U^{+++}		g						
	std. state, hyp. m = 1	aq		-123.0	-124.4	91.18	-30.	
U^{++++}	std. state, hyp. m = 1	aq		-146.7	-138.4	101.44	-78.	

Table 81-2. Uranium (at. no., 92; at. wt., 238.07)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
UO_2		c		-270.	-257.	188.4	18.6	
UO_2^+	std. state, hyp. m=1	aq		-247.4	-237.6	174.16	12.	
UO_2^{++}	std. state, hyp. m=1	aq		-250.4	-236.4	173.28	-17.	
UO_3		c		-302.	-283.	207.4	23.57	
$UO_3 \cdot H_2O$		c		-375.4				
$UO_3 \cdot 2H_2O$		c		-446.2				
$UO_4 \cdot 2H_2O$		c		-436.				
U_3O_8		c		-898.				
UH_3		c		-30.4				
$U(OH)^{+++}$	std. state, hyp. m=1	aq		-204.1	-193.5	141.83	-30.	

Table 81-3. Uranium (at. no., 92; at. wt., 238.07)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
UF_3		c		-357.	-339.	248.5	26.	
UF_4		c		-443.	-421.	308.6	36.1	28.12
UF_5		c		-488.	-461.	337.9	43.	
UF_6		g		-505.	-485.	355.5	90.76	
		c		-517.	-486.	356.2	54.45	
UO_2F_2		c					32.40	24.68
UCl_3		c		-213.0	-196.9	144.32	37.99	
UCl_4		c		-251.2	-230.0	168.59	47.4	
UCl_5		c		-262.1	-237.4	174.01	62.	
UCl_6		c		-272.4	-241.5	177.02	68.3	
UO_2Cl_2		aq		-331.				

Table 81-4. Uranium (at. no., 92; at. wt., 238.07)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
UBr_3		c		-170.1	-164.7	120.72	49.	
UBr_4		c		-196.6	-188.5	138.17	58.	
UO_2Br_2		aq		-308.2				
UI_3		c		-114.7	-115.3	84.51	56.	
UI_4		c		-127.0	-126.1	92.43	65.	
UCl_3I		c		-219.9	-204.4	149.82	54.	
UBr_3I		c		-177.1				
UO_2SO_4	std. state, hyp. m=1	aq		-467.3	-413.7	303.24	-13.	
$UO_2SO_4 \cdot 3H_2O$		c		-666.8	-586.0	429.53	63.	
$U(SO_4)_2$		c		-563.				

Table 81-5. Uranium (at. no., 92; at. wt., 238.07)
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)
December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
UN		c		-80.	-75.	55.0	18.	
U_2N_3		c		-213.	-194.	142.2	29.	
$UO_2(NO_3)_2$		c		-329.2	-273.1	200.18	66.	
	std. state, hyp. m=1	aq		-349.1	-289.2	211.98	53.	
$UO_2(NO_3)_2 \cdot H_2O$		c		-404.8	-335.3	245.77	76.	
$UO_2(NO_3)_2 \cdot 2H_2O$		c		-480.0	-396.6	290.70	85.	
$UO_2(NO_3)_2 \cdot 3H_2O$		c		-552.2	-454.7	333.29	94.	
$UO_2(NO_3)_2 \cdot 6H_2O$		c		-764.3	-625.0	458.12	120.85	

Table 81-6. Uranium (at. no., 92; at. wt., 238.07)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
UC		c						
UC_2		c		-42.	-42.	30.8	14.	
$UO_2(C_2H_3O_2)_2$	uranyl acetate	aq		-484.0				
$UO_2(C_2H_3O_2)_2 \cdot 2H_2O$		c		-624.9				
$UO_2(C_2H_3O_2)_2 \cdot NH_4C_2H_3O_2 \cdot 6H_2O$		c		-1045.8				
UO_2CrO_4		aq		-456.7				
$UO_2CrO_4 \cdot 5\frac{1}{2}H_2O$		c		-838.8				

Table 83-1. Thorium (at. no., 90; at. wt., 232.12)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Th		g					45.43	
		c	0.000	0.000	0.000	0.0000	13.6	7.7
Th^+		g						
Th^{++++}		aq		-183.0				
ThO_2		c		-292.				20.38
ThH_4		c		-43.				
$Th(OH)_4$	"soluble"	c		-421.5				
ThF_4		c		-477.				

Table 83-2. Thorium (at. no., 90; at. wt., 232.12)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ThCl_4$		c		-285.				
		aq		-343.0				
$ThCl_4 \cdot 2H_2O$		c		-437.4				
$ThCl_4 \cdot 4H_2O$		c		-589.2				
$ThCl_4 \cdot 7H_2O$		c		-805.9				
$ThCl_4 \cdot 8H_2O$		c		-877.6				
$ThOCl_2$		c		-274.8				
$Th(OH)Cl_3 \cdot H_2O$		c		-377.4				
$ThBr_4$		c		-227.1				
		aq		-298.6				
$ThBr_4 \cdot 7H_2O$		c		-753.7				
$ThBr_4 \cdot 10H_2O$		c		-971.6				
$ThBr_4 \cdot 12H_2O$		c		-1116.0				
$ThOBr_2$		c		-252.8				

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Table 83-3. Thorium (at. no., 90; at. wt., 232.12)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
ThI_4		c		-131.				
$ThOI_2$		c		-228.2				
$ThOI_2 \cdot 3\frac{1}{2}H_2O$		c		-479.3				
$Th(OH)I_3 \cdot 10H_2O$		c		-952.4				
Th_2S_3		c		-262.0				
$ThOSO_4$		c		-487.				
$Th(SO_4)_2$		c		-602.				41.
		aq		-616.8				
$Th(SO_4)_2 \cdot 4H_2O$		c		-882.7				
$Th(SO_4)_2 \cdot 8H_2O$		c		-1168.6				

Table 83-4. Thorium (at. no., 90; at. wt., 232.12)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Th_3N_4		c		-308.				37.3
$Th(NO_3)_4$	in 20 H_2O	aq		-379.10				
	25 H_2O	aq		-379.70				
	50 H_2O	aq		-380.36				
	100 H_2O	aq		-380.48				
	500 H_2O	aq		-380.5				
$Th(NO_3)_4 \cdot NH_4NO_3 \cdot H_2O$		c		-446.				
$Th(NO_3)_4 \cdot NH_4NO_3 \cdot 8H_2O$		c		-994.				
$5Th(NO_3)_4 \cdot 4NH_4NO_3 \cdot 11H_2O$		c		-2995.				
$5Th(NO_3)_4 \cdot 4NH_4NO_3 \cdot 25H_2O$		c		-3918.				

Table 83-5. Thorium (at. no., 90; at. wt., 232.12)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$ThCl_4 \cdot NH_4Cl$		c		-373.6				
$ThCl_4 \cdot 2NH_4Cl \cdot 10H_2O$		c		-1172.6				
$ThCl_4 \cdot 4NH_3$	α	c		-408.3				
$ThCl_4 \cdot 6NH_3$	α	c		-460.9				
$[Th(NH_3)_6]Cl_4$	β	c		-498.7				
$ThCl_4 \cdot 7NH_3$	α	c		-483.4				
$[Th(NH_3)_6]Cl_4 \cdot NH_3$	β	c		-531.0				
$ThCl_4 \cdot 12NH_3$	α	c		-586.7				
$[Th(NH_3)_6]Cl_4 \cdot 6NH_3$	β	c		-632.7				
$ThCl_4 \cdot 18NH_3$	α	c		-704.1				
$[Th(NH_3)_6]Cl_4 \cdot 12NH_3$	β	c		-746.8				
ThC_2		c		-45.				

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Table 85-1. Beryllium (at. no., 4; at. wt. 9.013)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Be		g		76.63	67.60	-49.550	32.545	4.9680
		c	0.000	0.000	0.000	0.0000	2.28	4.26
Be^+		g		293.049				
Be^{++}		g		714.393				
	in acid solution	aq		-93.				
Be^{+++}		g		4263.92				
Be^{++++}		g		9284.95				
BeO		g		11.8	5.7	-4.18	47.18	6.963
		c		-146.0	-139.0	101.88	3.37	6.07
BeO_2^{--}		aq		-187.8				
BeH		g		78.1	71.3	-52.26	40.84	6.956

Table 85-2. Beryllium (at. no., 4; at. wt., 9.013)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Be(OH)_2$	α	c		-216.8				
	β	c		-216.1				
$BeO \cdot Be(OH)_2$	precipitated	c		-366.2				
BeF_2		aq		-251.4				
$BeCl_2$		c		-122.3				
	in HCl (aq)	aq		-173.4				
	in C_2H_6O (ethanol)			-160.				
$BeCl_2 \cdot 4H_2O$		c		-436.8				
$BeBr_2$		c		-88.4				
	in HCl (aq)	aq		-151.				
BeI_2		c		-50.6				
	in HCl (aq)	aq		-120.				

Table 85-3. Beryllium (at. no., 4; at. wt., 9.013)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BeS		c		-55.9				
$BeSO_4$		c		-286.0				21.
	in 15 H_2O	aq		-301.50				
	18 H_2O	aq		-301.89				
	20 H_2O	aq		-302.08				
	25 H_2O	aq		-302.42				
	30 H_2O	aq		-302.65				
	40 H_2O	aq		-302.92				
	50 H_2O	aq		-303.09				
	100 H_2O	aq		-303.50				
	200 H_2O	aq		-303.83				
	400 H_2O	aq		-304.1				
	1000 H_2O	aq		-304.46				
	2000 H_2O	aq		-304.79				
	5000 H_2O	aq		-305.10				

Table 85-4. Beryllium (at. no., 4; at. wt., 9.013)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BeSO_4 \cdot H_2O$		c		-361.				
$BeSO_4 \cdot 2H_2O$		c		-433.2				
$BeSO_4 \cdot 4H_2O$		c		-576.3				
$BeSO_4 \cdot 4BeO$		c		-871.4				
$BeBr_2 \cdot 2H_2S$		c		-115.7				
$BeI_2 \cdot 2H_2S$		c		-74.2				
Be_3N_2		c		-135.7				
$Be(NO_3)_2$		aq		-188.3				

Table 85-5. Beryllium (at. no., 4; at. wt., 9.013)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

December 31, 1949

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BeCl_2 \cdot 2NH_3$		c		-206.4				
$BeCl_2 \cdot 4NH_3$		c		-265.2				
$BeCl_2 \cdot 6NH_3$		c		-303.1				
$BeCl_2 \cdot 12NH_3$		c		-414.9				
$BeBr_2 \cdot 4NH_3$		c		-239.4				
$BeBr_2 \cdot 6NH_3$		c		-278.8				
$BeBr_2 \cdot 10NH_3$		c		-353.6				
$BeI_2 \cdot 4NH_3$		c		-212.4				
$BeI_2 \cdot 6NH_3$		c		-252.0				
$BeI_2 \cdot 13NH_3$		c		-383.4				
Be_2SiO_4		c					15.4	22.84
$BeMoO_4$		c		-330.				
$Be(AlO_2)_2$		c						25.

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Table 86-1. Magnesium (at. no., 12 ; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Mg		g		35.9	27.6	-20.23	35.504	4.9680
		c	0.000	0.000	0.000	0.0000	7.77	5.71
Mg^+		g		213.663				
Mg^{++}		g		561.788				
	std. state, hyp. m = 1	aq		-110.41	-108.99	79.888	-28.2	
Mg^{+++}		g		2410.91				
Mg^{++++}		g		4932.91				
Mg^{+++++}		g		8191.4				
Mg^{++++++}		g		12502.2				
$Mg^{+++++++}$		g		17699.6				
$Mg^{++++++++}$		g		23834.5				
$Mg^{+++++++++}$		g		31398.				
$Mg^{++++++++++}$		g		39872.				
$Mg^{+++++++++++}$		g		80490.				

Table 86-2. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MgO		c		-143.84	-136.13	99.781	6.4	8.94
	finely divided	c		-142.95	-135.31	99.180	6.66	9.03
MgO_2		c		-148.9				
MgH		g		41.	34.	-24.9	47.61	7.050
$Mg(OH)_2$		c		-221.00	-199.27	146.062	15.09	18.41
MgF		g		-20.	-27.	19.8	54.85	7.82
MgF_2		c		-263.5	-250.8	183.83	13.68	14.72
MgCl		g		2.				
$MgCl_2$		c		-153.40	-141.57	103.769	21.4	17.04
	std. state, hyp. m =1	aq		-190.46	-171.69	125.846	-1.9	
	in 10 H_2O	aq		-185.65				
	12 H_2O	aq		-186.06				
	15 H_2O	aq		-187.25				
	20 H_2O	aq		-188.05				

Table 86-3. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgCl_2$	in 25 H_2O	aq		-188.43				
	50 H_2O	aq		-189.14				
	75 H_2O	aq		-189.37				
	100 H_2O	aq		-189.49				
	200 H_2O	aq		-189.72				
	300 H_2O	aq		-189.81				
	400 H_2O	aq		-189.88				
	500 H_2O	aq		-189.93				
	1000 H_2O	aq		-190.05				
	1500 H_2O	aq		-190.11				
	2000 H_2O	aq		-190.15				
	3000 H_2O	aq		-190.20				
	5000 H_2O	aq		-190.25				
	10000 H_2O	aq		-190.31				
	50000 H_2O	aq		-190.38				
	100000 H_2O	aq		-190.41				
	500000 H_2O	aq		-190.43				
	∞ H_2O	aq		-190.46				

Table 86–4. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgCl_2 \cdot H_2O$		c		−231.15	−206.11	151.076	32.8	27.48
$MgCl_2 \cdot 2H_2O$		c		−305.99	−267.32	195.942	43.0	38.02
$MgCl_2 \cdot 4H_2O$		c		−454.00	−390.49	286.224	63.1	57.70
$MgCl_2 \cdot 6H_2O$		c		−597.42	−505.65	370.635	87.5	75.46
$MgO \cdot MgCl_2$		c		−312.6				
$MgO \cdot MgCl_2 \cdot 6H_2O$		c		−742.1				
$MgO \cdot MgCl_2 \cdot 16H_2O$		c		−1440.8				
$Mg(ClO_4)_2$		c		−140.6				
		aq		−172.5				
$Mg(ClO_4)_2 \cdot 2H_2O$		c		−290.7				
$Mg(ClO_4)_2 \cdot 4H_2O$		c		−438.6				
$Mg(ClO_4)_2 \cdot 6H_2O$		c		−583.2				
Mg(OH)Cl		c		−191.3	−175.0	128.27	19.8	

Table 86-5. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgBr_2$		c		-123.7				
	std. state, hyp m = 1	aq		-168.21	-158.14	115.914	10.4	
	in 25 H_2O	aq		-166.66				
	50 H_2O	aq		-167.16				
	75 H_2O	aq		-167.33				
	100 H_2O	aq		-167.41				
	250 H_2O	aq		-167.53				
	500 H_2O	aq		-167.67				
	1000 H_2O	aq		-167.80				
	2500 H_2O	aq		-167.92				
	5000 H_2O	aq		-167.99				
	10000 H_2O	aq		-168.05				
	50000 H_2O	aq		-168.14				
	100000 H_2O	aq		-168.16				
	500000 H_2O	aq		-168.18				
	∞ H_2O	aq		-168.21				
$MgBr_2 \cdot 6H_2O$		c		-575.4	-491.0	359.90	95.	

Table 86-6. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MgI_2		c		-86.0				
	std. state, hyp. m = 1	aq		-137.15	-133.69	97.993	24.1	
MgS		c		-83.0				
$MgSO_3$		c		-241.0				
$MgSO_3 \cdot 3H_2O$		c		-461.6				
$MgSO_3 \cdot 6H_2O$		c		-673.4				
$MgSO_4$		c		-305.5	-280.5	152.83	21.9	23.01
	std. state, hyp. m = 1	aq		-327.31	-286.33	209.876	-24.0	
	in 200 H_2O	aq		-326.23				
	400 H_2O	aq		-326.34				
	500 H_2O	aq		-326.37				
	1000 H_2O	aq		-326.47				
	1500 H_2O	aq		-326.54				
	2000 H_2O	aq		-326.58				

Table 86–7. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgSO_4$	in 3000 H_2O	aq		-326.66				
	5000 H_2O	aq		-326.75				
	10000 H_2O	aq		-326.88				
	20000 H_2O	aq		-326.97				
	50000 H_2O	aq		-327.09				
	100000 H_2O	aq		-327.16				
	200000 H_2O	aq		-327.21				
	500000 H_2O	aq		-327.25				
	1000000 H_2O	aq		-327.27				
	∞ H_2O	aq		-327.31				
$MgSO_4 \cdot 2H_2O$		c		-381.9				
$MgSO_4 \cdot 4H_2O$		c		-595.5				
$MgSO_4 \cdot 6H_2O$		c		-736.6				
$MgSO_4 \cdot 7H_2O$		c		-808.7				
MgS_2O_3		aq		-264.				
$MgS_2O_3 \cdot 3H_2O$		c		-462.1				
$MgS_2O_3 \cdot 6H_2O$		c		-677.3				

Table 86-8. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
MgTe		c		-50.				
Mg_3N_2	α	c		-110.24				24.99
$Mg(NO_3)_2$		c		-188.72	-140.63	103.080	39.2	33.94
	std. state, hyp. m=1	aq		-209.15	-161.81	118.605	41.8	
	in 15 H_2O	aq		-208.410				
	25 H_2O	aq		-208.612				
	50 H_2O	aq		-208.658				
	100 H_2O	aq		-208.706				
	250 H_2O	aq		-208.772				
	500 H_2O	aq		-208.820				
	1000 H_2O	aq		-208.865				
	2500 H_2O	aq		-208.918				
	5000 H_2O	aq		-208.958				
	10000 H_2O	aq		-209.000				
	50000 H_2O	aq		-209.074				
	100000 H_2O	aq		-209.098				
	500000 H_2O	aq		-209.124				
	∞ H_2O	aq		-209.15				

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Table 86-9. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Mg(NO_3)_2 \cdot 6H_2O$		c		-624.36				
$Mg(NH_3)_2^{++}$		aq		-147.8				
$MgCl_2 \cdot NH_3$		c		-185.8				
$MgCl_2 \cdot 2NH_3$		c		-215.2				
		aq		-227.8				
$MgBr_2 \cdot NH_3$		c		-157.1				
$MgBr_2 \cdot 2NH_3$		c		-188.8				
$MgI_2 \cdot 2NH_3$		c		-156.0				
$Mg(NH_3)_2SO_4$		aq		-364.6				
$3MgSO_3 \cdot (NH_4)_2SO_3 \cdot 6H_2O$		c		-1380.2				
$3MgSO_3 \cdot (NH_4)_2SO_3 \cdot 18H_2O$		c		-2230.2				

889115 O—51—25

Table 86-10. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Mg_3(PO_4)_2$		c		-961.5				
$MgHPO_4$		aq		-422.2				
$Mg(NH_4)PO_4 \cdot 6H_2O$		c		-881.0				
$Mg_3(AsO_4)_2$		c		-731.3				
$MgHAsO_4$		aq		-349.2				
$Mg(H_2AsO_4)_2$		aq		-541.0				
$Mg(NH_4)AsO_4 \cdot 6H_2O$		c		-800.7				
Mg_3Sb_2		c		-68.1				
Mg_3Bi_2		c		-36.5				

Table 86-11. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgCO_3$		c		-266.	-246.	180.3	15.7	18.05
$Mg(C_2H_3O_3)_2$	magnesium glycollate	c		-415.9				
		aq		-420.3				
$Mg(C_2H_3O_3)_2 \cdot 2H_2O$		c		-558.7				
$MgCl_2 \cdot 6CH_3OH$		c		-509.				
$MgCl_2 \cdot 6C_2H_5OH$		c		-610.				
$MgCN_2$	magnesium cyanamide	c		-60.3				
$Mg(CN)_2$		aq		-31.9				
$Mg(NO_3)_2 \cdot 6CH_3OH$		c		-560.				
$Mg(NO_3)_2 \cdot 6C_2H_5OH$		c		-603.				
Mg_2Si		c		-18.6				
$MgSiO_3$		c		-357.9	-337.2	247.16	16.2	19.56
Mg_2SiO_4	forsterite	c		-488.2	-459.8	337.03	22.7	28.21
Mg_2Sn		c		-17.0				

Table 86-12. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔH°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Mg_2 \cdot Pb$		c		-12.6				
$2MgI_2 \cdot PbI_2$		c		-205.0				
MgTl		c		-11.				
$MgZn_2$		c		-12.6				
MgCd		c, II		-9.2				
$MgHgBr_4$		aq		-207.6				
$MgHg_2Br_4$		aq		-244.9				
Mg_2HgBr_6		aq		376.7				
Mg_4HgBr_{10}		aq		-713.7				
$MgHg(CN)_4$		aq		21.8				
$MgHg_2(CN)_6$		aq		86.1				
$2Hg(CN)_2 \cdot MgCl_2$		aq		-52.7				
$2Hg(CN)_2 \cdot MgCl_2 \cdot 6H_2O$		c		-472.1				
$2Hg(CN)_2 \cdot MgBr_2$		aq		-31.6				
$2Hg(CN)_2 \cdot MgBr_2 \cdot 8H_2O$		c		-593.4				
$2Hg(CN)_2 \cdot MgI_2$		aq		-4.4				
$2Hg(CN)_2 \cdot MgI_2 \cdot 8H_2O$		c		-570.2				

Table 86-13. Magnesium (at. no., 12; at. wt., 24.32)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$MgCrO_4$		c		-318.3				
		aq		-321.2				
$MgCr_2O_4$		c					25.3	30.32
$MgTiO_3$		c					17.8	21.93
Mg_4Al_3		c		-48.7				
MgPr		c		-8.2				
Mg_3Pr		c		-11.1				
MgLa		c		-5.7				
Mg_3La		c		-12.8				
$2La(NO_3)_2 \cdot 3Mg(NO_3)_2 \cdot 24H_2O$		c					525.2	483.2
MgCe		c		-13.				
$MgCe_3$		c		-17.				

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National Bureau of Standards — Washington, D.C.

Table 87-1. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ca		g	45.94	46.04	37.98	-27.839	36.993	4.968
		c, II	0.000	0.000	0.000	0.0000	9.95	6.28
Ca^+		g	186.878	188.459				
Ca^{++}		g	460.58	463.64				
	std. state, hyp. m = 1	aq		-129.77	-132.18	96.886	-13.2	
Ca^{+++}		g	1641.5	1646.0				
Ca^{++++}		g	3191.	3197.				
Ca^{+++++}		g	5137.	5145.				
CaO		c		-151.9	-144.4	105.84	9.5	10.23
CaO_2		c		-157.5				
$CaO_2 \cdot 8H_2O$		c		-719.7				
CaH		g	59.	58.7				
CaH_2		c		-45.1	-35.8	26.24	10.	
$Ca(OH)_2$		c		-235.80	-214.33	157.101	18.2	20.2
	std. state, hyp. m = 1	aq		-239.68	-207.37	152.000	-18.2	
$Ca(OH)_2 \cdot H_2O_2$		c		-291.3				

Table 87-2. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CaF		g	-9.	-9.3				
CaF_2		c		-290.3	-277.7	203.55	16.46	16.02
	std. state, hyp. m = 1	aq		-287.09	-264.34	193.758	-17.8	
CaCl		g	7	6.7				
$CaCl_2$		c		-190.0	-179.3	131.42	27.2	17.36
	std. state, hyp. m = 1	aq		-209.82	-194.88	142.844	13.1	
	in 25 H_2O			-208.51				
	50 H_2O			-208.86				
	100 H_2O			-209.055				
	200 H_2O			-209.200				
	400 H_2O			-209.3				
	500 H_2O			-209.320				
	800 H_2O			-209.385				
	1000 H_2O			-209.41				
	5000 H_2O			-209.60				
	∞ H_2O			-209.82				

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Table 87-3. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaCl_2 \cdot H_2O$		c		-265.1				
$CaCl_2 \cdot 2H_2O$		c		-335.5				
$CaCl_2 \cdot 4H_2O$		c		-480.2				
$CaCl_2 \cdot 6H_2O$		c		-623.15				
$CaOCl_2$		c		-178.6				
		aq		-189.1				
$CaOCl_2 \cdot H_2O$		c		-249.2				
$Ca(OCl)_2$		aq		-180.0				
$CaCl_2 \cdot 2CaO$		c		-505.				
$CaCl_2 \cdot 3CaO$		c		-654.				
$CaCl_2 \cdot 3CaO \cdot \frac{1}{2}H_2O$		c		-910.6				
$CaCl_2 \cdot 3CaO \cdot 6H_2O$		c		-1833.				

Table 87-4. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaBr_2$		c		-161.3	-156.8	114.93	31.	
	std. state, hyp. m = 1	aq		-187.57	-181.33	132.912	25.4	
	in 400 H_2O	aq		-187.0				
	1000 H_2O	aq		-187.17				
	2000 H_2O	aq		-187.24				
	4000 H_2O	aq		-187.30				
	∞ H_2O	aq		-187.57				
$CaBr_2 \cdot 6H_2O$		c		-597.2				
$CaBr_2 \cdot 3CaO \cdot 16H_2O$		c		-1810.				
CaI_2		c		-127.8	-126.6	92.80	34.	
	std. state, hyp. m = 1	aq		-156.51	-156.88	114.991	39.1	
	in 400 H_2O	aq		-156.0				
	∞ H_2O	aq		-156.51				
$CaI_2 \cdot 8H_2O$		c		-700.7				
$CaI_2 \cdot 3CaO \cdot 16H_2O$		c		-1779.				

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Table 87-5. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CaS		c		-115.3	-114.1	83.63	13.5	11.33
		aq		-119.8				
$CaSO_3$		c					24.2	21.90
$CaSO_3 \cdot 2H_2O$		c		-421.2	-374.1	274.21	44.	42.7
$CaSO_4$	anhydrite	c		-342.42	-315.56	231.301	25.5	23.8
	soluble α	c		-340.27	-313.52	229.806	25.9	23.9
	soluble β	c		-339.21	-312.46	229.029	25.9	23.8
	std. state, hyp. m=1	aq		-346.67	-309.52	226.874	-9.1	
	in 2500 H_2O	aq		-345.95				
	5000 H_2O	aq		-346.040				
	7500 H_2O	aq		-346.116				
	10000 H_2O	aq		-346.174				
	20000 H_2O	aq		-346.312				
	50000 H_2O	aq		-346.446				
	100000 H_2O	aq		-346.520				
	200000 H_2O	aq		-346.574				
	500000 H_2O	aq		-346.620				
	∞ H_2O	aq		-346.67				
$CaSO_4 \cdot \frac{1}{2}H_2O$	α	c		-376.47	-343.02	251.429	31.2	28.6
	β	c		-375.97	-342.78	251.253	32.1	29.6
$CaSO_4 \cdot 2H_2O$		c		-483.06	-429.19	314.590	46.36	44.5

Table 87-6. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CaS_2O_3	in 35 H_2O	aq		-282.86				
	100 H_2O	aq		-283.10				
	200 H_2O	aq		-283.25				
	400 H_2O	aq		-283.32				
	1000 H_2O	aq		-283.4				
$CaS_2O_3 \cdot 6H_2O$		c			-602.2	441.40		
CaSe		c		-74.7	-73.5	53.87	16.	
CaTe		c					19.	
CaN_6	calcium azide	c		75.8				
Ca_3N_2		c		-103.2	-88.1	64.57	25.	22.5
$CaN_2O_2 \cdot 4H_2O$		c		-405.7				
$Ca(NO_2)_2$		c		-178.3				
		aq		-180.5				

Table 87-7. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ca(NO_3)_2$		c		-224.00	-177.34	129.988	46.2	35.69
	std. state, hyp. m=1	aq		-228.51	-185.00	135.602	56.8	
	in 10 H_2O	aq		-229.48				
	25 H_2O	aq		-229.31				
	50 H_2O	aq		-229.123				
	75 H_2O	aq		-228.970				
	100 H_2O	aq		-228.832				
	200 H_2O	aq		-228.556				
	300 H_2O	aq		-228.470				
	400 H_2O	aq		-228.426				
	500 H_2O	aq		-228.400				
	1000 H_2O	aq		-228.345				
	2000 H_2O	aq		-228.326				
	5000 H_2O	aq		-228.344				
	10000 H_2O	aq		-228.374				
	50000 H_2O	aq		-228.436				
	100000 H_2O	aq		-228.456				
	500000 H_2O	aq		-228.484				
	∞ H_2O	aq		-228.51				

Table 87-8. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ca(NO_3)_2$	in 100 C_2H_5OH			-231.28				
	∞ C_2H_5OH			-231.58				
$Ca(NO_3)_2 \cdot 2H_2O$		c		-368.00	-293.51	215.139	64.3	
$Ca(NO_3)_2 \cdot 3H_2O$		c		-437.18	-349.0	255.81	74.	
$Ca(NO_3)_2 \cdot 4H_2O$		c, II		-509.37	-406.5	297.96	81.	
$Ca(NH_2)_2$		c		-91.6				
$Ca(NO_3)_2 \cdot Ca(OH)_2$		c		-461.7				
$Ca(NO_3)_2 \cdot Ca(OH)_2 \cdot 2\frac{1}{2}H_2O$		c		-641.1				
$CaCl_2 \cdot NH_3$		c		-217.3				
$CaCl_2 \cdot 2NH_3$		c		-242.8				
$CaCl_2 \cdot 4NH_3$		c		-285.0				
$CaCl_2 \cdot 8NH_3$		c		-368.5				
$CaBr_2 \cdot NH_3$		c		-189.6				
$CaBr_2 \cdot 2NH_3$		c		-217.1				
$CaBr_2 \cdot 6NH_3$		c		-307.3				
$CaBr_2 \cdot 8NH_3$		c		-349.0				

Table 87-9. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaI_2 \cdot NH_3$		c		-157.7				
$CaI_2 \cdot 2NH_3$		c		-186.9				
$CaI_2 \cdot 6NH_3$		c		-285.3				
$CaI_2 \cdot 8NH_3$		c		-316.1				
Ca_3P_2		c		-120.5				
$Ca_3(PO_4)_2$		c, α		-986.2	-929.7	681.46	57.6	55.35
		c, β		-988.9	-932.0	683.14	56.4	54.45
$CaHPO_4$		c		-435.2	-401.5	294.29	21.	
$CaHPO_4 \cdot 2H_2O$		c		-576.0	-514.6	377.19	40.	
$Ca(H_2PO_4)_2$	precipitated	c		-744.4				
$Ca(H_2PO_4)_2 \cdot H_2O$		c		-818.0				
$Ca(H_2PO_4)_2 \cdot H_2O \cdot NH_3$		c		-840.6				
$Ca(H_2PO_4)_2 \cdot H_2O \cdot 2NH_3$		c		-860.7				
$Ca(H_2PO_4)_2 \cdot H_2O \cdot 4NH_3$		c		-898.0				

Table 87-10. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ca_3(AsO_4)_2$		c		-796.				
$CaHAsO_4$		aq		-344.1				
$CaHAsO_4 \cdot H_2O$		c		-410.	-363.	266.1	35.	
$Ca(H_2AsO_4)_2$		aq		-560.8				
Ca_3Sb_2		c		-155.				
Ca_3Bi_2		c		-112.				
CaC_2		c		-15.0	-16.2	11.87	16.8	14.90
$CaCO_3$	calcite	c		-288.45	-269.78	197.745	22.2	19.57
	aragonite	c		-288.49	-269.53	197.562	21.2	19.42
$CaC_2O_4 \cdot H_2O$	precipitated	c		-400.4	-361.9	265.27	37.28	36.40
$CaC_2O_4 \cdot 2H_2O$		c		-470.4	-418.2	306.53	47.	
$Ca(CHO_2)_2$	calcium formate	c		-323.5				
	in 400 H_2O	aq		-324.6				
$Ca(HCO_3)_2$	std. state, hyp. m=1	aq		-460.13	-412.80	302.577	32.2	
$Ca(C_2H_3O_2)_2$	calcium acetate	c		-355.0				
		aq		-362.5				
$Ca(C_2H_3O_2)_2 \cdot H_2O$		c		-425.1				

Table 87-11. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ca(C_2H_3O_3)_2$	calcium glycollate	c		-441.6				
		aq		-440.0				
$Ca(C_2H_3O_3)_2 \cdot 3H_2O$		c		-652.1				
$Ca(C_2H_3O_3)_2 \cdot 5H_2O$		c		-789.4				
$Ca(C_2H_5O)_2$	calcium ethylate	c		-227.1				
$Ca(C_2H_5O)_2 \cdot 2C_2H_5OH$		c		-368.2				
$3CaO \cdot 4C_2H_5OH$		c		-776.9				
$CaCl_2 \cdot 3C_2H_5OH$		c		-399.8				
$CaCl_2 \cdot 4C_2H_5OH$		c		-467.4				
$CaCN_2$	calcium cyanamide	c		-84.0				
$Ca(CN)_2$		c		-44.2				
		aq		-57.7				
$Ca(NO_3)_2 \cdot 2CH_3OH$		c		-343.0				
$3CaO \cdot Ca(CN)_2 \cdot 15H_2O$		c		-1608.				

Table 87-12. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State		At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaSi_2$		c			-36.				
Ca_2Si		c			-50.				
Ca_2Si_2		c			-72.				
$CaSiO_3$	pseudowollastonite	c, α			-377.4	-357.4	261.97	20.9	20.67
	wollastonite	c, β			-378.6	-358.2	262.55	19.6	20.38
Ca_2SiO_4		c, β			-538.0				
		c, γ			-539.0				
Ca_3SiO_5		c			-688.4				
CaSn		c			-38.				
$CaSn_3$		c			-44.				
Ca_2Sn		c			-75.				

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Table 87-13. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaPb$		c		-25.				
$CaPb_3$		c		-26.				
Ca_2Pb		c		-47.				
$CaI_2 \cdot 2PbI_2$		c		-223.1				
$CaI_2 \cdot 2PbI_2 \cdot 7H_2O$		c		-712.6				
$CaTl$		c		-35.				
$CaZn$		c		-17.4				
$CaZn_2$		c		-22.				
$CaZn_5$		c		-33.				
$CaZn_{13}$		c		-57.				
Ca_4Zn		c		-32.				
$CaCd_3$		c		-30.				

Table 87-14. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaHgBr_4$	in 5000 H_2O	aq		-226.9				
$CaHg_2Br_6$	in 9000 H_2O	aq		-264.3				
$CaHg(CN)_4$	in 700 H_2O	aq		-4.2				
$CaHg_2(CN)_6$	in 1000 H_2O	aq		60.2				
$CaCl_2 \cdot 2Hg(CN)_2$	in 1000 H_2O	aq		-77.5				
$CaCl_2 \cdot 2Hg(CN)_2 \cdot 6H_2O$		c		-501.0				
$CaBr_2 \cdot 2Hg(CN)_2$	in 1000 H_2O	aq		-56.0				
$CaBr_2 \cdot 2Hg(CN)_2 \cdot 7H_2O$		c		-553.1				
$CaI_2 \cdot 2Hg(CN)_2$	in 1000 H_2O	aq		-29.3				
$CaI_2 \cdot 2Hg(CN)_2 \cdot 7H_2O$		c		-529.0				
$CaAg(CN)_3$	in 1200 H_2O	aq		-30.1				
$CaAg_2(CN)_4$	in 550 H_2O	aq		-1.6				

Table 87-15. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf^o	ΔHf^o	ΔFf^o	$\log_{10} Kf$	S^o	C_p^o
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaO \cdot Fe_2O_3$		c		-398.				
$CaH_2Fe(CN)_6$		aq		-2.9				
$Ca_2Fe(CN)_6$		aq		-132.8				
$Ca_2Fe(CN)_6 \cdot 11H_2O$		c		-886.6				
$CaCrO_4$		c		-329.6	-305.3	223.78	32.	
		aq		-336.0				
$CaWO_4$		c		-392.5				
$CaTiO_3$		c					22.4	23.34
$CaO \cdot B_2O_3$		c		-483.3	-457.7	335.49	25.1	24.85
$CaO \cdot 2B_2O_3$		c		-798.8	-752.4	551.50	32.2	37.75
		gls		-786.2				
$2CaO \cdot B_2O_3$		c		-651.6	-618.6	453.42	34.7	35.16
$2CaO \cdot 3B_2O_3$		c		-1280.				
$2CaO \cdot 3B_2O_3 \cdot 13H_2O$	inyoite	c		-2211.				
$3CaO \cdot B_2O_3$		c		-817.7	-777.1	569.60	43.9	44.90

Table 87-16. Calcium (at. no., 20; at. wt., 40.08)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CaAl_3$		c		-52.				
$CaO \cdot Al_2O_3$		gls		-545.				
$2CaO \cdot Al_2O_3$		c		-704.				
		gls		-695.				
$2CaO \cdot Al_2O_3 \cdot 5H_2O$		c		-1078.				
$3CaO \cdot Al_2O_3$		c		-861.				
		gls		-848.				
$3CaO \cdot Al_2O_3 \cdot 6H_2O$		c		-1329.				
$4CaO \cdot Al_2O_3$		c		-1026.				
$12CaO \cdot 7Al_2O_3$		c		-4617.				
		gls		-4535.				
$3CaCl_2 \cdot 4AlCl_3$		c		-1263.				
$CaO \cdot Al_2O_3 \cdot 6SiO_2$	heulandite	c		-1828.				
$3CaO \cdot Al_2O_3 \cdot 2SiO_2$		c		-1303.				
$4CaO \cdot Al_2O_3 \cdot Fe_2O_3$		c		-1211.				
$CaMg_2$		c		-30.0				
$CaCl_2 \cdot 2MgCl_2 \cdot 2H_2O$		c		-702.9				
$CaCO_3 \cdot MgCO_3$		c		-556.				

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Table 88-1. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Sr		g		39.2	26.3	-19.28	39.325	4.9680
		c	0.000	0.000	0.000	0.0000	13.0	6.0
	amalgam	liq		-50.4				
Sr^+		g		171.96				
Sr^{++}		g		427.75				
	std. state, hyp. m=1	aq		-130.38	-133.2	97.49	-9.4	
SrO		c		-141.1	-133.8	98.07	13.0	10.76
SrO_2		c		-153.6				
$SrO_2 \cdot 8H_2O$		c		-722.6				
Sr_2O		c		-154.0				
SrH		g		52.4	45.8	-33.57	49.43	7.179
SrH_2		c		-42.3				

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Table 88-2. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Sr(OH)_2$		c		-229.3				
	std. state, hyp. m = 1	aq		-240.29	-208.2	152.61	-14.4	
	in 1000 H_2O	aq		-240.11				
$Sr(OH)_2 \cdot H_2O$		c		-302.3				
$Sr(OH)_2 \cdot 8H_2O$		c		-801.2				
SrF		g		-5.				
SrF		c		-290.3				
Sr		g		9.				
$SrCl_2$		c		-198.0	-186.7	136.85	28.	18.9
	std. state, hyp. m = 1	aq		-210.43	-195.7	143.45	16.9	
	in 100 H_2O	aq		-209.70				
	200 H_2O	aq		-209.83				
	400 H_2O	aq		-209.9				
	500 H_2O	aq		-209.97				
	1000 H_2O	aq		-210.06				
	1500 H_2O	aq		-210.10				
	5000 H_2O	aq		-210.22				

Table 88-3. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrCl_2$	in 10000 H_2O	aq		-210.27				
	50000 H_2O	aq		-210.35				
	100000 H_2O	aq		-210.37				
	500000 H_2O	aq		-210.41				
	∞ H_2O	aq		-210.43				
$SrCl_2 \cdot H_2O$		c		-271.7				28.7
$SrCl_2 \cdot 2H_2O$		c		-343.7				38.3
$SrCl_2 \cdot 6H_2O$		c		-627.1				
$SrOCl_2$		aq		-195.8				
$Sr(OCl)_2$		aq		-176.5				
$SrCl_2 \cdot SrO \cdot H_2O$		c		-437.4				
$SrCl_2 \cdot SrO \cdot 3H_2O$		c		-1006.8				

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Table 88-4. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrBr_2$		c		-171.1				19.0
	std. state, hyp. m = 1	aq		-188.2	-182.1	133.48	29.2	
	in 100 H_2O	aq		-187.56				
	200 H_2O	aq		-187.65				
	500 H_2O	aq		-187.78				
	1000 H_2O	aq		-187.86				
	1500 H_2O	aq		-187.90				
	5000 H_2O	aq		-188.01				
	10000 H_2O	aq		-188.05				
	50000 H_2O	aq		-188.12				
	100000 H_2O	aq		-188.15				
	500000 H_2O	aq		-188.18				
	∞ H_2O	aq		-188.2				
$SrBr_2 \cdot H_2O$		c		-246.8				28.9
$SrBr_2 \cdot 6H_2O$		c		-604.4				82.1
$SrBr_2 \cdot SrO \cdot 3H_2O$		c		-552.6				
$SrBr_2 \cdot SrO \cdot 9H_2O$		c		-984.8				

Table 88-5. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
SrI_2		c		-135.5				19.5
	std. state, hyp. m = 1	aq		-157.1	-157.7	115.59	42.9	
	in 1000 H_2O	aq		-156.8				
$SrI_2 \cdot H_2O$		c		-212.2				28.5
$SrI_2 \cdot 2H_2O$		c		-282.8				39.1
$SrI_2 \cdot 6H_2O$		c		-571.2				84.9
SrS		g		19.				
		c		-108.1				
$SrSO_4$		c		-345.3	-318.9	233.75	29.1	
	std. state, hyp. m = 1	aq		-347.38	-310.3	227.45	-5.3	
SrS_2O_6		aq		-410.8				
$SrS_2O_6 \cdot 4H_2O$		c		-693.1				

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Table 88-6. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrI_2 \cdot 2SO_2$		c		-299.5				
$SrI_2 \cdot 4SO_2$		c		-462.9				
SrSe		c		-78.7				
$Sr(N_3)_2$		c		48.9				
Sr_3N_2		c		-93.4				
$SrN_2O_2 \cdot 5H_2O$		c		-469.9				
$Sr(NO_2)_2$		c, II		-179.3				
		aq		-180.4				
$Sr(NO_3)_2$		c		-233.25				38.3
	std. state, hyp. m = 1	aq		-229.02	-185.8	136.19	60.6	
	in 20 H_2O	aq		-231.950				
	50 H_2O	aq		-230.552				
	100 H_2O	aq		-229.736				
	200 H_2O	aq		-229.179				
	400 H_2O	aq		-228.895				
	500 H_2O	aq		-228.873				

Table 88-7. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔH°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Sr(NO_3)_2$	in 800 H_2O	aq		-228.843				
	1000 H_2O	aq		-228.838				
	1500 H_2O	aq		-228.836				
	2000 H_2O	aq		-228.840				
	4000 H_2O	aq		-228.867				
	10000 H_2O	aq		-228.894				
	50000 H_2O	aq		-228.950				
	100000 H_2O	aq		-228.968				
	500000 H_2O	aq		-228.993				
	∞ H_2O	aq		-229.02				
$Sr(NO_3)_2 \cdot 4H_2O$		c		-514.5				
$Sr(NH_2)_2$		c		-83.2				
$Sr(NH_3)_6$		c		-123.8				
$SrCl_2 \cdot NH_3$		c		-220.5				
$SrCl_2 \cdot 8NH_3$		c		-368.5				

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Table 88-8. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrBr_2 \cdot NH_3$		c		-138.9				
$SrBr_2 \cdot 2NH_3$		c		-222.8				
$SrBr_2 \cdot 8NH_3$		c		-354.4				
$SrI_2 \cdot NH_3$		c		-164.8				
$SrI_2 \cdot 2NH_3$		c		-191.4				
$SrI_2 \cdot 6NH_3$		c		-285.9				
$SrI_2 \cdot 8NH_3$		c		-330.0				
$(NH_4)_2SO_4 \cdot SrSO_4$		c		-628.8				
$Sr_3(PO_4)_2$		c		-987.3				
$SrHPO_4$		c		-431.3				
$Sr(H_2PO_4)_2 \cdot H_2O$		c		-819.4				
$Sr_3(AsO_4)_2$		c		-800.7				
$SrHAsO_4$		aq		-344.8				
$Sr(H_2AsO_4)_2$		aq		-561.4				

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Table 88-9. Strontium (at. no., 38: = ..
HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ... AND HEAT CAPACITY, AT 298.16°K (25°C)
March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrCO_3$	strontianite	c, II		-291.2	-271.9	199.30	23.2	19.46
SrC_2O_4	std. state, hyp. m = 1	aq		-327.4	-294.3	215.72	3	
$SrC_2O_4 \cdot H_2O$		c			-360.8	264.46		
$SrC_2O_4 \cdot 2\frac{1}{2}H_2O$		c		-504.2				
$Sr(CHO_2)_2$	strontium formate	c		-325.5				
		aq		-326.4				
$Sr(CHO_2)_2 \cdot 2H_2O$		c		-468.3				
$Sr(HCO_3)_2$	std. state, hyp. m = 1	aq		-460.7	-413.8	303.31	36.0	
$Sr(C_2H_3O_2)_2$	strontium acetate	c		-356.7				
		aq		-362.1				
$Sr(C_2H_3O_2)_2 \cdot \frac{1}{2}H_2O$		c		-391.2				
$Sr(C_2H_3O_3)_2$	strontium glycollate	c		-440.7				
		aq		-440.5				

Table 88-10. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrBr_2 \cdot \frac{1}{2}C_2H_5OH$		c		-204.5				
$Sr(CN)_2$		aq		-57.8				
$Sr(CN)_2 \cdot 4H_2O$		c		-335.2				
$SrSi$		c		-113.				
$SrSi_2$		c		-150.				
$SrSiO_3$		c		-371.2				
		gls		-367.4				
Sr_2SiO_4		c		-520.6				
$SrI_2 \cdot 2PbI_2$		c		-222.0				
$SrI_2 \cdot 2PbI_2 \cdot 7H_2O$		c		-713.7				
$SrHgBr_4$		aq		-227.5				
$SrHg_2Br_6$		aq		-265.0				
Sr_2HgBr_6		aq		-417.4				

Table 88-11. Strontium (at. no., 38; at. wt., 87.63)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$SrHg(CN)_4$		aq		-4.3				
$SrHg_2(CN)_6$		aq		60.2				
$SrCl_2 \cdot 2Hg(CN)_2$		aq		-78.2				
$SrCl_2 \cdot 2Hg(CN)_2 \cdot 6H_2O$		c		-504.6				
$SrBr_2 \cdot 2Hg(CN)_2$		aq		-56.8				
$SrBr_2 \cdot 2Hg(CN)_2 \cdot 6H_2O$		c		-486.3				
$SrI_2 \cdot 2Hg(CN)_2$		aq		-30.1				
$SrI_2 \cdot 2Hg(CN)_2 \cdot 7H_2O$		c		-531.1				
$SrAg(CN)_3$		aq		-40.1				
$SrAg_2(CN)_4$		aq		-1.1				
$SrNi(CN)_4$		aq		-43.5				
$Sr_3[FeCO(CN)_5]_2$		c		-257.5				
		aq		-299.0				
$Sr_3[FeCO(CN)_5]_2 \cdot 4H_2O$		c		-538.7				
$SrWO_4$		c		-398.3				
$3SrCl_2 \cdot 4AlCl_3$		c		-1275.6				

889115 O—51—27

Table 89-1. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ba		g		41.96	34.60	-25.361	40.699	4.9680
		c, II	0.000	0.000	0.000	0.0000	16.	6.30
Ba^+		g		163.582				
Ba^{++}		g		395.705				
	std. state, hyp. m = 1	aq		-128.67	-134.0	98.22	3.	
BaO		g					55.70	7.38
		c		-133.4	-126.3	92.58	16.8	11.34
BaO_2		c		-150.5				
$BaO_2 \cdot H_2O$		c		-223.5				
$BaO_2 \cdot 8H_2O$		c		-719.3				
Ba_2O		c		-147.				
BaH		g		52.	46.	-33.7	52.97	7.001
BaH_2		c		-40.9				

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Table 89-2. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba(OH)_2$		c		-226.2				
	std. state, hyp. m = 1	aq		-238.58	-209.2	153.34	-2.	
	in 600 H_2O	aq		-238.5				
$Ba(OH)_2 \cdot H_2O$		c		-299.0				
$Ba(OH)_2 \cdot 8H_2O$		c		-799.5				
$BaO_2 \cdot H_2O_2$		c		-209.6				
BaF		g		-9.				
BaF_2		c		-286.9	-274.5	201.20	23.0	17.02
		aq		-286.0				
BaCl		g		24.				
		c		-111.				
$BaCl_2$		c		-205.56	-193.8	142.05	30.	18.0
	std. state, hyp. m = 1	aq		-208.72	-196.7	144.18	29.	

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Table 89-3. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaCl_2$	in 31.1 H_2O	aq		-208.072				
	50 H_2O	aq		-208.085				
	75 H_2O	aq		-208.097				
	100 H_2O	aq		-208.110				
	150 H_2O	aq		-208.135				
	200 H_2O	aq		-208.162				
	300 H_2O	aq		-208.2				
	400 H_2O	aq		-208.231				
	500 H_2O	aq		-208.257				
	700 H_2O	aq		-208.306				
	1000 H_2O	aq		-208.338				
	1200 H_2O	aq		-208.373				
	1500 H_2O	aq		-208.388				
	2000 H_2O	aq		-208.419				
	3000 H_2O	aq		-208.455				
	5000 H_2O	aq		-208.496				
	7500 H_2O	aq		-208.526				
	10000 H_2O	aq		-208.544				
	20000 H_2O	aq		-208.584				

Table 89-4. Barium (at. no., 56; at. wt., 132.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaCl_2$	in 300 H_2O	aq		-208.604				
	500 H_2O	aq		-208.627				
	1000 H_2O	aq		-208.650				
	2000 H_2O	aq		-208.669				
	5000 H_2O	aq		-208.686				
	∞ H_2O	aq		-208.72				
$BaCl_2 \cdot H_2O$		c		-278.4	-253.1	185.52	40.	28.2
$BaCl_2 \cdot 2H_2O$		c		-349.35	-309.7	227.01	48.5	37.10
$BaOCl_2$		aq		-194.0				
$Ba(OCl)_2$		aq		-176.1				
$Ba(ClO_2)_2$		c		-158.2				
$Ba(ClO_3)_2$		c		-181.7				
		aq		-175.6				
$Ba(ClO_3)_2 \cdot H_2O$		c		-254.9				50.6
$Ba(ClO_4)_2$		c		-192.8				
		aq		-191.5				
$Ba(ClO_4)_2 \cdot 3H_2O$		c		-405.4				

Table 89-5. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaCl_2 \cdot BaO \cdot 3H_2O$		c		-545.5				
$BaCl_2 \cdot BaO \cdot 5H_2O$		c		-727.5				
$BaCl_2 \cdot BaO \cdot 8H_2O$		c		-931.7				
$BaBr_2$		c		-180.4				
	std. state, hyp. m = 1	aq		-186.47	-183.1	134.21	42.	
	in 300 H_2O	aq		-186.047				
	400 H_2O	aq		-186.074				
	500 H_2O	aq		-186.093				
	700 H_2O	aq		-186.123				
	1000 H_2O	aq		-186.153				
	1500 H_2O	aq		-186.186				
	2000 H_2O	aq		-186.211				
	3000 H_2O	aq		-186.243				
	5000 H_2O	aq		-186.281				
	10000 H_2O	aq		-186.326				
	20000 H_2O	aq		-186.364				
	50000 H_2O	aq		-186.399				
	100000 H_2O	aq		-186.417				
	∞ H_2O	aq		-186.47				

Table 89-6. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaBr_2 \cdot H_2O$		c		-254.9				
$BaBr_2 \cdot 2H_2O$		c		-326.3				
$BaOBr_2$		aq		-181.6				
$Ba(BrO_3)_2 \cdot H_2O$		c					68.8	52.90
$BaBr_2 \cdot BaO \cdot 2H_2O$		c		-486.3				
$BaBr_2 \cdot BaO \cdot 5H_2O$		c		-705.7				
BaI_2		c		-144.0				
	std. state, hyp. m = 1	aq		-155.41	-158.7	116.32	55.	
	in 400 H_2O	aq		-155.15				
	1000 H_2O	aq		-155.28				
$BaI_2 \cdot H_2O$		c		-219.8				
$BaI_2 \cdot 2H_2O$		c		-290.9				
$BaI_2 \cdot 2\frac{1}{2}H_2O$		c		-326.0				
$BaI_2 \cdot 7H_2O$		c		-640.1				

Table 89-7. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba(IO_3)_2$		aq		-238.4				
$Ba(IO_3)_2 \cdot H_2O$		c		-319.6				
$BaI_2 \cdot BaO \cdot 2H_2O$		c		-455.9				
$BaI_2 \cdot BaO \cdot 9H_2O$		c		-956.0				
BaS		g		41.				
		c		-106.0				
		aq		-118.4				
$BaSO_3$		c		-282.6				
$BaSO_4$		c		-350.2	-323.4	237.05	31.6	24.32
	std. state, hyp. m = 1	aq		-345.57	-311.3	228.18	7.	
BaS_2O_3		c						40.7
BaS_2O_6		aq		-409.3				
$BaS_2O_6 \cdot 2H_2O$		c		-552.5				
BaS_2O_8		aq		-454.0				
$BaS_2O_8 \cdot 4H_2O$		c		-738.7				

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Table 89-8. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
BaS_4O_6		aq		-419.				
$BaS_4O_6 \cdot 2H_2O$		c		-572.2				
$Ba(HS)_2$		aq		-134.8				
$Ba(HSO_3)_2$		aq		-430.7				
$BaSO_4 \cdot H_2SO_4$		c		-549.1				
$BaSO_4 \cdot 2H_2SO_4 \cdot H_2O$		c		-821.0				
$BaI_2 \cdot 2SO_2$		c		-308.6				
$BaI_2 \cdot 4SO_2$		c		-470.3				
BaSe		c		-74.2				
$BaSeO_4$		c		-280.0				
$Ba(N_3)_2$		c		-8.0				
		aq		0.2				
Ba_3N_2		c		-86.9				

Table 89-9. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba(NO_2)_2$		c		-174.0				
	in 800 H_2O	aq		-178.6				
$Ba(NO_2)_2 \cdot H_2O$		c		-254.5				
$Ba(NO_3)_2$		c		-237.06	-190.0	139.27	51.1	36.1
	std. state, hyp. m = 1	aq		-227.41	-186.8	136.92	73.	
	in 150 H_2O	aq		-226.27				
	200 H_2O	aq		-226.57				
	250 H_2O	aq		-226.74				
	300 H_2O	aq		-226.86				
	400 H_2O	aq		-227.035				
	500 H_2O	aq		-227.104				
	600 H_2O	aq		-227.181				
	700 H_2O	aq		-227.229				
	800 H_2O	aq		-227.266				
	1000 H_2O	aq		-227.317				
	1200 H_2O	aq		-227.350				
	1500 H_2O	aq		-227.381				
	1800 H_2O	aq		-227.400				
	2000 H_2O	aq		-227.415				

Table 89-10. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba(NO_3)_2$	in 2500 H_2O	aq		-227.449				
	3000 H_2O	aq		-227.464				
	4000 H_2O	aq		-227.476				
	5000 H_2O	aq		-227.480				
	6000 H_2O	aq		-227.484				
	7500 H_2O	aq		-227.487				
	10000 H_2O	aq		-227.488				
	15000 H_2O	aq		-227.485				
	20000 H_2O	aq		-227.482				
	30000 H_2O	aq		-227.477				
	50000 H_2O	aq		-227.468				
	100000 H_2O	aq		-227.456				
	200000 H_2O	aq		-227.445				
	500000 H_2O	aq		-227.434				
	∞ H_2O	aq		-227.41				
BaNH		c		-53.8				
$Ba(NH_2)_2$		c		-78.9				
$Ba(NH_3)_6$		c		-124.1				

Table 89-11. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaCl_2 \cdot 8NH_3$		c		-365.0				
$BaBr_2 \cdot NH_3$		c		-203.3				
$BaBr_2 \cdot 2NH_3$		c		-225.0				
$BaBr_2 \cdot 4NH_3$		c		-267.5				
$BaBr_2 \cdot 8NH_3$		c		-351.4				
$BaI_2 \cdot 2NH_3$		c		-193.1				
$BaI_2 \cdot 4NH_3$		c		-237.8				
$BaI_2 \cdot 6NH_3$		c		-282.0				
$BaI_2 \cdot 8NH_3$		c		-325.5				
$BaI_2 \cdot 9NH_3$		c		-346.5				
$BaI_2 \cdot 10NH_3$		c		-365.1				
$Ba_3(PO_4)_2$		c		-998.0				
	colloidal	aq		-981.4				
$BaHPO_4$		c		-465.8				
$Ba(H_2PO_2)_2$	in 400 H_2O	aq		-423.6				
$Ba(H_2PO_2)_2 \cdot H_2O$		c		-492.0				
$Ba(H_2PO_4)_2$		c		-749.6				

Table 89-12. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba_3(AsO_4)_2$		c		-817.8				
$BaHAsO_4 \cdot H_2O$		c		-411.5				
$Ba(H_2AsO_4)_2 \cdot 2H_2O$		c		-694.7				
Ba_3Sb_2		c		-175.				
Ba_3Bi_2		c		-160.				
$BaCO_3$	witherite	c, II		-291.3	-272.2	199.52	26.8	20.40
	std. state, hyp. m = 1	aq		-290.30	-260.2	190.72	-10.	
$BaC_2O_4 \cdot \frac{1}{2}H_2O$	barium oxalate	c		-363.7				
$BaC_2O_4 \cdot 2H_2O$		c		-470.1				
$BaC_2O_4 \cdot 3\frac{1}{2}H_2O$		c		-575.3				
$BaO \cdot BaCO_3$		c		-426.				
$Ba(CHO_2)_2$	barium formate	c		-326.5				
	in 400 H_2O	aq		-324.5				
$Ba(HCO_3)_2$	std. state, hyp. m = 1	aq		-459.0	-414.6	303.90	48.	

Table 89-13. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Ba(C_2H_3O_2)_2$	barium acetate	c		-355.1				
	in 400 H_2O	aq		-361.5				
$Ba(C_2H_3O_2)\cdot 3H_2O$		c		-567.3				
$Ba(C_2H_3O_3)_2$	barium glycollate	c		-443.6				
		aq		-439.1				
$Ba(OC_2H_5)_2$	barium ethylate	c		-219.1				
$3BaO\cdot 4CH_3OH$		c		-713.1				
$3BaO\cdot 4C_2H_5OH$		c		-736.7				
$Ba(HSO_3)_2\cdot C_2H_2O_2$	barium bisulfite–glyoxal	aq		-543.1				
$Ba(HSO_3)_2\cdot C_2H_2O_2\cdot 2\frac{1}{2}H_2O$		c		-722.1				
$Ba(OSO_3C_2H_5)_2$	barium ethylsulfate	aq		-546.4				
$Ba(OSO_3C_2H_5)_2\cdot 2H_2O$		c		-687.5				

Table 89-14. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaCN_2$	barium cyanamide	c		-63.8				
$Ba(CN)_2$		c		-47.9				
		aq		-50.7				
$Ba(CN)_2 \cdot H_2O$		c		-120.1				
$Ba(CN)_2 \cdot 2H_2O$		c		-191.1				
$Ba(CNO)_2$	barium cyanate	c		-209.6				
		aq		-195.7				
$BaSi_3$		c		-407.				
Ba_2Si_2		c		-367.				
$BaSiO_3$		c		-359.5				
Ba_2SiO_4		c		-496.8				
$BaSiF_6$		c		-691.6				
$BaSn_3$		c		-44.				
Ba_2Sn		c		-90.				

Table 89-15. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaPb$				[illegible]				
$BaPb_2$				4..				
Ba_2Pb				[illegible]				
$BaI_2 \cdot 2PbI_2$		c		-[illegible]9.7				
$BaI_2 \cdot 2PbI_2 \cdot 7H_2O$		c		-708.6				
$BaHgBr_4$		aq		-226.1				
$BaHg_2Br_6$		aq		-26[illegible].5				
Ba_2HgBr_6		aq		-414.[illegible]				
Ba_4HgBr_{10}		aq		-787.9				
$BaHg(CN)_4$		aq		[illegible]				
$BaHg_2(CN)_6$		aq		-[illegible]				
$BaCl_2 \cdot Hg(CN)_2$		aq		-76.4				
$BaCl_2 \cdot 2Hg(CN)_2 \cdot [illegible]H_2O$		c		-436.3				
$BaBr_2 \cdot 2Hg(CN)_2$		aq		-[illegible]5.1				
$BaBr_2 \cdot 2Hg(CN)_2 \cdot [illegible]H_2O$		c		-554.6				
$BaI_2 \cdot 2Hg(CN)_2$		aq		-28.2				
$BaI_2 \cdot 2Hg(CN)_2 \cdot [illegible]H_2O$		c		-461.1				

Table 89-16. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaAg(CN)_3$		aq		-24.3				
$BaAg_2(CN)_4$		aq		6.3				
$BaPtCl_6$		c		-286.8				
		aq		-296.1				
$BaPtCl_2 \cdot 6H_2O$		c		-707.2				
$BaOsCl_6$		c		-270.0				
$BaPdCl_4$		c		-229.9				
$Ba_3(RhCl_6)_2$		c		-687.				
$BaNi(CN)_4$		aq		-41.7				
$Ba_2Fe(CN)_6$		aq		-129.7				
$Ba_2Fe(CN)_6 \cdot 6H_2O$		c		-551.0				
$BaH_2Fe(CN)_6$		aq		-2.5				
$Ba_3[FeCO(CN)_5]_2$		c		-273.7				
		aq		-292.0				
$Ba_3[FeCO(CN)_5]_2 \cdot 11H_2O$		c		-1050.2				

Table 89-17. Barium (at. no., 56; at. wt., 137.36)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$BaMnO_4$		c		-282.				
$BaCrO_4$		c		-341.3				
$BaMoO_4$		c		-373.8				33.6
$BaWO_4$		c		-407.7				
$BaCl_2 \cdot 2AlCl_3$		c		-543.3				
$3BaCl_2 \cdot 4AlCl_3$		c		-1090.5				

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National Bureau of Standards — Washington, D.C.

Table 90-1. Radium (at. no., 88; at. wt., 226.05)

HEAT OF FORMATION AT 0°K: HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Ra		g		31.	23.	-16.8	42.15	4.968
		c	0.000	0.000	0.000	0.0000	17.	
Ra^+		g		153.1				
Ra^{++}		g		388.5				
	std. state, hyp. m = 1	aq		-126.	-134.5	98.58	13.	
RaO		c		-125.				
$RaCl_2$		c					32.	
$RaCl_2 \cdot 2H_2O$		c		-351.	-311.7	228.47	50.	
$RaSO_4$		c		-352.	-326.0	238.95	34.	
$Ra(NO_3)_2$		c		-237.	-190.3	139.49	52.	

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National Bureau of Standards — Washington, D.C.

Table 91-1. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Li		g	36.49	37.07	29.19	-21.396	33.143	4.9680
		c	0.000	0.000	0.000	0.0000	6.7	5.65
Li^+		g	160.799	162.860				
	std. state, hyp. m = 1	aq		-66.554	-71.22	51.470	3.4	
Li^{++}		g	1904.7	1908.2				
Li^{+++}		g	4727.9	4732.9				
Li_2		g	47.2	47.6	37.6	-27.56	47.06	8.52
Li_2O		c		-142.4				
$LiOH$		c		-151.7				
		aq		-159.0				
LiH		g	0.	30.7	24....	-18.47	4...	7....
		c		-21.61	-16....	12.255	5.4	8.3

Table 91-2. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LiOH		c		−116.[illegible]5	−106.1	77.77	12.	
	std. state, hyp. m = 1	aq		−121.511	−107.82	79.031	0.9	
	in 11 H_2O	aq		−120.51				
	25 H_2O	aq		−120.930				
	50 H_2O	aq		−121.090				
	100 H_2O	aq		−121.198				
	200 H_2O	aq		−121.27				
	400 H_2O	aq		−121.[illegible]38				
	800 H_2O	aq		−121.[illegible]81				
	1600 H_2O	aq		−121.[illegible]17				
	3200 H_2O	aq		−121.[illegible]34				
	6400 H_2O	aq		−121.[illegible]64				
	∞ H_2O	aq		−121.511				
$LiOH \cdot H_2O$		c		−188.[illegible]7	−164.8	120.80	22.	
$Li_2O_2 \cdot H_2O_2 \cdot 2H_2O$		c		−414.[illegible]				

Table 91-3. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LiF		c		-146.3	-139.6	102.32	8.57	10.04
	std. state, hyp. m = 1	aq		-145.210	-136.30	99.906	1.1	
$LiHF_2$	in 400 H_2O	aq		-220.4				
LiCl		g	-53.	-53.	-58.	42.5	51.01	7.88
		c		-97.70				12.2
	std. state, hyp. m = 1	aq		-106.577	-101.57	74.449	16.6	
	in 3 H_2O	aq		-102.62				
	4 H_2O	aq		-103.73				
	5 H_2O	aq		-104.431				
	6 H_2O	aq		-105.310				
	10 H_2O	aq		-105.554				
	12 H_2O	aq		-105.711				
	15 H_2O	aq		-105.848				
	20 H_2O	aq		-105.987				
	25 H_2O	aq		-106.064				
	50 H_2O	aq		-106.221				

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National Bureau of Standards — Washington, D.C.

Table 91-4. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LiCl	in 100 H_2O	aq		-106.315				
	200 H_2O	aq		-106.380				
	400 H_2O	aq		-106.430				
	800 H_2O	aq		-106.467				
	1600 H_2O	aq		-106.497				
	3200 H_2O	aq		-106.518				
	6400 H_2O	aq		-106.536				
	∞ H_2O	aq		-106.577				
	in 25 CH_3OH			-108.28				
	50 CH_3OH			-108.56				
	100 CH_3OH			-108.76				
	1000 CH_3OH			-109.10				
	∞ CH_3OH			-109.25				
	in 20 C_2H_5OH			-108.96				
	25 C_2H_5OH			-109.05				
	50 C_2H_5OH			-109.24				
	100 C_2H_5OH			-109.38				
	1000 C_2H_5OH			-109.60				
	∞ C_2H_5OH			-109.70				

Table 91-5. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiCl \cdot H_2O$		c		-170.31	-151.2	110.82	24.8	23.4
$LiCl \cdot 2H_2O$		c		-242.1				
$LiCl \cdot 3H_2O$		c		-313.5				
$LiClO$		aq		-91.6				
$LiBr$		g		-41.	-50.	36.6	53.78	8.17
		c		-83.72				12.4
	std. state, hyp. m = 1	aq		-95.45	-94.79	69.483	7.7	
	in 3 H_2O	aq		-91.34				
	4 H_2O	aq		-92.75				
	5 H_2O	aq		-93.484				
	8 H_2O	aq		-94.296				
	10 H_2O	aq		-94.506				
	12 H_2O	aq		-94.639				
	15 H_2O	aq		-94.762				
	20 H_2O	aq		-94.887				
	25 H_2O	aq		-94.967				
	50 H_2O	aq		-95.111				

Table 91-6. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LiBr	in 100 H_2O	aq		-95.216				
	200 H_2O	aq		-95.276				
	400 H_2O	aq		-95.327				
	800 H_2O	aq		-95.360				
	1600 H_2O	aq		-95.384				
	3200 H_2O	aq		-95.402				
	6400 H_2O	aq		-95.414				
	∞ H_2O	aq		-95.45				
$LiBr \cdot H_2O$		c		-158.34				22.6
$LiBr \cdot 2H_2O$		c		-229.94				
$LiBr \cdot 3H_2O$		c		-301.9				
LiI		g		-16.	-26.	19.1	55.68	8.32
		c		-64.79				13.0
	std. state, hyp. m = 1	aq		-79.92	-82.57	60.523	29.5	
	in 100 H_2O	aq		-79.781				
	200 H_2O	aq		-79.824				

Table 91-7. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
LiI	in 300 H_2O	aq		-79.841				
	400 H_2O	aq		-79.852				
	500 H_2O	aq		-79.860				
	1000 H_2O	aq		-79.878				
	∞ H_2O	aq		-79.92				
$LiI \cdot \frac{1}{2}H_2O$		c		-103.8				
$LiI \cdot H_2O$		c		-141.16				23.6
$LiI \cdot 2H_2O$		c		-213.03				32.9
$LiI \cdot 3H_2O$		c		-285.02				43.2
Li_2SO_4		c, II		-342.83				
	std. state, hyp. m = 1	aq		-350.01	-317.78	232.928	10.9	
	in 17.75 H_2O	aq		-348.40				
	200 H_2O	aq		-349.44				
	300 H_2O	aq		-349.455				
	400 H_2O	aq		-349.472				
	500 H_2O	aq		-349.495				
	1000 H_2O	aq		-349.590				

Table 91-8. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Li_2SO_4	in 200 H_2O	aq		-349.638				
	500 H_2O	aq		-349.790				
	1000 H_2O	aq		-349.845				
	5000 H_2O	aq		-349.930				
	10000 H_2O	aq		-349.957				
	∞ H_2O	aq		-350.01				
$Li_2SO_4 \cdot H_2O$		c		-414.20				
$LiI \cdot SO_2$		c		-145.5				
$LiI \cdot 2SO_2$		c		-225.9				
Li_2Se		c		-91.1				
		aq		-101.6				
$Li_2Se \cdot 9H_2O$		c		-729.0				

Table 91-9. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Li_3N		c		-47.2				18.4
$LiNO_2$		c		-96.6				
$LiNO_3$		c		-115.279				
	std. state, hyp. m = 1	aq		-115.926	-96.63	70.828	38.4	
	in 3 H_2O	aq		-115.1				
	10 H_2O	aq		-115.54				
	25 H_2O	aq		-115.623				
	50 H_2O	aq		-115.677				
	100 H_2O	aq		-115.721				
	200 H_2O	aq		-115.759				
	400 H_2O	aq		-115.795				
	800 H_2O	aq		-115.825				
	1600 H_2O	aq		-115.849				
	3200 H_2O	aq		-115.869				
	6400 H_2O	aq		-115.884				
	∞ H_2O	aq		-115.926				
	in 400 C_2H_5OH			-120.0				
$LiNO_3 \cdot 3H_2O$		c		-328.6				

Table 91-10. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiNH_2$		c		-43.50				
$Li(NH_3)_4$		liq		-78.9				
Li_2NH		c		-52.9				
$LiCl \cdot NH_3$		c		-120.5				
$LiCl \cdot 2NH_3$		c		-142.2				
$LiCl \cdot 3NH_3$		c		-163.6				
$LiCl \cdot 4NH_3$		c		-182.6				
$LiCl \cdot 5NH_3$		c		-201.6				
$LiBr \cdot NH_3$		c		-107.6				
$LiBr \cdot 2NH_3$		c		-130.3				
$LiBr \cdot 3NH_3$		c		-152.4				
$LiBr \cdot 4NH_3$		c		-173.5				
$LiBr \cdot 5NH_3$		c		-192.6				
$LiBr \cdot 6\frac{1}{2}NH_3$		c		-220.1				

Table 91-11. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiI \cdot NH_3$		c		-91.8				
$LiI \cdot 2NH_3$		c		-116.1				
$LiI \cdot 3NH_3$		c		-138.9				
$LiI \cdot 4NH_3$		c		-161.3				
$LiI \cdot 5NH_3$		c		-180.6				
$LiI \cdot 5\frac{1}{2}NH_3$		c		-189.7				
$LiI \cdot 7NH_3$		c		-216.9				
Li_3Sb_2		c		-43.5				
Li_3Bi		c		-55.2				
Li_2C_2		c		-14.2				
Li_2CO_3		c		-290.54	-270.66	198.390	21.60	23.28
	std. state, hyp. m = 1	aq		-294.74	-266.66	195.458	-5.9	
	in 1900 H_2O	aq		-293.92				
	∞ H_2O	aq		-294.74				
$LiHCO_3$	std. state, hyp. m = 1	aq		-231.73	-210.53	154.316	29.5	
	in 1000 H_2O	aq		-231.4				
	∞ H_2O	aq		-231.73				

Table 91-12. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiOCH_3$	in 60 CH_3OH			-112.1				
$LiOC_2H_5$	in 60 C_2H_5OH			-117.9				
LiCN	in 220 H_2O	aq		-30.3				
$LiCl \cdot CH_3NH_2$		c		-117.5				
$LiCl \cdot C_2H_5NH_2$		c		-123.0				
$LiCl \cdot (CH_3)_2NH$		c		-113.0				
$LiCl \cdot 2CH_3NH_2$		c		-135.2				
$LiCl \cdot 3CH_3NH_2$		c		-152.0				
$LiCl \cdot 2C_2H_5NH_2$		c		-145.6				
$LiCl \cdot 2(CH_3)_2NH$		c		-127.4				
$LiCl \cdot 4CH_3NH_2$		c		-168.2				
$LiCl \cdot 3C_2H_5NH_2$		c		-167.7				
$LiCl \cdot 3(CH_3)_2NH$		c		-141.6				
$LiBr \cdot \frac{1}{2}(CH_3)_2NH$		c		-92.1				
$LiBr \cdot CH_3NH_2$		c		-104.9				
$LiBr \cdot (CH_3)_2NH$		c		-100.3				
$LiBr \cdot 2CH_3NH_2$		c		-124.8				

Table 91-13. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiBr \cdot 3CH_3NH_2$		c		-144.4				
$LiBr \cdot 2(CH_3)_2NH$		c		-113.7				
$LiBr \cdot 4CH_3NH_2$		c		-161.2				
$LiBr \cdot 5CH_3NH_2$		c		-176.8				
$LiBr \cdot 3(CH_3)_2NH$		c		-127.9				
$LiBr \cdot 4(CH_3)_2NH$		c		-141.3				
$LiBr \cdot 5(CH_3)_2NH$		c		-154.1				
$LiI \cdot \frac{1}{2}(CH_3)_2NH$		c		-74.7				
$LiI \cdot CH_3NH_2$		c		-87.8				
$LiI \cdot (CH_3)_2NH$		c		-83.8				
$LiI \cdot 2CH_3NH_2$		c		-107.6				
$LiI \cdot 1\frac{1}{2}(CH_3)_2NH$		c		-92.1				
$LiI \cdot 3CH_3NH_2$		c		-125.8				
$LiI \cdot 3\frac{1}{2}CH_3NH_2$		c		-133.7				
$LiI \cdot 2(CH_3)_2NH$		c		-99.8				
$LiI \cdot 3(CH_3)_2NH$		c		-113.0				
$LiI \cdot 5(CH_3)_2NH$		c		-138.6				

Table 91-14. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Li_2SiO_3		gls		-376.7				
Li_2SiF_6		c		-688.9				
	in 1500 H_2O	aq		-691.2				
LiSn		c		-16.8				
$LiSn_2$		c		-17.1				
Li_2Sn		c		-27.				
Li_4Sn		c		-47.0				
Li_5Sn_2		c		-66.				
Li_7Sn_2		c		-86.				
LiPb		c		-14.6				
Li_3Pb		c		-33.				
Li_4Pb		c		-42.				
Li_5Pb_2		c		-57.				
Li_7Pb_2		c		-76.				
$2LiI \cdot PbI_2$		c		-140.27				
$2LiI \cdot PbI_2 \cdot 4H_2O$		c		-488.65				

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Table 91-15. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole	-	cal/deg mole	cal/deg mole
LiTl		c		-12.8				
LiHg		c		-20.8				
$LiHg_2$		c		-24.2				
$LiHg_3$		c		-26.8				
$LiHg_{99}$		liq		-19.6				
$LiBr \cdot HgBr_2$	in 4500 H_2O	aq		-133.7				
$2LiBr \cdot HgBr_2$	in 4700 H_2O	aq		-230.2				
$4LiBr \cdot HgBr_2$	in 5000 H_2O	aq		-422.7				
$8LiBr \cdot HgBr_2$	in 5900 H_2O	aq		-805.2				
$LiCl \cdot Hg(CN)_2$	in 550 H_2O	aq		-40.4				
$2LiCl \cdot Hg(CN)_2$	in 660 H_2O	aq		-146.8				
$LiBr \cdot Hg(CN)_2$	in 550 H_2O	aq		-29.7				
$LiBr \cdot Hg(CN)_2 \cdot 3\frac{1}{2}H_2O$		c		-277.7				
$2LiBr \cdot Hg(CN)_2$	in 660 H_2O	aq		-125.3				

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Table 91-16. Lithium (at. no., 3; at. wt., 6.940)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$LiI \cdot Hg(CN)_2$	in 550 H_2O	aq		-16.5				
$LiI \cdot Hg(CN)_2 \cdot 3\frac{1}{2}H_2O$		c		-265.6				
$2LiI \cdot Hg(CN)_2$	in 600 H_2O	aq		-97.3				
$LiCN \cdot Hg(CN)_2$	in 550 H_2O	aq		28.7				
$2LiCN \cdot Hg(CN)_2$	in 600 H_2O	aq		-7.1				
$LiReO_4$		c		-253.4				
$LiReO_4 \cdot H_2O$		c		-324.9				
$LiReO_4 \cdot 2H_2O$		c		-395.1				
$LiCl \cdot ThCl_4 \cdot 8H_2O$		c		-969.8				
$2LiCl \cdot ThCl_4$		c		-485.8				
$LiBH_4$		c		-44.6				16.8
$LiAlH_4$		c		-24.2				18.2

Table 92-1. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na		g	26.05	25.98	18.67	−13.685	36.715	4.9680
		c	0.000	0.000	0.000	0.0000	12.2	6.79
Na^+		g	144.534	146.015				
	std. state, hyp. m = 1	aq		−57.279	−62.589	45.8769	14.4	
Na^{++}		g	1235.14	1238.10				
Na^{+++}		g	2887.45	2891.89				
Na^{++++}		g	5167.8	5173.7				
Na^{+++++}		g	8364.1	8371.5				
Na^{++++++}		g	12339.0	12347.9				
$Na^{+++++++}$		g	17146.1	17156.5				
$Na^{++++++++}$		g	23238.	23250.				
$Na^{+++++++++}$		g	30151.	30164.				
Na_2		g	34.58	33.97	24.85	−18.215	55.02	
NaO_2		c		−61.9				
Na_2O		c		−99.4	−90.0	65.97	17.4	16.3
Na_2O_2		c		−120.6				

Table 92-2. Sodium (at. no., 11; at. wt. 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaH		g	30.4	29.88	24.78	-18.163	44.93	7.002
		c		-13.7				
NaOH		c, II		-101.99				19.2
	std. state, hyp. m = 1	aq		-112.236	-100.184	73.4335	11.9	
	in 3 H_2O	aq		-108.894				
	4 H_2O	aq		-110.219				
	5 H_2O	aq		-111.015				
	6 H_2O	aq		-111.520				
	7 H_2O	aq		-111.836				
	8 H_2O	aq		-112.011				
	10 H_2O	aq		-112.148				
	12 H_2O	aq		-112.200				
	15 H_2O	aq		-112.228				
	18 H_2O	aq		-112.237				
	20 H_2O	aq		-112.235				
	25 H_2O	aq		-112.221				
	30 H_2O	aq		-112.203				
	40 H_2O	aq		-112.175				
	50 H_2O	aq		-112.154				

Table 92-3. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaOH	in 75 H_2O	aq		-112.123				
	100 H_2O	aq		-112.108				
	200 H_2O	aq		-112.1				
	300 H_2O	aq		-112.105				
	500 H_2O	aq		-112.117				
	1000 H_2O	aq		-112.139				
	2000 H_2O	aq		-112.162				
	5000 H_2O	aq		-112.186				
	10000 H_2O	aq		-112.201				
	50000 H_2O	aq		-112.220				
	∞ H_2O	aq		-112.236				
$NaOH \cdot H_2O$		c		-175.17	-149.00	109.215	20.2	
$NaHO_2$		aq		-94.4				
NaF		g	-71.	-72.				
		c		-136.0	-129.3	94.78	14.0	11.0
	std. state, hyp. m = 1	aq		-135.94	-128.67	94.313	12.1	
	in 50 H_2O	aq		-135.71				

Table 92-4. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaF	in 100 H_2O	aq		-135.74				
	200 H_2O	aq		-135.78				
	400 H_2O	aq		-135.81				
	500 H_2O	aq		-135.82				
	1000 H_2O	aq		-135.84				
	3000 H_2O	aq		-135.88				
	∞ H_2O	aq		-135.94				
$NaHF_2$		c		-216.6				
		aq		-211.2				
NaCl		g	-43.0	-43.50				
		c	-97.755	-98.232	-91.785	67.2771	17.30	11.88
	std. state, hyp. m = 1	aq		-97.302	-93.939	68.8560	27.6	
	in 8 H_2O	aq		-97.780				
	9 H_2O	aq		-97.774				
	10 H_2O	aq		-97.768				
	15 H_2O	aq		-97.662				
	20 H_2O	aq		-97.572				
	25 H_2O	aq		-97.506				

Table 92-5. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaCl	in 30 H_2O	aq		-97.455				
	50 H_2O	aq		-97.340				
	100 H_2O	aq		-97.250				
	200 H_2O	aq		-97.216				
	400 H_2O	aq		-97.212				
	1000 H_2O	aq		-97.228				
	2000 H_2O	aq		-97.242				
	5000 H_2O	aq		-97.260				
	10000 H_2O	aq		-97.271				
	50000 H_2O	aq		-97.288				
	100000 H_2O	aq		-97.292				
	500000 H_2O	aq		-97.297				
	∞ H_2O	aq		-97.302				
	in CH_3OH			-100.1				
NaClO		aq		-82.7				
$NaClO_2$		c		-72.65				
	in 1000 H_2O	aq		-73.80				

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Table 92-6. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaClO_3$		c		-85.73				
	std. state, hyp. m=1	aq		-80.78	-63.21	46.332	53.4	
	in 400 H_2O	aq		-80.744				
	600 H_2O	aq		-80.739				
	800 H_2O	aq		-80.734				
	1000 H_2O	aq		-80.733				
	2000 H_2O	aq		-80.735				
	5000 H_2O	aq		-80.744				
	10000 H_2O	aq		-80.752				
	20000 H_2O	aq		-80.760				
	50000 H_2O	aq		-80.766				
	100000 H_2O	aq		-80.770				
	∞ H_2O	aq		-80.78				
$NaClO_4$		c, II		-92.18				24.1
	std. state, hyp. m=1	aq		-88.69	-65.16	47.688	57.9	
	in 400 H_2O	aq		-88.76				
	600 H_2O	aq		-88.73				
	1000 H_2O	aq		-88.70				

Table 92-7. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaClO_4$	in 2000 H_2O	aq		-88.68				
	5000 H_2O	aq		-88.67				
	∞ H_2O	aq		-88.69				
	in CH_3OH			-94.6				
	in C_2H_5OH			-92.6				
NaBr		g		-36.33				
		c		-86.030				12.5
	std. state, hyp. m=1	aq		-86.18	-87.163	63.8893	33.7	
	in 8 H_2O	aq		-86.888				
	9 H_2O	aq		-86.864				
	10 H_2O	aq		-86.846				
	15 H_2O	aq		-86.662				
	20 H_2O	aq		-86.536				
	25 H_2O	aq		-86.454				
	30 H_2O	aq		-86.390				
	50 H_2O	aq		-86.244				
	100 H_2O	aq		-86.142				
	200 H_2O	aq		-86.104				

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Table 92-8. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaBr	in 400 H_2O	aq		-86.098				
	1000 H_2O	aq		-86.108				
	2000 H_2O	aq		-86.121				
	5000 H_2O	aq		-86.138				
	10000 H_2O	aq		-86.149				
	50000 H_2O	aq		-86.166				
	100000 H_2O	aq		-86.170				
	500000 H_2O	aq		-86.175				
	∞ H_2O	aq		-86.18				
	in CH_3OH			-90.2				
	in C_2H_5OH			-88.7				
$NaBr \cdot 2H_2O$		c		-227.25				
NaBrO		aq		-79.1				
NaI		g	-20.1	-20.94				
		c		-68.84				13.0
	std. state, hyp. m = 1	aq		-70.65	-70.94	51.998	40.5	
	in 8 H_2O	aq		-71.496				
	9 H_2O	aq		-71.452				
	10 H_2O	aq		-71.424				

Table 92-9. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION,, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaI	in 15 H_2O	aq		-71.186				
	20 H_2O	aq		-71.037				
	25 H_2O	aq		-70.940				
	30 H_2O	aq		-70.816				
	50 H_2O	aq		-70.708				
	100 H_2O	aq		-70.598				
	200 H_2O	aq		-70.564				
	400 H_2O	aq		-70.560				
	1000 H_2O	aq		-70.576				
	2000 H_2O	aq		-70.590				
	5000 H_2O	aq		-70.608				
	10000 H_2O	aq		-70.619				
	50000 H_2O	aq		-70.636				
	100000 H_2O	aq		-70.640				
	500000 H_2O	aq		-70.645				
	∞ H_2O	aq		-70.65				
	in CH_3OH			-76.1				
	in C_2H_5OH			-74.6				
$NaI \cdot 2H_2O$		c		-211.05				

Table 92-10. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaIO_3$	in 100 H_2O	aq		-112.568				
	150 H_2O	aq		-112.501				
	200 H_2O	aq		-112.461				
	300 H_2O	aq		-112.415				
	400 H_2O	aq		-112.387				
	500 H_2O	aq		-112.367				
	700 H_2O	aq		-112.342				
	1000 H_2O	aq		-112.319				
	2000 H_2O	aq		-112.291				
	5000 H_2O	aq		-112.280				
	10000 H_2O	aq		-112.281				
	20000 H_2O	aq		-112.284				
	∞ H_2O	aq		-112.3				
Na_2S		c		-89.2				
	in 20 H_2O	aq		-105.42				
	25 H_2O	aq		-105.22				
	30 H_2O	aq		-105.08				
	50 H_2O	aq		-104.79				
	100 H_2O	aq		-104.55				

Table 92–11. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2S	in 200 H_2O	aq		-104.40				
	400 H_2O	aq		-104.3				
	800 H_2O	aq		-104.36				
$Na_2S \cdot 4\frac{1}{2}H_2O$		c		-416.9				
$Na_2S \cdot 5H_2O$		c		-452.7				
$Na_2S \cdot 9H_2O$		c		-736.7				
Na_2S_2		aq		-104.6				
Na_2S_3		aq		-106.5				
Na_2S_4		c		-98.4				
		aq		-108.5				
Na_2SO_3		c		-260.6	-239.5	175.55	34.9	28.7
		aq		-263.8				
$Na_2SO_3 \cdot 7H_2O$		c		-753.4				

Table 92-12. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2SO_4		c, II		-330.90	-302.78	221.934	35.73	30.50
	std. state, hyp. m=1	aq		-331.46	-302.52	221.743	32.9	
	in 100 H_2O	aq		-331.64				
	150 H_2O	aq		-331.51				
	200 H_2O	aq		-331.40				
	250 H_2O	aq		-331.340				
	300 H_2O	aq		-331.303				
	400 H_2O	aq		-331.261				
	500 H_2O	aq		-331.239				
	800 H_2O	aq		-331.217				
	1000 H_2O	aq		-331.215				
	1500 H_2O	aq		-331.222				
	2000 H_2O	aq		-331.234				
	3000 H_2O	aq		-331.252				
	5000 H_2O	aq		-331.280				
	7500 H_2O	aq		-331.303				
	10000 H_2O	aq		-331.318				
	20000 H_2O	aq		-331.352				
	50000 H_2O	aq		-331.387				

Table 92-13. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2SO_4	in 100000 H_2O	aq		-331.407				
	200000 H_2O	aq		-331.422				
	500000 H_2O	aq		-331.435				
	∞ H_2O	aq		-331.46				
$Na_2SO_4 \cdot 10H_2O$		c		-1033.48	-870.93	638.380	141.7	140.4
$Na_2S_2O_3$		c		-267.0				34.9
		aq		-269.				
	in 5 H_2O	aq		-270.7				
$Na_2S_2O_3 \cdot 5H_2O$		c, I		-621.89				86.2
		c, II		-620.60				
$Na_2S_2O_5$		c		-349.1				
		aq		-345.				
$Na_2S_2O_6$		c		-399.9				
		aq		-394.6				
$Na_2S_2O_6 \cdot 2H_2O$		c		-542.5				
$Na_2S_3O_6$		aq		-409.				
$Na_2S_3O_6 \cdot 3H_2O$		c		-623.0				

Table 92-14. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Na_2S_4O_6$		aq		-405.				
$Na_2S_4O_6 \cdot 2H_2O$		c		-550.0				
NaHS		c, II		-56.5				
	in 4 H_2O	aq		-61.60				
	5 H_2O	aq		-62.04				
	6 H_2O	aq		-62.25				
	8 H_2O	aq		-62.26				
	10 H_2O	aq		-62.20				
	12 H_2O	aq		-62.04				
	15 H_2O	aq		-61.94				
	20 H_2O	aq		-61.77				
	25 H_2O	aq		-61.66				
	50 H_2O	aq		-61.45				
	100 H_2O	aq		-61.36				
	200 H_2O	aq		-61.30				
	400 H_2O	aq		-61.26				
	800 H_2O	aq		-61.25				
$NaHS \cdot 2H_2O$		c		-199.27				

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Table 92-15. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaHSO_3$		aq		-206.6				
$NaHSO_4$		c		-269.2				
	in 200 H_2O	aq		-270.6				
$NaHSO_4 \cdot H_2O$		c		-339.2				
$NaI \cdot 2SO_2$		c		-231.0				
$NaI \cdot 4SO_2$		c		-392.2				
Na_2Se		c		-63.0				
		aq		-82.9				
$Na_2Se \cdot 4\frac{1}{2}H_2O$		c		-398.2				
$Na_2Se \cdot 9H_2O$		c		-709.1				
$Na_2Se \cdot 16H_2O$		c		-1199.4				
Na_2SeO_3		aq		-236.6				
Na_2SeO_4		c		-258.				
		aq		-259.7				
NaHSe		c, II		-27.8				
		aq		-32.7				

Table 92-16. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaHSeO_3$		aq		-180.7				
$NaHSeO_4$		aq		-201.1				
Na_2Te		c, II		-84.0				
Na_2Te_2		c		-101.5				
Na_2TeO_4		c		-313.				
NaN_3	sodium azide	c						19.1
$NaNO_2$		c, II		-85.9				
		aq		-82.6				
$NaNO_3$		c, II		-111.54	-87.45	64.100	27.8	22.24
	std. state, hyp. m=1	aq		-106.651	-89.00	65.236	49.4	
	in 6 H_2O	aq		-108.47				
	7 H_2O	aq		-108.31				
	10 H_2O	aq		-108.10				
	15 H_2O	aq		-107.81				
	25 H_2O	aq		-107.45				
	50 H_2O	aq		-107.02				

Table 92-17. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaNO_3$	in 75 H_2O	aq		-106.91				
	100 H_2O	aq		-106.83				
	200 H_2O	aq		-106.70				
	400 H_2O	aq		-106.629				
	500 H_2O	aq		-106.618				
	1000 H_2O	aq		-106.604				
	2000 H_2O	aq		-106.604				
	5000 H_2O	aq		-106.614				
	10000 H_2O	aq		-106.622				
	15000 H_2O	aq		-106.626				
	25000 H_2O	aq		-106.631				
	50000 H_2O	aq		-106.636				
	100000 H_2O	aq		-106.640				
	200000 H_2O	aq		-106.643				
	500000 H_2O	aq		-106.646				
	∞ H_2O	aq		-106.651				
$NaNH_2$		c		-28.4				

Table 92-18. Sodium (at. no., 11; at. wt., 22.[illegible])

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaCl \cdot 5NH_3$		c		-193.3				
$NaBr \cdot 5\frac{1}{4}NH_3$		c		-189.2				
$NaBr \cdot 5\frac{3}{4}NH_3$		c		-198.3				
$NaI \cdot 4\frac{1}{2}NH_3$		c		-161.1				
$NaI \cdot 6NH_3$		c		-189.2				
$Na_2SO_4 \cdot (NH_4)_2SO_4 \cdot H_2O$		c		-691.5				
$NaPO_3$		c		-288.6				22.
	in 600 H_2O	aq		-292.8				
Na_3PO_4		c		-460.				
	in 300 H_2O	aq		-475.0				
	500 H_2O	aq		-474.8				
	800 H_2O	aq		-474.4				
	1000 H_2O	aq		-473.9				
$Na_3PO_4 \cdot 12H_2O$		c		-1309.0				

Table 92-19. Sodium (at. no., 11; at. wt., 22.9997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Na_4P_2O_7$		c		-760.8				61.
	in 1500 H_2O	aq		-772.9				
$Na_4P_2O_7 \cdot 10H_2O$		c		-1468.2				
NaH_2PO_3		c		-289.4				
	in 600 H_2O	aq		-290.5				
$NaH_2PO_3 \cdot 2\frac{1}{2}H_2O$		c		-454.8				
NaH_2PO_4	in 300 H_2O	aq		-367.7				
$NaH_3P_2O_7$		c		-602.7				
	in 120 H_2O	aq		-603.9				
$NaH_3P_2O_7 \cdot H_2O$		c		-670.6				
Na_2HPO_3		c		-338.0				
	in 800 H_2O	aq		-347.5				
$Na_2HPO_3 \cdot 5H_2O$		c		-684.2				

Table 92-20. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2HPO_4		c		-417.4				
	in 200 H_2O	aq		-423.89				
	300 H_2O	aq		-423.72				
	500 H_2O	aq		-423.6				
	1000 H_2O	aq		-423.44				
$Na_2HPO_4 \cdot 2H_2O$		c		-560.2				
$Na_2HPO_4 \cdot 7H_2O$		c		-913.3				86.6
$Na_2HPO_4 \cdot 12H_2O$		c		-1266.4				133.3
$Na_2H_2P_2O_5$		c		-505.6				
		aq		-506.4				
$Na_2H_2P_2O_7$		c		-663.4				
	in 1500 H_2O	aq		-661.6				
$Na_2H_2P_2O_7 \cdot 6H_2O$		c		-1085.5				
$Na_3HP_2O_7$		c		-711.4				
	in 1500 H_2O	aq		-718.5				
$Na_3HP_2O_7 \cdot H_2O$		c		-788.2				
$Na_3HP_2O_7 \cdot 6H_2O$		c		-1135.7				

Table 92-21. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaNH_4HPO_4$	in 500 H_2O	aq		-398.8				
$NaNH_4HPO_4 \cdot 4H_2O$		c		-682.7				
Na_3AsO_4		c		-365.				
	in 500 H_2O	aq		-381.5				
$Na_3AsO_4 \cdot 12H_2O$		c		-1213.9				
NaH_2AsO_3	in 400 H_2O	aq		-227.7				
NaH_2AsO_4	in 300 H_2O	aq		-273.4				
Na_2HAsO_4	in 400 H_2O	aq		-329.5				
Na_3Sb				-47.2				
Na_3SbO_4		c		-352.				
Na_3SbS_3	in 1200 H_2O	aq		-193.				
Na_3Bi		c		-45.6				
Na_3BiO_4		c		-288.				

Table 92-22. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2C_2	sodium carbide	c		4.1				
Na_2CO_3		c		-270.3	-250.4	183.53	32.5	26.41
	in 15 H_2O	aq		-278.13				
	18 H_2O	aq		-278.00				
	20 H_2O	aq		-277.91				
	25 H_2O	aq		-277.72				
	30 H_2O	aq		-277.55				
	40 H_2O	aq		-277.30				
	50 H_2O	aq		-277.09				
	75 H_2O	aq		-276.77				
	100 H_2O	aq		-276.57				
	200 H_2O	aq		-276.17				
	400 H_2O	aq		-275.9				
$Na_2CO_3 \cdot H_2O$		c		-341.8				
$Na_2CO_3 \cdot 7H_2O$		c		-765.1				
$Na_2CO_3 \cdot 10H_2O$		c		-975.6				128.

Table 92-23. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Na_2C_2O_4$	sodium oxalate	c		-314.3				34.
	in 600 H_2O	aq		-310.5				
$NaHC_2$		c		249.				
$NaCHO_2$	sodium formate	c		-155.03				
	in 400 H_2O	aq		-154.92				
$NaCHO_2 \cdot 2H_2O$		c		-296.6				
$NaCHO_2 \cdot 3H_2O$		c		-364.2				
$NaHCO_3$	sodium bicarbonate	c		-226.5	-203.6	149.24	24.4	20.94
		aq		-222.5				
$NaCH_3O$	sodium methoxide in 60 CH_3OH			-105.1				
$NaHC_2O_4$	sodium acid oxalate	c		-257.8				
	in 400 H_2O	aq		-252.7				
$NaHC_2O_4 \cdot H_2O$		c		-330.2				

Table 92-24. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description		State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaC_2H_3O_2$	sodium acetate		c		-169.8				
	in	3 H_2O	aq		-171.20				
		4 H_2O	aq		-171.51				
		5 H_2O	aq		-172.09				
		6 H_2O	aq		-172.57				
		7 H_2O	aq		-172.86				
		8 H_2O	aq		-173.01				
		10 H_2O	aq		-173.24				
		12 H_2O	aq		-173.36				
		15 H_2O	aq		-173.48				
		20 H_2O	aq		-173.58				
		25 H_2O	aq		-173.63				
		50 H_2O	aq		-173.752				
		100 H_2O	aq		-173.827				
		200 H_2O	aq		-173.890				
		400 H_2O	aq		-173.941				
		800 H_2O	aq		-173.995				
		1600 H_2O	aq		-174.022				
		3200 H_2O	aq		-174.049				
		6400 H_2O	aq		-174.072				
		∞ H_2O	aq		-174.122				

Table 92-25. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaC_2H_3O_2$	in 1100 C_2H_5OH			-171.1				
$NaC_2H_3O_2 \cdot 3H_2O$		c		-383.50				
$NaC_2H_3O_3$	sodium glycollate	c		-213.9				
	in 200 H_2O	aq		-212.2				
$NaC_2H_3O_3 \cdot \frac{1}{2}H_2O$		c		-249.3				
NaC_2H_5O	sodium ethoxide in 60 C_2H_5OH			-112.1				
$NaC_2H_5O_2$	monosodium glycol	c		-148.2				
$NaC_2H_5O_2 \cdot CH_3OH$	monosodium glycol methanol	c		-211.8				
$NaC_2H_3O_3 \cdot HC_2H_3O_3$	sodium acid glycollate	c		-374.6				
$NaC_2H_5O_2 \cdot C_2H_5OH$	monosodium glycol ethanol	c		-219.6				
$NaC_2H_5O_2 \cdot C_2H_6O_2$	monosodium glycol glycol	c		-263.8				
$Na_2C_2H_2O_3$	disodium glycollate	c		-247.5				
	in 400 H_2O	aq		-256.9				
$Na_2C_2H_2O_3 \cdot 2H_2O$		c		-393.8				
$Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$	trona	c		-641.2				

Table 92-26. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaCCl_3CO_2$	sodium trichloroacetate in 400 H_2O	aq		-182.3				
$NaCH_2ClCO_2$	sodium chloroacetate in 400 H_2O	aq		-178.5				
$NaCHCl_2CO_2$	sodium dichloroacetate in 400 H_2O	aq		-180.7				
$NaI \cdot 3CH_3OH$		c		-249.3				
$NaC_2H_5OSO_3$	sodium ethylsulfate in 400 H_2O	aq		-265.9				
$2NaHSO_3 \cdot C_2H_2O_2 \cdot H_2O$	sodium bisulfite glyoxal	c		-580.4				
		aq		-572.0				
NaCN		c, III		-21.46				
	in 200 H_2O	aq		-21.2				
$NaCN \cdot \frac{1}{2}H_2O$		c		-56.19				
$NaCN \cdot 2H_2O$		c		-162.25				
NaCNO	sodium cyanate	c		-95.6				
	in 2000 H_2O	aq		-90.9				
$NaCN_2H$	sodium cyanamid	aq		-34.5				
$NaCO_2NH_2$	sodium carbamate	c		-179.4				

Table 92-27. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaCNS	sodium thiocyanate	c		-41.73				
	in 3 H_2O	aq		-41.13				
	4 H_2O	aq		-41.25				
	5 H_2O	aq		-41.30				
	6 H_2O	aq		-41.29				
	8 H_2O	aq		-41.21				
	10 H_2O	aq		-41.11				
	12 H_2O	aq		-41.01				
	15 H_2O	aq		-40.88				
	20 H_2O	aq		-40.70				
	25 H_2O	aq		-40.59				
	50 H_2O	aq		-40.30				
	100 H_2O	aq		-40.16				
	200 H_2O	aq		-40.08				
	400 H_2O	aq		-40.05				
	800 H_2O	aq		-40.04				
	1600 H_2O	aq		-40.04				
	3200 H_2O	aq		-40.05				
	6400 H_2O	aq		-40.06				
	∞ H_2O	aq		-40.1				

Table 92-28. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
NaCNS	in 5 C_2H_5OH			-42.85				
	10 C_2H_5OH			-42.77				
	15 C_2H_5OH			-42.61				
	19 C_2H_5OH			-42.35				
	20 C_2H_5OH			-42.23				
	25 C_2H_5OH			-42.03				
	30 C_2H_5OH			-41.53				
	50 C_2H_5OH			-41.13				
	100 C_2H_5OH			-40.88				
	200 C_2H_5OH			-40.80				
Na_2SiO_3		c		-363.	-341.	249.9	27.2	26.72
		gls		-360.				
$Na_2SiO_3 \cdot 5H_2O$		c		-720.0				
$Na_2SiO_3 \cdot 9H_2O$		c		-1002.0				
$Na_2Si_2O_5$		c					39.4	37.41
Na_4SiO_4		c					46.8	43.79
Na_2SiF_6		c		-677.				
	in 600 H_2O	aq		-671.2				
$NaHSiF_6$	in 400 H_2O	aq		-614.1				

Table 92-29. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaSn$		c		-12.				
$NaSn_2$		c		-12.				
Na_2Sn		c		-14.4				
Na_4Sn		c		-13.5				
Na_4Sn_3		c		-38.				
Na_2SnO_3		c		-276.				
Na_4SnO_4	in 1200 H_2O	aq		-455.5				
$NaPb$		c		-11.6				
Na_2Pb		c		-15.6				
Na_2Pb_5		c		-22.				
Na_4Pb		c		-20.				
Na_5Pb_2		c		-35.				
Na_2PbO_3		c		-205.				
$2NaI \cdot PbI_2$		c		-103.4				
$2NaI \cdot PbI_2 \cdot 4H_2O$		c		-481.0				
$2NaI \cdot PbI_2 \cdot 6H_2O$		c		-620.6				
$2Na_2S_2O_3 \cdot PbS_2O_3$		c		-698.7				
		aq		-696.				

Table 92-30. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2ZnO_2		c		-188.				
$Na_2Zn(SO_4)_2$		c		-567.0				
$Na_2Zn(SO_4)_2 \cdot 4H_2O$		c		-856.7				
$NaCd_2$		c		-8.4				
$NaCd_6$		c		-12.6				
Na_2CdO_2		c		-165.				
NaHg		c		-10.2				
$NaHg_2$		c		-18.3				
$NaHg_4$		c		-20.0				
$NaHg_{27.5}$		liq		-19.65				
$NaHg_{50}$		liq		-19.80				
$NaHg_{200}$		liq		-19.94				
$NaHg_{500}$		liq		-19.97				
Na_3Hg		c		-11.2				
Na_3Hg_2		c		-22.5				
Na_5Hg_2		c		-22.4				
Na_7Hg_8		c		-80.				

Table 92-31. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2HgBr_4	in 6000 H_2O	aq		-214.3				
Na_2HgS_2		c		-120.				
$NaHg(CN)_3$	in 500 H_2O	aq		37.8				
$Na_2Hg(CN)_4$	in 600 H_2O	aq		11.3				
$NaCl \cdot Hg(CN)_2$		aq		-31.3				
$NaCl \cdot Hg(CN)_2 \cdot 1\frac{1}{2}H_2O$		c		-124.3				
$2NaCl \cdot Hg(CN)_2$		aq		-128.6				
$NaBr \cdot Hg(CN)_2$		aq		-20.5				
$NaBr \cdot Hg(CN)_2 \cdot 2H_2O$		c		-168.9				
$2NaBr \cdot Hg(CN)_2$		aq		-106.9				
$NaI \cdot Hg(CN)_2$		aq		-7.2				
$NaI \cdot Hg(CN)_2 \cdot 2H_2O$		c		-154.9				
$2NaI \cdot Hg(CN)_2$		aq		-78.9				
$Na_2O \cdot CuO_2$		c		-168.				
$Na_2CO_3 \cdot CuCO_3$		c		-411.4				
$Na_2CO_3 \cdot CuCO_3 \cdot 3H_2O$		c		-625.6				

Table 92-32. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$Na_2O \cdot Ag_2O_2$		c		-148.				
$Na_3Ag(S_2O_3)_2$		aq		-475.				
$NaAg(CN)_2$	in 600 H_2O	aq		7.1				
$Na_2Ag(CN)_3$	in 1,00 H_2O	aq		-14.6				
Na_2PtCl_4		aq		-240.0				
Na_2PtCl_6		c		-273.6				
		aq		-282.0				
$Na_2PtCl_6 \cdot 2H_2O$		c		-418.5				
$Na_2PtCl_6 \cdot 6H_2O$		c		-702.5				
Na_2PtBr_6		c		-221.8				
		aq		-231.7				
$Na_2PtBr_6 \cdot 6H_2O$		c		-650.1				
Na_2PtI_6		aq		-170.1				
Na_2IrCl_6		c		-233.4				
Na_3IrCl_6		c		-318.7				
Na_2OsCl_6		c		-295.8				

Table 92-33. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaReO_4$		c		-249.4				
		aq		-247.6				
Na_3RhCl_6		c		-371.7				
		aq		-379.6				
$Na_3RhCl_6 \cdot 12H_2O$		c		-1220.0				
$Na_2Ni(CN)_4$		aq		-27.9				
Na_2CoO_3		c		-203.				
$Na_2Fe_2O_4$		c		-251.				
$Na_3FeCO(CN)_5$		c		-117.8				
		aq		-124.0				
$Na_3FeCO(CN)_5 \cdot 7H_2O$		c		-609.0				
Na_2MnO_4		c		-274.				
$Na_2SO_4 \cdot MnSO_4$		c		-585.5				
$Na_2SO_4 \cdot MnSO_4 \cdot 2H_2O$		c		-732.7				

Table 92-34. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2CrO_4		c		-317.6				
	in ∞ H_2O	aq		-324.1				
	600 H_2O	aq		-320.6				
$Na_2CrO_4 \cdot 4H_2O$		c		-601.3				
$Na_2Cr_2O_7$	in 600 H_2O	aq		-463.4				
Na_2MoO_4		c, II		-368.				
	in 800 H_2O	aq		-368.6				
Na_2WO_4		c		-395.				
	in 220 H_2O	aq		-380.9				
$NaVO_5$		aq		-252.2				
Na_3VO_4		c		-420.				
$Na_3V_3O_9$		aq		-849.9				
Na_2TiO_3		c, II					29.1	30.02
$Na_2Ti_2O_5$		c					41.5	41.68
$Na_2Ti_3O_7$		c					55.9	54.85

Table 92-35. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$NaBO_2$		c		-253.				16.5
	in 300 H_2O	aq		-241.1				
$NaBO_3$		aq		-220.0				
$NaBO_3 \cdot 4H_2O$		c		-504.8				
$Na_2B_4O_7$		c		-777.7				48.
	in 900 H_2O	aq		-787.9				
$Na_2B_4O_7 \cdot 4H_2O$		c		-1072.9				
$Na_2B_4O_7 \cdot 5H_2O$		c		-1143.5				
$Na_2B_4O_7 \cdot 10H_2O$		c		-1497.2				147.
$NaBH_4$	sodium borohydride	c, I		-43.82	-28.57	20.941	25.02	20.7
$NaAlO_2$		c		-273.				
Na_3AlF_6		c, II		-759.6				58.2
$Na_3AlF_6 \cdot 3\frac{1}{2}H_2O$		c		-1021.0				
$NaCl \cdot AlCl_3$		c		-270.6				
$3NaCl \cdot AlCl_3$		c		-470.2				
$3NaCl \cdot 2AlCl_3$		c		-642.4				
$NaCl \cdot AlCl_3 \cdot 6NH_3$		c		-463.0				
$Na_2O \cdot Al_2O_3 \cdot 3SiO_2$	natrolite	c		-1205.2				
$Na_2O \cdot Al_2O_3 \cdot 4SiO_2$	dehydrated analcite	c		-1393.3				

Table 92-36. Sodium (at. no., 11; at. wt., 22.997)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Na_2UO_4		c		-501.				
$Na_2U_2O_7 \cdot 1\frac{1}{2}H_2O$		c		-880.				
$(Na_2O_2)_2UO_4$		aq		-596.				
$(Na_2O_2)_2 \cdot UO_4 \cdot 9H_2O$		c		-1225.				
$2NaCl \cdot ThCl_4$		c		-485.8				
$2NaCl \cdot ThCl_4 \cdot 10H_2O$		c		-1225.7				
$Na_2SO_4 \cdot CaSO_4$		c		-674.1				
$2Na_2SO_4 \cdot CaSO_4 \cdot 2H_2O$		c		-1146.1				
$NaSrPO_4 \cdot 9H_2O$		c		-1121.5				
$NaSrAsO_4 \cdot 9H_2O$		c		-1027.5				
$NaBaPO_4 \cdot 9H_2O$		c		-1121.2				
$NaBaAsO_4 \cdot 9H_2O$		c		-1026.3				
NaLiICl		c		-166.0				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 93-1. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K		g	21.73	21.51	14.62	-10.716	38.296	4.968
		c	0.000	0.000	0.000	0.0000	15.2	6.97
K^+		g	121.81	123.07				
	std. state, hyp. m = 1	aq		-60.04	-67.466	49.4516	24.5	
K^{++}		g	855.41	858.15				
K^{+++}		g	1909.	1913.				
K^{++++}		g	3313.	3318.				
K_2		g	31.7	30.8	22.1	-16.20	59.69	
K_2O		c		-86.4				
K_2O_2		c		-118.				
K_2O_3		c		-125.				
K_2O_4		c		-134.				
KH		g	30.4	30.0	25.1	-18.40	47.3	
		c		-13.6				

Table 93-2. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KOH		c		-101.78				
	std. state, hyp. m=1	aq		-115.00	-105.061	77.0083	22.0	
	in 3 H_2O	aq		-111.77				
	4 H_2O	aq		-112.72				
	5 H_2O	aq		-113.31				
	6 H_2O	aq		-113.700				
	8 H_2O	aq		-114.148				
	10 H_2O	aq		-114.363				
	12 H_2O	aq		-114.493				
	15 H_2O	aq		-114.594				
	20 H_2O	aq		-114.677				
	25 H_2O	aq		-114.702				
	50 H_2O	aq		-114.767				
	100 H_2O	aq		-114.796				
	200 H_2O	aq		-114.822				
	500 H_2O	aq		-114.864				
	1000 H_2O	aq		-114.894				
	2000 H_2O	aq		-114.923				
	5000 H_2O	aq		-114.950				
	10000 H_2O	aq		-114.964				
	50000 H_2O	aq		-114.984				
	∞ H_2O	aq		-115.00				

Table 93-3. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KOH \cdot \frac{3}{4}H_2O$		c		-161.7				
$KOH \cdot H_2O$		c		-179.6				
$KOH \cdot 2H_2O$		c		-251.2				
KF		c		-134.46	-127.42	93.397	15.91	11.73
	in 4 H_2O	aq		-137.35				
	5 H_2O	aq		-137.75				
	10 H_2O	aq		-138.34				
	12 H_2O	aq		-138.39				
	15 H_2O	aq		-138.44				
	20 H_2O	aq		-138.47				
	25 H_2O	aq		-138.48				
	50 H_2O	aq		-138.51				

Table 93-4. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KF	in 100 H_2O	aq		-138.534				
	200 H_2O	aq		-138.553				
	300 H_2O	aq		-138.567				
	400 H_2O	aq		-138.578				
	500 H_2O	aq		-138.586				
	1000 H_2O	aq		-138.609				
	5000 H_2O	aq		-138.651				
	∞ H_2O	aq		-138.70				
$KF \cdot 2H_2O$		c		-277.00	-242.7	177.90	36.	
$KF \cdot 4H_2O$		c		-418.0				
KHF_2		c		-219.98	-203.73	149.331	24.92	18.37
	in 25 H_2O	aq		-213.73				
	50 H_2O	aq		-213.49				
	100 H_2O	aq		-213.39				
	200 H_2O	aq		-213.4				
$KF \cdot 2HF$		c		-296.7				
$KF \cdot 3HF$		c		-373.0				

Table 93-5. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KCl		g	-51.2	-51.6	-56.2	41.19	57.24	8.66
		c		-104.175	-97.592	71.5336	19.7o	12.31
	std. state, hyp. m=1	aq		-100.06	-98.816	72.430ᵹ	37.7	
	in 50 H_2O	aq		-100.105				
	100 H_2O	aq		-100.015				
	200 H_2O	aq		-99.974				
	400 H_2O	aq		-99.973				
	800 H_2O	aq		-99.982				
	1600 H_2O	aq		-99.994				
	3200 H_2O	aq		-100.008				
	6400 H_2O	aq		-100.026				
	∞ H_2O	aq		-100.06				
KClO		aq		-85.4				
$KClO_3$		c		-93.50	-69.29	50.789	34.17	23.96
	std. state, hyp. m=1	aq		-83.54	-68.09	49.909	o3.5	

Table 93-6. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KClO_3$	in 100 H_2O	aq		-84.09				
	200 H_2O	aq		-83.72				
	300 H_2O	aq		-83.67				
	400 H_2O	aq		-83.610				
	500 H_2O	aq		-83.580				
	600 H_2O	aq		-83.555				
	800 H_2O	aq		-83.543				
	900 H_2O	aq		-83.535				
	1000 H_2O	aq		-83.531				
	2000 H_2O	aq		-83.514				
	3000 H_2O	aq		-83.511				
	4000 H_2O	aq		-83.511				
	5000 H_2O	aq		-83.512				
	10000 H_2O	aq		-83.515				
	20000 H_2O	aq		-83.520				
	50000 H_2O	aq		-83.526				
	100000 H_2O	aq		-83.530				
	200000 H_2O	aq		-83.532				
	500000 H_2O	aq		-83.535				
	∞ H_2O	aq		-83.54				

Table 93-7. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KClO_4$		c		-103.6	-72.7	53.29	36.1	26.33
	std. state, hyp. m = 1	aq		-91.45	-70.04	51.338	68.0	
	in 500 H_2O	aq		-91.580				
	600 H_2O	aq		-91.549				
	700 H_2O	aq		-91.532				
	800 H_2O	aq		-91.518				
	900 H_2O	aq		-91.507				
	1000 H_2O	aq		-91.499				
	1500 H_2O	aq		-91.474				
	2000 H_2O	aq		-91.461				
	3000 H_2O	aq		-91.447				
	4000 H_2O	aq		-91.441				
	5000 H_2O	aq		-91.437				
	8000 H_2O	aq		-91.433				
	10000 H_2O	aq		-91.433				
	20000 H_2O	aq		-91.434				
	50000 H_2O	aq		-91.438				
	100000 H_2O	aq		-91.442				
	200000 H_2O	aq		-91.444				
	500000 H_2O	aq		-91.446				
	∞ H_2O	aq		-91.45				

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Table 93-8. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KBr		g					59.87	8.75
		c		-93.73	-90.63	66.430	23.05	12.82
	std. state, hyp. m=1	aq		-88.94	-92.040	67.4640	43.8	
	in 10 H_2O	aq		-89.77				
	12 H_2O	aq		-89.65				
	15 H_2O	aq		-89.52				
	20 H_2O	aq		-89.380				
	25 H_2O	aq		-89.290				
	30 H_2O	aq		-89.225				
	40 H_2O	aq		-89.130				
	50 H_2O	aq		-89.068				
	75 H_2O	aq		-88.987				
	100 H_2O	aq		-88.942				
	200 H_2O	aq		-88.892				
	300 H_2O	aq		-88.881				
	400 H_2O	aq		-88.878				
	500 H_2O	aq		-88.871				
	600 H_2O	aq		-88.878				
	800 H_2O	aq		-88.880				
	1000 H_2O	aq		-88.883				

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Table 93-9. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance				ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula		Description	State	At 0°K	At 298.16°K (25°C)				
				kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KBr		in 2000 H_2O	aq		-88.892				
		3000 H_2O	aq		-88.898				
		4000 H_2O	aq		-88.902				
		5000 H_2O	aq		-88.905				
		8000 H_2O	aq		-88.911				
		10000 H_2O	aq		-88.915				
		20000 H_2O	aq		-88.921				
		50000 H_2O	aq		-88.928				
		100000 H_2O	aq		-88.931				
		200000 H_2O	aq		-88.934				
		∞ H_2O	aq		-88.94				
		∞ CH_3OH			-94.4				
KBr_3			aq		-92.0				
KBr_5			aq		-96.5				

Table 93-10. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KBrO		aq		-82.0				
$KBrO_3$		c		-79.4	-58.2	42.66	35.65	25.07
	std. state, hyp. m=1	aq		-69.6	-56.6	41.49	63.4	
	in 500 H_2O	aq		-69.64				
	1000 H_2O	aq		-69.59				
	10000 H_2O	aq		-69.58				
	∞ H_2O	aq		-69.6				
KI		g					61.64	8.78
		c		-78.31	-77.03	56.462	24.94	13.16
	std. state, hyp. m=1	aq		-73.41	-79.816	58.5040	50.6	
	in 6 H_2O	aq		-74.94				
	8 H_2O	aq		-74.71				
	10 H_2O	aq		-74.55				
	15 H_2O	aq		-74.23				
	20 H_2O	aq		-74.04				
	25 H_2O	aq		-73.910				
	50 H_2O	aq		-73.625				
	100 H_2O	aq		-73.471				

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Table 93-11. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KI	in 200 H_2O	aq		-73.397				
	400 H_2O	aq		-73.365				
	800 H_2O	aq		-73.355				
	1600 H_2O	aq		-73.357				
	3200 H_2O	aq		-73.365				
	6400 H_2O	aq		-73.373				
	∞ H_2O	aq		-73.41				
	∞ CH_3OH, methanol			-78.14				
	∞ C_2H_5OH, ethanol			-77.6				
	200 CH_3COCH_3, acetone			-82.5				
	200 CH_3CN, acetonitrile			-75.6				
KI_3		c		-76.6				
	in 100 H_2O	aq		-72.6				

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Table 93-12. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KIO_3		c		-121.5	-101.7	74.54	36.20	25.42
	std. state, hyp. m=1	aq		-115.0	-99.9	73.22	52.2	
	in 200 H_2O	aq		-115.16				
	300 H_2O	aq		-115.12				
	400 H_2O	aq		-115.09				
	500 H_2O	aq		-115.07				
	1000 H_2O	aq		-115.02				
	5000 H_2O	aq		-114.98				
	10000 H_2O	aq		-114.98				
	∞ H_2O	aq		-115.0				
KIO_4	in 1200 H_2O	aq		-97.6				
$KIO_3 \cdot HIO_3$		c		-180.7				
		aq		-170.1				
KH_4IO_6		aq		-234.2				
$K_2H_3IO_6$		aq		-302.2				
KI·KCl	fresh melt	c		-181.95				

Table 93-13. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2S		c		-100.				
	in 7 H_2O	aq		-107.04				
	8 H_2O	aq		-108.05				
	10 H_2O	aq		-108.95				
	12 H_2O	aq		-109.49				
	15 H_2O	aq		-109.90				
	20 H_2O	aq		-110.17				
	25 H_2O	aq		-110.27				
	50 H_2O	aq		-110.17				
	100 H_2O	aq		-110.02				
	200 H_2O	aq		-109.94				
	400 H_2O	aq		-109.9				
$K_2S \cdot 2H_2O$		c		-243.0				
$K_2S \cdot 5H_2O$		c		-456.7				
K_2S_4		c		-113.0				
		aq		-114.6				
$K_2S_4 \cdot \frac{1}{2}H_2O$		c		-150.5				
$K_2S_4 \cdot 2H_2O$		c		-258.7				

Table 93-14. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2SO_3		c		-266.9				
		aq		-269.1				
K_2SO_4		c, II		-342.66	-314.62	230.612	42.0	31.1
	in 600 H_2O	aq		-336.731				
	800 H_2O	aq		-336.738				
	1000 H_2O	aq		-336.748				
	2000 H_2O	aq		-336.757				
	3000 H_2O	aq		-336.776				
	5000 H_2O	aq		-336.808				
	8000 H_2O	aq		-336.830				
	10000 H_2O	aq		-336.852				
	20000 H_2O	aq		-336.876				
	50000 H_2O	aq		-336.910				
	100000 H_2O	aq		-336.930				
	500000 H_2O	aq		-336.958				
	∞ H_2O	aq		-336.98				

Table 93-15. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$K_2S_2O_3$		aq		-274.				
$K_2S_2O_5$		c		-362.6				
		aq		-351.9				
$K_2S_2O_5 \cdot 1\frac{1}{2}H_2O$		c		-397.0				
$K_2S_2O_6$		c		-413.6				
	in 400 H_2O	aq		-401.0				
	600 H_2O	aq		-400.8				
$K_2S_2O_8$		c		-458.3				
		aq		-445.3				
$K_2S_4O_6$		c		-422.				
		aq		-410.				
$K_2S_5O_6$		c						
		aq		-401.				
$K_2S_5O_6 \cdot 1\frac{1}{2}H_2O$		c		-515.4				

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Table 93-1b. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KHS		c		-83.2				
	in 10 H_2O	aq		-64.35				
	20 H_2O	aq		-64.21				
	30 H_2O	aq		-64.16				
	40 H_2O	aq		-64.05				
	50 H_2O	aq		-64.00				
	100 H_2O	aq		-63.99				
	200 H_2O	aq		-64.1				
$KHS \cdot \frac{1}{4}H_2O$		c		-80.1				
$KHSO_3$	in 385 H_2O	aq		-209.7				
$KHSO_4$		c		-276.8				
	in 20 H_2O	aq		-273.38				
	25 H_2O	aq		-273.36				
	50 H_2O	aq		-273.37				
	100 H_2O	aq		-273.44				
	200 H_2O	aq		-273.59				
	400 H_2O	aq		-273.90				
	800 H_2O	aq		-274.3				

Table 93-17. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KI \cdot 4SO_2$		c		-400.8				
K_2Se		c		-79.3				
		aq		-88.5				
$K_2Se \cdot 9H_2O$		c		-722.0				
$K_2Se \cdot 14H_2O$		c		-1066.				
$K_2Se \cdot 19H_2O$		c		-1417.				
K_2SeO_4	in 440 H_2O	aq		-265.3				
KHSe		c		-35.9				
		aq		-35.4				
$KHSeO_4$	in 220 H_2O	aq		-202.8				
K_2TeO_3		aq		-261.6				
K_2TeO_4		aq		-290.3				

Table 93-18. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KNO_2		c		-88.5				
	in 400 H_2O	aq		-85.2				
KNO_3		c		-117.76	-93.96	68.871	31.77	23.01
	std. state, hyp. m=1	aq		-109.412	-93.88	68.813	69.5	
	in 400 H_2O	aq		-109.480				
	500 H_2O	aq		-109.458				
	600 H_2O	aq		-109.443				
	800 H_2O	aq		-109.423				
	1000 H_2O	aq		-109.412				
	2500 H_2O	aq		-109.390				
	5000 H_2O	aq		-109.388				
	10000 H_2O	aq		-109.389				
	20000 H_2O	aq		-109.394				
	50000 H_2O	aq		-109.399				
	100000 H_2O	aq		-109.403				
	∞ H_2O	aq		-109.412				

Table 93-19. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KNH_2		c		-28.3				
$KBr \cdot 4NH_3$		c		-166.5				
$KI \cdot NH_3$		c		-153.1				
$KI \cdot 6NH_3$		c		-189.9				
KH_2PO_4		c		-374.9				
	in 35 H_2O	aq		-370.70				
	50 H_2O	aq		-370.63				
	100 H_2O	aq		-370.51				
	200 H_2O	aq		-370.40				
	300 H_2O	aq		-370.34				
	755 H_2O	aq		-370.4				
KH_2AsO_4		c		-271.5	-237.0	173.72	37.08	30.29
		aq		-276.2				

Table 93-20. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2CO_3		c		-273.93				
	in 50 H_2O	aq		-281.02				
	100 H_2O	aq		-281.03				
	200 H_2O	aq		-281.08				
	400 H_2O	aq		-281.20				
	800 H_2O	aq		-281.37				
	1000 H_2O	aq		-281.56				
$K_2CO_3 \cdot \frac{1}{2}H_2O$		c		-210.43				
$K_2CO_3 \cdot 1\frac{1}{2}H_2O$		c		-283.40				
$K_2C_2O_4$	potassium oxalate	c		-320.8				
	in 100 H_2O	aq		-316.88				
	200 H_2O	aq		-316.80				
	300 H_2O	aq		-316.77				
	400 H_2O	aq		-316.76				
	500 H_2O	aq		-316.76				
	1000 H_2O	aq		-316.783				
	2000 H_2O	aq		-316.829				
	2500 H_2O	aq		-316.845				
	5000 H_2O	aq		-316.897				

Table 93-21. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$K_2C_2O_4$	in 10000 H_2O	aq		-316.951				
	50000 H_2O	aq		-317.032				
	100000 H_2O	aq		-317.051				
	∞ H_2O	aq		-317.1				
$K_2C_2O_4 \cdot H_2O$		c		-392.17				
$KCHO_2$	potassium formate	c		-158.0				
		aq		-157.7				
$KHCO_3$		c		-229.3				
	in 1500 H_2O	aq		-224.5				
$KOCH_3$	potassium methylate in CH_3OH			-108.0				

Table 93-22. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KC_2H_3O_2$	potassium acetate	c		-173.2				
	in 10 H_2O	aq		-175.6				
	15 H_2O	aq		-175.9				
	20 H_2O	aq		-176.08				
	25 H_2O	aq		-176.18				
	50 H_2O	aq		-176.40				
	100 H_2O	aq		-176.54				
	200 H_2O	aq		-176.64				
	400 H_2O	aq		-176.71				
	800 H_2O	aq		-176.76				
	∞ H_2O	aq		-176.88				
$KC_2H_3O_3$	potassium glycollate	aq		-215.2				
KOC_2H_5	potassium ethylate in C_2H_5OH			-116.0				
$5(K_2CO_3 \cdot 1\frac{1}{2}H_2O) \cdot 4KHCO_3$		c		-2833.				
KCN		c		-26.90				
		aq		-24.1				
KCNO		c		-98.5				
		aq		-93.5				

Table 93-23. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KCO_2CONH_2	potassium oxamate	aq		-214.5				
KCNS		c		-48.62				
	in 2 H_2O	aq		-45.46				
	3 H_2O	aq		-45.22				
	4 H_2O	aq		-45.000				
	5 H_2O	aq		-44.780				
	6 H_2O	aq		-44.600				
	8 H_2O	aq		-44.320				
	10 H_2O	aq		-44.110				
	15 H_2O	aq		-43.780				
	20 H_2O	aq		-43.570				
	25 H_2O	aq		-43.425				
	50 H_2O	aq		-43.105				
	100 H_2O	aq		-42.925				
	200 H_2O	aq		-42.830				
	400 H_2O	aq		-42.78				
	∞ H_2O	aq		-42.8				
$KCNS \cdot \frac{1}{2} SO_2$		c		-89.7				
$KCNS \cdot SO_2$		c		-130.2				

Table 93-24. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2SiF_6		c		-671.				
$K_2SnCl_4 \cdot H_2O$		c		-365.3				
K_2SnCl_6		c		-362.9				
		aq		-360.0				
$KCl \cdot PbCl_2 \cdot \frac{1}{2}H_2O$		c		-214.1				
$KCl \cdot 2PbCl_2$		c		-278.1				
$2KI \cdot PbI_2$		c		-199.0				
$2KI \cdot PbI_2 \cdot 2H_2O$		c		-340.4				
$4KI \cdot 3PbI_2$		c		-437.1				
$4KI \cdot 3PbI_2 \cdot 6H_2O$		c		-859.4				
$K_2SO_4 \cdot PbSO_4$		c		-567.4				
$K_2SO_4 \cdot ZnSO_4$		c		-580.31				
$K_2SO_4 \cdot ZnSO_4 \cdot 2H_2O$		c		-724.6				
$K_2SO_4 \cdot ZnSO_4 \cdot 6H_2O$		c		-1011.8				
$2KCN \cdot Zn(CN)_2$		c		-44.2				

Table 93-25. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KHg		c		-11.6				
KHg_2		c		-17.7				
KHg_{12}		c		-32.83	-23.424	17.1694	205.7	
KHg_{50}		liq		-26.06				
KHg_{100}		liq		-26.08				
KHg_{200}		liq		-26.30				
KHg_{1000}		liq		-26.39				
$KHgCl_3$		c		-160.9				
		aq		-152.2				
$KHgCl_3 \cdot H_2O$		c		-231.1				
K_2HgCl_4		c		-267.6				
		aq		-253.3				
$K_2HgCl_4 \cdot H_2O$		c		-337.6				
$4KCl \cdot 3HgCl_2$		c		-590.3				
$4KCl \cdot 3HgCl_2 \cdot 3H_2O$		c		-801.2				

Table 93-26. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KHgBr_3$		c		-137.3				
		aq		-127.3				
$KHgBr_3 \cdot H_2O$		c		-209.1				
$KHgI_3$		c		-105.7				
$KHgI_3 \cdot H_2O$		c		-174.2				
K_2HgI_4		c		-184.9				
		aq		-175.7				
$KHg(CN)_3$		aq		34.9				
$K_2Hg(CN)_4$		c		-7.7				
		aq		5.5				
$KCN \cdot 2Hg(CN)_2$		aq		100.8				
$KCl \cdot Hg(CN)_2$		c		-42.3				
$KCl \cdot Hg(CN)_2 \cdot H_2O$		c		-112.2				
$KBr \cdot Hg(CN)_2$		c		-34.5				
		aq		-23.3				
$KBr \cdot Hg(CN)_2 \cdot \frac{1}{2}H_2O$		c		-138.0				

Table 93-27. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KI \cdot Hg(CN)_2$		c		-21.7				
		aq		-10.1				
$KI \cdot Hg(CN)_2 \cdot \frac{1}{4}H_2O$		c		-39.3				
$KCl \cdot CuCl_2$		c		-158.0				
$2KCl \cdot CuCl$		c		-242.3				
$2KCl \cdot CuCl_2$		c		-261.6				
$2KCl \cdot CuCl_2 \cdot 2H_2O$		c		-400.7				
$K_2Cr_2(SO_4)_2$	α	c		-547.4				
	β	c		-550.8				
	fused	c		-548.7				
$K_2Cu(SO_4)_2 \cdot 2H_2O$		c		-694.8				
$K_2Ca(SO_4)_2 \cdot 6H_2O$		c		-980.7				
$K_2Cu(CO_4)_2$		c, V		-418.6				
		c, IV		-418.1				
		c, II		-416.				

Table 93-28. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KCl·AgCl		c		-134.54				
KBr·AgBr		c		-117.11				
3KBr·AgBr·½H_2O		c		-337.53				
KI·AgI		c		-91.42				
KI·AgI·¼H_2O		c		-109.95				
2KI·AgI·½H_2O		c		-205.69				
3KI·AgI		c		-248.94				
3KI·AgI·½H_2O		c		-282.8				
3KI·2AgI·H_2O		c		-332.37				
$KAg(CN)_2$		c		-3.9				
		aq		4.2				
$K_2Ag(CN)_3$		aq		-21.4				
$KAuCl_4$		c						
$KAu(CN)_2$		aq		-2.1				

Table 93-29. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2PtCl_4		c		-254.2				
		aq		-242.8				
K_2PtCl_6		c		-301.0	-265.1	194.31	79.8	49.1
	in 9400 H_2O	aq		-287.5				
K_2PtBr_4		c		-220.7				
	in 1000 H_2O	aq		-210.7				
K_2PtBr_6		c		-248.6				
	in 2000 H_2O	aq		-236.9				
K_2IrCl_6		c		-286.				
		aq		-274.				
K_3IrCl_6		c		-374.				
		aq		-369.				
K_2OsCl_6		c		-280.				
$KReO_4$		c		-264.02				
	in 10000 H_2O	aq		-250.3				

Table 93-30. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
K_2PdCl_4		c		-261.6				
		aq		-248.4				
K_2PdCl_6		c		-283.8				
		aq		-272.				
K_2PdBr_4		c		-217.2				
		aq		-205.6				
K_3RhCl_6		c		-343.				
$K_2Ni(CN)_4$		aq		-33.3				
$K_2CO_3 \cdot CoCO_3$		c		-450.5				
$K_2CO_3 \cdot CoCO_3 \cdot 4H_2O$		c		-735.2				
$KFe(SO_4)_2$		aq		-496.3				
$K_2Fe(SO_4)_2$		aq		-572.9				
$K_2Fe(SO_4)_2 \cdot 4H_2O$		c		-836.				
$K_2Fe(SO_4)_2 \cdot 6H_2O$		c		-972.1				

Table 93-31. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$K_3Fe(CN)_6$		c		-41.4				
		aq		-28.2				
$K_4Fe(CN)_6$		c		-125.1				80.3
		aq		-113.5				
$K_4Fe(CN)_6\ 3H_2O$		c		-334.3				
$KH_2Fe(CN)_6$		aq		92.3				
$KH_3Fe(CN)_6$		aq		67.1				
$K_2HFe(CN)_6$		aq		31.6				
$K_2H_2Fe(CN)_6$		aq		7.2				
$K_3HFe(CN)_6$		aq		-53.1				
$K_3FeCO(CN)_5$		c		-137.4				
		aq		-133.0				
$K_3FeCO(CN)_5 \cdot 3\frac{1}{2}H_2O$		c		-382.5				

Table 93-32. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KMnO_4$		c		-194.4	-170.6	125.05	41.04	28.5
	in 140 H_2O	aq		-184.44				
	175 H_2O	aq		-184.32				
	220 H_2O	aq		-184.29				
	660 H_2O	aq		-184.04				
	1000 H_2O	aq		-183.98				
	4000 H_2O	aq		-183.9				
$K_2Mn(SO_4)_2$		c		-597.7				
$K_2Mn(SO_4)_2 \cdot 2H_2O$		c		-743.7				
$K_2Mn(SO_4)_2 \cdot 4H_2O$		c		-884.0				
K_2CrO_4		c		-330.49				
	in 17.2 H_2O	aq		-328.2				
	21.5 H_2O	aq		-327.88				
	27 H_2O	aq		-327.63				
	36 H_2O	aq		-327.32				
	54 H_2O	aq		-327.00				
	1080 H_2O	aq		-326.00				
	1700 H_2O	aq		-325.79				
	2000 H_2O	aq		-325.7				
	∞ H_2O	aq		-326.0				

Table 93-33. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$K_2Cr_2O_7$		c		-485.90				
	in 135 H_2O	aq		-470.41				
	150 H_2O	aq		-470.36				
	200 H_2O	aq		-470.22				
	300 H_2O	aq		-470.05				
	400 H_2O	aq		-469.95				
	800 H_2O	aq		-469.50				
	1000 H_2O	aq		-469.22				
	1500 H_2O	aq		-468.87				
	2000 H_2O	aq		-468.7				
$K_2Cr_2O_7 \cdot CrO_3$		c		-598.				
$KCl \cdot CrO_3$		c		-245.5				
$KCr(SO_4)_2$		c		-562.				
		aq		-553.8				
$KCr(SO_4)_2 \cdot H_2O$		c		-642.				
$KCr(SO_4)_2 \cdot 2H_2O$		c		-720.				
$KCr(SO_4)_2 \cdot 6H_2O$		c		-959.3				
$KCr(SO_4)_2 \cdot 12H_2O$		c		-1383.1				

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Table 93-34. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
KNH_4CrO_4		c		-303.9				
		aq		-299.0				
K_2MoO_4	in 880 H_2O	aq		-374.1				
KVO_3		aq		-284.0				
KVO_4		c		-273.9				
		aq		-270.4				
KVO_5		aq		-254.9				
$3KF \cdot AlF_3$		c		-777.9				
		aq		-775.5				
$3KF \cdot AlF_3 \cdot 3\frac{1}{2}H_2O$		c		-1033.6				
$KCl \cdot AlCl_3$		c		-284.7				
$3KCl \cdot AlCl_3$		c		-498.0				
$3KCl \cdot 2AlCl_3$		c		-677.6				

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Table 93-35. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KAl(SO_4)_2$		c		-589.24	-534.29	391.627	48.9	46.12
		aq		-616.9				
$KAl(SO_4)_2 \cdot H_2O$		c		-667.5				
$KAl(SO_4)_2 \cdot 2H_2O$		c		-742.				
$KAl(SO_4)_2 \cdot 3H_2O$		c		-814.				
$KAl(SO_4)_2 \cdot 12H_2O$		c		-1447.74	-1227.8	899.96	164.3	155.6
$KCl \cdot AlCl_3 \cdot 6NH_3$		c		-472.4				
$K_2O \cdot Al_2O_3 \cdot 4SiO_2$	leucite	c		-1406.4				
		gls		-1395.0				
$K_2O \cdot Al_2O_3 \cdot 6SiO_2$	microcline	c		-1816.				
	adularia	c		-1842.				
		gls		-1780.				
$2KCl \cdot UO_2Cl_2 \cdot 2H_2O$		c		-665.				
$KCl \cdot ThCl_4 \cdot 9H_2O$		c		-1055.0				
$2KCl \cdot ThCl_4$		c		-502.5				

Table 93-36. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$KCl \cdot MgCl_2$		c		-260.75				
$KCl \cdot MgCl_2 \cdot 6H_2O$	carnallite	c		-702.0				
$2KCl \cdot MgCl_2$	fresh melt	c		-364.36				
$4KCl \cdot MgCl_2$	fresh melt	c		-574.76				
$K_2SO_4 \cdot MgSO_4$		c		-651.0				
	fresh melt	c		-655.2				
$K_2SO_4 \cdot MgSO_4 \cdot 2H_2O$		c		-798.6				
$K_2SO_4 \cdot MgSO_4 \cdot 4H_2O$		c		-946.4				
$K_2SO_4 \cdot MgSO_4 \cdot 5H_2O$		c		-1012.4				
$K_2SO_4 \cdot MgSO_4 \cdot 6H_2O$		c		-1082.8				
$K_2SO_4 \cdot 2MgSO_4$	langbeinite	c		-985.8				
$KCl \cdot MgSO_4$	kainite	c		-424.5				
$2KCl \cdot CaCl_2$	fresh melt	c		-400.9				
$K_2SO_4 \cdot CaSO_4 \cdot H_2O$		c		-757.96				
$K_2SO_4 \cdot 5CaSO_4 \cdot H_2O$		c		-2133.6				
$KCaFeC0(CN)_5 \cdot 5H_2O$		c		933.				

Table 93-37. Potassium (at. no., 19; at. wt., 39.096)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$K_2SO_4 \cdot SrSO_4$		c		-687.8				
KI·LiCl	fresh melt	c		-176.08				
KNa		g	33.6	32.5				
		liq		-2.4				
KNa_2		liq		-0.8				
K_2Na		liq		-5.7				
K_3Na		liq		-6.1				
KCl·NaCl	fresh melt	c		-201.73				
KI·NaCl	fresh melt	c		-201.81				
KNa_2PO_4	in 330 H_2O	aq		-477.4				
3KCNS·NaCNS		c		-185.6				

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Table 94-1. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rb		g		20.51	13.35	-9.785	40.628	4.9680
		c, I	0.000	0.000	0.000	0.0000	16.6	7.27
Rb^+	std. state, hyp. m=1	aq		-58.9	-67.45	47.974	29.7	
		g		118.297				
Rb^{++}		g		753.95				
Rb^{+++}		g		1670.4				
Rb_2		g		29.6				
Rb_2O		c		-78.9				
Rb_2O_2		c		-101.7				
Rb_2O_3		c		-116.7				
Rb_2O_4		c		-126.2				
RbH		g		33.				
RbOH		g, II		-98.9				
	std. state, hyp. m=1	aq		-113.9	-105.05	77.000	27.2	
	in 3.2 H_2O	aq		-110.5				
	200 H_2O	aq		-113.7				
$RbOH \cdot H_2O$		c		-177.8				
$RbOH \cdot 2H_2O$		c		-250.8				

Table 94-2. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
RbF		c		-131.28				12.2
	std. state, hyp. m=1	aq		-137.6	-133.53	97.876	27.4	
	in 100 H_2O	aq		-137.45				
	200 H_2O	aq		-137.476				
	500 H_2O	aq		-137.512				
	1000 H_2O	aq		-137.534				
	2000 H_2O	aq		-137.551				
	5000 H_2O	aq		-137.567				
	10000 H_2O	aq		-137.576				
	20000 H_2O	aq		-137.583				
	50000 H_2O	aq		-137.588				
	100000 H_2O	aq		-137.591				
	∞ H_2O	aq		-137.6				
RbF·$\frac{1}{3}H_2O$		c		-156.12				
RbF·$1\frac{1}{2}H_2O$		c		-240.33				
RbH$_3$		c		-217.3				
		aq		-212.5				

Table 94-3. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
RbCl		c		-102.91				12.3
	std. state, hyp. m=1	aq		-98.9	-98.80	72.419	42.9	
	in 100 H_2O	aq		-98.90				
	200 H_2O	aq		-98.840				
	500 H_2O	aq		-98.836				
	1000 H_2O	aq		-98.840				
	2000 H_2O	aq		-98.849				
	5000 H_2O	aq		-98.863				
	10000 H_2O	aq		-98.872				
	20000 H_2O	aq		-98.880				
	50000 H_2O	aq		-98.887				
	∞ H_2O	aq		-98.9				
	in CH_3OH			-98.6				
$RbClO_3$		c		-93.8	-69.8	51.16	36.3	24.66
	std. state, hyp. m=1	aq		-82.4	-68.07	49.894	68.7	
$RbClO_4$		c, II		-103.87	-73.19	53.647	38.4	
	std. state, hyp. m=1	aq		-90.3	-70.02	51.324	73.2	

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Table 94-4. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
RbBr		c		-93.03	-90.38	66.247	25.88	12.68
	std. state, hyp. m=1	aq		-87.8	-92.02	67.449	49.0	
	in 200 H_2O	aq		-87.766				
	500 H_2O	aq		-87.745				
	1000 H_2O	aq		-87.748				
	2000 H_2O	aq		-87.754				
	5000 H_2O	aq		-87.766				
	10000 H_2O	aq		-87.774				
	20000 H_2O	aq		-87.781				
	50000 H_2O	aq		-87.787				
	∞ H_2O	aq		-87.8				
RbI		c		-78.5	-77.8	57.03	28.21	12.50
	std. state, hyp. m=1	aq		-72.3	-79.80	58.492	55.8	
Rb_2S		c		-83.2				
	in 500 H_2O	aq		-107.8				

Table 94-5. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rb_2SO_4		c		-340.50				
	std. state, hyp. m = 1	aq		-334.7	-312.24	228.868	33.8	
	in 400 H_2O	aq		-334.508				
	500 H_2O	aq		-334.489				
	800 H_2O	aq		-334.478				
	1000 H_2O	aq		-334.479				
	2000 H_2O	aq		-334.494				
	3000 H_2O	aq		-334.507				
	5000 H_2O	aq		-334.529				
	10000 H_2O	aq		-334.565				
	20000 H_2O	aq		-334.598				
	50000 H_2O	aq		-334.637				
	100000 H_2O	aq		-334.652				
	500000 H_2O	aq		-334.677				
	∞ H_2O	aq		-334.7				
RbHS		c		-62.4				
		aq		-63.1				
$RbHSO_4$		c		-273.7				
	in 300 H_2O	aq		-270.4				
$RbI \cdot 4SO_2$		c		-402.6				

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Table 94-6. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$RbHS_{(c)}$		c		-35.5				
		aq		-34.3				
$RbNO_3$		c, II		-117.04				
	std. state, hyp. m = 1	aq		-108.3	-93.86	68.798	64.7	
	in 60 H_2O	aq		-109.00				
	100 H_2O	aq		-108.76				
	200 H_2O	aq		-108.54				
	400 H_2O	aq		-108.40				
	500 H_2O	aq		-108.36				
	800 H_2O	aq		-108.316				
	1000 H_2O	aq		-108.305				
	2000 H_2O	aq		-108.280				
	5000 H_2O	aq		-108.277				
	10000 H_2O	aq		-108.278				
	50000 H_2O	aq		-108.287				
	∞ H_2O	aq		-108.3				
$RbNH_2$		c		-25.7				
$RbCl \cdot 3NH_3$		c		-148.0				
$RbI \cdot NH_3$		c		-190.7				

Table 94-7. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rb_2CO_3		c		-269.6				28.4
	in 200 H_2O	aq		-279.4				
	2000 H_2O	aq		-278.0				
$Rb_2CO_3 \cdot H_2O$		c		-344.2				
$Rb_2CO_3 \cdot 1\frac{1}{2}H_2O$		c		-381.5				
$Rb_2CO_3 \cdot 3\frac{1}{2}H_2O$		c		-521.7				
$RbHCO_3$		c		-228.5				
		aq		-224.1				
$3Rb_2CO_3 \cdot 2RbHCO_3 \cdot 4\frac{1}{2}H_2O$		c		-1599.1				
RbCNS	rubidium thiocyanate	c		-54.				
		aq		-41.7				
$RbCNS \cdot \frac{1}{2}SO_2$		c		-94.8				
Rb_2SiF_6		c		-678.4				
$2RbI \cdot PbI_2$		c		-104.8				
$2RbI \cdot PbI_2 \cdot 4H_2O$		c		-486.2				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 94-8. Rubidium (at. no., 37; at. wt., 85.48)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Rb_2CuCl_4		c		-261.0				
$Rb_2CuCl_4 \cdot 2H_2O$		c		-405.2				
Rb_2IrCl_6		c		-290.9				
$RbReO_4$		c		-256.9				
		aq		-249.2				
$RbAl(SO_4)_2$		c		-569.				
$RbAl(SO_4)_2 \cdot H_2O$		c		-647.				
$RbAl(SO_4)_2 \cdot 2H_2O$		c		-722.				
$RbAl(SO_4)_2 \cdot 3H_2O$		c		-797.				
$RbAl(SO_4)_2 \cdot 12H_2O$		c		-1448.0				
$2RbCl \cdot ThCl_4$		c		-512.1				
$2RbCl \cdot ThCl_4 \cdot 9H_2O$		c		-1154.6				
$4RbCl \cdot ThCl_4$		c		-725.9				

SERIES I

National Bureau of Standards — Washington, D.C.

Table 95-1. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cs		g		18.83	12.24	-8.972	41.944	4.9680
		c		0.000	0.000	0.0000	19.8	7.42
Cs^+		g		110.081				
	std. state, hyp. m = 1	aq		-59.2	-67.41	49.411	31.8	
Cs^{++}		g		652.5				
e^-		g		27.0				
Cs_2O		c		-75.9				
Cs_2O_2		c		-96.2				
Cs_2O_3		c		-111.2				
Cs_2O_4		c		-124.2				
CsH		g		29.0	24.3	-17.81	51.25	7.133
CsOH		c, II		-97.2				
	std. state, hyp. m = 1	aq		-114.2	-105.00	76.964	29.3	
	in 2.2 H_2O	aq		-111.5				
	200 H_2O	aq		-114.0				
	∞ H_2O	aq		-114.2				
$CsOH \cdot H_2O$		c		-186.9				

Table 95-2. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CsF		c		-126.9				
	std. state, hyp. m = 1	aq		-135.9	-133.49	97.84o	29.o	
	in 500 H_2O	aq		-135.85				
	1000 H_2O	aq		-135.86				
	5000 H_2O	aq		-135.87				
	10000 H_2O	aq		-135.88				
	100000 H_2O	aq		-135.89				
	∞ H_2O	aq		-135.9				
$CsF \cdot \frac{3}{4}H_2O$		c		-176.8				
$CsF \cdot 1\frac{1}{2}H_2O$		c		-237.2				
$CsHF_2$		c		-216.1				
		aq		-212.8				

Table 95-3. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CsCl		c, II		-103.5				
	std. state, hyp. m = 1	aq		-99.2	-88.76	65.060	45.0	
	in 50 H_2O	aq		-99.55				
	75 H_2O	aq		-99.46				
	100 H_2O	aq		-99.346				
	200 H_2O	aq		-99.205				
	500 H_2O	aq		-99.152				
	1000 H_2O	aq		-99.150				
	2000 H_2O	aq		-99.155				
	5000 H_2O	aq		-99.165				
	10000 H_2O	aq		-99.174				
	50000 H_2O	aq		-99.188				
	∞ H_2O	aq		-99.2				
$CsClO_4$		c		-103.86	-73.28	53.713	41.89	25.71
	std. state, hyp. m = 1	aq		-90.6	-69.98	51.294	75.3	

Table 95-4. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
CsBr		c		-94.3	-91.6	67.142	29.	12.4
	std. state, hyp. m = 1	aq		-88.1	-91.98	67.420	51.1	
	in 500 H_2O	aq		-88.065				
	1000 H_2O	aq		-88.060				
	2000 H_2O	aq		-88.062				
	5000 H_2O	aq		-88.069				
	10000 H_2O	aq		-88.076				
	50000 H_2O	aq		-88.088				
	∞ H_2O	aq		-88.1				
CsI		c		-80.5	-79.7	58.419	31.	12.4
	std. state, hyp. m = 1	aq		-72.6	-79.76	58.463	57.9	
	in 500 H_2O	aq		-72.57				
	1000 H_2O	aq		-72.56				
	2000 H_2O	aq		-72.57				
	10000 H_2O	aq		-72.58				
	50000 H_2O	aq		-72.59				
	∞ H_2O	aq		-72.6				

Table 95-5. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔH_f°	ΔH_f°	ΔF_f°	$\log_{10} K_f$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cs_2S		c		-81.1				
		aq		-108.4				
Cs_2SO_4		c, II		-339.38				
	std. state, hyp. m=1	aq		-335.3	-312.16	228.809	67.7	
	in 200 H_2O	aq		-335.261				
	400 H_2O	aq		-335.191				
	500 H_2O	aq		-335.176				
	1000 H_2O	aq		-335.145				
	2000 H_2O	aq		-335.138				
	5000 H_2O	aq		-335.157				
	10000 H_2O	aq		-335.184				
	20000 H_2O	aq		-335.211				
	50000 H_2O	aq		-335.239				
	100000 H_2O	aq		-335.268				
	200000 H_2O	aq		-335.3				
CsHS		c		-62.9				
		aq		-63.2				
$CsHSO_4$		c		-274.0				
	in 300 H_2O	aq		-270.7				

Table 95-6. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CsI \cdot 4SO_2$		c		-407.9				
CsHSe		c		-36.7				
		aq		-34.6				
$CsNO_3$		c, II		-118.11				
	std. state, hyp. m = 1	aq		-108.6	-93.82	68.769	86.8	
	in 60 H_2O	aq		-109.35				
	100 H_2O	aq		-109.08				
	200 H_2O	aq		-108.84				
	400 H_2O	aq		-108.71				
	500 H_2O	aq		-108.68				
	1000 H_2O	aq		-108.620				
	2000 H_2O	aq		-108.593				
	5000 H_2O	aq		-108.582				
	10000 H_2O	aq		-108.581				
	20000 H_2O	aq		-108.585				
	100000 H_2O	aq		-108.591				
	∞ H_2O	aq		-108.6				
$CsNH_2$		c		-25.4				

Table 95-7. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
Cs_2CO_3		c		-267.4				
	in 200 H_2O	aq		-280.0				
	2000 H_2O	aq		-278.6				
$Cs_2CO_3 \cdot 3\frac{1}{2}H_2O$		c		-522.3				
$CsHCO_3$		c		-228.4				
		aq		-224.4				
$5Cs_2CO_3 \cdot 2CsHCO_3 \cdot 10H_2O$		c		-2538.3				
$5Cs_2CO_3 \cdot 2CsHCO_3 \cdot 17\frac{1}{2}H_2O$		c		-3069.1				
Cs_2SiF_6		c		-669.5				
Cs_2CuCl_4		c		-263.5				
$Cs_2CuCl_4 \cdot 2H_2O$		c		-404.3				
$CsReO_4$		c		-257.2				
		aq		-249.5				

Table 95-8. Cesium (at. no., 55; at. wt., 132.91)

HEAT OF FORMATION AT 0°K; HEAT, FREE ENERGY, AND EQUILIBRIUM CONSTANT OF FORMATION, ENTROPY, AND HEAT CAPACITY, AT 298.16°K (25°C)

March 31, 1950

Substance			ΔHf°	ΔHf°	ΔFf°	$\log_{10} Kf$	S°	C_p°
Formula	Description	State	At 0°K	At 298.16°K (25°C)				
			kcal/mole	kcal/mole	kcal/mole		cal/deg mole	cal/deg mole
$CsAl(SO_4)_2$		c		-570.				
$CsAl(SO_4)_2 \cdot H_2O$		c		-649.				
$CsAl(SO_4)_2 \cdot 2H_2O$		c		-725.				
$CsAl(SO_4)_2 \cdot 3H_2O$		c		-798.				
$CsAl(SO_4)_2 \cdot 12H_2O$		c		-1449.5	-1218.5	893.14	164.	148.1
$2CsCl \cdot ThCl_4$		c		-5022.				
$2CsCl \cdot ThCl_4 \cdot 8H_2O$		c		-1084.5				
$4CsCl \cdot ThCl_4$		c		-718.2				
CsLiICl	fresh melt	c		-178.3				
CsNaICl	fresh melt	c		-178.4				
CsKICl	fresh melt	c		-184.0				

III. TABLES OF SELECTED VALUES OF PROPERTIES OF SERIES II:

Heat, Temperature, and Entropy of

Transition, Fusion, and Vaporization

(including values of pressure)

SERIES II

National Bureau of Standards — Washington, D.C.

Table 1-1. Oxygen (at. no., 8; at. wt., 16.0000)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
O_2		Transition	c, III	c, II		23.66	-249.50	0.022	0.93	0.3
		Transition	c, II	c, I		43.77	-229.39	0.178	4.07	-0.14
		Fusion	c, I	liq	1.1	54.40	-218.76	0.106	1.95	1.74
		Vaporization	liq	g	1.1	54.40	-218.76			
		Vaporization	liq	g	760	90.19	-182.97	1.630	18.07	-6.00
O_3		Vaporization	liq	g	760	162.65	-110.51	2.59	15.92	

National Bureau of Standards SERIES II Washington, D.C.

Table 2-1. Hydrogen (at. no., 1; at. wt., 1.0080)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^oK	^oC	kcal/mole	cal/deg mole	cal/deg mole
H_2		Fusion	c	liq	54.0	13.96	-259.20	0.028	2.0	1.9
		Vaporization	liq	g	54.0	13.96	-259.20			
		Vaporization	liq	g	760	20.39	-252.77	0.216	10.6	
H_2O		Fusion	c	liq	760	273.16	0.00	1.4363	5.2581	8.911
		Vaporization	liq	g	4.58	273.16	0.00	10.767	39.416	-10.184
		Vaporization	liq	g	23.75	298.16	25.00	10.514	35.263	-9.971
		Vaporization	liq	g	760	373.16	100.00	9.7171	26.0400	-10.021
		Vaporization	liq, std.	g, std.	760	298.16	25.00	10.520	28.390	
H_2O_2		Fusion	c	liq		271.2	-2.0	2.52	9.29	
		Vaporization	liq	g	2.1	298.16	25.00	13.01	43.64	

Table 2a-1. Hydrogen isotope of mass 1 (at. no., 1; at. wt., 1.0078)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^oK	^oC	kcal/mole	cal/deg mole	cal/deg mole
$^1H_2$		Fusion	c	liq	54.0	13.96	-259.20	0.028	2.0	1.9
		Vaporization	liq	g	54.0	13.96	-259.20			
		Vaporization	liq	g	760	20.39	-252.77	0.216	10.6	

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Table 2b-1. Hydrogen isotope of mass 2 (at. no., 1; at. wt., 2.0142)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$^2H_2$		Fusion	c	liq	128	18.72	-254.44	0.047	2.5	2.3
		Vaporization	liq	g	128	18.72	-254.44			
		Vaporization	liq	g	760	23.57	-249.59			
$^1H^2H$		Fusion	c	liq	93	16.60	-256.56	0.038	2.3	7.0
		Vaporization	liq	g	93	16.60	-256.56	0.265	16.	
		Vaporization	liq	g	760	22.13	-251.03			
^2H_2O		Fusion	c	liq		276.98	3.82	1.501	5.419	9.48
		Vaporization	liq	g	20.78	298.16	25.00	10.193	34.185	
		Vaporization	liq, std.	g, std.	760	298.16	25.00	10.350	29.22	
$^1H^2HO$		Vaporization	liq	g	22.0	298.16	25.00	10.652	35.726	

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Table 3-1. Helium (at. no., 2; at. wt., 4.003)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
He		Fusion	c	liq, I	78300	3.5	-269.7	0.005	1.5	
		Transition	liq, II	liq, I	38.3	2.186	-270.974	0.00	0.00	-1g
		Vaporization	liq, I	g	760	4.216	-268.944	0.020	4.7	

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Table 4-1. Neon (at. no., 10; at. wt., 20.183)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ne		Fusion	c	liq	324	24.57	-248.59	0.080	3.26	2.42
		Vaporization	liq	g	324	24.57	-248.59	0.431	17.54	-3.42

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Table 5-1. Argon (at. no., 18; at. wt., 39.944)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
A		Fusion	c	liq	516.5	83.85	-189.31	0.281	3.35	2.1
		Vaporization	liq	g	516.5	83.85	-189.31			
		Vaporization	liq	g	760	87.29	-185.87	1.558	17.85	-5.08

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Table 6-1. Krypton (at. no., 36; at. wt., 83.7)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
Kr		Fusion	c	liq	549	115.95	-157.21	0.391	3.37	2.01
		Vaporization	liq	g	549	115.95	-157.21			
		Vaporization	liq	g	760	119.93	-153.23	2.158	17.99	-5.67

Table 7-1. Xenon (at. no., 54, at. wt., 131.3)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Xe		Fusion	c	liq	611	161.3	-111.9	0.549	3.40	2.13
		Vaporization	liq	g	611	161.3	-111.9			
		Vaporization	liq	g	760	165.1	-108.1	3.021	18.29	-5.71

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Table 8-1. Radon (at. no., 86; at. wt., 222)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Rn		Fusion	c	liq		202.	-71.	0.693	3.43	
		Vaporization	liq	g	760	211.	-62.	3.92	18.6	

Table 9-1. Fluorine (at. no., 9; at. wt., 19.

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
F_2		Fusion	c	liq		55.20	-217.96	0.372	6.74	1.86
		Vaporization	liq	g	760	85.24	-187.92	1.51	17.7	-4.27
F_2O		Vaporization	liq	g	760	128.3	-144.9	2.65	20.7	
HF		Fusion	c	liq		190.09	-83..7	1.094	5.756	2.55
		Vaporization	liq	g	760	293.1	19.9	1.8	6.1	-10.9

Table 10-1. Chlorine (at. no., 17; at. wt., 35.457)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cl_2		Fusion	c	liq		172.16	−101.00	1.531	8.89	2.75
		Vaporization	liq	g		172.16	−101.00			
		Vaporization	liq	g	760	239.10	−34.06	4.878	20.40	−8.76
ClO_2		Vaporization	liq	g	760	284.	11.	7.13	25.1	
Cl_2O		Vaporization	liq	g	760	275.1	1.9	6.11	22.2	
Cl_2O_7		Vaporization	liq	g	85.31	298.16	25.00	7.96	26.7	
		Vaporization	liq	g	760	354.7	81.5	7.88	22.2	
HCl		Transition	c, II	c, I		98.38	−174.78	0.284	2.89	1.15
		Fusion	c, I	liq		158.94	−114.22	0.476	2.99	2.10
		Vaporization	liq	g	760	188.11	−85.05	3.86	20.5	−7.14
$HCl \cdot 2H_2O$		Fusion	c	liq		258.	−18.	2.5	9.7	
ClF		Vaporization	liq	g	760	172.9	−100.3	5.34	30.88	
ClF_3		Vaporization	liq	g	760	284.6	11.4	5.74	20.2	
ClO_2F		Vaporization	liq	g	760	267.4	−5.8	5.60	20.9	

Table 11-1. Bromine (at. no., 35; at. wt., 79.916)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Br_2		Fusion	c	liq		265.9	-7.3	2.52	9.48	2.0
		Vaporization	liq	g	214	298.16	25.00	7.34	24.6	
HBr		Fusion	c	liq		186.28	-86.82	0.575	3.09	1.64
		Vaporization	liq	g		186.28	-86.82			
		Vaporization	liq	g	760	206.43	-66.73	4.210	20.39	-1.37
$HBr \cdot H_2O$		Fusion	c	liq		262.	-11.	3.0	11.	
BrF_5		Fusion	c	liq	2.3	210.7	-62.5	1.74	8.25	
		Vaporization	liq	g	2.3	210.7	-62.5	7.43	35.2	
		Vaporization	liq	g	760	315.5	40.3	7.20	23.0	

Table 12-1. Iodine (at. no., 53; at. wt., 126.92)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

June 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
I_2		Fusion	c	liq		386.8	113.6	3.74	9.67	
		Sublimation	c	g	0.31	298.16	25.00	14.88	49.91	
HI		Fusion	c	liq		222.36	-50.80	0.686	3.08	1.17
		Vaporization	liq	g		222.36	-50.80			
		Vaporization	liq	g	760	237.80	-35.36	4.724	19.86	-7.14
IF_5		Fusion	c	liq	10.1	282.	9.	3.83	13.6	
		Vaporization	liq	g	10.1	282.	9.	10.12	35.9	
IF_7		Sublimation	c	g	760	276.6	3.4	7.37	26.6	
ICl		Fusion	c	liq	33.2	300.5	27.3	1.83	6.09	
		Vaporization	liq	g	33.2	300.5	27.3	9.93	33.05	

Table 14-1. Sulfur (at. no., 16; at. wt., 32.066)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
S		Transition	c, II, rhombic	c, I, monoclinic	0.0047	368.6	95.4	0.09	0.25	0.24
		Sublimation	c, II, rhombic	g, S_8	0.0047	368.6	95.4	3.01	8.17	
		Sublimation	c, I, monoclinic	g, S_8	0.0047	368.6	95.4	2.92	7.93	
		Fusion	c, I, monoclinic	liq, λ		392.	119.	0.293	0.75	1.6
		Vaporization	equilibrium liq, λ, μ	g	760	717.76	444.60	2.5	3.5	
SO_2		Fusion	c	liq	1.256	197.68	-75.48	1.769	8.95	4.50
		Vaporization	liq	g	1.256	197.68	-75.48			
		Vaporization	liq	g	760	263.14	-10.02	5.955	22.63	-11.84
SO_3		Fusion	c, III, ice-like	liq	160	290.0	16.8	0.47	1.6	
		Sublimation	c, III, ice-like	g	160	290.0	16.8	11.76	40.69	
		Fusion	c, II, wool-like	liq	400	305.7	32.5	2.47	8.08	
		Sublimation	c, II, wool-like	g	400	305.7	32.5	12.96	42.40	
		Fusion	c, I, wool-like	liq	1760	335.4	62.2	6.09	18.16	
		Sublimation	c, I, wool-like	g	1760	335.4	62.2			
		Sublimation	c, I, wool-like	g	760	324.8	51.6	15.91	48.98	
		Vaporization	liq	g	760	316.5	43.3	9.99	31.55	

Table 14-2. Sulfur (at. no., 16; at. wt., 32.066)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
S_2O_7		Fusion	c	liq		273.	0.			
H_2S		Transition	c, III	c, II		103.54	-169.62	0.366	3.53	1.20
		Transition	c, II	c, I		126.24	-146.92	0.108	0.86	-0.65
		Fusion	c, I	liq	173.9	187.63	-85.53	0.568	3.03	1.59
		Vaporization	liq	g	173.9	187.63	-85.53			
		Vaporization	liq	g	760	212.82	-60.34	4.463	20.97	-8.34
H_2S_2		Fusion	c	liq		183.4	-89.8	1.8	9.7	12.9
		Vaporization	liq	g	748	343.5	70.3	8.4	24.4	
H_2S_3		Fusion	c	liq		220.	-53.			
		Vaporization	liq	g	760	342.	69.			
H_2SO_4		Fusion	c	liq		283.51	10.35	2.36	8.32	6.218
$H_2SO_4 \cdot H_2O$		Fusion	c	liq		281.69	8.53	4.63	16.44	25.04
$H_2SO_4 \cdot 2H_2O$		Fusion	c	liq		234.3	-38.9			
$H_2SO_4 \cdot 4H_2O$		Fusion	c	liq		248.	-25.			
H_2SO_5		Fusion	c	liq		318.	45.			
$H_2S_2O_7$		Fusion	c	liq		308.1	34.9	3.19	10.4	30.1

Table 14-3. Sulfur (at. no., 16; at. wt., 32.066)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$H_2S_2O_8$		Fusion	c	liq		438.	65.			
SF_4		Fusion	c	liq	1.3	149.	-124.			
		Vaporization	liq	g	1.3	149.	-124.			
		Vaporization	liq	g	760	233.	-40.	5.20	22.2	
SF_6		Transition	c, II	c, I		94.26	-178.90	0.384	4.07	-1.98
		Sublimation	c, I	g	760	209.5	-63.7	5.46	26.04	
		Fusion	c, I	liq	1700	222.5	-50.7	1.20	5.40	-1.7
		Vaporization	liq	g	1700	222.5	-50.7	4.08	18.34	
S_2F_2		Fusion	c	liq		167.7	-105.5			
		Vaporization	liq	g	760	174.	-99.			
S_2F_{10}		Fusion	c	liq	760	181.	-92.			
		Vaporization	liq	g	760	302.3	29.1	6.15	20.33	
SOF_2		Fusion	c	liq	0.5	143.7	-129.5			
		Vaporization	liq	g	760	229.31	-43.85	5.08	22.14	
SO_2F_2		Fusion	c	liq	65	153.	-120.			
		Vaporization	liq	g	760	221.	-52.			

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Table 14-4. Sulfur (at. no., 16; at. wt., 32.066)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
HSO_3F		Vaporization	liq	g	760	435.8	162.6			
S_2Cl_2		Fusion	c	liq		193.	-80.			
		Vaporization	liq	g	760	411.2	138.0	8.61	20.92	
$SOCl_2$		Fusion	c	liq		168.7	-104.5			
		Vaporization	liq	g	760	348.9	75.7	7.41	21.24	
SO_2Cl_2		Fusion	c	liq		227.	-46.			
		Vaporization	liq	g	760	342.4	69.2	7.50	21.90	
$S_2O_5Cl_2$		Fusion	c	liq		234.	-39.			
		Vaporization	liq	g	730.5	423.9	150.7	13.2	31.1	
SOFCl		Fusion	c	liq		135.7	-137.5			
		Vaporization	liq	g	760	285.4	12.2	5.67	19.9	
SO_2FCl		Fusion	c	liq		148.5	-124.7			
		Vaporization	liq	g	760	280.4	7.2	5.69	20.3	
S_2Br_2		Fusion	c	liq		227.	-46.			
		Vaporization	liq	g	0.18	327.	54.			
$SOBr_2$		Fusion	c	liq		221.	-52.			
		Vaporization	liq	g	760	411.	138.	10.2	24.8	

Table 14a-1. Sulfur (at. no., 16)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$^{2}H_2S$		Transition	c, III	c, II		107.82	-165.34	0.402	3.73	0.78
		Transition	c, II	c, I		132.85	-140.31	0.124	0.93	-0.75
		Fusion	c, I	liq	163.0	187.14	-86.02	0.566	3.02	3.50
$^{1}H^{2}HS$		Transition	c, III	c, II		105.8	-167.4	0.386	3.64	1.00
		Transition	c, II	c, I		129.6	-143.6	0.116	0.90	-0.70
		Fusion	c, I	liq	168	187.40	-85.76	0.567	3.02	2.56

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Table 15-1. Selenium (at. no., 34; at. wt., 78.96)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Se		Transition	vitreous	c, I, gray		398.	125.	1.05	2.64	2.2
		Transition	c, III, red	c, I, gray		423.	150.	0.18	0.43	0.2
		Fusion	c, I, gray	liq	0.0043	490.6	217.4	1.25	2.56	2.7
		Vaporization	liq	g, Se_6	0.0043	490.6	217.4	4.31	8.79	
		Vaporization	liq	g, Se_6	760	1009.	736.	3.43	3.40	
		Vaporization	liq	g, $Se_{4.37}$	760	958.0	684.8	5.10	5.32	
		Vaporization	liq	g, Se_2	760	1027.	754.	12.80	12.46	
SeO_2		Sublimation	c	g	760	595.	322.	21.1	35.4	
H_2Se		Transition	c, III	c, II		82.3	-190.9	0.309	3.75	1.5
		Transition	c, II	c, I		172.54	-100.62	0.267	1.55	-1.9
		Fusion	c, I	liq	205.4	207.43	-65.73	0.601	2.90	1.95
		Vaporization	liq	g	205.4	207.43	-65.73	5.34	25.72	
		Vaporization	liq	g	760	231.9	-41.3	4.62	19.93	
H_2SeO_4		Fusion	c	liq		333.	60.	3.45	10.4	
$H_2SeO_4 \cdot H_2O$		Fusion	c	liq		299.	26.	4.75	15.9	
$H_2SeO_4 \cdot 4H_2O$		Fusion	c	liq		221.5	-51.7			

Table 15-2. Selenium (at. no., 34; at. wt., 78.96)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SeF_4		Fusion	c	liq		260.0	-13.2			
		Vaporization	liq	g	760	366.	93.			
SeF_6		Sublimation	c	g	760	226.6	-46.6	6.27	27.68	
		Fusion	c	liq	1500	238.6	-34.6	1.70	7.14	
		Vaporization	liq	g	1500	238.6	-34.6	4.38	18.34	
$SeOF_2$		Fusion	c	liq		277.8	4.6			
		Vaporization	liq	g	760	397.	124.			
$SeCl_4$		Sublimation	c	g	760	469.	196.			
		Fusion	c	liq		578.	305.			
		Vaporization	liq	g		578.	305.			
$SeOCl_2$		Fusion	c	liq		284.0	10.8	1.01	3.56	
		Vaporization	liq	g	760	450.8	177.6	10.2	22.6	
$Se(OH)_3ClO_4$		Fusion	c	liq		306.	33.			
$SeOBr_2$		Fusion	c	liq		314.8	41.6			
		Vaporization	liq	g	740	490.	217.			

Table 15a-1. Selenium (at. no., 34)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$^{2}H_2Se$		Transition	c, III	c, II		90.5	-182.7	0.378	4.19	1.1
		Transition	c, II	c, I		176.02	-97.14	0.283	1.61	-0.5
		Fusion	c, I	liq	193.4	206.24	-66.92	0.596	2.89	1.9
		Vaporization	liq	g	193.4	206.24	-66.92			
$^{1}H^{2}HSe$		Transition	c, III	c, II		87.0	-186.2	0.349	4.01	1.3
		Transition	c, II	c, I		174.35	-98.81	0.275	1.58	-1.2
		Fusion	c, I	liq	199.4	206.80	-66.36	0.598	2.89	1.9
		Vaporization	liq	g	199.4	206.80	-66.36			

Table 16-1. Tellurium (at. no., 52; at. wt., 127.61)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Te		Transition	c, II	c, I		621.	348.	0.13	0.21	
		Fusion	c, I	liq	0.18	723.	450.	4.28	5.92	2.0
		Vaporization	liq	g, Te_2	0.18	723.	450.	13.3	18.4	
		Vaporization	liq	g, Te_2	760	1360.	1087.	11.9	8.75	
H_2Te		Fusion	c	liq		222.	-51.	1.0	4.5	
		Vaporization	liq	g	760	270.9	-2.3	5.55	20.49	
TeF_6		Transition	c, II	c, I	60	199.7	-73.5	0.5	2.5	
		Sublimation	c, I	g	760	234.6	-38.6	6.47	27.6	
		Fusion	c, I	liq	800	235.5	-37.7	2.1	9.0	
		Vaporization	liq	g	800	235.5	-37.7	4.3	18.4	
$TeCl_4$		Fusion	c	liq		497.3	224.1	4.51	9.07	21.9
		Vaporization	liq	g	760	661.	388.	18.4	27.9	

Table 18-1. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
N_2		Transition	c, II	c, I		35.62	-237.54	0.055	1.54	
		Fusion	c, I	liq	94	63.15	-210.01	0.172	2.72	
		Vaporization	liq	g	94	63.15	-210.01			
		Vaporization	liq	g	760	77.34	-195.82	1.333	17.24	
NO		Fusion	c	liq	164.4	109.51	-163.65	0.550	5.02	6.0
		Vaporization	liq	g	164.4	109.51	-163.65			
		Vaporization	liq	g	760	121.39	-151.77	3.293	27.13	11.8
N_2O		Fusion	c	liq	658.9	182.30	-90.86	1.563	8.574	4.67
		Vaporization	liq	g	658.9	182.30	-90.86			
		Vaporization	liq	g	760	184.68	-88.48	3.956	21.42	
N_2O_3		Fusion	c	liq		162.	-111.			
		Vaporization	liq	g	760	275.	2.	9.4	34.	
N_2O_4		Fusion	c	liq	139.78	261.96	-11.20	3.502	13.37	6.12
		Vaporization	liq	g	139.78	261.96	-11.20			
		Vaporization	liq	g	760	294.31	21.15	9.110	30.95	
N_2O_5		Sublimation	c	g	760	305.6	32.4	13.6	44.5	

Table 18-2. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NH_3		Fusion	c	liq	45.57	195.40	-77.76	1.351	6.914	
		Vaporization	liq	g	45.57	195.40	-77.76			
		Vaporization	liq	g	760	239.73	-33.43	5.581	23.28	
$NH_3 \cdot \frac{1}{2}H_2O$		Fusion	c	liq		194.3	-78.9			
$NH_3 \cdot H_2O$		Fusion	c	liq		194.1	-79.1			
N_2H_4		Fusion	c	liq		274.7	1.5			
		Vaporization	liq	g	764	386.7	113.5	10.	25.9	
$N_2H_4 \cdot H_2O$		Fusion	c	liq		233.	-40.			
		Vaporization	liq	g	739.5	391.7	118.5			
HN_3		Fusion	c	liq		193.	-80.			
		Vaporization	liq	g	760	309.	36.	7.1	23.	
NH_4N_3		Sublimation	c	g	760	407.	134.	15.1	37.1	
		Fusion	c	liq		433.	160.			
$N_2H_4 \cdot HN_3$		Fusion	c	liq		338.	65.			

Table 18-3. Nitrogen (at. no., 7; at. wt., 14.006)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
HNO_3		Fusion	c	liq		231.56	-41.60	2.503	10.81	10.55
		Vaporization	liq	g	48	293.	20.	9.43	32.2	
$HNO_3 \cdot H_2O$		Fusion	c	liq		235.53	-37.63	4.184	17.76	24.51
$HNO_3 \cdot 3H_2O$		Fusion	c	liq		254.69	-18.47	6.954	27.3	34.7
NH_2OH		Fusion	c	liq		306.3	33.1			
		Vaporization	liq	g	22	331.	58.			

Table 18-4. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NH_4NO_3		Transition	c, V	c, IV	760	255.	-18.	0.13	0.51	
		Transition	c, IV	c, III	760	305.3	32.1	0.38	1.23	
		Transition	c, III	c, II	6.32×10^5	336.5	63.3	0.20	0.59	
		Transition	c, IV	c, III	6.32×10^5	336.5	63.3	0.32	0.95	
		Transition	c, IV	c, II	6.32×10^5	336.5	63.3	0.52	1.54	
		Transition	c, III	c, II	760	357.4	84.2	0.32	0.90	
		Transition	c, II	c, I	760	398.4	125.2	1.01	2.54	
		Transition	c, IV	c, II	6.73×10^6	442.4	169.2	0.96	2.16	
		Transition	c, IV	c, VI	6.73×10^6	442.4	169.2	0.98	2.21	
		Transition	c, II	c, VI	6.73×10^6	442.4	169.2	0.02	0.05	
		Fusion	c, I	liq	760	442.8	169.6	1.3	2.94	
		Transition	c, VI	c, I	6.63×10^6	459.9	186.7	0.99	2.15	
		Transition	c, II	c, VI	6.63×10^6	459.9	186.7	0.03	0.06	
		Transition	c, II	c, I	6.63×10^6	459.9	186.7	1.02	2.21	

Table 18-5. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$N_2H_4 \cdot HNO_2$		Fusion	c	liq		316.	43.			
$N_2H_4 \cdot HNO_3$	metastable	Fusion	c, II	liq		335.3	62.1			
	stable	Fusion	c, I	liq		343.9	70.7			
$N_2H_4 \cdot 2HNO_3$		Fusion	c	liq		377.	104.			
$NH_4NO_3 \cdot 2HNO_3$		Fusion	c	liq		302.7	29.5			
NF_3		Transition	c, II	c, I		54.	-219.			
		Fusion	c, I	liq		64.7	-208.5			
		Vaporization	liq	g	760	144.1	-129.1	2.93	20.3	
NOF		Fusion	c	liq		140.7	-132.5			
		Vaporization	liq	g	760	213.3	-59.9	4.61	21.6	
NO_2F		Fusion	c	liq		107.2	-166.0			
		Vaporization	liq	g	760	200.8	-72.4	4.31	21.5	
NO_3F		Fusion	c	liq		92.	-181.			
		Vaporization	liq	g	103	193.	-80.			

Table 18-6. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NH_2F		Sublimation	c	g	760	196.	-77.			
NHF_2		Fusion	c	liq		148.	-125.			
		Vaporization	liq	g	760	208.	-65.			
$NH_4F \cdot HF$		Fusion	c	liq		397.8	126.6			
$N_2H_4 \cdot 2HF$		Fusion	c	liq		378.	105.			
NCl_3		Vaporization	liq	g	760	344.	71.			
NOCl		Fusion	c	liq	38.6	211.7	-61.5			
		Vaporization	liq	g	38.6	211.7	-61.5			
		Vaporization	liq	g	760	267.4	-5.8	6.0	22.4	
NO_2Cl		Fusion	c	liq		128.	-145.			
		Vaporization	liq	g	760	257.9	-15.3	5.0	19.4	
NH_2Cl		Fusion	c	liq		207.	-66.			
NH_4Cl		Transition	c, II	c, I	760	457.6	184.4	1.0	2.2	
		Fusion	c, I	liq	2.62×10^4	793.	520.			
		Vaporization	liq	g	2.62×10^4	793.	520.			
$NH_4Cl \cdot 3NH_3$		Fusion	c	liq		283.9	10.7			

Table 18-7. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$N_2H_4 \cdot HCl$		Fusion	c	liq		365.8	92.6	3.64	9.95	
$N_2H_4 \cdot 2HCl$		Fusion	c	liq		471.	198.			
$NH_2OH \cdot HCl$		Fusion	c	liq		430.	157.			
NH_4ClO_4		Transition	c, II	c, I		513.	240.			
N_3Br		Fusion	c	liq		228.	-45.			
NOBr		Fusion	c	liq		217.7	-55.5			
$NOBr_3$		Fusion	c	liq		233.	-40.			
NH_4Br		Transition	c, II	c, I	735	411.0	137.8	0.77	1.87	
		Fusion	c, I	liq		815.	542.			
$NH_4Br \cdot 3NH_3$		Fusion	c	liq		286.9	13.7			
$N_2H_4 \cdot HBr$		Fusion	c	liq		353.	80.			
$N_2H_4 \cdot 2HBr$		Fusion	c	liq		468.	195.			
NH_4I		Transition	c, II	c, I	760	260.	-13.	0.70	2.7	
		Fusion	c, I	liq		824.	551.			
$NH_4I \cdot 3NH_3$		Fusion	c	liq		265.2	-8.0			
$NH_4I \cdot 4NH_3$		Fusion	c	liq		268.1	-5.1			

Table 18-8. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$N_2H_4 \cdot HI$		Fusion	c	liq		400.	127.			
$N_2H_4 \cdot 2HI$		Fusion	c	liq		493.	220.			
NH_4Cl_2I		Fusion	c	liq		435.	162.			
NH_4Cl_4I		Fusion	c	liq		398.	125.			
NH_4IBr_2		Fusion	c	liq		471.	198.			
N_2S_5		Fusion	c	liq		283.	10.			
N_4S_4		Fusion	c	liq		453.	180.			
$N_2O_3 \cdot 2SO_3$		Fusion	c	liq		490.	217.			
		Vaporization	liq	g	760	630.	357.			
NO_2SO_2OH		Fusion	c	liq		346.7	73.5			

Table 18-9. Nitrogen (at. no., 7; at. wt., 14.008)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NH_4HSO_4		Transition	c, I	c, II	1.368×10^6	399.4	126.2			
		Transition	c, II	c, III	1.368×10^6	399.4	126.2			
		Fusion	c, I	liq		417.	144.	3.42	8.20	
		Transition	c, II	c, III	4.165×10^6	450.1	176.9			
		Transition	c, III	c, IV	4.165×10^6	450.1	176.9			
$N_2H_4\cdot H_2SO_4$		Fusion	c	liq		527.	254.			
$(NH_4)_2SO_4$		Fusion	c	liq		786.	513.			
$(NH_2OH)\cdot H_2SO_4$		Fusion	c	liq		443.	170.			
$(H_2NSO_2)_2NH$		Fusion	c	liq		441.	168.			
$(N_2H_4)_2\cdot H_2SO_4$		Fusion	c	liq		390.	117.			
$NOSO_3F$		Fusion	c	liq		413.	140.			

Table 19-1. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
P		Transition	c, IV, white	c, III, white	760	196.	-77.			
		Transition	c, IV, white	c, III, white	4.41×10^6	270.8	-2.4	1.35	4.09	
		Transition	c, III, white	c, II, red		298.16	25.00	-4.4		
		Transition	c, III, white	c, I, black		298.16	25.00	-10.3		
		Fusion	c, III, white	liq	760	317.4	44.2	0.15	0.47	
		Vaporization	liq	g, P_4	760	553.	280.	2.97	5.37	
		Fusion	c, II, red	liq	32760	863.	590.	4.85	5.62	
		Vaporization	liq	g, P_4	32760	863.	590.	2.50	2.90	
P_4O_6		Fusion	c	liq		297.0	23.8			
		Vaporization	liq	g	760	448.5	175.3	9.0	20.1	
P_4O_{10}		Sublimation	c, II	g	760	632.	359.	17.6	27.8	
		Fusion	c, II	liq	3700	693.	420.	5.	7.2	
		Fusion	c, I	liq	570	845.	572.	11.5	13.6	
		Vaporization	liq	g	570	845.	572.	16.8	19.9	

SERIES II

National Bureau of Standards — Washington, D.C.

Table 19-2. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PH_3		Transition	c, IV	c, III		30.31	-242.85	0.0197	0.650	
		Transition	c, III	c, II		49.44	-223.72	0.186	3.76	
		Transition	c, II	c, I		88.12	-185.04	0.116	1.32	
		Fusion	c, I	liq	27.33	139.38	-133.78	0.270	1.94	
		Vaporization	liq	g	27.33	139.38	-133.78			
		Vaporization	liq	g	760	185.42	-87.74	3.490	18.82	
P_2H_4		Vaporization	liq	g	735	330.	57.			
H_3PO_2		Fusion	c	liq		299.7	26.5	2.32	7.74	
H_3PO_3		Fusion	c	liq		343.3	70.1	3.07	8.94	
H_3PO_4		Fusion	c	liq		315.51	42.35	2.52	7.99	
$H_3PO_4 \cdot \frac{1}{2}H_2O$		Fusion	c	liq		302.51	29.35	3.64	12.03	
$H_4P_2O_6$		Fusion	c	liq		328.	55.			
$H_4P_2O_6 \cdot 2H_2O$		Fusion	c	liq		335.	62.	0.84	2.5	
$H_4P_2O_7$		Fusion	c	liq		334.	61.	2.20	6.6	
$H_4P_2O_7 \cdot 1\frac{1}{2}H_2O$		Fusion	c	liq		299.	26.	3.14	10.5	
$H_6P_4O_{13}$		Fusion	c	liq		307.	34.			

Table 19-3. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PF_3		Fusion	c	liq		121.7	-151.5			
		Vaporization	liq	g	760	172.0	-101.2	3.43	19.9	
PF_5		Fusion	c	liq	427	179.4	-93.8	2.8	15.6	
		Sublimation	c	g	427	179.4	-93.8	6.9	38.5	
		Vaporization	liq	g	760	188.7	-84.5	4.1	21.7	
POF_3		Sublimation	c	g	760	233.7	-39.5	9.0	38.5	
		Fusion	c	liq	778	234.1	-39.1	3.7	15.8	
		Vaporization	liq	g	760	233.5	-39.7	5.3	22.7	
HPO_2F_2		Vaporization	liq	g	760	383.	110.			
PCl_3		Fusion	c	liq		181.	-92.			
		Vaporization	liq	g	760	349.	76.	7.28	20.9	
PCl_5		Sublimation	c	g, mixt. equil.	760	432.	159.	16.1	37.3	
		Fusion	c	liq		433.	160.			
P_2Cl_4		Fusion	c	liq		245.	-28.			

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Table 19-4. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$POCl_3$		Fusion	c	liq		274.33	1.17	3.11	11.33	
		Vaporization	liq	g	760	378.5	105.3	8.21	21.69	
PH_4Cl		Transition	c, II	c, I		232.	-41.			
		Fusion	c, I	liq	34790	301.7	28.5			
PF_2Cl		Fusion	c	liq		108.4	-164.8			
		Vaporization	liq	g	760	226.0	-47.3	4.21	18.6	
$PFCl_2$		Fusion	c	liq		129.2	-144.0			
		Vaporization	liq	g	760	286.9	13.7	5.93	20.7	
POF_2Cl		Fusion	c	liq		176.8	-96.4			
		Vaporization	liq	g	760	276.1	2.9	5.93	21.5	
$POFCl_2$		Fusion	c	liq		193.1	-80.1			
		Vaporization	liq	g	760	326.0	52.8	6.98	21.4	

Table 19-5. Phosphorus (at. no., 15; at. wt. 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PBr_3		Fusion	c	liq		232.7	-40.5			
		Vaporization	liq	g	760	446.4	173.2	9.28	20.79	
PBr_5		Sublimation	c	g	210	357.0	83.8	13.0	36.4	
$POBr_3$		Fusion	c	liq		328.	55.			
		Vaporization	liq	g	760	464.9	191.7	9.08	19.53	
PF_2Br		Fusion	c	liq		139.4	-133.8			
		Vaporization	liq	g	760	257.1	-16.1	5.45	21.2	
$PFBr_2$		Fusion	c	liq		158.2	-115.0			
		Vaporization	liq	g	760	351.5	78.3	7.34	20.88	
PF_3Br_2		Fusion	c	liq		253.	-20.			
POF_2Br		Fusion	c	liq		188.4	-84.8			
		Vaporization	liq	g	760	305.1	31.9	6.73	22.06	
$POFBr_2$		Fusion	c	liq		156.0	-117.2			
		Vaporization	liq	g	760	383.0	109.8	7.38	19.27	

Table 19-6. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$POCl_2Br$		Fusion	c	liq		286.	13.			
$POClBr_2$		Fusion	c	liq		303.	30.			
$POFClBr$		Vaporization	liq	g	765	352.	79.			
PI_3		Fusion	c	liq		334.7	61.5			
P_2I_4		Fusion	c	liq		397.7	124.5			
P_2S_3		Fusion	c	liq		569.	296.			
P_4S_3		Fusion	c	liq		445.	172.			
		Vaporization	liq	g	760	680.	407.			
P_4S_7		Fusion	c	liq		580.	307.			
P_4S_{10}		Fusion	c	liq		561.	288.			
$P_4O_6S_4$		Fusion	c	liq		375.	102.			
		Vaporization	liq	g	760	568.	295.			

Table 19-7. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PSF_3		Fusion	c	liq		124.	-149.			
		Vaporization	liq	g	760	221.0	-52.2	4.68	21.2	
$PSCl_3$		Fusion	c, II	liq		232.4	-40.8			
		Fusion	c, I	liq		237.0	-36.2			
		Vaporization	liq	g	760	398.	125.			
PSF_2Cl		Fusion	c	liq		118.	-155.			
		Vaporization	liq	g	760	279.5	6.3	5.82	20.82	
$PSFCl_2$		Fusion	c	liq		177.2	-96.0			
		Vaporization	liq	g	760	337.9	64.7	7.1	21.0	
$PSBr_3$		Fusion	c	liq		311.	38.			
PSF_2Br		Fusion	c	liq		136.3	-136.9			
		Vaporization	liq	g	760	308.7	35.5	6.77	21.93	
$PSFBr_2$		Fusion	c	liq		198.0	-75.2			
		Vaporization	liq	g	760	398.5	125.3	8.35	20.95	

Table 19-8. Phosphorous (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$PSCl_2Br$		Fusion	c	liq		243.	-30.			
		Vaporization	liq	g	60	353.	80.			
$PSClBr_2$		Fusion	c	liq		267.	-6.			
		Vaporization	liq	g	60	368.	95.			
$NH_2OH \cdot H_3PO_2$		Fusion	c	liq		365.	92.			
$NH_4H_2PO_3$		Fusion	c	liq		393.	120.			
$N_2H_4 \cdot H_3PO_3$		Fusion	c	liq		309.	36.			
$NH_4NH_2HPO_3$		Fusion	c	liq		578.	305.			
$N_2H_4 \cdot H_3PO_4$		Fusion	c	liq		355.	82.			
$N_2H_4 \cdot H_4P_2O_6$		Fusion	c	liq		425.	152.			
$N_2H_4 \cdot (H_3PO_3)_2$		Fusion	c	liq		355.	82.			
$(NH_4)_2H_2P_2O_6$		Fusion	c	liq		443.	170.			

Table 19-9. Phosphorus (at. no., 15; at. wt., 30.98)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$N_3P_3F_8H_2 \cdot 2H_2O$		Fusion	c	liq		305.7	32.5			
NH_4HPO_3F		Fusion	c	liq		498.7	225.5			
$NH_4PO_2F_2$		Fusion	c	liq		486.	213.			
$(PNCl_2)_3$		Fusion	c	liq	9	388.1	114.9	5.0	12.9	
		Vaporization	liq	g	9	388.1	114.9	13.2	34.0	
		Vaporization	liq	g	760	526.	253.	13.	25.	
$(PNCl_2)_4$		Fusion	c	liq		396.7	123.5			
		Vaporization	liq	g	760	601.7	328.5	15.	25.	
$(PNCl_2)_5$		Fusion	c	liq		314.	41.			
		Vaporization	liq	g	13	501.	224.			
$(PNCl_2)_6$		Fusion	c	liq		364.	91.			
		Vaporization	liq	g	13	535.	262.			
$N_4P_4Cl_2F_6$		Fusion	c	liq		261.0	-12.2			
		Vaporization	liq	g	760	379.0	105.8	8.75	23.09	
$PNBr_2$		Fusion	c	liq		463.	190.			

Table 20-1. Arsenic (at. no., 33; at. wt., 74.91)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
As		Sublimation	c, metallic	g, As_4	760	883.	610.	7.75	8.78	
		Fusion	c, metallic	liq	27200	1090.	817.			
		Vaporization	liq	g	27200	1090.	817.			
As_4O_6		Sublimation	c, octahedral	g	28	547.	274.	26.1	47.7	
		Fusion	c, octahedral	liq	28	547.	274.	11.9	21.8	
		Sublimation	c, monoclinic	g	67	586.	313.	23.0	39.2	
		Fusion	c, monoclinic	liq	67	586.	313.	8.8	15.0	
		Vaporization	liq	g	760	733.	460.	14.2	19.4	
AsH_3		Fusion	c	liq	24.6	156.9	-116.3	0.56	3.6	
		Vaporization	liq	g	24.6	156.9	-116.3			
		Vaporization	liq	g	760	210.7	-62.5	4.18	19.8	
$H_3AsO_4 \cdot \frac{1}{2}H_2O$		Fusion	c	liq		309.30	36.14			

Table 20-2. Arsenic (at. no., 33; at. wt., 74.91)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
AsF_3		Fusion	c	liq		267.21	-5.95	2.486	9.304	
		Vaporization	liq	g	142.6	292.50	19.34	8.566	29.285	
AsF_5		Fusion	c	liq	149	192.9	-80.3	2.71	14.0	
		Vaporization	liq	g	149	192.9	-80.3			
		Vaporization	liq	g	760	220.6	-52.6	4.96	22.5	
$AsCl_3$		Fusion	c	liq		257.	-16.	2.42	9.42	
		Vaporization	liq	g	760	403.	130.	7.5	18.6	
$AsBr_3$		Fusion	c	liq		304.4	31.2	2.81	9.23	
		Vaporization	liq	g	760	494.	221.	10.	20.	
AsI_2		Fusion	c	liq		403.	130.			
AsI_3		Fusion	c	liq	1.1	417.	144.			
		Vaporization	liq	g	1.1	417.	144.	20.	48.	

Table 20-3. Arsenic (at. no., 33; at. wt., 74.91)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
As_2S_2		Transition	c, II, red	c, I, black		540.	267.			
		Fusion	c, I, black	liq		580.	307.			
		Vaporization	liq	g	760	838.	565.			
As_2S_3		Transition	c, II, yellow	c, I, red		443.	170.			
		Fusion	c, I, red	liq		573.	300.			

Table 21-1. Antimony (at. no., 51; at. wt., 121.76)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Sb		Transition	c, III	c, II		367.8	94.6			
		Transition	c, II	c, I		690.	413.			
		Fusion	c, I	liq		903.7	630.5	4.8	5.3	
		Vaporization	liq	g, equil	760	1713.	1440.			
Sb_4O_6		Transition	c, II	c, I	0.525	830.	557.	3.24	3.91	
		Fusion	c, I	liq	8.5	928.	655.	29.49	31.78	
		Vaporization	liq	g	8.5	928.	655.			
		Vaporization	liq	g	760	1729.	1456.	17.83	10.31	
SbH_3		Fusion	c	liq		185.	-88.			
		Vaporization	liq	g	760	256.	-17.			
SbF_3		Fusion	c	liq		563.	290.			
		Vaporization	liq	g	760	649.	376.			
SbF_5		Fusion	c	liq		279.	6.			
		Vaporization	liq	g	760	422.	149.			
$2SbF_3 \cdot SbF_5$		Vaporization	liq	g	760	663.	390.			

Table 21-2. Antimony (at. no., 51; at. wt., 121.76)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SbCl_3$		Fusion	c	liq		346.4	73.2	3.03	8.74	
		Vaporization	liq	g	760	494.	221.	10.80	21.86	
$SbCl_5$		Fusion	c	liq		276.2	3.0	2.4	8.7	
		Vaporization	liq	g	21	349.7	76.5	11.5	32.9	
$SbCl_3F_2$		Fusion	c	liq		328.	55.			
$SbBr_3$		Fusion	c	liq		369.8	96.6	3.51	9.49	
		Vaporization	liq	g	749	561.	288.			
SbI_3		Fusion	c	liq		443.7	170.5			
Sb_4S_6		Fusion	c	liq		820.	547.	11.2	13.7	
Sb_2Se_3		Fusion	c	liq		890.	617.			
Sb_2Te_3		Fusion	c	liq		898.	625.			
$3NH_4Cl \cdot 2SbCl_3$		Fusion	c	liq		564.	291.			

Table 22-1. Bismuth (at. no., 83; at. wt., 209.00)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1947; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Bi		Fusion	c	liq		544.2	271.0	2.63	4.83	
		Vaporization	liq	g	760	1693.	1420.			
Bi_2O_3		Fusion	c	liq		1090.	817.	6.8	6.2	
BiF_3		Fusion	c	liq		1000.	727.			
BiF_5		Sublimation	c	g	760	823.	550.			
$BiCl_3$		Fusion	c	liq		505.	232.	2.6	5.1	
		Vaporization	liq	g	760	714.	441.	17.35	24.30	
$BiCl_4$		Fusion	c	liq		498.	225.			
$BiBr_3$		Transition	c, II	c, I		428.	155.			
		Fusion	c, I	liq		491.	218.			
		Vaporization	liq	g	760	734.	461.	18.0	24.5	
BiS		Fusion	c	liq		958.	685.			
BiSe		Transition	c, II	c, I		695.	422.			
Bi_2Se_3		Fusion	c	liq		979.	706.			
Bi_2Te_3		Fusion	c	liq		853.	580.			
$Bi_2Te_3 \cdot Bi_2S_3$		Fusion	c	liq		888.	615.			

Table 23-1. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C		Sublimation	c, graphite	g, std. state	760	298.16	25.00	171.698	36.4002	
		Sublimation	c, graphite	equilibrium gas	760	4620.	4347.			
CO	carbon monoxide	Transition	c, II	c, I		61.53	-211.63	0.151	2.45	-3.2
		Fusion	c, I	liq	115.3	68.10	-205.06	0.200	2.94	1.9
		Vaporization	liq	g	115.3	68.10	-205.06			
		Vaporization	liq	g	760	81.66	-191.50	1.444	17.68	
CO_2	carbon dioxide	Sublimation	c	g	760	194.68	-78.48	6.031	30.98	
		Fusion	c	liq		217.0	-56.2	1.99	9.2	
CH_4	methane	Fusion	c	liq	87.7	90.68	-182.48	0.225	2.48	
		Vaporization	liq	g	87.7	90.68	-182.48			
		Vaporization	liq	g	760	111.67	-161.49	1.955	17.51	

Table 23-2. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CH_2O	formaldehyde	Fusion	c	liq		154.9	-118.3			
		Vaporization	liq	g	760	253.9	-19.3	5.85	23.0	
CH_2O_2	formic acid	Fusion	c	liq	18	281.46	8.30	3.03	10.8	8.8
		Vaporization	liq	g	18	281.46	8.30			
		Vaporization	liq	g	760	373.7	100.5	5.32	14.24	
CH_4O	methanol	Transition	c, II	c, I		157.4	-115.8	0.154	0.98	
		Fusion	c, I	liq		175.26	-97.90	0.757	4.32	4.2
		Vaporization	liq	g	124.0	298.16	25.00	8.94	29.98	
		Vaporization	liq, std.	g, std.	760	298.16	25.00	8.94	26.48	
		Vaporization	liq	g	760	337.9	64.7	8.43	24.95	
CH_4O_2	methyl hydrogen peroxide	Vaporization	liq	g	34	298.	25.	7.9	26.5	

Table 23-3. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CF_4	tetrafluoromethane	Transition	c, II	c, I		76.23	-196.93	0.35	4.6	
		Fusion	c, I	liq		89.47	-183.69	0.167	1.87	
		Vaporization	liq	g	760	145.14	-128.02	3.01	20.7	
COF_2	carbonyl fluoride	Fusion	c	liq	106	159.2	-114.0			
		Vaporization	liq	g	760	189.9	-83.3	3.86	20.3	
CH_3F	fluoromethane	Fusion	c	liq						
		Vaporization	liq	g	760	195.1	-78.1	4.23	21.7	
CH_2F_2	difluoromethane	Fusion	c	liq						
		Vaporization	liq	g	760	221.	-52.			
CHF_3	trifluoromethane	Fusion	c	liq		113.	-160.			
		Vaporization	liq	g	760	189.0	-84.2	4.4	23.	

Table 23-4. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CCl_4	tetrachloromethane	Transition	c, II	c, I		225.5	-47.7	1.09	4.8	
		Fusion	c, I	liq		250.3	-22.9	0.60	2.4	1.1
		Vaporization	liq	g	760	349.9	76.7	7.17	20.5	
$COCl_2$	carbonyl chloride	Fusion	c	liq		140.37	-127.79	1.371	9.43	
		Vaporization	liq	g	760	280.72	7.56	5.832	20.78	
CH_3Cl	chloromethane	Fusion	c	liq	65.66	175.44	-97.72	1.537	8.76	1.5
		Vaporization	liq	g	65.66	175.44	-97.72			
		Vaporization	liq	g	760	248.94	-24.22	5.15	20.7	
CH_2Cl_2	dichloromethane	Fusion	c	liq		176.	-97.	1.1	6.	
		Vaporization	liq	g	760	313.	40.	6.69	21.4	
$CHCl_3$	trichloromethane	Fusion	c	liq		209.7	-63.5	2.2	10.5	
		Vaporization	liq	g	760	334.4	61.2	7.02	20.99	

Table 23-5. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CF_3Cl	trifluorochloromethane	Fusion	c	liq		91.6	-181.6			
		Vaporization	liq	g	760	192.0	-81.2	3.92	20.4	
CF_2Cl_2	difluorodichloromethane	Fusion	c	liq		118.	-155.	0.99	8.4	
		Vaporization	liq	g	760	242.7	-30.5	4.85	20.0	
$CFCl_3$	fluorotrichloromethane	Fusion	c	liq		162.68	-110.68	1.648	10.13	
		Vaporization	liq	g	760	296.8	23.6	5.96	20.1	-10.4
$COFCl$	carbonyl fluorochloride	Fusion	c	liq		135.	-138.			
		Vaporization	liq	g	760	231.	-42.	5.3	23.	
CH_2FCl	fluorochloromethane	Fusion	c	liq						
		Vaporization	liq	g	760	264.	-9.	5.6	21.	
CHF_2Cl	difluorochloromethane	Fusion	c	liq		113.	-160.			
		Vaporization	liq	g	760	232.4	-40.8	5.1	22.	
$CHFCl_2$	fluorodichloromethane	Fusion	c	liq		138.	-135.			
		Vaporization	liq	g	760	282.1	8.9	6.4	23.	

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Table 23-6. Carbon (at. no., 6; at. wt. 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CBr_4	tetrabromomethane	Transition	c, II	c, I		320.1	46.9	1.5	4.7	
		Fusion	c, I	liq		363.3	90.1	0.98	2.70	
		Vaporization	liq	g	760	460.	187.	10.4	22.6	
$COBr_2$	carbonyl bromide	Fusion	c	liq						
		Vaporization	liq	g	760	333.	60.	7.2	21.6	
CH_3Br	bromomethane	Transition	c, II	c, I		173.79	-99.37	0.113	0.650	
		Fusion	c, I	liq		179.48	-93.68	1.429	7.96	
		Vaporization	liq	g	760	276.72	3.56	5.715	20.65	
CH_2Br_2	dibromomethane	Fusion	c	liq		220.5	-52.7	1.	4.	
		Vaporization	liq	g	760	370.4	97.2	8.6	23.	
$CHBr_3$	tribromomethane	Fusion	c	liq		281.21	8.05	2.65	9.42	
		Vaporization	liq	g	22	323.	50.	10.4	32.2	
		Vaporization	liq	g	760	422.7	149.5			

Table 23-7. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CF_3Br	trifluorobromomethane	Fusion	c	liq						
		Vaporization	liq	g	740	213.	-60.			
CF_2Br_2	difluorodibromomethane	Fusion	c	liq						
		Vaporization	liq	g	760	24.5	297.7			
$CFBr_3$	fluorotribromomethane	Fusion	c	liq						
		Vaporization	liq	g	760	380.	107.			
CHF_2Br	difluorobromomethane	Fusion	c	liq						
		Vaporization	liq	g	760	258.7	-14.5			
$CHFBr_2$	fluorodibromomethane	Fusion	c	liq						
		Vaporization	liq	g	757	338.1	64.9			

Table 23-8. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CI_4	tetraiodomethane	Fusion	c	liq		444.	171.			
CH_3I	iodomethane	Fusion	c	liq		206.7	-66.5			
		Vaporization	liq	g	760	315.6	42.4	6.7	21.2	
CH_2I_2	diiodomethane	Fusion	c II	liq		278.76	5.60	3.02	10.8	
		Fusion	c, I	liq		279.26	6.10	2.88	10.3	
		Vaporization	liq	g	330	425.	152.			
CHI_3	triiodomethane	Fusion	c	liq		398.	125.	3.9	9.8	
CHF_2I	difluoroiodomethane	Fusion	c	liq		151.2	-122.0			
		Vaporization	liq	g	760	294.7	21.5	6.29	21.3	
$CHFI_2$	fluorodiiodomethane	Fusion	c	liq		238.7	-34.5			
		Vaporization	liq	g	100	329.2	56.0	7.8	24.	

Table 23-9. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CS_2	carbon disulfide	Fusion	c	liq		161.1	-112.1	1.05	6.52	
		Vaporization	liq	g	760	319.41	46.25	6.40	20.0	
COS	carbon oxysulfide	Fusion	c	liq		134.34	-138.82	1.130	8.41	5.6
		Vaporization	liq	g	760	222.92	-50.24	4.423	19.84	
CH_4S	methanethiol	Transition	c, II	c, I		137.6	-135.6	0.052	0.38	
		Fusion	c, I	liq		150.16	-123.00	1.411	9.40	4.8
		Vaporization	liq	g	760	279.12	5.96	5.872	21.04	
H_2CS_3	trithiocarbonic acid	Fusion	c	liq		242.7	-30.5			
CSe_2	carbon diselenide	Fusion	c	liq		227.7	-45.5			
		Vaporization	liq	g	760	397.	124.	8.8	22.	
COSe	carbon oxyselenide	Fusion	c	liq		151.1	-122.1			
		Vaporization	liq	g	760	251.6	-21.6	5.4	21.	
CSSe	carbon sulfoselenide	Fusion	c	liq		188.	-85.			
		Vaporization	liq	g	760	357.5	84.3	7.56	21.2	
CSTe	carbon sulfotelluride	Fusion	c	liq		219.	-54.			

Table 23-10. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C(NO_2)_4$	tetranitromethane	Fusion	c	liq		286.	13.			
		Vaporization	liq	g	760	398.9	125.7	9.2	23.	
HCN	hydrogen cyanide	Transition	c, II	c, I		170.41	-102.75	0.004	0.02	
		Fusion	c, I	liq	140.4	259.92	-13.24	2.009	7.73	1.7
		Vaporization	liq	g	140.4	259.92	-13.24			
		Vaporization	liq	g	760	298.86	25.70	6.027	20.17	
CH_5N	methyl amine	Fusion	c	liq		179.70	-93.46	1.466	8.16	
		Vaporization	liq	g	760	266.84	-6.32	6.17	23.1	
CH_2N_2	cyanamide	Fusion	c	liq		316.0	42.8	2.1	6.6	
HNCO	hydrogen isocyanate	Fusion	c	liq		193.	-80.			
		Vaporization	liq	g	202	267.3	-5.9	7.2	27.	
CH_3ON	formamide	Fusion	c	liq		275.71	2.55	1.6	5.8	

Table 23-11. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CH_3O_2N	nitromethane	Fusion	c	liq		244.78	-28.38	2.319	9.47	
		Vaporization	liq	g	36.7	298.16	25.00	9.147	30.68	
		Vaporization	liq	g	760	374.0	100.8			
CH_3O_2N	methyl nitrite	Fusion	c	liq						
		Vaporization	liq	g	760	255.	-18.	5.0	19.7	
CH_3O_3N	methyl nitrate	Fusion	c	liq						
		Vaporization	liq	c	760	339.7	66.5	7.8	23.0	
CH_4ON_2	urea	Fusion	c	liq		405.8	132.6	3.60	8.9	

Table 23-12. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CFN	cyanogen fluoride	Sublimation	c	g	760	201.	-72.	5.66	28.2	
COF_3N	N,N-difluoro fluoroformamide	Fusion	c	liq		120.7	-152.5			
		Vaporization	liq	g	760	190.9	-82.3	4.16	21.8	
COF_3N	trifluoronitrosomethane	Fusion	c	liq		77.2	-196.0			
		Vaporization	liq	g	760	189.1	-84.1	4.20	22.2	
CClN	cyanogen chloride	Fusion	c	liq		266.3	-6.9	2.72	10.2	
		Vaporization	liq	g	760	286.1	12.9	6.29	22.0	
CO_2Cl_3N	trichloronitromethane	Fusion	c	liq						
		Vaporization	liq	g	760	385.56	112.40	8.71	22.6	
CH_6ClN	methylamine hydrochloride	Transition	c, III	c, II		220.4	-52.8	0.425	1.93	
		Transition	c, II	c, I		264.5	-8.7	0.674	2.55	

Table 23-13. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CBrN	cyanogen bromide	Sublimation	c	g	119.5	298.	25.	11.3	37.9	
		Fusion	c	liq		324.5	51.3			
		Vaporization	liq	g	760	334.5	61.3			
CIN	cyanogen iodide	Sublimation	c	g	760	413.0	139.8	14.2	34.4	
		Fusion	c	liq		419.	146.			
HCNS	hydrogen thiocyanate	Fusion	c	liq		173.	-110.			

Table 23-14. Carbon (at. no., 6; at. wt., 12.010)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NH_4SCN	ammonium thiocyanate	Transition	c, II	c, I	760	360.9	87.7	0.789	2.19	
COF_2NP	phosphorus difluoroisocyanate	Fusion	c	liq		165.	-108.			
		Vaporization	liq	g	760	285.5	12.3			
CF_2SNP	phosphorus difluoroisothiocyanate	Vaporization	liq	g	760	363.5	90.3	8.0	22.	
CCl_2SNP	phosphorus dichlorothiocyanate	Fusion	c	liq		197.	-76.			
		Vaporization	liq	g	760	421.	148.	12.6	29.9	
CH_5As	methyl arsine	Fusion	c	liq		130.	-143.			
		Vaporization	liq	g	760	275.0	1.8	5.34	19.4	
CH_3F_2As	methyl difluoroarsine	Fusion	c	liq		243.5	-29.7			
		Vaporization	liq	g	760	349.7	76.5	8.5	24.	
CH_3Cl_2As	methyl dichloroarsine	Fusion	c	liq		230.7	-42.5			
		Vaporization	liq	g	760	405.7	132.5	8.9	22.	

Table 23-15. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_2	ethyne (acetylene)	Sublimation	c	g	760	189.2	-84.0	5.1	27.	
		Fusion	c	liq	900	191.7	-81.5	0.9	5.	
		Vaporization	liq	g	900	191.7	-81.5	4.2	22.	
C_2H_4	ethene (ethylene)	Fusion	c	liq	0.9	103.97	-169.19	0.8008	7.702	
		Vaporization	liq	g	0.9	103.97	-169.19			
		Vaporization	liq	g	760	169.45	-103.71	3.237	19.10	
C_2H_6	ethane	Fusion	c	liq	0.006	89.89	-183.27	0.6834	7.603	2.2
		Vaporization	liq	g	0.006	89.89	-183.27			
		Vaporization	liq	g	760	184.53	-88.63	3.517	19.06	-11.5
C_2H_2O	ketene	Fusion	c	liq		122.	-151.			
		Vaporization	liq	g	760	217.	-56.			
$C_2H_2O_2$	glyoxal	Fusion	c	liq		288.	15.			
		Vaporization	liq	g	776	324.	51.	9.	28.	
$C_2H_2O_4$	oxalic acid	Sublimation	c	g	0.35	373.	100.	21.7	58.2	
C_2H_4O	acetaldehyde	Fusion	c	liq		155.	-118.	0.77	5.0	
		Vaporization	liq	g	760	293.3	20.1	6.5	22.2	-9.3
$C_2H_4O \cdot H_2O$	acetaldehyde monohydrate	Fusion	c	liq		319.2	46.0	1.0	3.1	8.1
C_2H_4O	ethylene oxide	Fusion	c	liq	760	160.71	-112.45	1.236	7.69	3.45
		Vaporization	liq	g	760	283.72	10.56	6.101	21.50	-9.7

Table 23-16. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_4O_2$	acetic acid	Fusion	c, I	liq	760	289.77	16.61	2.80	9.66	9.4
		Transition	c, I	c, II	155000	328.9	55.7	0.11	0.3	
		Fusion	c, I	liq	155000	328.9	55.7	2.78	8.5	
		Fusion	c, II	liq	155000	328.9	55.7	2.89	8.8	
		Vaporization	liq	g, equilibrium	760	391.4	118.2	5.83	14.9	
$C_2H_4O_2$	methyl formate	Fusion	c	liq		174.	-99.	1.6	9.2	
		Vaporization	liq	g	760	304.7	31.5	6.75	22.2	
$C_2H_4O_2$	hydroxyacetaldehyde	Fusion	c	liq		370.	97.			
$C_2H_4O_3$	hydroxyacetic acid (glycollic acid)	Fusion	c, II	liq		336.	63.	2.0	6.	
		Fusion	c, I	liq		351.	78.	2.1	6.	
C_2H_6O	ethanol	Fusion	c	liq		158.6	-114.6	1.200	7.57	5.70
		Vaporization	liq	g	58.6	298.16	25.00	10.12	33.94	
		Vaporization	liq, std.	g, std.	760	298.16	25.00	10.12	28.99	
		Vaporization	liq	g	760	351.7	78.5	9.22	26.22	
C_2H_6O	dimethyl ether	Fusion	c	liq		131.66	-141.50	1.180	8.96	6.8
		Vaporization	liq	g	760	248.34	-24.82	5.141	20.70	-10.6
$C_2H_6O_2$	1,2-ethanediol (ethylene glycol)	Fusion	c	liq.		260.0	-13.2			
		Vaporization	liq	g	760	470.4	197.2	13.6	28.9	

Table 23-17. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2F_4	tetrafluoroethene	Fusion	c	liq		130.7	-142.5			
		Vaporization	liq	g	760	197.	-76.	4.3	22.	
C_2F_6	hexafluoroethane	Transition	c, II	c, I		103.98	-169.18	0.893	8.59	1.2
		Fusion	c, I	liq		173.10	-100.06	0.642	3.71	1.78
		Vaporization	liq	g	760	194.9	-78.3	3.857	19.79	
C_2OF_4	trifluoroacetyl fluoride	Vaporization	liq	g	760	214.	-59.			
C_2H_3F	fluoroethene	Fusion	c	liq		112.7	-160.5			
		Vaporization	liq	g	760	201.0	-72.2	4.1	20.	
C_2H_5F	fluoroethane	Vaporization	liq	g	760	241.	-32.			
$C_2H_4F_2$	1,1-difluoroethane	Fusion	c	liq		156.	-117.			
		Vaporization	liq	g	760	246.7	-26.5	5.7	23.	
C_2HF_3	trifluoroethene	Vaporization	liq	g	760	221.	-52.			
$C_2H_3F_3$	1,1,1-trifluoroethane	Transition	c, II	c, I		156.35	-116.81	0.071	0.45	
		Fusion	c, I	liq		161.82	-111.34	1.48	9.1	
		Vaporization	liq	g	709.1	224.40	-48.76	4.583	20.42	

Table 23-18. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_3OF	acetyl fluoride	Vaporization	liq	g	760	293.6	20.4	6.2	21.	
$C_2H_3O_2F$	fluoroacetic acid	Fusion	c	liq		308.4	35.2			
C_2H_5OF	2-fluoroethanol	Fusion	c	liq		246.7	-26.5			
		Vaporization	liq	g	760	376.6	103.4	10.5	27.9	
$C_2H_2O_2F_2$	difluoroacetic acid	Fusion	c	liq		272.1	-1.1			
		Vaporization	liq	g	760	407.4	134.2			
$C_2H_4OF_2$	2,2-difluoroethanol	Fusion	c	liq		245.0	-28.2			
		Vaporization	liq	g	750	368.7	95.5			
$C_2HO_2F_3$	trifluoroacetic acid	Fusion	c	liq		257.9	-15.3			
		Vaporization	liq	g	760	345.6	72.4			
$C_2H_3OF_3$	2,2,2-trifluoroethanol	Fusion	c	liq		229.7	-43.5			
		Vaporization	liq	g	760	347.3	74.1			

Table 23-19. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2Cl_2	dichloroethyne	Vaporization	liq	g	740	302.	29.			
C_2Cl_4	tetrachloroethene	Fusion	c	liq		250.8	-22.4	2.5	10.	
		Vaporization	liq	g	760	394.2	121.0	8.3	21.	
C_2Cl_6	hexachloroethane	Transition	c, II	c, I	9.5	344.4	71.2	1.8	5.	
		Sublimation	c, I	g	760	457.6	184.4	12.2	26.7	
$C_2O_2Cl_4$	trichloromethyl chloroformate	Vaporization	liq	g	760	400.	127.	11.	28.	
C_2H_3Cl	chloroethene	Fusion	c	liq		113.5	-159.7			
		Vaporization	liq	g	760	259.3	-13.9	5.5	21.	
C_2H_5Cl	chloroethane	Fusion	c	liq		134.83	-138.33	1.064	7.89	1.52
		Vaporization	liq	g	760	285.43	12.27	5.9	21.	

Table 23-20. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_2Cl_2$	1,1-dichloroethene	Fusion	c	liq		150.7	-122.5			
		Vaporization	liq	g	760	304.9	31.7	6.3	21.	
$C_2H_2Cl_2$	*cis*-1,2-dichloroethene	Fusion	c	liq		192.7	-80.5			
		Vaporization	liq	g	760	333.0	59.8	7.15	21.5	
$C_2H_2Cl_2$	*trans*-1,2-dichloroethene	Fusion	c	liq		223.	-50.			
		Vaporization	liq	g	760	321.7	48.5	7.0	21.8	
$C_2H_4Cl_2$	1,1-dichloroethane	Fusion	c	liq		176.5	-96.7	1.3	7.	
		Vaporization	liq	g	760	330.6	57.4	7.3	22.	
$C_2H_4Cl_2$	1,2-dichloroethane	Fusion	c	liq		237.5	-35.7	2.11	8.9	5.9
		Vaporization	liq	g	760	356.7	83.5	7.7	22.	
C_2HCl_3	trichloroethene	Fusion	c	liq		186.8	-86.4			
		Vaporization	liq	g	760	360.3	87.1	7.6	21.	
$C_2H_3Cl_3$	1,1,1-trichloroethane	Transition	c, II	c, I		224.20	-48.96	1.786	7.97	
		Fusion	c, I	liq		240.4	-32.8	0.8	3.3	
		Vaporization	liq	g	76.86	286.53	13.37	7.96	27.8	
		Vaporization	liq	g	760	347.2	74.0			

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Table 23-21. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
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Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_3Cl_3$	1.1,2-trichloroethane	Fusion	c	liq		236.5	-36.7			
		Vaporization	liq	c	760	387.1	113.9	8.8	22.7	
$C_2H_2Cl_4$	1,1,1,2-tetrachloroethane	Fusion	c	liq		204.5	-68.7			
		Vaporization	liq	g	760	403.7	130.5	8.8	21.8	
$C_2H_2Cl_4$	1,1,2,2-tetrachloroethane	Fusion	c	liq		230.7	-42.5			
		Vaporization	liq	g	760	418.	145.	9.2	22.	
C_2HCl_5	pentachloroethane	Fusion	c	liq		244.2	-29.0	2.7	11.	
		Vaporization	liq	g	760	432.5	159.3	9.7	22.4	
C_2H_3OCl	acetyl chloride	Fusion	c	liq		161.	-112.			
		Vaporization	liq	g	760	323.6	50.4	6.93	21.2	
C_2H_3OCl	chloroacetaldehyde	Vaporization	liq	g	760	358.	85.			
$C_2H_3O_2Cl$	chloroacetic acid	Fusion	c, III	liq		324.	51.	3.8	12.	
		Fusion	c, II	liq		329.	56.	4.5	14.	
		Fusion	c, I	liq		334.	61.	4.6	14.	6.
		Vaporization	liq	g	100	403.	130.	13.	32.	

Table 23–22. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_5OCl	2-chloroethanol	Fusion	c	liq		205.7	-67.5			
		Vaporization	liq	g	760	401.8	128.6	9.90	24.64	
C_2H_5OCl	chloromethyl methyl ether	Vaporization	liq	g	760	332.7	59.5			
$C_2H_2OCl_2$	chloroacetyl chloride	Vaporization	liq	g	760	378.	105.			
$C_2H_2OCl_2$	dichloroacetaldehyde	Vaporization	liq	g	760	362.	89.			
$C_2H_2O_2Cl_2$	dichloroacetic acid	Fusion	c	liq		284.0	10.8	1.83	6.44	-3.
		Vaporization	liq	g	100	405.	132.	14.	35.	
$C_2H_4O_2Cl_2$	dichloroacetaldehyde monohydrate	Fusion	c	liq		330.	57.			
C_2HOCl_3	trichloroacetaldehyde (chloral)	Fusion	c	liq		216.	-57.			
		Vaporization	liq	g	760	370.9	97.7	8.1	21.8	
$C_2HO_2Cl_3$	trichloroacetic acid	Fusion	c	liq		332.3	59.1	1.4	4.2	-16.7
		Vaporization	liq	g	760	468.	195.	13.4	28.6	
$C_2H_3OCl_3$	2,2,2-trichloroethanol	Fusion	c	liq		291.0	17.8			
		Vaporization	liq	g	740	424.	151.			
$C_2H_3O_2Cl_3$	trichloroacetaldehyde monohydrate	Fusion	c	liq		324.9	51.7	5.50	17.	44.

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Table 23-23. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2F_3Cl	trifluorochloroethene	Fusion	c	liq		115.7	-157.5			
		Vaporization	liq	g	760	245.3	-27.9	5.23	21.3	
C_2F_5Cl	pentafluorochloroethane	Vaporization	liq	g	760	235.	-38.			
$C_2F_2Cl_2$	1,1-difluoro-2,2-dichloroethene	Fusion	c	liq		158.	-115.			
		Vaporization	liq	g	760	292.	19.			
$C_2F_2Cl_2$	*cis*-1,2-difluoro-1,2-dichloroethene	Fusion	c	liq		142.7	-130.5			
		Vaporization	liq	g	760	294.3	21.1			
$C_2F_2Cl_2$	*trans*-1,2-difluoro-1,2-dichloroethene	Fusion	c	liq		162.9	-110.3			
		Vaporization	liq	g	760	295.2	22.0			
$C_2F_4Cl_2$	1,1,1,2-tetrafluoro-2,2-dichloroethane	Vaporization	liq	g	760	271.	-2.			
$C_2F_4Cl_2$	1,1,2,2-tetrafluoro-1,2-dichloroethane	Fusion	c	liq	1	179.	-94.			
		Vaporization	liq	g	760	277.0	3.8	6.09	22.0	
C_2FCl_3	fluorotrichloroethene	Fusion	c	liq		191.	-82.			
		Vaporization	liq	g	740.8	343.2	70.0			

Table 23-24. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2F_3Cl_3$	1,1,2-trifluoro-1,2,2-trichloroethane	Fusion	c	liq		238.	-35.			
		Vaporization	liq	g	760	320.4	47.2	6.8	21.2	-13.1
$C_2F_3Cl_3$	1,1,1-trifluoro-2,2,2-trichloroethane	Fusion	c	liq		287.4	14.2			
		Vaporization	liq	g	760	319.1	45.9			
$C_2F_2Cl_4$	1,2-difluoro-1,1,2,2-tetrachloroethane	Fusion	c	liq	63	301.3	28.1			
		Vaporization	liq	g	63	301.3	28.1			
		Vaporization	liq	g	760	365.1	91.9	8.59	23.5	
$C_2F_2Cl_4$	1,1-difluoro-1,2,2,2-tetrachloroethane	Fusion	c	liq		313.8	40.6			
		Vaporization	liq	g	760	364.7	91.5			
C_2FCl_5	fluoropentachloroethane	Fusion	c	liq		374.5	101.3			
		Vaporization	liq	g	760	410.7	137.5			
C_2OF_3Cl	trifluoroacetyl chloride	Fusion	c	liq		127.	-146.			
		Vaporization	liq	g	760	245.	-28.	4.7	19.	
$C_2OF_2Cl_2$	difluorochloroacetyl chloride	Vaporization	liq	g	760	307.	34.			

Table 23-25. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_3F_2Cl$	1,1-difluoro-1-chloroethane	Fusion	c	liq		142.4	-130.8	0.642	4.51	1.3
		Vaporization	liq	g	760	263.95	-9.21	5.35	20.27	
$C_2H_3F_2Cl$	1,1-difluoro-2-chloroethane	Vaporization	liq	g	760	309.	36.			
$C_2H_2F_3Cl$	1,1,2-trifluoro-2-chloroethane	Vaporization	liq	g	760	290.	17.			
C_2HFCl_2	2-fluoro-1,1-dichloroethene	Vaporization	liq	g	760	310.7	37.5			
$C_2H_2F_2Cl_2$	1,1-difluoro-2,2-dichloroethane	Vaporization	liq	g	760	333.	60.			
$C_2H_2FCl_3$	1-fluoro-1,2,2-trichloroethane	Vaporization	liq	g	760	376.	103.			
C_2HFCl_4	2-fluoro-1,1,1,2-tetrachloroethane	Vaporization	liq	g	760	389.7	116.5			

Table 23-26. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_2OFCl	fluoroacetyl chloride	Vaporization	liq	g	760	343.	70.	8.8	26.	
C_2H_2OFCl	chloroacetyl fluoride	Vaporization	liq	g	760	348.	75.	9.1	26.	
C_2HOF_2Cl	difluoroacetyl chloride	Vaporization	liq	g	760	298.	25.			
$C_2HO_2F_2Cl$	difluorochloroacetic acid	Fusion	c	liq		296.1	22.9			
		Vaporization	liq	g	760	394.7	121.5			
C_2HOFCl_2	dichloroacetyl fluoride	Vaporization	liq	g	760	344.	71.			
C_2Br_4	tetrabromoethene	Sublimation	c	g	7.5	298.2	25.0	7.3	24.	
		Fusion	c	liq		329.7	56.5			
C_2H_3Br	bromoethene	Fusion	c	liq		135.	-138.	5.5	19.0	
		Vaporization	liq	g	760	288.9	15.7			
C_2H_5Br	bromoethane	Fusion	c	liq		155.0	-118.2	1.4	9.	
		Vaporization	liq	g	760	311.5	38.3	7.3	23.	-7.
$C_2H_2Br_2$	1,1-dibromoethene	Vaporization	liq	g	760	349.	76.			
$C_2H_2Br_2$	*cis*-1,2-dibromoethene	Fusion	c	liq		220.	-53.			
		Vaporization	liq	g	760	385.7	112.5			
$C_2H_2Br_2$	*trans*-1,2-dibromoethene	Fusion	c	liq		266.7	-6.5			
		Vaporization	liq	g	760	381.	108.			

Table 23-27. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_4Br_2$	1,1-dibromoethane	Vaporization	liq	g	760	383.7	110.5			
$C_2H_4Br_2$	1,2-dibromoethane	Transition	c, II	c, I		249.65	-23.51	0.464	1.86	-11.1
		Fusion	c, I	liq		283.1	9.9	2.616	9.24	7.9
		Vaporization	liq	g	760	404.9	131.7	8.7	21.	
$C_2H_3Br_3$	1,1,2-tribromoethane	Fusion	c	liq		244.0	-29.2			
		Vaporization	liq	g	760	461.	188.	10.	22.	
$C_2H_2Br_4$	1,1,1,2-tetrabromoethane	Vaporization	liq	g	18	385.7	112.5			
$C_2H_2Br_4$	1,1,2,2-tetrabromoethane	Fusion	c	liq		273.3	0.1	2.4	8.8	
		Vaporization	liq	g	12	387.	114.	13.	34.	
C_2HBr_5	pentabromoethane	Fusion	c	liq		330.	57.			

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Table 23-28. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
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Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_3OBr	acetyl bromide	Fusion	c	liq		177.	-96.			
		Vaporization	liq	g	760	349.1	75.9	7.25	20.8	
C_2H_3OBr	bromoacetaldehyde	Vaporization	liq	g	750	378.	105.			
$C_2H_3O_2Br$	bromoacetic acid	Fusion	c	liq		322.7	49.5			
		Vaporization	liq	g	760	481.	208.	13.	27.	
C_2H_5OBr	2-bromoethanol	Vaporization	liq	g	20	330.	57.			
C_2H_5OBr	bromomethyl methyl ether	Vaporization	liq	g	760	360.	87.			
$C_2H_2OBr_2$	bromoacetyl bromide	Vaporization	liq	g	760	422.	149.			
$C_2H_2O_2Br_2$	dibromoacetic acid	Fusion	c	liq		321.	48.			
		Vaporization	liq	g	760	503.	230.			
$C_2H_4OBr_2$	bis(bromomethyl) ether	Vaporization	liq	g	760	416.	143.	12.	29.	
C_2HOBr_3	tribromoacetaldehyde (bromal)	Vaporization	liq	g	760	447.	174.	8.8	20.	
$C_2HO_2Br_3$	tribromoacetic acid	Fusion	c	liq		404.	131.			
$C_2H_3OBr_3$	2,2,2-tribromoethanol	Fusion	c	liq		353.	80.			
$C_2H_3O_2Br_3$	tribromoacetaldehyde monohydrate	Fusion	c	liq		326.7	53.5	5.05	15.	39.

Table 23-29. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2F_3Br	trifluorobromoethene	Vaporization	liq	g	760	270.7	-2.5			
C_2F_5Br	pentafluorobromoethane	Vaporization	liq	g	740	251.	-22.			
$C_2F_4Br_2$	1,1,2,2-tetrafluoro-1,2-dibromoethane	Fusion	c	liq		161.7	-111.5			
		Vaporization	liq	g	760	320.5	47.3	7.2	22.5	
C_2FBr_3	fluorotribromoethene	Vaporization	liq	g	760	420.4	147.2			
$C_2F_2Br_4$	1,1-difluoro-1,2,2,2-tetrabromoethane	Fusion	c	liq		372.	99.			
		Vaporization	liq	g	760	458.	185.			
C_2OF_3Br	trifluoroacetyl bromide	Fusion	c	liq		137.	-136.			
		Vaporization	liq	g	760	268.	-5.	4.9	18.	

Table 23-30. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_2FBr	1-fluoro-1-bromoethene	Vaporization	liq	g	760	285.7	12.5			
C_2H_4FBr	1-fluoro-2-bromoethane	Vaporization	liq	g	760	345.	72.			
C_2HF_2Br	1,1-difluoro-2-bromoethene	Vaporization	liq	g	760	279.4	6.2			
$C_2H_3F_2Br$	1,1-difluoro-2-bromoethane	Vaporization	liq	g	760	330.	57.			
$C_2H_2F_3Br$	1,1,2-trifluoro-1-bromoethane	Vaporization	liq	g	760	298.	25.			
$C_2H_2F_3Br$	1,1,1-trifluoro-2-bromoethane	Vaporization	liq	g	760	299.7	26.5			
$C_2H_3FBr_2$	2-fluoro-1,1-dibromoethane	Vaporization	liq	g	760	390.7	117.5			
$C_2H_3FBr_2$	1-fluoro-1,2-dibromoethane	Fusion	c	liq		219.	-54.			
		Vaporization	liq	g	760	395.7	122.5			
$C_2H_2F_2Br_2$	1,1-difluoro-2,2-dibromoethane	Vaporization	liq	g	760	380.7	107.5			
$C_2H_2F_2Br_2$	1,1-difluoro-1,2-dibromoethane	Vaporization	liq	g	760	365.	92.			
$C_2HF_3Br_2$	1,1,2-trifluoro-1,2-dibromoethane	Vaporization	liq	g	760	349.7	76.5			

Table 23-31. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_2FBr_3$	1-fluoro-1,2,2-tribromoethane	Vaporization	liq	g	760	446.	173.			
$C_2H_2FBr_3$	1-fluoro-1,1,2-tribromoethane	Vaporization	liq	g	760	436.	163.			
$C_2HF_2Br_3$	1,1-difluoro-1,2,2-tribromoethane	Vaporization	liq	g	755	416.7	143.5			
C_2HFBr_4	1-fluoro-1,1,2,2-tetrabromoethane	Vaporization	liq	g	760	484.	211.			
$C_2H_2O_2FBr$	fluorobromoacetic acid	Fusion	c	liq		322.	49.			
		Vaporization	liq	g	760	456.	183.			
C_2HOFBr_2	fluorobromoacetyl bromide	Vaporization	liq	g	760	385.7	112.5			

Table 23-32. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2Cl_2Br_2$	1,2-dichloro-1,2-dibromoethene	Fusion	c	liq		278.	5.			
		Vaporization	liq	g	760	445.	172.			
$C_2Cl_4Br_2$	1,1,2,2-tetrachloro-1,2-dibromoethane	Sublimation	c	g	6.0	373.	100.	15.	40.	
C_2OCl_3Br	trichloroacetyl bromide	Vaporization	liq	g	760	416.	143.	9.5	23.	
$C_2OCl_2Br_2$	chlorodibromoacetyl chloride	Vaporization	liq	g	760	440.	167.			
C_2H_2ClBr	*cis*-1-chloro-2-bromoethene	Fusion	c	liq		186.	-87.			
		Vaporization	liq	g	760	357.8	84.6			
C_2H_2ClBr	*trans*-1-chloro-2-bromoethene	Fusion	c	liq		232.	-41.			
		Vaporization	liq	g	760	348.5	75.3			
C_2H_4ClBr	1-chloro-1-bromoethane	Fusion	c	liq		289.8	16.6			
		Vaporization	liq	g	760	355.9	82.7	7.9	22.2	
C_2H_4ClBr	1-chloro-2-bromoethane	Fusion	c	liq		256.6	-16.6	2.3	9.0	4.3
		Vaporization	liq	g	760	379.9	106.7	8.3	21.8	
C_2HCl_2Br	1,1-dichloro-2-bromoethene	Fusion	c	liq		214.7	-58.5			
		Vaporization	liq	g	760	380.	107.			
C_2HCl_2Br	*cis*-1,2-dichloro-1-bromoethene	Fusion	c	liq		189.7	-83.5			
		Vaporization	liq	g	760	387.	114.			
C_2HCl_2Br	*trans*-1,2-dichloro-1-bromoethene	Fusion	c	liq		185.	-88.			

Table 23-33. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_3Cl_2Br$	1,1-dichloro-2-bromoethane	Vaporization	liq	g	760	411.	138.			
$C_2H_2Cl_3Br$	1,2,2-trichloro-1-bromoethane	Fusion	c	liq		317.8	44.6			
		Vaporization	liq	g	760	445.	172.			
$C_2H_2Cl_2Br_2$	1,1-dichloro-1,2-dibromoethane	Fusion	c	liq		206.4	-66.8			
		Vaporization	liq	g	18	343.	70.			
$C_2H_2Cl_2Br_2$	1,2-dichloro-1,2-dibromoethane	Fusion	c	liq		246.	-27.			
		Vaporization	liq	g	24	363.2	90.0	10.8	29.7	
		Vaporization	liq	g	760	468.	195.			
$C_2HCl_3Br_2$	1,1,2-trichloro-1,2-dibromoethane	Fusion	c	liq		264.3	-8.9			
$C_2HCl_3Br_2$	1,1,1-trichloro-2,2-dibromoethane	Fusion	c	liq		268.7	-4.5			
$C_2H_2ClBr_3$	2-chloro-1,1,2-tribromoethane	Fusion	c	liq		252.6	-20.6			
		Vaporization	liq	g	14	370.	97.			
$C_2HCl_2Br_3$	1,2-dichloro-1,1,2-tribromoethane	Fusion	c	liq		279.2	6.0			
		Vaporization	liq	g	16	385.	112.			
$C_2HCl_2Br_3$	1,1-dichloro-1,2,2-tribromoethane	Fusion	c	liq		290.0	16.8			
		Vaporization	liq	g	16	379.	106.			
C_2H_2OClBr	bromoacetyl chloride	Vaporization	liq	g	760	400.	127.			

Table 23-34. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2F_3ClBr_2$	1,1,2-trifluoro-2-chloro-1,2-dibromoethane	Vaporization	liq	g	760	366.1	92.9			
$C_2F_2Cl_2Br_2$	1,1-difluoro-2,2-dichloro-1,2-dibromoethane	Fusion	c	liq		319.	46.			
		Vaporization	liq	g	760	390.3	117.1			
$C_2F_2Cl_2Br_2$	1,2-difluoro-1,2-dichloro-1,2-dibromoethane	Fusion	c	liq		306.1	32.9			
		Vaporization	liq	g	760	413.0	139.8			
$C_2FCl_3Br_2$	1-fluoro-1,2,2-trichloro-1,2-dibromoethane	Fusion	c	liq		395.7	122.5			
C_2OF_2ClBr	fluorochlorobromoacetyl fluoride	Vaporization	liq	g	760	324.	51.			
$C_2HFCl_2Br_2$	2-fluoro-1,1-dichloro-1,2-dibromoethane	Vaporization	liq	g	760	436.	163.			
$C_2HOFClBr$	fluorobromoacetyl chloride	Vaporization	liq	g	765	371.	98.			
C_2HO_2FClBr	fluorochlorobromoacetic acid	Fusion	c	liq		268.	-5.			
		Vaporization	liq	g	760	454.	181.			

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Table 23-35. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2I_4	tetraiodoethene	Fusion	c	liq		465.	192.			
C_2H_5I	iodoethane	Fusion	c	liq		162.	-111.			
		Vaporization	liq	g	760	345.5	72.3	7.15	20.7	
$C_2H_2I_2$	1,1-diiodoethene	Fusion	c	liq		329.	56.			
$C_2H_2I_2$	*cis*-1,2-diiodoethene	Fusion	c	liq		259.4	-13.8			
		Vaporization	liq	g	760	461.	188.			
$C_2H_2I_2$	*trans*-1,2-diiodoethene	Sublimation	c	g	0.04	293.	20.	10.	34.	
		Fusion	c	liq		345.	72.			
		Vaporization	liq	g	760	463.	190.			
$C_2H_4I_2$	1,2-diiodoethane	Sublimation	c	g	1	318.3	45.1	15.	47.	
		Fusion	c	liq		354.	81.			
C_2H_3OI	acetyl iodide	Vaporization	liq	g	760	381.	108.			
$C_2H_3O_2I$	iodoacetic acid	Fusion	c	liq		356.	83.			
C_2H_5OI	2-iodoethanol	Vaporization	liq	g	25	359.	86.			
C_2H_5OI	iodomethyl methyl ether	Vaporization	liq	g	760	397.	124.			

Table 23-36. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_3F_2I$	1,1-difluoro-2-iodoethane	Vaporization	liq	g	760	354.7	81.5			
$C_2H_2F_3I$	1,1,1-trifluoro-2-iodoethane	Vaporization	liq	g	730	328.	55.			
$C_2H_2O_2FI$	fluoroiodoacetic acid	Fusion	c	liq		365.7	92.5			
C_2OCl_3I	trichloroacetyl iodide	Vaporization	liq	g	760	453.	180.			
C_2H_2ClI	*cis*-1-chloro-2-iodoethene	Fusion	c	liq		232.2	-41.0			
		Vaporization	liq	g	760	386.	113.			
C_2H_2ClI	*trans*-1-chloro-2-iodoethene	Fusion	c	liq		236.8	-36.4			
		Vaporization	liq	g	760	390.	117.			
C_2H_2OClI	iodoacetyl chloride	Vaporization	liq	g	15	323.	50.			

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Table 23-37. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_6S	ethanethiol	Fusion	c	liq		126.	-147.			
		Vaporization	liq	g	760	307.6	34.4	6.9	22.	
C_2H_6S	dimethyl sulfide	Fusion	c	liq		174.86	-98.30	1.908	10.91	6.95
		Vaporization	liq	g	365.5	291.06	17.90	6.688	22.98	
		Vaporization	liq	g	760	309.1	35.9			
C_2H_6OS	dimethyl sulfoxide	Fusion	c	liq		281.	8.			
		Vaporization	liq	g	0.6	298.2	25.0	12.64	42.39	
$C_2H_6O_2S$	dimethyl sulfone	Fusion	c	liq		382.	109.			
		Vaporization	liq	g	760	507.	234.			
$C_2H_6O_3S$	dimethyl sulfite	Vaporization	liq	g	760	395.	122.			
$C_2H_6O_4S$	dimethyl sulfate	Fusion	c	liq		241.	-32.			
		Vaporization	liq	g	760	461.7	188.5			
$C_2H_6O_4S$	ethylsulfuric acid	Fusion	c	liq		256.	-17.			
$C_2H_6O_4S \cdot H_2O$	ethylsulfuric acid monohydrate	Fusion	c	liq		278.6	5.4			

Table 23-38. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$C_2H_5O_3FS$	ethyl fluorosulfonate	Vaporization	liq	g	755	385.	112.	9.2	24.	
$C_2H_5O_3ClS$	ethyl chlorosulfonate	Vaporization	liq	g	760	425.	152.			
$C_2H_4Br_2S$	bis(bromomethyl) sulfide	Vaporization	liq	g	608	468.	195.	12.	26.	
C_2H_6Se	dimethyl selenide	Vaporization	liq	g	55	327.	54.			
$C_2H_6O_4Se$	dimethyl selenate	Vaporization	liq	g	760	341.	68.			
C_2H_6Te	dimethyl telluride	Vaporization	liq	g	770	367.	94.			
$C_2H_6TeF_2$	dimethyltellurium difluoride	Fusion	c	liq		357.	84.			
$C_2H_6TeCl_2$	dimethyltellurium dichloride	Fusion	c	liq		365.	92.			
$C_2H_6TeBr_2$	dimethyltellurium dibromide	Fusion	c	liq		365.	92.			
$C_2H_6TeI_2$	dimethyltellurium diiodide	Fusion	c	liq		403.	130.			

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Table 23-39. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2N_2	cyanogen	Fusion	c	liq	553.6	245.32	-27.84	1.938	7.900	5.29
		Vaporization	liq	g	553.6	245.32	-27.84			
		Vaporization	liq	g	760	252.01	-21.15	5.576	22.126	
C_2H_3N	acetonitrile	Fusion	c	liq		228.3	-44.9	2.13	9.3	
		Vaporization	liq	g	760	354.7	81.5	7.83	22.1	
C_2H_7N	ethylamine	Fusion	c	liq		192.2	-81.0			
		Vaporization	liq	g	760	289.7	16.5	6.7	23.	-14.4
C_2H_7N	dimethylamine	Fusion	c	liq		180.97	-92.19	1.420	7.85	9.81
		Vaporization	liq	g	760	280.0	6.8	6.33	22.6	-17.1
$C_2H_8N_2$	1,2-ethanediamine (ethylenediamine)	Fusion	c	liq		281.	8.	4.6	16.4	
		Vaporization	liq	g	760	390.6	117.4	9.3	23.8	
$C_2H_8N_2$	1,1-dimethylhydrazine	Vaporization	liq	g	760	335.7	62.5			
$C_2H_8N_2$	1,2-dimethylhydrazine	Vaporization	liq	g	760	354.	81.			

Table 23-40. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_5ON	acetamide	Fusion	c, II	liq	760	343.	71.	3.4	10.	
		Fusion	c, I	liq	760	355.1	81.9	3.75	10.56	15.1
		Transition	c, I	c, III	396000	400.2	127.0	0.14	0.35	0.7
		Fusion	c, I	liq	396000	400.2	127.0	3.60	9.00	
		Fusion	c, III	liq	396000	400.2	127.0	3.46	8.65	
$C_2H_5O_2N$	nitroethane	Fusion	c	liq		183.	-90.			
		Vaporization	liq	g	17	293.	20.	9.1	31.	
$C_2H_5O_2N$	ethyl nitrite	Vaporization	liq	g	760	290.1	16.9	6.64	22.9	
$C_2H_5O_3N$	ethyl nitrate	Fusion	c	liq		171.	-102.			
		Vaporization	liq	g	67.5	298.2	25.0	9.20	30.9	
		Vaporization	liq	g	760	361.9	88.7			
C_2H_7ON	2-aminoethanol	Fusion	c	liq		284.68	11.52			
		Vaporization	liq	g	760	444.3	171.1			
$C_2H_4O_3N_2$	2-nitroacetamide	Fusion	c	liq		380.	107.			
$C_2H_4O_6N_2$	glycol dinitrate	Fusion	c	liq		250.9	-22.3	4.5	18.	
		Vaporization	liq	g	19	378.	105.			
$C_2H_6O_2N_2$	ethylnitramine	Fusion	c	liq		279.	6.			

Table 23-41. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2F_3N	trifluoroacetonitrile	Vaporization	liq	g	760	212.	-61.			
$C_2F_6N_2$	hexafluoroazomethane	Fusion	c	liq		140.	-133.			
		Vaporization	liq	g	760	241.6	-31.6	5.5	23.	
C_2H_2FN	fluoroacetonitrile	Vaporization	liq	g	760	351.	78.	9.1	26.	
$C_2H_5F_2N$	2,2-difluoroethylamine	Vaporization	liq	g	760	341.	68.			
C_2HF_6N	bis(trifluoromethyl) amine	Vaporization	liq	g	760	267.1	-6.1	5.6	21.0	
C_2H_4OFN	fluoroacetamide	Fusion	c	liq		381.	108.			
$C_2H_4O_2FN$	2-fluoroethyl nitrite	Vaporization	liq	g	760	332.	59.	9.	27.	
$C_2H_3OF_2N$	difluoroacetamide	Fusion	c	liq		325.0	51.8			
		Vaporization	liq	g	35	381.8	108.6			
$C_2H_2OF_3N$	trifluoroacetamide	Fusion	c	liq		348.0	74.8			
		Vaporization	liq	g	760	435.7	162.5			
$C_2H_4O_2F_2N_2$	2,2-difluoroethylnitramine	Fusion	c	liq		295.7	22.5			

Table 23-42. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_2ClN	chloroacetonitrile	Vaporization	liq	g	760	397.	124.			
C_2H_6ClN	*N*-chlorodimethylamine	Vaporization	liq	g	760	319.	46.			
C_2H_4OClN	chloroacetamide	Fusion	c	liq		390.	117.			
C_2H_4OClN	*N*-chloroacetamide	Fusion	c	liq		383.	110.			
$C_2H_2OF_2ClN$	difluorochloroacetamide	Fusion	c	liq		351.7	78.5			
		Vaporization	liq	g	760	407.	134.			
C_2H_4OBrN	bromoacetamide	Fusion	c	liq		381.	108.			
C_2H_4OBrN	*N*-bromoacetamide	Fusion	c	liq		379.	106.			
$C_2H_2OBr_3N$	tribromoacetamide	Fusion	c	liq		392.	119.			
$C_2H_2OFClBrN$	fluorochlorobromoacetamide	Fusion	c	liq		404.7	131.5			
C_2H_3SN	methyl thiocyanate	Fusion	c	liq		218.7	-54.5			
		Vaporization	liq	g	760	406.1	132.9	9.2	23.	
C_2H_3SN	methyl isothiocyanate	Fusion	c	liq		308.7	35.5			
		Vaporization	liq	g	760	392.2	119.0	8.9	23.	
$C_2H_6O_6TeN_2$	dimethyltellurium dinitrate	Fusion	c	liq		415.	142.			

Table 23-43. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_7P	dimethylphosphine	Vaporization	liq	g	760	294.8	21.6	6.0	20.4	
$C_2H_6O_3FP$	dimethylfluorophosphonate	Vaporization	liq	g	4.4	298.2	25.0	10.6	35.5	
$C_2O_2FN_2P$	phosphorous fluorodiisocyanate	Fusion	c	liq		218.	-55.			
		Vaporization	liq	g	760	371.9	98.7	9.2	24.7	
$C_2O_2ClN_2P$	phosphorous chlorodiisocyanate	Fusion	c	liq		223.	-50.			
		Vaporization	liq	g	760	407.8	134.6	11.2	27.5	
C_2H_7As	dimethylarsine	Vaporization	liq	g	747	308.8	35.6			
C_2H_7As	ethylarsine	Vaporization	liq	g	760	309.	36.			
C_2H_5OAs	ethylarsenic oxide	Vaporization	liq	g	168	489.	216.	17.	35.	
$C_2H_5F_2As$	ethyldifluoroarsine	Fusion	c	liq		234.5	-38.7			
		Vaporization	liq	g	760	367.5	94.3	8.3	22.5	

Table 23-44. Carbon (at. no., 6; at. wt., 12.010)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
C_2H_6ClAs	dimethylchloroarsine	Vaporization	liq	g	760	380.	107.			
$C_2H_5Cl_2As$	ethyldichloroarsine	Fusion	c	liq		208.	-65.			
		Vaporization	liq	g	760	428.5	155.3	9.2	21.5	
$C_2H_2Cl_3As$	2-chlorovinyldichloroarsine	Vaporization	liq	g	0.57	298.2	25.0	12.7	42.6	
C_2H_2OClAs	2-chlorovinylarsenic oxide	Fusion	c	liq		416.	143.			
$C_2H_4O_3ClAs$	2-chlorovinylarsonic acid	Fusion	c	liq		403.	130.			
$C_2H_2F_2Cl$	2-chlorovinyldifluoroarsine	Vaporization	liq	g	14.5	316.7	43.5			
C_2H_6BrAs	dimethylbromoarsine	Vaporization	liq	g	760	403.	130.			
$C_2H_5Br_2As$	ethyldibromoarsine	Vaporization	liq	g	0.56	298.2	25.0	11.9	39.9	
$C_2H_4O_3BrAs$	2-bromovinylarsonic acid	Fusion	c	liq		416.	143.			
$C_2H_2ClBr_2As$	2-chlorovinyldibromoarsine	Vaporization	liq	g	15	274.7	1.5			
C_2H_6IAs	dimethyliodoarsine	Vaporization	liq	g	760	428.	155.			
$C_2H_2ClI_2As$	2-chlorovinyldiiodoarsine	Fusion	c	liq		311.	38.			

Table 24-1. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Si		Fusion	c	liq		1683.	1410.	11.	6.5	
SiO_2		Transition	quartz, c, III	quartz, c, II		91.	-182.			
		Transition	quartz, c, II	quartz, c, I		846.	573.	0.15	0.18	-5.6
		Transition	quartz, c, I	tridymite, c, I		1140.	867.	0.12	0.11	
		Fusion	quartz, c, I	liq		1883.	1610.	2.04	1.08	
		Transition	tridymite, c, IV	tridymite, c, III		390.	117.	0.07	0.18	
		Transition	tridymite, c, III	tridymite, c, II		436.	163.	0.04	0.09	
		Transition	tridymite, c, II	tridymite, c, I		598.	225.	0.05	0.08	
		Transition	tridymite, c, I	cristobalite, I		1743.	1470.	0.05	0.03	
		Fusion	tridymite, c, I	liq		1953.	1680.			
		Transition	cristobalite, II	cristobalite, I		515.	242.	0.31	0.60	
		Fusion	cristobalite, I	liq		2001.	1728.	1.84	0.92	

Table 24-2. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiH_4	silane	Transition	c, II	c, I		63.5	-209.7	0.147	2.32	
		Fusion	c, I	liq		88.5	-184.7	0.159	1.80	1.3
		Vaporization	liq	g	760	161.8	-111.4	2.9	18.	
Si_2H_6	disilane	Fusion	c	liq		141.	-132.			
		Vaporization	liq	g	760	258.9	-14.3	5.2	20.1	
Si_3H_8	trisilane	Fusion	c	liq		156.	-117.			
		Vaporization	liq	g	760	326.2	53.0	6.8	20.8	
Si_4H_{10}	tetrasilane	Fusion	c	liq		188.9	-84.3			
		Vaporization	liq	g	760	381.6	108.4	8.2	21.5	
Si_2H_6O	disiloxane	Fusion	c	liq		129.	-144.			
		Vaporization	liq	g	760	257.7	-15.5	5.3	20.6	

Table 24-3. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
SiF_4	tetrafluorosilane	Sublimation	c	g	760	177.7	-95.5	6.15	34.6	
		Fusion	c	liq	1320	182.9	-90.3	1.69	9.2	
		Vaporization	liq	g	1320	182.9	-90.3	4.46	24.4	
Si_2F_6	hexafluorodisilane	Sublimation	c	g	760	254.1	-19.1	10.1	39.7	
		Fusion	c	liq	780	254.5	-18.7	3.5	13.8	
		Vaporization	liq	g	780	254.5	-18.7	6.6	25.9	
Si_2OF_6	hexafluorodisiloxane	Fusion	c	liq		225.4	-47.8			
		Vaporization	liq	g	760	249.9	-23.3	5.1	20.4	
SiH_3F	fluorosilane	Vaporization	liq	g	760	175.	-98.	4.2	24.	
SiH_2F_2	difluorosilane	Fusion	c	liq		151.	-122.	1.	7.	
		Vaporization	liq	g	760	197.	-76.	3.9	20.	
$SiHF_3$	trifluorosilane	Fusion	c	liq		141.9	-131.3			
		Vaporization	liq	g	760	178.8	-94.4	3.8	21.	

Table 24-4. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiCl_4$	tetrachlorosilane	Fusion	c	liq		205.	-68.	1.84	9.0	
		Vaporization	liq	g	760	330.2	57.0	7.0	21.2	
Si_2Cl_6	hexachlorodisilane	Fusion	c	liq		272.	-1.			
		Vaporization	liq	g	760	418.	145.	10.	24.	
Si_3Cl_8	octachlorotrisilane	Vaporization	liq	g	760	485.	212.	15.	31.	
Si_2OCl_6	hexachlorodisiloxane	Fusion	c	liq		240.	-33.			
		Vaporization	liq	g	760	409.5	136.3	9.3	22.7	
SiH_3Cl	chlorosilane	Fusion	c	liq		155.	-118.			
		Vaporization	liq	g	760	242.8	-30.4	5.1	21.0	
SiH_2Cl_2	dichlorosilane	Fusion	c	liq		151.	-122.			
		Vaporization	liq	g	760	281.5	8.3	6.0	21.3	
$SiHCl_3$	trichlorosilane	Fusion	c	liq		146.7	-126.5			
		Vaporization	liq	g	760	304.9	31.7	6.35	20.83	

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Table 24-5. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiF_3Cl	trifluorochlorosilane	Fusion	c	liq		133.	-140.			
		Vaporization	liq	g	760	203.2	-70.0	4.4	21.7	
SiF_2Cl_2	difluorodichlorosilane	Fusion	c	liq		133.5	-139.7			
		Vaporization	liq	g	760	241.3	-31.9	5.0	20.7	
$SiFCl_3$	fluorotrichlorosilane	Fusion	c	liq		152.	-121.			
		Vaporization	liq	g	760	285.5	12.3	6.0	21.0	
$Si_2OF_4Cl_2$	1,1,1,3-tetrafluoro-3,3-dichlorodisiloxane	Fusion	c	liq		213.	-60.			
		Vaporization	liq	g	760	290.0	16.8	6.8	23.4	
$Si_2OF_3Cl_3$	1,1,1-trifluoro-3,3,3-trichlorodisiloxane	Fusion	c	liq		173.	-100.			
		Vaporization	liq	g	760	316.2	43.0	7.3	23.1	
$SiHFCl_2$	fluorodichlorosilane	Fusion	c	liq		124.	-149.			
		Vaporization	liq	g	760	254.5	-18.7	4.8	18.9	

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Table 24-6. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiBr_4$	tetrabromosilane	Fusion	c	liq		278.4	5.2			
		Vaporization	liq	g	760	426.0	152.8	9.1	21.4	
Si_2Br_6	hexabromodisilane	Fusion	c	liq		368.	95.			
		Vaporization	liq	g	760	538.	265.			
Si_3Br_8	octabromotrisilane	Fusion	c	liq		406.	133.			
SiH_3Br	bromosilane	Fusion	c	liq		179.	-94.			
		Vaporization	liq	g	760	275.1	1.9	5.8	21.1	
SiH_2Br_2	dibromosilane	Fusion	c	liq		203.	-70.			
		Vaporization	liq	g	760	286.8	13.6	7.5	26.2	
$SiHBr_3$	tribromosilane	Fusion	c	liq		200.	-73.			
		Vaporization	liq	g	760	385.4	112.2	8.1	21.0	
Si_2H_5Br	bromodisilane	Fusion	c	liq		173.	-100.			
		Vaporization	liq	g	10	243.	-30.	7.	29.	

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Table 24-7. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiF_3Br	trifluorobromosilane	Fusion	c	liq		202.7	-70.5			
		Vaporization	liq	g	760	231.6	-41.6	4.2	18.	
SiF_2Br_2	difluorodibromosilane	Fusion	c	liq		206.3	-66.9			
		Vaporization	liq	g	760	287.1	13.9	5.9	20.6	
$SiFBr_3$	fluorotribromosilane	Fusion	c	liq		190.7	-82.5			
		Vaporization	liq	g	760	357.1	83.9	7.8	21.8	
$SiCl_3Br$	trichlorobromosilane	Vaporization	liq	g	760	353.	80.			
$SiCl_2Br_2$	dichlorodibromosilane	Vaporization	liq	g	760	377.	104.			
$SiClBr_3$	chlorotribromosilane	Fusion	c	liq		234.	-39.			
		Vaporization	liq	g	760	400.	127.			
$SiFCl_2Br$	fluorodichlorobromosilane	Fusion	c	liq		160.9	-112.3			
		Vaporization	liq	g	760	308.5	35.3	6.0	19.4	
$SiFClBr_2$	fluorochlorodibromosilane	Fusion	c	liq		173.9	-99.3			
		Vaporization	liq	g	760	332.6	59.4	7.1	21.4	

Table 24-8. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiI_4	tetraiodosilane	Fusion	c	liq		393.	120.			
		Vaporization	liq	g	760	563.	290.			
Si_2I_6	hexaiododisilane	Fusion	c	liq		523.	250.			
SiH_3I	iodosilane	Fusion	c	liq		216.	-57.			
		Vaporization	liq	g	760	318.8	45.6	6.9	21.6	
SiH_2I_2	diiodosilane	Fusion	c	liq		272.	-1.			
		Vaporization	liq	g	760	423.	150.	8.8	20.8	
$SiHI_3$	triiodosilane	Fusion	c	liq		281.	8.			
		Vaporization	liq	g	45	400.	127.	15.	38.	
$SiCl_3I$	trichloroiodosilane	Vaporization	liq	g	760	386.	113.			
$SiCl_2I_2$	dichlorodiiodosilane	Vaporization	liq	g	760	445.	172.			
$SiClI_3$	chlorotriiodosilane	Fusion	c	liq		275.	2.			
		Vaporization	liq	g	760	508.	235.			

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Table 24-9. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiBr_3I$	tribromoiodosilane	Fusion	c	liq		287.	14.			
		Vaporization	liq	g	760	465.	192.			
$SiBr_2I_2$	dibromodiiodosilane	Fusion	c	liq		311.	38.			
		Vaporization	liq	g	760	503.	230.			
$SiBrI_3$	bromotriiodosilane	Fusion	c	liq		326.	53.			
		Vaporization	liq	g	760	528.	255.			
SiS_2		Fusion	c	liq		1363.	1090.			
$SiSCl_2$		Fusion	c	liq		348.	75.			
$SiSBr_2$		Fusion	c	liq		366.	93.			
Si_3H_9N	trisilylamine	Fusion	c	liq		167.6	−105.6			
		Vaporization	liq	g	100	271.4	−1.8	6.8	25.1	
$3Bi_2O_3 \cdot SiO_2$		Fusion	c	liq		1095.	822.			
$3Bi_2O_3 \cdot 2SiO_2$		Fusion	c	liq		1064.	791.			
$Bi_2O_3 \cdot 8SiO_2$		Fusion	c	liq		1265.	992.			

Table 24-10. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiH_6C	methylsilane	Fusion	c	liq		116.8	-156.4			
		Vaporization	liq	g	760	216.3	-56.9	4.2	19.	
SiH_8C_2	ethylsilane	Vaporization	liq	g	760	259.	-14.	5.4	20.9	
SiH_8C_2	dimethylsilane	Fusion	c	liq		123.4	-149.8			
		Vaporization	liq	g	760	253.0	-20.2	4.9	19.4	
$SiH_{10}C_3$	n-propylsilane	Vaporization	liq	g	760	296.	23.	6.4	22.	
$SiH_{10}C_3$	trimethylsilane	Vaporization	liq	g	760	283.	10.			
$SiH_{12}C_4$	diethylsilane	Vaporization	liq	g	760	327.	54.	7.4	23.	
$SiH_{12}C_4$	tetramethylsilane	Fusion	c, I	liq		171.04	-102.12	1.427	8.34	
		Fusion	c, II	liq		174.12	-99.04	1.648	9.46	5.6
		Vaporization	liq	g	760	299.80	26.64	5.79	19.31	
$SiH_{14}C_5$	trimethylethylsilane	Vaporization	liq	g	760	335.	62.	7.2	21.5	
$SiH_{18}C_7$	methyltriethylsilane	Vaporization	liq	g	760	400.	127.	8.6	21.5	
$SiH_{20}C_8$	tetraethylsilane	Vaporization	liq	g	760	426.	153.	9.5	22.3	
$Si_2H_{18}C_6$	hexamethyldisilane	Fusion	c	liq		287.4	14.2			
		Vaporization	liq	g	100	325.2	52.0	10.7	32.9	

Table 24-11. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiH_{10}OC_3$	trimethylsilanol	Vaporization	liq	g	752	371.8	98.6			
$SiH_{14}OC_5$	ethoxytrimethylsilane	Vaporization	liq	g	760	349.	76.	8.	23.	
$SiH_{16}O_2C_6$	diethoxydimethylsilane	Vaporization	liq	g	760	387.	114.	9.	23.	
$SiH_{18}O_3C_7$	triethoxymethylsilane	Vaporization	liq	g	760	417.	144.	10.	24.	
$SiH_{20}O_4C_8$	tetraethoxysilane	Fusion	c	liq		190.7	-82.5	2.1	11.	
		Vaporization	liq	g	760	441.7	168.5	10.19	23.07	
$Si_2H_{18}OC_6$	hexamethyldisiloxane	Vaporization	liq	g	760	373.	100.	8.	21.	
$Si_2H_{22}O_3C_8$	1,3-diethoxytetramethyldisiloxane	Vaporization	liq	g	760	444.	161.	11.	25.	
$Si_2H_{30}O_6C_{12}$	hexaethoxydisilane	Vaporization	liq	g	29	410.	137.	12.	29.	
$Si_3H_{24}O_2C_8$	octamethyltrisiloxane	Vaporization	liq	g	760	425.	152.	10.	23.	
$Si_3H_{28}O_4C_{10}$	1,5-diethoxyhexamethyltrisiloxane	Vaporization	liq	g	760	470.	197.	12.	26.	
$Si_4H_{24}O_4C_8$	octamethylcyclotetrasiloxane	Vaporization	liq	g	760	449.	176.	11.	24.	
$Si_4H_{30}O_3C_{10}$	decamethyltetrasiloxane	Vaporization	liq	g	760	467.	194.	12.	26.	

Table 24-12. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiH_3F_3C	methyltrifluorosilane	Fusion	c	liq		200.4	-72.8			
		Vaporization	liq	g	760	243.0	-30.2	5.7	23.5	
$SiH_6F_2C_2$	dimethyldifluorosilane	Fusion	c	liq		185.7	-87.5			
		Vaporization	liq	g	760	275.9	2.7	6.12	22.18	
$SiH_5F_3C_2$	ethyltrifluorosilane	Fusion	c	liq		159.9	-113.3			
		Vaporization	liq	g	760	269.0	-4.2	6.1	22.7	
SiH_9FC_3	trimethylfluorosilane	Fusion	c	liq		198.9	-74.3			
		Vaporization	liq	g	760	289.6	16.4	6.4	22.1	
$SiH_{10}F_2C_4$	diethyldifluorosilane	Fusion	c	liq		194.5	-78.7			
		Vaporization	liq	g	760	334.1	60.9	7.2	21.6	
SiH_5ClC	methylchlorosilane	Fusion	c	liq		139.	-134.			
		Vaporization	liq	g	250	254.6	-18.6	5.8	22.8	
SiH_4Cl_2C	methyldichlorosilane	Fusion	c	liq		180.	-93.			
		Vaporization	liq	g	100	266.8	-6.4	6.8	25.5	
SiH_3Cl_3C	methyltrichlorosilane	Fusion	c	liq		195.4	-77.8			
		Vaporization	liq	g	760	338.9	65.7	7.4	21.8	

Table 24-13. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiH_6Cl_2C_2$	dimethyldichlorosilane	Fusion	c	liq		197.	-76.			
		Vaporization	liq	g	760	343.2	70.0	7.5	21.9	
$SiH_5Cl_3C_2$	ethyltrichlorosilane	Fusion	c	liq		168.	-105.			
		Vaporization	liq	g	760	371.1	97.9	7.7	20.7	
SiH_9ClC_3	trimethylchlorosilane	Fusion	c	liq		215.5	-57.7			
		Vaporization	liq	g	760	331.	58.	7.	21.	
$SiH_{10}Cl_2C_4$	diethyldichlorosilane	Vaporization	liq	g	760	403.	130.	10.	25.	
$SiH_{15}ClC_6$	triethylchlorosilane	Vaporization	liq	g	760	419.	146.	9.	22.	
$SiH_5OCl_3C_2$	ethoxytrichlorosilane	Vaporization	liq	g	760	375.	102.	8.	21.	
$SiH_8OCl_2C_3$	ethoxymethyldichlorosilane	Vaporization	liq	g	760	373.	100.	8.	21.	
$Si_2H_{12}OCl_2C_4$	tetramethyl-1,3-dichlorodisiloxane	Fusion	c	liq		236.	-37.			
		Vaporization	liq	g	760	411.	138.	9.	22.	

Table 24-14. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiH_3FCl_2C	methylfluorodichlorosilane	Fusion	c	liq		174.5	-98.7			
		Vaporization	liq	g	760	302.7	29.5	6.7	22.1	
SiH_6FClC_2	dimethylfluorochlorosilane	Fusion	c	liq		188.	-85.			
		Vaporization	liq	g	760	309.6	36.4	6.6	21.3	
$SiH_5F_2ClC_2$	ethyldifluorochlorosilane	Vaporization	liq	g	760	300.3	27.1	6.7	22.3	
$SiH_5FCl_2C_2$	ethylfluorodichlorosilane	Vaporization	liq	g	760	335.3	62.1	7.4	22.1	
$SiO_4N_4C_4$	silicon tetracyanate	Fusion	c	liq		307.9	34.5			
		Vaporization	liq	g	760	520.	247.	16.5	31.7	
$SiO_4N_4C_4$	silicon tetraisocyanate	Fusion	c	liq		299.2	26.0			
		Vaporization	liq	g	760	459.	185.	12.9	28.1	
Si_2H_9NC	2-methyldisilazane	Vaporization	liq	g	760	305.5	32.3	6.9	22.6	
$Si_2H_{11}NC_2$	2-ethyldisilazane	Fusion	c	liq		146.	-127.			
		Vaporization	liq	g	68	273.	0.	8.0	29.3	

Table 24-15. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SiH_9ONC_4	trimethylsilicon isocyanate	Fusion	c	liq		224.2	-49.0			
		Vaporization	liq	g	760	364.1	90.9	8.3	22.8	
$SiH_6O_2N_2C_4$	dimethylsilicon diisocyanate	Fusion	c	liq		242.0	-31.2			
		Vaporization	liq	g	760	412.3	139.1	9.9	24.0	
$SiH_3O_3N_3C_4$	methylsilicon triisocyanate	Fusion	c	liq		275.9	2.7			
		Vaporization	liq	g	760	444.0	170.8	11.2	25.2	
$SiH_5O_4N_3C_5$	ethoxysilicon triisocyanate	Vaporization	liq	g	760	452.7	179.5	11.5	25.4	
$SiH_{10}O_4N_2C_6$	diethoxysilicon diisocyanate	Vaporization	liq	g	760	448.5	175.3	11.0	24.5	
$SiH_{15}O_4NC_7$	triethoxysilicon isocyanate	Vaporization	liq	g	760	446.0	172.8	10.9	24.4	

Table 24-16. Silicon (at. no., 14; at. wt., 28.06)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SiOF_3NC$	trifluorosilicon isocyanate	Vaporization	liq	g	760	267.	-6.			
$SiO_2F_2N_2C_2$	difluorosilicon diisocyanate	Fusion	c	liq		198.	-75.			
		Vaporization	liq	g	760	341.8	68.6	8.5	24.9	
$SiO_3FN_3C_3$	fluorosilicon triisocyanate	Fusion	c	liq		244.0	-29.2			
		Vaporization	liq	g	760	407.	134.	10.7	26.	
$SiS_4N_4C_4$	silicon tetraisothiocyanate	Fusion	c	liq		417.	144.			
		Vaporization	liq	g	760	586.	313.	15.	26.	
SiH_9SNC_4	trimethylsilicon isothiocyanate	Fusion	c	liq		240.4	-32.8			
		Vaporization	liq	g	760	416.2	143.0	9.3	22.3	
$SiH_6S_2N_2C_4$	dimethylsilicon diisothiocyanate	Fusion	c	liq		291.2	18.0			
		Vaporization	liq	g	760	490.	217.	12.2	24.9	
$SiH_3S_3N_3C_4$	methylsilicon triisothiocyanate	Fusion	c	liq		345.6	72.4			
		Vaporization	liq	g	760	540.	267.	13.7	25.4	
$SiH_9O_3SNC_4$	trimethoxysilicon isothiocyanate	Vaporization	liq	g	760	443.7	170.5	13.4	30.2	

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Table 25-1. Germanium (at. no., 32; at. wt., 72.60)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ge		Fusion	c	liq		1233.	960.	8.3	6.7	
GeO		Sublimation	c	g	760	983.	710.			
GeO_2		Transition	c, II, insoluble	c, I, soluble		1306.	1033.			
		Fusion	c, II, insoluble	liq		1359.	1086.			
		Fusion	c, I, soluble	liq		1389.	1116.			
GeH_4	germane	Transition	c, III	c, II		73.2	-200.0	0.050	0.68	
		Transition	c, II	c, I		76.5	-196.7	0.086	1.12	
		Fusion	c, I	liq		107.26	-165.90	0.200	1.86	2.0
		Vaporization	liq	g	760	184.80	-88.36	3.361	18.19	
Ge_2H_6	digermane	Fusion	c	liq		164.	-109.			
		Vaporization	liq	g	760	304.0	30.8	6.0	19.8	
Ge_3H_8	trigermane	Fusion	c	liq		168.	-105.			
		Vaporization	liq	g	760	384.3	111.1	7.7	20.0	

Table 25-2. Germanium (at. no., 32; at. wt., 72.60)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
GeF_4		Sublimation	c	g	760	236.4	-36.8	7.8	33.0	
		Fusion	c	liq	3032	258.2	-15.0			
$GeCl_4$		Fusion	c	liq		223.7	-49.5			
		Vaporization	liq	g	760	356.3	83.1	7.9	22.2	
$GeHCl_3$		Fusion	c	liq		202.	-71.			
		Vaporization	liq	g	760	348.5	75.3	8.2	23.5	
GeF_3Cl		Fusion	c	liq		207.	-66.			
		Vaporization	liq	g	760	253.	-20.			
GeF_2Cl_2		Fusion	c	liq		221.	-52.			
		Vaporization	liq	g	760	269.	-4.	5.9	21.9	
$GeFCl_3$		Fusion	c	liq		223.	-50.			
		Vaporization	liq	g	760	310.4	37.2	6.6	21.3	
$GeBr_4$		Fusion	c	liq		299.3	26.1			
		Vaporization	liq	g	760	460.3	187.1	9.9	21.5	
GeI_4		Fusion	c	liq		417.	144.			

Table 25-3. Germanium (at. no., 32; at. wt., 72.60)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^oK	^oC	kcal/mole	cal/deg mole	cal/deg mole
GeS		Fusion	c, I, black	liq		898.	625.			
GeSe		Fusion	c	liq		940.	667.			
$GeSe_2$		Fusion	c	liq		980.	707.			
$GeH_{12}C_4$	tetramethylgermane	Fusion	c	liq		185.	-88.			
		Vaporization	liq	g	760	316.5	43.3	6.7	21.2	
$GeH_{20}C_8$	tetraethylgermane	Fusion	c	liq		183.	-90.			
		Vaporization	liq	g	760	436.7	163.5			
GeH_6OC_2	dimethylgermanium oxide	Fusion	c	liq		406.6	133.4			
		Vaporization	liq	g	760	484.	211.			
$GeH_5F_3C_2$	ethylgermanium trifluoride	Fusion	c	liq		257.	-16.			
		Vaporization	liq	g	750	385.	112.			
GeH_3Cl_3C	methylgermanium trichloride	Vaporization	liq	g	760	384.	111.			
$GeH_6Cl_2C_2$	dimethylgermanium dichloride	Fusion	c	liq		251.	-22.			
		Vaporization	liq	g	760	397.	124.			
$GeH_5Cl_3C_2$	ethylgermanium trichloride	Vaporization	liq	g	760	417.	144.			

Table 25-4. Germanium (at. no., 32; at. wt., 72.60)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$GeH_5Br_3C_2$	ethylgermanium tribromide	Vaporization	liq	g	760	473.	200.			
$GeH_5I_3C_2$	ethylgermanium triiodide	Fusion	c	liq		271.	-2.			
		Vaporization	liq	g	760	555.	282.			
GeH_6SC_2	dimethylgermanium sulfide	Fusion	c	liq		328.7	55.5			
		Vaporization	liq	g	760	575.	302.			
$GeO_4N_4C_4$	germanium tetraisocyanate	Fusion	c	liq		265.	-8.			
		Vaporization	liq	g	760	477.	204.	12.6	26.4	

Table 26-1. Tin (at. no., 50; at. wt., 118.70)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Sn		Transition	c, III, gray	c, II, white		291.	18.	0.6	2.1	
		Transition	c, II, white	c, I		476.0	202.8	0.002	0.004	
		Fusion	c, I	liq		505.1	231.9	1.69	3.35	
		Vaporization	liq	g	760	2600.	2337.			
SnO_2		Transition	c, II	c, I		683.	410.	0.45	0.66	
SnH_4	stannane	Fusion	c	liq		123.	-150.			
		Vaporization	liq	g	760	221.4	-51.8	4.4	19.9	
SnF_4		Vaporization	liq	g	760	978.	705.			
$SnCl_2$		Fusion	c	liq		520.	247.	3.0	5.8	
		Vaporization	liq	g	760	896.	623.	21.	23.	
$SnCl_4$		Fusion	c	liq		239.9	-33.3	2.19	9.13	
		Vaporization	liq	g	760	386.	113.	8.3	21.5	

Table 26-2. Tin (at. no., 50; at. wt., 118.70)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SnBr_2$		Fusion	c	liq		505.	232.	1.7	3.4	
		Vaporization	liq	g	760	911.	638.	22.	24.	
$SnBr_4$		Transition	c, II	c, I		267.	-6.			
		Fusion	c, I	liq		303.	30.	3.0	9.9	
		Vaporization	liq	g	760	478.	205.	10.	21.	
$SnCl_3Br$		Fusion	c	liq		242.	-31.			
$SnCl_2Br_2$		Fusion	c	liq		253.	-20.			
$SnClBr_3$		Fusion	c	liq		274.	1.			
SnI_2		Fusion	c	liq		593.	320.			
		Vaporization	liq	g	760	991.	718.	24.	24.	
SnI_4		Fusion	c	liq		417.7	144.5	4.48	10.73	5.7
		Vaporization	liq	g	760	617.	344.	13.6	22.	
SnS		Fusion	c	liq		1153.	880.			
SnSe		Fusion	c	liq		1133.	860.			
SnTe		Fusion	c	liq		1073.	800.			

Table 26-3. Tin (at. no., 50; at. wt., 118.70)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SnH_6C	methylstannane	Vaporization	liq	g	760	273.	0.	5.7	20.9	
SnH_8C_2	dimethylstannane	Vaporization	liq	g	760	308.	35.	6.8	22.1	
$SnH_{10}C_3$	trimethylstannane	Vaporization	liq	g	760	332.	59.	7.2	21.6	
$SnH_{12}C_4$	tetramethylstannane	Vaporization	liq	g	760	351.2	78.0	7.4	21.1	
$SnH_{14}C_5$	ethyltrimethylstannane	Vaporization	liq	g	760	381.4	108.2	8.4	22.0	
$SnH_{16}C_6$	n-propyltrimethylstannane	Vaporization	liq	g	760	404.0	130.8	8.8	21.8	
$SnH_{20}C_8$	tetraethylstannane	Fusion	c	liq		161.	-112.			
		Vaporization	liq	g	760	448.	175.			
SnH_3Cl_3C	methyltin trichloride	Fusion	c	liq		300.	27.			
$SnH_6Cl_2C_2$	dimethyltin dichloride	Fusion	c	liq		380.	107.			
SnH_9ClC_3	trimethyltin chloride	Fusion	c	liq		316.	43.			
$SnH_{15}ClC_6$	triethyltin chloride	Fusion	c	liq		289.	16.			
		Vaporization	liq	g	13	367.	94.			

Table 26-4. Tin (at. no., 50; at. wt., 118.70)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SnH_3Br_3C	methyltin tribromide	Fusion	c	liq		326.	53.			
$SnH_6Br_2C_2$	dimethyltin dibromide	Fusion	c	liq		349.	76.			
SnH_9BrC_3	trimethyltin bromide	Fusion	c	liq		300.	27.			
$SnH_{15}BrC_6$	triethyltin bromide	Fusion	c	liq		260.	-13.			
		Vaporization	liq	g	13	370.	97.			
SnH_3I_3C	methyltin triiodide	Fusion	c	liq		357.	84.			
$SnH_6I_2C_2$	dimethyltin diiodide	Fusion	c	liq		315.	42.			
SnH_9IC_3	trimethyltin iodide	Fusion	c	liq		276.6	3.4			
		Vaporization	liq	g	13	343.	70.			
$SnH_{15}IC_6$	triethyltin iodide	Fusion	c	liq		239.	-34.			
		Vaporization	liq	g	13	390.	117.			

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Table 27-1. Lead (at. no., 82; at. wt., 207.21)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Pb		Fusion	c	liq		600.6	327.4	1.22	2.03	
		Vaporization	liq	g	760	2023.	1750.	43.0	21.3	
PbO		Transition	c, II, red	c, I, yellow		762.	489.			
		Fusion	c, I, yellow	liq		1159.	886.	2.8	2.4	
		Vaporization	liq	g	760	1745.	1472.	51.	29.	
PbF_2		Fusion	c, I	liq		1095.	822.	1.8	1.6	
		Vaporization	liq	g	760	1563.	1290.	38.3	24.5	
PbF_4		Fusion	c	liq		873.	600.			
$PbCl_2$		Fusion	c	liq		771.	498.	5.7	7.4	
		Vaporization	liq	g	760	1227.	954.	29.6	24.1	
$2PbO \cdot PbCl_2$		Fusion	c	liq		966.	693.			
$4PbO \cdot PbCl_2$		Fusion	c	liq		984.	711.			
PbFCl		Fusion	c	liq		874.	601.			

Table 27-2. Lead (at. no., 82; at. wt., 207.21)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$PbBr_2$		Fusion	c	liq		643.2	370.0	5.	7.8	
		Vaporization	liq	g	760	1187.	914.	27.7	23.3	
$2PbO \cdot PbBr_2$		Fusion	c	liq		985.	712.			
PbBrF		Fusion	c	liq		834.	561.			
PbI_2		Fusion	c	liq		685.	412.	5.2	7.6	
		Vaporization	liq	g	760	1145.	872.	24.8	21.7	
PbS		Sublimation	c	g	10	1238.	965.	55.	44.	
		Fusion	c	liq		1387.	1114.	4.2	3.0	
$PbSO_4$		Transition	c, II	c, I		1139.	866.	4.06	3.56	
		Fusion	c, I	liq		1360.	1087.	9.6	7.1	
$PbO \cdot PbSO_4$		Fusion	c	liq		1243.	970.			
$2PbO \cdot PbSO_4$		Fusion	c	liq		1223.	950.			
PbSe		Fusion	c	liq		1338.	1065.			
PbTe		Fusion	c	liq		1178.	905.			

Table 27-3. Lead (at. no., 82; at. wt., 207.21)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Pb(PO_3)_2$		Fusion	c	liq		1073.	800.			
$Pb_3(PO_4)_2$		Fusion	c	liq		1287.	1014.			
$PbO \cdot Pb_3(PO_4)_2$		Fusion	c	liq		1253.	980.			
$5PbO \cdot Pb_3(PO_4)_2$		Fusion	c	liq		1133.	860.			
$PbF_2 \cdot 3Pb_3(PO_4)_2$		Fusion	c	liq		1373.	1100.			
$PbCl_2 \cdot 3Pb_3(PO_4)_2$		Fusion	c	liq		1429.	1156.			
$Pb_3(AsO_4)_2$		Fusion	c	liq		1315.	1042.			
$5PbO \cdot Pb_3(AsO_4)_2$		Fusion	c	liq		1135.	862.			
$PbF_2 \cdot 3Pb_3(AsO_4)_2$		Fusion	c	liq		1315.	1042.			
$PbCl_2 \cdot 3Pb_3(AsO_4)_2$		Fusion	c	liq		1413.	1140.			
$PbO \cdot Sb_2O_3$		Fusion	c	liq		831.	558.			
$2PbO \cdot Bi_2O_3$		Fusion	c	liq		898.	625.			
$2PbO \cdot 3Bi_2O_3$		Fusion	c	liq		959.	686.			

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Table 27-4. Lead (at. no., 82; at. wt., 207.21)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$PbH_{12}C_4$	tetramethyllead	Fusion	c	liq		245.7	-27.5			
		Vaporization	liq	g	760	379.3	106.1	8.0	21.1	
$PbH_{14}C_5$	ethyltrimethyllead	Vaporization	liq	g	760	407.8	134.6	9.1	22.3	
$PbH_{16}C_6$	diethyldimethyllead	Vaporization	liq	g	760	427.7	154.5	10.2	23.8	
$PbH_{18}C_7$	triethylmethyllead	Vaporization	liq	g	760	443.6	170.4	11.2	25.2	
$PbH_{20}C_8$	tetraethyllead	Fusion	c	liq		137.	-136.			
		Vaporization	liq	g	609.7	450.0	176.8	11.87	26.38	
$PbO \cdot SiO_2$		Fusion	c	liq		1037.	764.			
$2PbO \cdot SiO_2$		Fusion	c	liq		1016.	743.			
$4PbO \cdot SiO_2$		Transition	c, III	c, II		413.	140.			
		Transition	c, II	c, I		993.	720.			
$3PbS \cdot 2SiS_2$		Fusion	c	liq		1089.	816.			

Table 28-1. Gallium (at. no., 31; at. wt., 69.72)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ga		Transition	c, I	c, II	8.86×10^6	275.6	2.4	0.51	1.85	
		Fusion	c, I	liq	8.86×10^6	275.6	2.4	1.23	4.46	
		Fusion	c, II	liq	8.86×10^6	275.6	2.4	0.72	2.61	
		Fusion	c, I	liq		309.940	29.780	1.336	4.31	0.38
		Vaporization	liq	g	0.0006	1210.	937.	63.8	52.7	
Ga_2O_3		Fusion	c	liq		2013.	1740.			
GaF_3		Vaporization	liq	g	760	1223.	950.			
$GaCl_2$		Fusion	c	liq		443.7	170.5			
Ga_2Cl_6		Sublimation	c	g	10	350.7	77.5	17.4	49.6	
		Fusion	c	liq	10	350.7	77.5	5.1	14.5	
		Vaporization	liq	g, equilibrium	760	473.	200.	11.0	23.3	
Ga_2Br_6		Fusion	c	liq		397.7	124.5			
		Vaporization	liq	g, equilibrium	760	551.	278.	18.6	33.8	
Ga_2I_6		Fusion	c	liq		283.	10.			
		Vaporization	liq	g, equilibrium	760	619.	346.	27.	44.	

Table 28-2. Gallium (at. no., 31; at. wt., 69.72)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
GaS		Fusion	c	liq		1218.	965.			
Ga_2S_3		Fusion	c	liq		1523.	1250.			
GaSe		Fusion	c	liq		1213.	960.			
GaTe		Fusion	c	liq		1097.	824.			
Ga_2Te_3		Fusion	c	liq		1063.	790.			
$GaCl_3 \cdot NH_3$		Fusion	c	liq		397.	124.			
$GaBr_3 \cdot NH_3$		Fusion	c	liq		397.	124.			
$GaI_3 \cdot NH_3$		Fusion	c	liq		413.	140.			
$Ga(CH_3)_3$		Fusion	c	liq		257.5	-15.7			
		Vaporization	liq	g	760	328.8	55.6	7.8	23.7	
$Ga(C_2H_5)_3$		Fusion	c	liq		189.9	-82.3			
		Vaporization	liq	g	760	415.8	142.6	9.9	23.8	

Table 28-3. Gallium (at. no., 31; at. wt., 69.72)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$(CH_3)_3Ga \cdot NH_3$		Fusion	c	liq		304.	31.			
$(CH_3)_3Ga \cdot N(CH_3)_3$		Fusion	c	liq	89.74	369.4	96.2	2.3	6.2	
		Vaporization	liq	g	89.74	369.4	96.2	10.3	27.9	
$(CH_3)_3Ga \cdot N(C_2H_5)_3$		Sublimation	c	g	40.7	369.	96.	14.2	38.5	
		Fusion	c	liq	40.7	369.	96.	0.9	2.4	
		Vaporization	liq	g	760	440.	167.	13.3	30.2	
$Ga(CH_3)_2Cl \cdot NH_3$		Fusion	c	liq		327.	54.			
$Ga(CH_3)_2Cl \cdot 2NH_3$		Fusion	c	liq		385.	112.			

Table 29-1. Indium (at. no., 49; at. wt., 114.76)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
In		Fusion	c	liq		430.	157.	0.78	1.81	
		Vaporization	liq	g	0.007	1200.	927.	55.7	46.4	
InF_3		Fusion	c	liq		1443.	1170.			
InCl		Transition	c, II, yellow	c, I, red		393.	120.			
		Fusion	c, I, red	liq		498.	225.			
		Vaporization	liq	g	760	882.	609.	21.5	24.4	
$InCl_2$		Fusion	c	liq		508.	235.			
		Vaporization	liq	g	760	758.	485.	46.0	60.7	
$InCl_3$		Sublimation	c	g	100	715.	442.	38.	53.	
		Fusion	c	liq	10000	859.	586.			
InBr		Fusion	c	liq		493.	220.			
		Vaporization	liq	g	760	929.	656.	22.0	23.7	
$InBr_2$		Fusion	c	liq		513.	240.			
		Vaporization	liq	g	760	911.	638.	19.7	21.6	

Table 29-2. Indium (at. no., 49; at. wt., 114.76)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$InBr_3$		Sublimation	c	g	760	645.	372.	25.1	38.9	
		Fusion	c	liq	4900	709.	436.			
InI		Fusion	c	liq		624.	351.			
		Vaporization	liq	g	760	985.	712.	21.7	22.0	
InI_3		Fusion	c	liq		483.	210.			
InS		Fusion	c	liq		965.	692.			
In_2S		Fusion	c	liq		926.	653.			
In_2S_3		Fusion	c	liq		1323.	1050.			
InSe		Fusion	c	liq		933.	660.			
In_2Se_3		Fusion	c	liq		1163.	890.			
InTe		Fusion	c	liq		969.	696.			
In_2Te_3		Fusion	c	liq		940.	667.			
$In(CH_3)_3$		Sublimation	c	g	153	361.6	88.4	13.8	30.2	
		Fusion	c	liq	153	361.6	88.4	3.8	8.3	
		Vaporization	liq	g	760	409.0	135.8	10.0	24.4	

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Table 30-1. Thallium (at. no., 81; at. wt., 204.39)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Tl		Transition	c, I	c, III	2.87×10^7	426.	153.	-0.19	-0.45	
		Transition	c, II	c, III	2.87×10^7	426.	153.	0.01	0.02	
		Transition	c, II	c, I	2.87×10^7	426.	153.	0.20	0.47	
		Transition	c, II	c, I		508.3	235.1	0.082	0.16	0.18
		Fusion	c, I	liq		576.8	303.6	1.03	1.79	0.43
		Vaporization	liq	g	28	1350.	1077.	40.1	29.7	
		Vaporization	liq	g	760	1730.	1457.			
Tl_2O		Fusion	c	liq		573.	300.			
		Vaporization	liq	g	760	773.	500.			
Tl_2O_3		Fusion	c	liq		990.	717.			
TlF		Fusion	c	liq		600.	327.			
		Vaporization	liq	g	760	928.	655.			
TlF_3		Fusion	c	liq		823.	550.			

Table 30–2. Thallium (at. no., 81; at. wt., 204.39)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
TlCl		Sublimation	c	g	1.12	702.	429.	29.	41.	
		Fusion	c	liq	1.12	702.	429.	4.0	5.6	
		Vaporization	liq	g	760	1079.	806.	24.8	23.0	
$TlCl_3 \cdot 4H_2O$		Fusion	c	liq		308.	35.			
$TlClO_4$		Transition	c, II	c, I		539.	266.			
		Fusion	c, I	liq		774.	501.			
TlBr		Sublimation	c	g	2.11	732.	459.	31.4	42.9	
		Fusion	c	liq	2.11	732.	459.	3.6	4.9	
		Vaporization	liq	g	760	1089.	816.	24.6	22.7	
TlI		Transition	c, II, yellow	c, I, red		438.	165.			
		Sublimation	c, I, red	g	1.00	713.	440.	30.0	42.1	
		Fusion	c, I, red	liq	1.00	713.	440.	2.7	3.8	
		Vaporization	liq	g	760	1098.	825.	24.9	22.6	

Table 30-3. Thallium (at. no., 81; at. wt., 204.39)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Tl_2S		Fusion	c	liq		721.	448.	3.0	4.2	
Tl_2S_3		Fusion	c	liq		533.	260.			
Tl_2S_5		Fusion	c	liq		583.	310.			
Tl_2SO_4		Fusion	c	liq		905.	632.	5.5	6.1	
Tl_2Se		Fusion	c	liq		671.	398.			
Tl_2Se_3		Transition	c, II	c, I		438.	165.			
Tl_2Te_3		Fusion	c	liq		701.	428.			
$TlNO_2$		Fusion	c	liq		455.	182.			
$TlNO_3$		Transition	c, III	c, II		334.2	61.0	0.24	0.72	
		Transition	c, II	c, I		416.7	143.5	0.76	1.82	
		Fusion	c, I	liq		479.7	206.5	2.29	4.77	
		Vaporization	liq	g	760	706.	433.			

Table 30-4. Thallium (at. no., 81; at. wt., 204.39)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$TlPO_3$		Fusion	c	liq		678.	405.			
TlH_2PO_2		Fusion	c	liq		383.	110.			
TlH_2PO_3		Fusion	c	liq		343.	70.			
TlH_2PO_4		Fusion	c	liq		437.	164.			
$TlAsS_2$		Fusion	c	liq		573.	300.			
Tl_3Bi_5		Fusion	c	liq		487.6	214.4			
$3TlCl \cdot BiCl_3$		Fusion	c	liq		686.	413.			
Tl_2CO_3		Transition	c, II	c, I		501.	228.			
		Fusion	c, I	liq		546.	273.	4.4	8.1	
$Tl(C_2H_5)_3$		Fusion	c	liq		210.	-63.			
$HCOOTl$	thallous formate	Fusion	c	liq		377.	104.			
CH_3COOTl	thallous acetate	Fusion	c	liq		403.	130.			
CF_3COOTl	thallous trifluoroacetate	Fusion	c	liq		393.7	120.5			
		Vaporization	liq	g	1.5	433.	160.			

Table 30-5. Thallium (at. no., 81; at. wt., 204.39)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Tl_2CO_3 \cdot TlNO_3$		Fusion	c	liq		487.	214.			
$Tl_2CO_3 \cdot 2TlNO_3$		Fusion	c	liq		491.	218.			
$TlCl \cdot SnCl_2$		Fusion	c	liq		517.	244.			
$3TlCl \cdot SnCl_2$		Fusion	c	liq		583.	310.			
$TlCl \cdot 2PbCl_2$		Fusion	c	liq		708.	435.			
$3TlCl \cdot PbCl_2$		Fusion	c	liq		680.	407.			

Table 31-1. Zinc (at. no., 30; at. wt., 65.38)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Zn		Fusion	c	liq		692.7	419.5	1.595	2.303	
		Vaporization	liq	g	760	1180.	907.	27.43	23.24	
ZnO		Fusion	c	liq		2248.	1975.			
ZnF_2		Fusion	c	liq		1145.	872.			
		Vaporization	liq	g	760	1775.	1502.	43.1	24.3	
$ZnCl_2$		Fusion	c	liq		548.	275.	5.5	10.	
		Vaporization	liq	g	760	1029.	756.	30.9	30.0	
$ZnCl_2 \cdot 1\frac{1}{2}H_2O$		Fusion	c	liq		299.	26.			
$ZnCl_2 \cdot 2H_2O$		Fusion	c	liq		292.	19.			
$ZnCl_2 \cdot 2\frac{1}{2}H_2O$		Fusion	c	liq		286.	13.			
$ZnCl_2 \cdot 3H_2O$		Fusion	c	liq		280.	7.			
$ZnBr_2$		Sublimation	c	g	0.00316	542.	269.	30.1	55.4	
		Fusion	c	liq		667.	394.			
		Vaporization	liq	g	760	970.	697.			
$ZnBr_2 \cdot 2H_2O$		Fusion	c	liq		310.	37.			
$ZnBr_2 \cdot 3H_2O$		Fusion	c	liq		268.	-5.			

Table 31-2. Zinc (at. no., 30; at. wt., 65.38)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
ZnI_2		Sublimation	c	g	0.00316	518	245.	27.6	53.3	
		Fusion	c	liq		719.	446.			
$ZnI_2 \cdot 2H_2O$		Fusion	c	liq		300.	27.			
ZnS		Sublimation	c, II	g	0.01	1127.	854.	64.3	57.1	
		Transition	c, II	c, I		1293.	1020.			
		Sublimation	c, I	g	760	1455.	1182.			
ZnTe		Fusion	c	liq		1511.	1238.			
$Zn(NO_3)_2 \cdot H_2O$		Fusion	c	liq		343.9	70.7			
$Zn(NO_3)_2 \cdot 2H_2O$		Fusion	c	liq		338.6	55.4			
$Zn(NO_3)_2 \cdot 4H_2O$		Fusion	c	liq		317.9	44.7			
$Zn(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		309.3	36.1			
$2ZnCl_2 \cdot NH_4Cl$		Fusion	c	liq		522.	249.			
$ZnAs_2$		Fusion	c	liq		1044.	771.			
ZnSb		Fusion	c	liq		817.	544.			
Zn_3Sb_2		Fusion	c	liq		839.	566.	12.1	14.5	

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Table 31-3. Zinc (at. no., 30; at. wt., 65.38)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Zn(CH_3)_2$	dimethylzinc	Vaporization	liq	g	760	321.	48.	6.7	20.9	
$Zn(C_2H_5)_2$	diethylzinc	Vaporization	liq	g	760	397.	124.	8.4	21.2	
$ZnBr_2 \cdot 2CH_3OH$		Fusion	c	liq		312.	39.			
$ZnSiO_3$		Fusion	c	liq		1702.	1429.			
Zn_2SiO_4		Fusion	c	liq		1785.	1512.			
$2TlCl \cdot ZnCl_2$		Fusion	c	liq		625.	352.			
$TlCl \cdot 2ZnCl_2$		Fusion	c	liq		499.	226.			

Table 32-1. Cadmium (at. no., 48; at. wt., 112.41)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cd		Sublimation	c	g	0.11	594.1	320.9	26.28	44.23	
		Fusion	c	liq	0.11	594.1	320.9	1.46	2.46	
		Vaporization	liq	g	760	1040.	767.	23.86	22.94	
CdO		Sublimation	c	g	760	1832.	1559.	53.8	29.4	
CdF_2		Fusion	c	liq		1383.	1110.	5.4	3.9	
		Vaporization	liq	g	760	2020.	1747.	56.0	27.7	
$CdCl_2$		Sublimation	c	g	0.966	841.	568.	41.2	49.0	
		Fusion	c	liq	0.966	841.	568.	5.3	6.3	
		Vaporization	liq	g	760	1253.	980.	29.4	23.5	
$CdBr_2$		Sublimation	c	g	0.0032	638.	365.	38.2	59.9	
		Fusion	c	liq		841.	568.	5.0	6.0	
		Vaporization	liq	g	760		1136.	863.		
CdI_2		Sublimation	c	g	0.48	660.	387.	32.	48.	
		Fusion	c	liq	0.48	660.	387.	8.	12.	

Table 32-2. Cadmium (at. no., 48; at. wt., 112.41)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CdS		Sublimation	c	g	0.0126	958.	685.	51.4	53.7	
$CdSO_4$		Fusion	c	liq		1273.	1000.			
CdTe		Fusion	c	liq		1315.	1042.			
$Cd(NO_3)_2 \cdot 4H_2O$		Fusion	c	liq		332.7	59.5	7.8	23.	
$2CdCl_2 \cdot NH_4Cl$		Fusion	c	liq		639.	366.			
CdSb		Fusion	c	liq		729.	456.	7.66	10.51	
Cd_3Sb_2		Fusion	c	liq		694.	421.			
$Cd(HCOO)_2 \cdot 3NH_3$	cadmium formate triammine	Fusion	c	liq		343.	70.			
$CdSiO_3$		Fusion	c	liq		1428.	1155.			
$CdCl_2 \cdot TlCl$		Fusion	c	liq		703.	430.			

Table 33-1. Mercury (at. no., 80; at. wt., 200.61)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Hg		Sublimation	c	g	2.5×10^{-6}	234.29	-38.87	15.20	64.9	
		Fusion	c	liq	2.5×10^{-6}	234.29	-38.87	0.557	2.37	
		Vaporization	liq	g	0.00209	298.16	25.00	14.54	48.8	
		Vaporization	liq	g, equilibrium	760	629.73	356.57	13.89	22.06	
HgF_2		Sublimation	c	g	178	575.	302.	16.	28.	
		Fusion	c	liq		918.	645.			
$HgCl_2$		Sublimation	c	g	418	550.	277.	18.50	33.6	
		Fusion	c	liq	418	550.	277.	4.15	7.5	
		Vaporization	liq	g	760	577.	304.	14.08	24.4	
$HgBr_2$		Sublimation	c	g	116	514.	241.	18.82	36.6	
		Fusion	c	liq	116	514.	241.	3.96	7.7	
		Vaporization	liq	g	760	592.	319.	14.08	23.8	
HgI_2		Transition	c, II, red	c, I, yellow	0.195	402.	129.	0.601	1.50	
		Sublimation	c, I, yellow	g	8.8	530.	257.	19.86	37.5	
		Fusion	c, I, yellow	liq	8.8	530.	257.	4.53	8.6	
		Vaporization	liq	g	760	627.	354.	14.26	22.7	

Table 33-2. Mercury (at. no., 80; at. wt., 200.61)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1948

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
HgS		Transition	c, II, red	c, I, black	80	659.	386.	1.0	1.5	
$HgI_2 \cdot 2N_2H_5I \cdot H_2O$		Fusion	c	liq		346.	73.			
$Hg(CH_3)_2$	dimethylmercury	Vaporization	liq	g	760	365.8	92.6	8.1	22.1	
$Hg(C_2H_5)_2$	diethylmercury	Vaporization	liq	g	760	432.	159.	10.1	23.4	
Hg_2Tl		Fusion	c	liq		288.	15.			
$HgCl_2 \cdot TlCl$		Fusion	c	liq		497.	224.			
$HgCl_2 \cdot 2TlNO_3$		Fusion	c	liq		468.	195.			

Table 34-1. Copper (at. no., 29; at. wt., 63.54)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cu		Fusion	c	liq		1356.2	1083.0	3.11	2.29	0.5
		Vaporization	liq	g	760	2855.	2582.	72.8	25.4	
Cu_2O		Fusion	c	liq		1502.	1229.	13.4	8.9	
CuCl		Fusion	c	liq		703.	430.	2.4	3.4	
CuBr		Fusion	c	liq		761.	488.			
CuI		Fusion	c	liq		861.	588.			
CuI_2		Transition	c, II	c, I		863.	590.			
Cu_2S		Transition	c, II	c, I		376.	103.	1.34	3.6	0.2
		Fusion	c, I	liq		1400.	1127.	5.5	3.9	
$CuSO_4 \cdot 5H_2O$		Transition	c, II	c, I		327.	54.			

Table 34-2. Copper (at. no., 29; at. wt., 63.54)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cu_2Se		Transition	c, II	c, I		383.	110.	1.13	2.95	0.5
		Fusion	c, I	liq		1386.	1113.			
Cu_2Te		Fusion	c	liq		1128.	855.			
Cu_4Te_3		Transition	c, II	c, I		638.	365.			
		Fusion	c, I	liq		896.	623.			
$Cu(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		297.6	24.4			
Cu_3P		Fusion	c	liq		1303.	1030.			
Cu_3As		Fusion	c	liq		1103.	830.			
Cu_5As_2		Fusion	c	liq		984.	711.			
Cu_3Sb		Fusion	c	liq		960.	687.			
Cu_5Sb_2		Fusion	c	liq		956.	683.			

Table 34-3. Copper (at. no., 29; at. wt., 63.54)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CuCN		Fusion	c	liq		746.	473.			
$Cu(C_2H_3O_2)_2 \cdot 2NH_3$	cupric acetate diammine	Fusion	c	liq		427.	154.			
$Cu(C_2H_2O_2Cl)_2 \cdot 2NH_3$	cupric chloroacetate diammine	Fusion	c	liq		453.	180.			
$Cu(C_2O_2Cl_3)_2 \cdot 5NH_3$	cupric trichloroacetate pentammine	Fusion	c	liq		371.	98.			
$CuBr_2 \cdot C_2H_4(NH_2)_2 \cdot 2HBr$	ethylenediammonium cupric bromide	Fusion	c	liq		515.	242.			
$(C_2H_5)_3PO \cdot CuCl_2$	triethylphosphine oxide cupric chloride	Fusion	c	liq		506.	233.			
Cu_5Si		Fusion	c	liq		1126.	853.			
$4CuS \cdot SiS_2$		Fusion	c	liq		1468.	1195.			
Cu_2Ga		Fusion	c	liq		1108.	835.			
Cu_2Cd_3		Fusion	c	liq		835.	562.	11.05	13.23	-3.50

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Table 35-1. Silver (at. no., 47; at. wt., 107.880)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ag		Fusion	c	liq		1234.0	960.8	2.70	2.19	0.7
		Vaporization	liq	g	760	2466.	2193.	60.72	24.62	
AgF		Fusion	c	liq		708.	435.			
AgCl		Fusion	c	liq		728.	455.	3.16	4.34	-2.31
		Vaporization	liq	g	760	1830.	1557.	43.7	23.9	
$AgClO_3$		Fusion	c	liq		504.	231.			
AgBr		Transition	c, II	c, I		532.	259.			
		Fusion	c, I	liq		703.	430.	2.18	3.10	-3.6
		Vaporization	liq	g	760	1806.	1533.	37.0	20.5	
AgI		Transition	c, II	c, I		420.	147.	1.47	3.50	
		Fusion	c, I	liq		831.	558.	2.25	2.71	
		Vaporization	liq	g	760	1777.	1504.	34.4	19.4	
$Ag_2H_3IO_6$		Transition	c, II	c, I		227.2	-46.0	0.38	1.7	

Table 35-2. Silver (at. no., 47; at. wt., 107.880)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ag_2S		Transition	c, II	c, I		452.	179.	1.05	2.32	1.2
		Fusion	c, I	liq		1115.	842.	3.36	3.01	
Ag_2SO_4		Transition	c, II	c, I		685.	412.	1.9	2.8	
		Fusion	c, I	liq		933.	660.	4.	4.	
$Ag_2SO_4 \cdot H_2SO_4$		Transition	c, II	c, I		339.	66.			
Ag_2Se		Transition	c, II	c, I		406.	133.	1.7	4.2	0.2
AgTe		Transition	c, II	c, I		685.	412.			
Ag_2Te		Transition	c, II	c, I		411.	138.			
		Fusion	c, I	liq		1232.	959.			
Ag_3Te_2		Transition	c, III	c, II		559.	286.			
		Transition	c, II	c, I		698.	425.			

Table 35-3. Silver (at. no., 47; at. wt., 107.880)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$AgNO_3$		Transition	c, II	c, I		433.	160.	0.66	1.52	-0.06
		Fusion	c, I	liq		483.	210.	2.76	5.71	4.5
$AgPO_3$		Fusion	c	liq		482.	209.			
Ag_3PO_4		Fusion	c	liq		1122.	849.			
$Ag_4P_2O_7$		Fusion	c	liq		858.	585.			
$Ag_2S \cdot As_2S_3$		Fusion	c	liq		690.	417.			
$3Ag_2S \cdot As_2S_3$		Fusion	c	liq		763.	490.			
$Ag_2S \cdot Sb_2S_3$		Fusion	c	liq		782.	509.			
$2Ag_2S \cdot Sb_2S_3$		Fusion	c	liq		755.	482.			
$3Ag_2S \cdot Sb_2S_3$		Fusion	c	liq		756.	483.			

Table 35-4. Silver (at. no., 47; at. wt., 107.880)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
AgCN		Fusion	c	liq		623.	350.	2.8	4.5	
Ag_2HgI_4		Transition	c, II	c, I		323.9	50.7	1.04	3.21	
$AgNO_3 \cdot HgI_2$		Transition	c, II	c, I		325.	52.			
$2AgNO_3 \cdot HgI_2$		Fusion	c	liq		380.	107.			
Ag_3Cu_2		Fusion	c	liq		1052.	779.			

Table 36-1. Gold (at. no., 79; at. wt., 197.2)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Au		Fusion	c	liq		1336.16	1063.00	3.03	2.27	-0.53
		Vaporization	liq	g	760	2933.	2660.	74.21	25.30	-2.0
$AuTe_2$		Fusion	c	liq		737.	464.			
$AuSb_2$		Transition	c, III	c, II		628.	355.	1.12	1.78	2.46
		Transition	c, II	c, I		678.	405.			
Au_2Bi		Fusion	c	liq		646.	373.			
AuSn		Fusion	c	liq		691.	418.	6.12	8.86	-0.2
AuGa		Fusion	c	liq		741.	468.			
$AuGa_2$		Fusion	c	liq		765.	492.			
AuZn		Fusion	c	liq		1033.	760.	5.9	5.7	-2.6
AuCd		Fusion	c	liq		900.	627.	4.28	4.76	-1.8

Table 37-1. Platinum (at. no., 78; at. wt., 195.23)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Pt		Fusion	c	liq		2042.5	1769.3	5.2	2.5	
		Vaporization	liq	g	760	4283.	4010.			
$PtTe_2$		Fusion	c	liq		1523.	1250.			
PtSb		Transition	c, II	c, I		933.	660.			
$PtSb_2$		Fusion	c	liq		1483.	1210.			
$PtCl_2 \cdot CO$		Fusion	c	liq		468.	195.			
$PtCl_2 \cdot 2CO$		Fusion	c	liq		415.	142.			
$2PtCl_2 \cdot 3CO$		Fusion	c	liq		403.	130.			
$PtBr_2 \cdot CO$		Fusion	c	liq		451.	178.			
$PtI_2 \cdot CO$		Fusion	c	liq		418.	145.			
PtSi		Fusion	c	liq		1501.	1228.			
Pt_2Si		Transition	c, II	c, I		973.	700.			
		Fusion	c	liq		1372.	1099.			

Table 38-1. Iridium (at. no., 77; at. wt., 193.1)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ir		Fusion	c	liq		2716.	2443.			
		Vaporization	liq	g	760	4623.	4350.			
IrF_6		Vaporization	liq	g	760	326.	53.	8.6	26.4	
$IrCl_5 \cdot 4(C_2H_5)_2S$		Fusion	c	liq		480.	207.			

Table 39-1. Osmium (at. no., 76; at. wt., 190.2)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Os		Fusion	c	liq		2973.	2700.			
		Vaporization	liq	g	760	4673.	4400.			
OsO_4		Fusion	c, I	liq		313.3	40.1	3.41	10.9	
		Vaporization	liq	g	760	403.	130.	9.5	23.6	
OsF_6		Vaporization	liq	g	760	476.	203.			
OsF_8		Fusion	c	liq		307.6	34.4			
		Vaporization	liq	g	760	320.5	47.3	6.8	21.2	
$Os(CO)_3Cl_2$		Fusion	c	liq		525.	252.			

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Table 40–1. Rhenium (at. no., 75; at. wt., 186.31)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Re		Fusion	c	liq		3420.	3147.			
ReO_3		Fusion	c	liq		433.	160.			
ReO_4		Fusion	c	liq		423.	150.			
Re_2O_7		Fusion	c	liq		569.	296.	15.3	26.9	
		Vaporization	liq	g	760	635.5	362.3	18.1	28.5	
ReF_4		Fusion	c	liq		397.7	124.5			
ReF_6		Fusion	c	liq		292.0	18.8	5.	1.7	
		Vaporization	liq	g	760	321.	48.	6.9	21.5	
$ReOF_4$		Sublimation	c	g	331	312.9	39.7	9.5	30.4	
		Fusion	c	liq	331	312.9	39.7			

Table 40-2. Rhenium (at. no., 75; at. wt., 186.31)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
ReO_3Cl		Fusion	c	liq		688.	415.			
		Vaporization	liq	g	760	404.	131.			
ReO_2Cl_3		Fusion	c	liq		296.6	23.4			
$ReOCl_4$		Fusion	c	liq		302.5	29.3			
$TlReO_4$		Fusion	c	liq		800.	527.			
$AgReO_4$		Fusion	c	liq		703.	430.			

Table 41-1. Palladium (at. no., 46; at. wt., 106.7)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Pd		Fusion	c	liq		1823.	1550.	4.	2.	
		Vaporization	liq	g	760	3833.	3560.			
$PdCl_2$		Fusion	c	liq		951.	678.	9.7	10.2	
PdS		Fusion	c	liq		1243.	970.			
PdSb		Fusion	c	liq		1078.	805.			
Pd_3Sb		Transition	c, II	c, I		1223.	950.	2.2	1.8	
		Fusion	c	liq		1493.	1220.			

Table 42-1. Rhodium (at. no., 45; at. wt., 102.91)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Rh		Fusion	c	liq		2233.	1960.			
		Vaporization	liq	g		4233.	3960.			

Table 43-1. Ruthenium (at. no., 44; at. wt., 101.7)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ru		Transition	c, IV	c, III		1308.	1035.	0.034	0.026	
		Transition	c, III	c, II		1473.	1200.			
		Transition	c, II	c, I		1773.	1500.	0.23	0.13	
		Fusion	c, I	liq		2773.	2500.			
		Vaporization	liq	g	760	4383.	4110.			
RuO_4		Fusion	c, II	liq		298.	25.			
		Fusion	c, I	liq		300.	27.			
RuF_5		Fusion	c	liq		374.	101.			
		Vaporization	liq	g	190	500.	227.			
$Ru(CO)_5$		Fusion	c	liq		251.	-22.			

Table 45-1. Nickel (at. no., 28; at. wt., 58.69)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ni		Transition	c, II	c, I		626.	353.	0.092	0.15	-0.71
		Fusion	c, I	liq		1728.	1455.	4.2	2.4	0.0
		Vaporization	liq	g	760	3073.	2800.	91.0	29.6	
NiO		Sublimation	c	g	1.14×10^{-5}	1500.	1227.	111.4	74.2	
		Fusion	c	liq		2223.	1950.			
$NiCl_2$		Sublimation	c	g	760	1260.	987.	48.36	38.38	
		Fusion	c	liq		1274.	1001.			
$NiBr_2$		Fusion	c	liq		1236.	963.			
NiI_2		Fusion	c	liq		1070.	797.			
NiS		Fusion	c	liq		1070.	797.			
Ni_2S		Fusion	c	liq		918.	645.	3.0	3.3	
Ni_3S_2		Fusion	c	liq		1063.	790.	5.8	5.5	
$NiSO_4\cdot6H_2O$		Transition	c, II	c, I		326.5	53.3			

Table 45-2. Nickel (at. no., 28; at. wt., 58.69)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1949 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Ni(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		329.9	56.7			
$Ni(NO_3)_2 \cdot 6NH_3$		Transition	c, II	c, I		243.	-30.	1.7	7.	
Ni_2P		Fusion	c	liq		1383.	1110.			
Ni_5P_2		Fusion	c	liq		1454.	1181.			
NiSb		Fusion	c	liq		1413.	1140.			
Ni_5Sb_2		Fusion	c	liq		1423.	1150.			
$Ni(CO)_4$		Fusion	c	liq		248.	-25.			
		Vaporization	liq	g	760	315.6	42.4	7.0	22.2	
$Ni(SCN)_4 \cdot C_2H_4(NH_3)_2$	nickel ethylenediammonium thiocyanate	Fusion	c	liq		368.	95.			
NiSi		Fusion	c	liq		1263.	990.			
Ni_2Si		Fusion	c	liq		1573.	1300.			
$NiZn_3$		Fusion	c	liq		1153.	880.			

Table 46-1. Cobalt (at. no., 27; at. wt., 58.94)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1949; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Co		Transition	c, III	c, II		723.	450.	0.005	0.007	
		Transition	c, II	c, I		1398.	1125.	0.07	0.05	
		Fusion	c, I	liq		1766.	1493.	3.7	2.1	
		Vaporization	liq	g	760	3373.	3100.			
CoO		Fusion	c	liq		2078.	1805.			
$CoCl_2$		Fusion	c	liq		997.	724.	7.4	7.4	
		Vaporization	liq	g	760	1323.	1050.	27.2	20.6	
$CoBr_2$		Fusion	c	liq		960.	687.			
CoI_2		Fusion	c	liq		793.	520.			
CoS		Fusion	c	liq		1373.	1100.			
$Co(NO_3)_2 \cdot 3H_2O$		Fusion	c	liq		364.	91.			
$Co(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		330.	57.	8.8	26.7	
$CoI_3 \cdot 6NH_3$		Transition	c, II	c, I		277.4	4.2	0.42	1.51	

Table 46–2. Cobalt (at. no., 27; at. wt., 58.94)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
June 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Co_2P		Fusion	c	liq		1653.	1380.			
CoSb		Fusion	c	liq		1463.	1190.			
$Co(SCN)_4 \cdot C_2H_4(NH_3)_2$	cobalt ethylenediammonium thiocyanate	Fusion	c	liq		355.	82.			
CoSi		Fusion	c	liq		1663.	1390.			
$CoSi_2$		Fusion	c	liq		1548.	1275.			
$CoSi_3$		Fusion	c	liq		1578.	1305.			
Co_2Si		Fusion	c	liq		1598.	1325.			
Co_2Sn		Fusion	c	liq		1438.	1165.			

Table 47-1. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Fe		Transition	c, α	c, β		1033.	760.	0.0	0.0	0.0
		Transition	c, β	c, γ		1180.	907.	0.217	0.184	1.40
		Sublimation	c, γ	g	2.1×10^{-7}	1473.	1200.	92.5	62.7	
		Transition	c, γ	c, δ		1673.	1400.	0.15	0.09	1.
		Fusion	c, δ	liq		1808.	1535.	3.6	2.0	-2.8
		Vaporization	liq	g	760	3073.	2800.			
$Fe_{0.95}O$	wüstite	Fusion	c	liq		1641.	1368.	7.5	4.6	
Fe_2O_3		Transition	c, II	c, I		1303.	1030.			
Fe_3O_4		Fusion	c	liq		1867.	1594.	33.	18.	

Table 47-2. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
FeF_2		Fusion	c	liq		1373.	1100.			
$FeCl_2$		Fusion	c	liq		950.	677.	10.28	10.82	3.63
		Vaporization	liq	g	760	1299.	1026.	30.21	23.26	
$FeCl_3$		Sublimation	c	$\frac{1}{2}Fe_2Cl_6(g)$	582	577.	304.	16.5	28.6	
		Fusion	c	$\frac{1}{2}Fe_2Cl_6(liq)$	582	577.	304.	10.3	17.8	-4.
		Vaporization	liq	$\frac{1}{2}Fe_2Cl_6(g)$	582	577.	304.	6.24	10.81	
		Vaporization	liq	$\frac{1}{2}Fe_2Cl_6(g)$	760	592.	319.	6.02	10.17	
$FeCl_3 \cdot 2H_2O$		Fusion	c	liq		346.7	73.5			
$FeCl_3 \cdot 2\frac{1}{2}H_2O$		Fusion	c	liq		329.	56.			
$FeCl_3 \cdot 3\frac{1}{2}H_2O$		Fusion	c	liq		305.7	32.5			
$FeCl_3 \cdot 6H_2O$		Fusion	c	liq		310.	37.			

Table 47-3. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$FeCl_3 \cdot HCl \cdot 2H_2O$		Fusion	c	liq		318.9	45.7			
$FeCl_3 \cdot HCl \cdot 4H_2O$		Fusion	c	liq		270.	-3.			
$FeCl_3 \cdot HCl \cdot 6H_2O$		Fusion	c	liq		267.	-6.			
$FeBr_2$		Fusion	c	liq		957.	684.			
FeI_2		Fusion	c	liq		860.	587.			
$FeI_2 \cdot 4H_2O$		Fusion	c	liq		368.	95.			
$FeI_2 \cdot 9H_2O$		Fusion	c	liq		274.	1.			

Table 47-4. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
FeS		Transition	c, II	c, I		411.	138.	1.05	2.55	-4.89
$FeSO_4 \cdot 7H_2O$		Fusion	c	liq		337.	64.			
$Fe(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		333.7	60.5			
$Fe(NO_3)_3 \cdot 9H_2O$		Fusion	c	liq		323.3	50.1			
$FeCl_3 \cdot NH_4Cl$		Fusion	c	liq		570.	297.			
$NH_4Fe(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		313.	40.			

Table 47-5. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Fe_2P		Fusion	c	liq		1633.	1360.			
$Fe_2O_3 \cdot P_2O_5$		Fusion	c	liq		1510.	1237.			
FeAs		Fusion	c	liq		1303.	1030.			
Fe_2As		Fusion	c	liq		1192.	919.			
Fe_3Sb_2		Fusion	c	liq		1287.	1014.			

Table 47-6. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Fe(CO)_5$		Fusion	c	liq		252.	-21.	3.25	12.90	
		Vaporization	liq	g	760	378.	105.	8.9	23.5	
$Fe(CO)_4H_2$		Fusion	c	liq		203.0	-70.2			
		Vaporization	liq	g	4.2	243.	-30.	6.1	25.	
$Fe(CO)_2(NO)_2$		Sublimation	c	g	18.7	291.7	18.5	12.	41.	
		Fusion	c	liq	18.7	291.7	18.5	2.5	8.6	
		Vaporization	liq	g	760	380.	107.	8.6	22.6	
$FeCl_3 \cdot CH_3NH_3Cl$	methylammonium ferric chloride	Fusion	c	liq		484.	211.			
$FeCl_3 \cdot (CH_3)_2NH_2Cl$	dimethylammonium ferric chloride	Fusion	c	liq		373.	100.			
$FeCl_3 \cdot C_2H_5NH_3Cl$	ethylammonium ferric chloride	Fusion	c	liq		358.	85.			

Table 47-7. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
FeSi		Fusion	c	liq		1703.	1430.			
$FeO \cdot SiO_2$	$FeSiO_3$	Fusion	c	liq		1413.	1140.			
$2FeO \cdot SiO_2$	Fe_2SiO_4	Fusion	c	liq		1513.	1240.			
$4FeO \cdot 3SiO_2$	$Fe_4Si_3O_{10}$	Fusion	c	liq		1443.	1170.			
$Fe_2O_3 \cdot PbO$		Fusion	c	liq		1803.	1530.			
$FeGa_2$		Fusion	c	liq		1063.	790.			
$FeCl_3 \cdot 2TlCl$		Fusion	c	liq		563.	290.			
$FeTl(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		310.	37.			

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Table 47-8. Iron (at. no., 26; at. wt., 55.85)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Fe_2O_3 \cdot ZnO$		Fusion	c	liq		1863.	1590.			
$Fe_2O_3 \cdot CdO$		Fusion	c	liq		1813.	1540.			
$Fe_2O_3 \cdot CuO$		Fusion	c	liq		1833.	1560.			
$2FeCl_3 \cdot Cu_2Cl_2$		Fusion	c	liq		593.	320.			
$Fe_2O_3 \cdot NiO$		Fusion	c	liq		1933.	1660.			
$2FeS \cdot Ni_2S$		Fusion	c	liq		1159.	886.			
$Fe_2O_3 \cdot CoO$		Fusion	c	liq		1843.	1570.			

Table 48-1. Manganese (at. no., 25; at. wt., 54.93)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mn		Transition	c, IV	c, III		1000.	727.	0.54	0.54	
		Transition	c, III	c, II		1374.	1101.	0.54	0.39	
		Transition	c, II	c, I		1410.	1137.	0.43	0.30	
		Fusion	c, I	liq		1517.	1244.	3.50	2.31	
		Vaporization	liq	g	760	2360.	2087.	53.7	22.8	
MnO		Fusion	c	liq		2053.	1780.			
Mn_2O_3		Transition	c, II	c, I		873.	600.			
Mn_3O_4		Transition	c, II	c, I		1445.	1172.	4.5	3.1	
		Fusion	c, I	liq		1833.	1560.			

Table 48-2. Manganese (at. no., 25; at. wt., 54.93)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
MnF_2		Fusion	c	liq		1129.	856.			
$MnCl_2$		Fusion	c	liq		923.	650.	9.0	9.7	
		Vaporization	liq	g	760	1463.	1190.	28.8	19.7	
$MnBr_2$		Fusion	c	liq		971.	698.			
MnI_2		Fusion	c	liq		911.	638.			
MnS		Fusion	c	liq		1888.	1615.			
$MnSO_4$		Fusion	c	liq		973.	700.			
$Mn(NO_3)_2 \cdot 3H_2O$		Fusion	c	liq		308.7	35.5	6.5	21.0	
$Mn(NO_3)_2 \cdot 4H_2O$		Fusion	c	liq		310.3	37.1			
$Mn(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		299.0	25.8	9.61	32.14	

Table 48-3. Manganese (at. no., 25; at. wt., 54.93)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mn_5P_2		Fusion	c	liq		1638.	1365.			
Mn_2Sb		Fusion	c	liq		1221.	948.			
Mn_3C		Transition	c, II	c, I		1310.	1037.	3.1	2.8	
$Mn(SCN)_2 \cdot C_2H_4(NH_3)_2(SCN)_2$	manganese ethylenediammonium thiocyanate	Fusion	c	liq		459.	186.			
$MnSiO_3$		Transition	c, III	c, II		1393.	1120.			
		Transition	c, II	c, I		1481.	1208.			
		Fusion	c, I	liq		1545.	1272.	8.	5.	
Mn_2SiO_4		Fusion	c	liq		1563.	1290.			
MnAu		Fusion	c	liq		1503.	1230.			
MnPd		Fusion	c	liq		1788.	1515.			
$MnFe_2O_4$		Fusion	c	liq		1843.	1570.			

Table 49-1. Chromium (at. no., 24; at. wt., 52.01)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cr		Fusion	c	liq		2173.	1900.	3.5	1.6	
Cr_2O_3		Transition	c, II	c, I		306.0	32.8			
		Fusion	c, I	liq		2538.	2265.			
$CrCl_2$		Sublimation	c	g	0.61	1088.	815.	60.1	55.2	
		Fusion	c	liq	0.61	1088.	815.	7.7	7.1	
CrO_2Cl_2		Vaporization	liq	g	760	390.	117.	8.4	21.5	
$CrBr_2$		Fusion	c	liq		1115.	842.			
CrI_2		Fusion	c	liq		1068.	795.			

Table 49-2. Chromium (at. no., 24; at. wt., 52.01)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$NH_4Cr(SO_4)_2 \cdot 12H_2O$	chrome alum	Fusion	c	liq		367.	94.			
CrSb		Fusion	c	liq		1383.	1110.			
$Cr(CO)_6$		Sublimation	c	g	13	350.	77.	17.2	49.1	
CrSi		Fusion	c	liq		1903.	1630.			
$CrSi_2$		Fusion	c	liq		1773.	1500.			
$PbCrO_4$		Transition	c, III	c, II		980.	707.			
		Transition	c, II	c, I		1056.	783.			
$PbCrO_4 \cdot PbO$		Fusion	c	liq		1193.	920.			
$TlCr(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		365.	92.			
Cr_3Pd_2		Fusion	c	liq		1673.	1400.			

Table 50-1. Molybdenum (at. no., 42; at. wt., 95.95)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mo		Fusion	c	liq		2883.	2610.			
MoO_3		Sublimation	c	g	0.3	973.	700.	65.	67.	
		Fusion	c	liq	10	1068.	795.			
		Vaporization	liq	g	760	1428.	1155.	33.	31.	
MoF_6		Sublimation	c	g	406	290.7	17.5	8.3	28.6	
		Fusion	c	liq	406	290.7	17.5	2.2	7.6	
		Vaporization	liq	g	760	308.	35.	6.0	19.5	
$MoOF_4$		Fusion	c	liq		370.	97.			
$MoCl_5$		Fusion	c	liq		467.	194.			
		Vaporization	liq	g	760	541.	268.			

Table 50-2. Molybdenum (at. no., 42; at. wt., 95.95)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Bi_2(MoO_4)_3$		Fusion	c	liq		916.	643.			
MoC		Fusion	c	liq		2950.	2677.			
Mo_2C		Fusion	c	liq		2945.	2672.			
$Mo(CO)_6$		Sublimation	c	g	48	375.	102.	16.3	43.5	
$PbMoO_4$		Fusion	c	liq		1338.	1065.			
$PbMoO_4 \cdot PbO$		Fusion	c	liq		1224.	951.			

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Table 51-1. Tungsten (at. no., 74; at. wt., 183.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
W		Fusion	c	liq		3653.	3380.			
WO_3		Sublimation	c	g	0.0058	1375.	1102.	112.	81.	
		Fusion	c	liq		1743.	1470.			
WF_6		Transition	c, II	c, I		265.0	-8.2	1.6	6.0	
		Fusion	c, I	liq	420	275.7	2.5	0.5	1.8	
WOF_4		Fusion	c	liq		383.	110.			
		Vaporization	liq	g	760	461.	188.			
WCl_5		Fusion	c	liq		521.	248.			
		Vaporization	liq	g	760	549.	276.			

Table 51-2. Tungsten (at. no., 74; at. wt., 183.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
WCl_6		Transition	c, III	c, II		442.	169.			
		Transition	c, II	c, I	38	500.1	226.9	3.4	6.8	
		Sublimation	c, II	g	38	500.1	226.9	21.0	42.0	
		Sublimation	c, I	g	233	557.2	284.0	17.4	31.2	
		Fusion	c, I	liq	233	557.2	284.0	2.3	4.1	
		Vaporization	liq	g	760	609.7	336.5	14.9	24.4	
$WOCl_4$		Sublimation	c	g	355	483.	210.	18.1	37.5	
		Fusion	c	liq	355	483.	210.	1.4	2.9	
		Vaporization	liq	g	760	505	232	16.6	32.9	
WBr_5		Fusion	c	liq		549.	276.			
		Vaporization	liq	g	760	606.	333.			

Table 51-3. Tungsten (at. no., 74; at. wt., 183.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$WOBr_4$		Fusion	c	liq		550.	277.			
		Vaporization	liq	g	760	600.	327.			
$WCl_6 \cdot 3WBr_6$		Fusion	c	liq		505.	232.			
$Bi_2(WO_4)_3$		Fusion	c	liq		1105.	832.			
WC		Fusion	c	liq		3140.	2867.			
W_2C		Fusion	c	liq		3130.	2857.			
$W(CO)_6$		Sublimation	c	g	70	400.	127.	17.7	44.2	
$PbWO_4$		Transition	c, II	c, I		1150.	877.			
		Fusion	c, I	liq		1403.	1130.			
$PbWO_4 \cdot PbO$		Fusion	c	liq		1178.	905.			
W_2Re_3		Fusion	c	liq		3260.	2987.			

Table 52-1. Vanadium (at. no., 23; at. wt., 50.95)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
V		Fusion	c	liq		2003.	1730.			
V_2O_3		Fusion	c	liq		2250.	1977.			
V_2O_4		Transition	c, II	c, I		345.	72.	2.05	5.94	6.9
		Fusion	c, I	liq		1815.	1542.	27.21	15.0	10.1
V_2O_5		Fusion	c	liq		943.	670.	15.56	16.50	2.9
VF_5		Sublimation	c	g	758	384.4	111.2			
VCl_4		Fusion	c	liq		247.5	-25.7			
		Vaporization	liq	g	760	425.	152.	9.1	21.4	
$VOCl_3$		Fusion	c	liq		194.	-79.			
		Vaporization	liq	g	760	400.	127.	8.3	20.8	
VN		Fusion	c	liq		2300.	2027.			
$NH_4V(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		318.	45.			

Table 52-2. Vanadium (at. no., 23; at. wt., 50.95)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
VC		Fusion	c	liq		3043.	2770.			
VSi_2		Fusion	c	liq		1923.	1650.			
$V_2O_5 \cdot 2PbO$		Fusion	c	liq		995.	722.			
$V_2O_5 \cdot 3PbO$		Fusion	c	liq		1225.	952.			
$V_2O_5 \cdot 8PbO$		Fusion	c	liq		1067.	794.			
$3Pb_3(VO_4)_2 \cdot PbF_2$		Fusion	c	liq		1189.	916.			
$3Pb_3(VO_4)_2 \cdot PbCl_2$		Transition	c, II	c, I		988.	715.			
		Fusion	c, I	liq		1263.	990.			
$TlV(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		321.	48.			

Table 53-1. Columbium (at. no., 41; at. wt., 92.91)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cb		Sublimation	c	g	0.00017	2500.	2227.	181.	72.	
		Fusion	c	liq		2760.	2487.			
Cb_2O_3		Fusion	c	liq		2045.	1772.			
Cb_2O_5		Fusion	c	liq		1733.	1460.			
CbF_5		Fusion	c	liq		348.7	75.5			
		Vaporization	liq	g	760	498.	225.	11.1	22.3	
$CbCl_5$		Sublimation	c	g	330	483.	210.	20.4	42.2	
		Fusion	c	liq	330	483.	210.	8.5	17.6	
		Vaporization	liq	g	760	519.	246.	11.8	22.7	
CbN		Fusion	c	liq		2300.	2027.			
CbC		Fusion	c	liq		3730.	3457.			
Cb_2Fe_3		Fusion	c	liq		1933.	1660.			

Table 54-1. Tantalum (at. no., 73; at. wt., 180.88)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ta		Sublimation	c	g	8.6×10^{-6}	2500.	2227.	180.	72.	
		Fusion	c	liq		3250.	2977.			
Ta_2O_5		Fusion	c	liq		2163.	1890.			
TaF_5		Fusion	c	liq		370.0	96.8			
		Vaporization	liq	g	760	402.	229.	6.6	16.4	
$TaCl_5$		Sublimation	c	g	415	484.	211.	22.7	46.9	
		Fusion	c	liq	415	484.	211.	11.1	22.9	
		Vaporization	liq	g	760	508.	235.	11.5	22.6	
$TaBr_5$		Sublimation	c	g	130	540.	267.	25.5	47.2	
		Fusion	c	liq	130	540.	267.	10.7	19.8	
		Vaporization	liq	g	760	618.	345.	14.6	23.6	
TaI_5		Fusion	c	liq		638.	365.			
TaN		Fusion	c	liq		3340.	3067.			
TaC		Fusion	c	liq		4100.	3827.			
TaFe		Fusion	c	liq		1973.	1700.			

Table 55-1. Titanium (at. no., 22; at. wt., 47.90)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
Ti		Transition	c, II	c, I		1155.	882.			
		Sublimation	c, I	g	0.036	2085.	1812.	106.5	51.0	
		Fusion	c, I	liq	0.036	2085.	1812.			
TiO		Transition	c, II	c, I		1264.	991.	0.82	0.65	
TiO_2		Transition	c, III, β anatase	c, II, α anatase		915.	642.	0.3	0.3	
		Fusion	c, I, rutile	liq		2108.	1835.			
Ti_2O_3		Transition	c, II	c, I		473.	200.	0.22	0.46	
Ti_3O_5		Transition	c, II	c, I		450.	177.	0.22	0.49	
TiF_4		Vaporization	liq	g	760	557.	284.			
$TiCl_4$		Fusion	c	liq		250.	-23.	2.24	9.0	
		Vaporization	liq	g	760	409.0	135.8	8.4	20.5	
$TiBr_4$		Transition	c, II	c, I		258.	-15.			
		Fusion	c, I	liq		311.7	38.5	2.1	6.7	
		Vaporization	liq	g	760	503.	230.			

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Table 55-2. Titanium (at. no., 22; at. wt., 47.90)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
TiI_4		Fusion	c	liq		423.	150.			
		Vaporization	liq	g	760	650.3	377.1	13.6	20.9	
$TiCl_4 \cdot SCl_4$		Fusion	c	liq		336.	63.			
TiN		Fusion	c	liq		3200.	2927.			
$TiCl_4 \cdot POCl_3$		Fusion	c	liq		383.	110.			
		Vaporization	liq	g	760	413.	140.			
TiC		Fusion	c	liq		3400.	3127.			
$TiFe_2$		Fusion	c	liq		1803.	1530.			
$FeTiO_3$		Fusion	c	liq		1640.	1367.	21.7	13.2	
Fe_2TiO_4		Fusion	c	liq		1645.	1372.			
$MnTiO_3$		Fusion	c	liq		1430.	1157.			

Table 56-1. Zirconium (at. no., 40; at. wt., 91.22)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Zr		Transition	c, II	c, I		1135.	862.	0.7	0.6	
		Sublimation	c, I	g						
		Fusion	c, I	liq		2125.	1852.			
ZrO		Transition	c, II	c, I		973.	700.			
ZrO_2		Transition	c, III	c, II		1273.	1000.			
		Transition	c, II	c, I		2173.	1900.			
		Fusion	c, I	liq		2950.	2677.	20.8	7.0	
$ZrCl_4$		Sublimation	c	g	760	604.	331.	25.3	41.9	
		Fusion	c	liq		710.	437.			
$ZrBr_4$		Sublimation	c	g	760	630.	357.	25.8	41.0	
		Fusion	c	liq		723.	450.			
ZrI_4		Sublimation	c	g	760	704.	431.	29.0	41.2	
		Fusion	c	liq		772.	499.			

Table 56-2. Zirconium (at. no., 40; at. wt., 91.22)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
ZrN		Fusion	c	liq		3225.	2952.			
$Zr(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		309.6	36.4			
$2ZrCl_4 \cdot PCl_5$		Fusion	c	liq		437.7	164.5			
		Vaporization	liq	g	760	689.	416.			
$2ZrCl_4 \cdot POCl_3$		Vaporization	liq	g	760	636.	363.			
ZrC		Fusion	c	liq		3765.	3492.			
$ZrSiO_4$		Fusion	c	liq		2693.	2420.			
$ZrCu_3$		Fusion	c	liq		1388.	1115.			
$ZrAu_3$		Fusion	c	liq		1828.	1555.			
Zr_2Fe_3		Fusion	c	liq		1908.	1635.			

Table 57-1. Hafnium (at. no., 72; at. wt., 178.6)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Hf		Transition	c, II	c, I		1773.	1500.			
		Fusion	c, I	liq		2500.	2227.			
HfO_2		Fusion	c	liq		3050.	2777.			
$HfCl_4$		Sublimation	c	g	760	590.	317.	24.	40.	
		Fusion	c	liq		705.	432.			
$HfBr_4$		Sublimation	c	g	760	595.	322.	24.	40.	
		Fusion	c	liq		693.	420.			
HfC		Fusion	c	liq		4110.	3837.			

Table 58-1. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
B		Fusion	c	liq		2313.	2040.			
B_2O_3		Fusion	c	liq		723.	450.	5.27	7.29	
		Vaporization	liq	g	2	1523.	1250.	77.	50.	
B_2H_6	diborane	Fusion	c	liq		107.7	-165.5	1.06	9.8	
		Vaporization	liq	g	760	180.63	-92.53	3.45	19.1	
B_4H_{10}	tetraborane	Fusion	c	liq		153.0	-120.0			
		Vaporization	liq	g	760	289.	16.	6.47	22.4	
B_5H_9	pentaborane	Fusion	c	liq		226.3	-46.9			
		Vaporization	liq	g	760	331.	58.	7.7	23.3	
B_5H_{11}		Fusion	c	liq		149.9	-123.3			
		Vaporization	liq	g	760	338.	65.	7.61	22.5	
B_6H_{10}	hexaborane	Fusion	c	liq		208.1	-65.1			
$B_{10}H_{14}$	decaborane	Sublimation	c	g	20.6	372.7	99.5	19.4	52.0	
		Fusion	c	liq	20.6	372.7	99.5	7.8	20.9	
		Vaporization	liq	g	20.6	372.7	99.5	11.6	31.1	

Table 58-2. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^oK	^oC	kcal/mole	cal/deg mole	cal/deg mole
HBO_2		Fusion	c, I	liq		509.	236.			
BF_3		Sublimation	c	g	54	144.5	-128.7	5.7	39.	
		Fusion	c	liq	54	144.5	-128.7	1.0	7.	
		Vaporization	liq	g	54	144.5	-128.7	4.7	33.	
		Vaporization	liq	g	760	174.	-99.	4.3	25.	
$BF_3 \cdot H_2O$		Fusion	c	liq		278.7	5.5			
$BF_3 \cdot 2H_2O$		Fusion	c	liq		278.	5.			
		Vaporization	liq	g	1.2	332.	59.			
BCl_3		Fusion	c	liq		166.	-107.			
		Vaporization	liq	g	760	285.6	12.4	5.7	20.0	
B_2H_5Cl		Fusion	c	liq		131.2	-142.0			

Table 58-3. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
BBr_3		Fusion	c	liq		225.7	-47.5			
		Vaporization	liq	g	760	364.4	91.2	7.30	20.03	
B_2H_5Br		Fusion	c	liq		169.	-104.			
		Vaporization	liq	g	760	289.	16.	6.2	21.4	
BI_3		Fusion	c	liq		316.	43.			
		Vaporization	liq	g	760	483.	210.			
B_2S_3		Fusion	c	liq		583.	310.			
B_2S_5		Fusion	c	liq		663.	390.			
$B(HSO_4)_3$		Fusion	c	liq		488.	215.			
$SCl_4 \cdot BCl_3$		Fusion	c	liq		250.	-23.			
$B_3N_3H_6$	hexahydro-s-triazatriborine, borazole	Fusion	c	liq		215.	-58.			
		Vaporization	liq	g	760	323.	50.	7.7	23.8	

Table 58-4. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$B(CH_3)_3$	trimethylborine	Fusion	c	liq		120.	-153.			
		Vaporization	liq	g	180	223.	-50.	5.7	25.6	
$(CH_3)_2B_2H_4$	unsym. dimethyldiborane	Fusion	c	liq		123.0	-150.2			
		Vaporization	liq	g	760	271.	-2.	5.5	20.3	
$(CH_3)_3B_2H_3$	1,1,2-trimethyldiborane	Fusion	c	liq		150.3	-122.9			
		Vaporization	liq	g	760	318.	45.	7.0	22.0	
$(CH_3)_4B_2H_2$	sym. tetramethyldiborane	Fusion	c	liq		200.7	-72.5			
		Vaporization	liq	g	760	345.	72.	7.3	21.1	
$(C_2H_5)_2B_2H_4$	unsym. diethyldiborane	Vaporization	liq	g	760	340.	67.	8.1	23.8	
$(C_2H_5)_4B_2H_2$	sym. tetraethyldiborane	Fusion	c	liq		216.9	-56.3			
$(CH_3O)_2BH$	dimethoxyborine	Fusion	c	liq		142.6	-130.6			
		Vaporization	liq	g	760	298.	25.	6.6	22.1	

Table 58-5. Boron (at. no.. 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$B_3O_3(CH_3)_3$	trimethylboroxole	Fusion	c	liq		235.	-38.			
		Vaporization	liq	g	7.9	298.	25.	8.7	29.2	
$B(CH_3)F_2$	methyldifluoroborine	Fusion	c	liq		142.8	-130.4			
		Vaporization	liq	g	760	210.	-63.	5.0	23.8	
$B(CH_3)_2F$	dimethylfluoroborine	Fusion	c	liq		125.9	-147.3			
		Vaporization	liq	g	760	231.	-42.	5.1	22.1	
$B(CH_3)Cl_2$	methyldichloroborine	Fusion	c	liq		146.1	-127.1			
		Vaporization	liq	g	760	284.3	11.1			
$B(CH_3)_2Cl$	dimethylchloroborine	Vaporization	liq	g	760	278.1	4.9	5.7	20.5	
$B(C_2H_5)_2Cl$	diethylchloroborine	Fusion	c	liq		188.6	-84.6			
		Vaporization	liq	g	760	351.7	78.5	7.9	22.4	
$B(CH_3)Br_2$	methyldibromoborine	Fusion	c	liq		162.6	-110.6			
		Vaporization	liq	g	760	333.2	60.0	7.3	22.0	
$B(CH_3)_2Br$	dimethylbromoborine	Fusion	c	liq		144.3	-128.9			
		Vaporization	liq	g	760	304.8	31.6	6.3	20.6	
$B(C_2H_5)_2Br$	diethylbromoborine	Fusion	c	liq		192.2	-81.0			
		Vaporization	liq	g	760	374.2	101.0	8.4	22.5	
$B(CH_3)_2I$	dimethyliodoborine	Fusion	c	liq		165.7	-107.5			
		Vaporization	liq	g	760	342.0	68.8	6.6	19.3	

Table 58-6. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$BH_2N(CH_3)_2$	dimethylaminoborine	Fusion	c	liq		346.7	73.5			
$BH_3 \cdot NH(CH_3)_2$	dimethylamine borine	Fusion	c	liq		284.	11.			
$B(CH_3)_2NH(CH_3)$	methylaminodimethylborine	Vaporization	liq	g	760	313.	40.	6.1	19.5	
$B(CH_3)_2NH_2$	aminodimethylborine	Fusion	c	liq		282.	9.			
$B(CH_3)_3 \cdot NH_2CH_3$	methylamine trimethylborine	Fusion	c	liq		299.6	26.4			
$BH[N(CH_3)_2]_2$	bis(dimethylamino)borine	Fusion	c	liq		228.	-45.			
$B(CH_3)_3 \cdot NH(CH_3)_2$	dimethylamine trimethylborine	Fusion	c	liq		307.	34.			
$B(CH_3)_2N(C_2H_5)_2$	diethylaminodimethylborine	Vaporization	liq	g	760	371.	98.	8.8	23.7	
$B(C_2H_5)_2N(CH_3)_2$	dimethylaminodiethylborine	Vaporization	liq	g	760	396.	123.	9.0	22.8	
$B[N(CH_3)_2]_3$	tris(dimethylamino)borine	Fusion	c	liq		233.	-40.			
		Vaporization	liq	g	760	420.	147.	10.5	25.0	
$[B(CH_3)_2NH(CH_3)]_2$	bis(methylaminodimethylborine)	Vaporization	liq	g	760	312.	39.	6.2	19.9	
$[B(N(CH_3)_2)_3]_2$		Vaporization	liq	g	760	420.	147.			

Table 58-7. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$(CH_3)B_3N_3H_5$	1-methylborazole (N-methylborazole)	Vaporization	liq	g	760	357.	84.	8.6	24.1	
$(CH_3)B_3N_3H_5$	2-methylborazole (B-methylborazole)	Fusion	c	liq		214.	-59.			
		Vaporization	liq	g	760	360.	87.	9.0	25.0	
$(CH_3)_2B_3N_3H_4$	1,3-dimethylborazole	Vaporization	liq	g	760	381.	108.	8.3	21.8	
$(CH_3)_2B_3N_3H_4$	2,4-dimethylborazole	Fusion	c	liq		225.	-48.			
		Vaporization	liq	g	760	382.	109.	9.0	23.6	
$(CH_3)_2B_3N_3H_4$	1,2-dimethylborazole	Vaporization	liq	g	760	388.	115.	8.3	21.4	
$(CH_3)_3B_3N_3H_3$	1,3,5-trimethylborazole	Fusion	c	liq		264.	-9.			
		Vaporization	liq	g	760	406.	133.	9.3	22.9	
$(CH_3)_3B_3N_3H_3$	2,4,6-trimethylborazole	Fusion	c	liq		305.0	31.8			
		Vaporization	liq	g	760	402.	129.	9.3	23.1	
$(CH_3)_3B_3N_3H_3$	1,2,4-trimethylborazole	Vaporization	liq	g	760	415.	142.	8.6	20.7	
$(CH_3)_4B_3N_3H_2$	1,2,4,6-tetramethylborazole	Vaporization	liq	g	760	431.	158.	10.4	24.1	
$(CH_3)_6B_3N_3$	hexamethylborazole	Fusion	c	liq		370.3	97.1			
		Vaporization	liq	g	760	496.	223.	11.	22.	

Table 58-8. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$(CH_3)_3B_3O_3 \cdot NH_2(CH_3)$	trimethylboroxole methylamine	Fusion	c	liq		455.	182.			
$BCl_2N(CH_3)_2$	dimethylaminodichloroborine	Fusion	c	liq		227.1	-46.1			
		Vaporization	liq	g	760	385.	112.	8.9	23.1	
$BCl[N(CH_3)_2]_2$	bis(dimethylamino)chloroborine	Fusion	c	liq		219.	-54.			
		Vaporization	liq	g	760	418.	145.	9.8	23.4	
$[BCl_2N(CH_3)_2]_2$	bis(dimethylaminodichloroborine)	Fusion	c	liq		415.	142.			
$BBr_2N(CH_3)_2$	dimethylaminodibromoborine	Fusion	c	liq		251.7	-21.5			
$[BBr_2N(CH_3)_2]_2$	bis(dimethylaminodibromoborine)	Fusion	c	liq		425.	152.			

Table 58-9. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$PbO \cdot B_2O_3$		Fusion	c	liq		773.	500.			
$PbO \cdot 2B_2O_3$		Fusion	c	liq		843.	570.			
$PbO \cdot 3B_2O_3$		Fusion	c	liq		833.	560.			
$2PbO \cdot 5B_2O_3$		Fusion	c	liq		793.	520.			
$3ZnO \cdot 2B_2O_3$		Fusion	c	liq		1253.	980.			
$CdO \cdot B_2O_3$		Fusion	c	liq		1123.	850.			
$2CdO \cdot 3B_2O_3$		Fusion	c	liq		1128.	855.			
Ni_2B		Fusion	c	liq		1503.	1230.			
Ni_3B_2		Transition	c, II	c, I		1323.	1050.			
		Fusion	c, I	liq		1433.	1160.			
Fe_2B		Fusion	c	liq		1693.	1420.			
$MnO \cdot B_2O_3$		Fusion	c	liq		1113.	840.			
$MnO \cdot 2B_2O_3$		Fusion	c	liq		1213.	940.			
$MnO \cdot 3B_2O_3$		Fusion	c	liq		1193.	920.			

Table 58-10. Boron (at. no., 5; at. wt., 10.82)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
September 30, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
ZrB		Fusion	c	liq		3245.	2972.			
$Zr(BH_4)_4$	zirconium borohydride	Sublimation	c	g	19.0	301.9	28.7	13.	43.	
		Fusion	c	liq	19.0	301.9	28.7	4.	13.	
		Vaporization	liq	g	19.0	301.9	28.7	9.3	30.8	
HfB		Fusion	c	liq		3315.	3042.			
$Hf(BH_4)_4$	hafnium borohydride	Sublimation	c	g	20.0	302.	29.	13.	43.	
		Fusion	c	liq	20.0	302.	29.	3.	10.	
		Vaporization	liq	g	20.0	302.	29.	9.7	32.1	

Table 59–1. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Al		Fusion	c	liq		933.	660.	2.6	2.8	
		Vaporization	liq	g	760	2600.	2327.	67.9	26.	
Al_2O_3		Fusion	c	liq		2313.	2040.	26.	11.	
AlF_3		Sublimation	c	g	760	1530.	1257.	77.	50.	
Al_2Cl_6		Sublimation	c	g	760	453.3	180.1	26.7	58.9	
		Sublimation	c	g	1625	465.	192.	26.5	57.0	
		Fusion	c	liq	1625	465.	192.	16.9	36.3	
Al_2Br_6		Fusion	c	liq		370.7	97.5	5.4	14.6	
		Vaporization	liq	g	760	530.	257.	11.	21.	
Al_2I_6		Fusion	c	liq		464.	191.	3.8	8.2	
		Vaporization	liq	g	760	659.	386.	15.4	23.4	
$AlBr_3 \cdot H_2S$		Fusion	c	liq		377.	104.			
Al_3Se_4		Fusion	c	liq		1223.	950.			
Al_2Te_3		Fusion	c	liq		1173.	900.			

Table 59–2. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$AlCl_3 \cdot NH_3$		Fusion	c	liq		398.	125.			
		Vaporization	liq	g	760	696.9	423.7	17.6	25.2	
$AlBr_3 \cdot NH_3$		Fusion	c	liq		397.	124.			
$AlI_3 \cdot NH_3$		Fusion	c	liq		399.	126.			
$NH_4Al(SO_4)_2 \cdot 12H_2O$		Transition	c, II	c, I		71.0	-202.2	0.194	2.73	
		Fusion	c, I	liq		368.	95.			
$AlCl_3 \cdot PH_3$		Fusion	c	liq		355.	82.			
$AlCl_3 \cdot POCl_3$		Fusion	c	liq		438.	165.			
$AlBr_3 \cdot PH_3$		Fusion	c	liq		390.	117.			
$AlI_3 \cdot PH_3$		Fusion	c	liq		422.	149.			
AlSb		Fusion	c	liq		1353.	1080.			
$AlBr_3 \cdot SbBr_3$		Fusion	c	liq		357.	84.			
$AlBr_3 \cdot BiBr_3$		Fusion	c	liq		424.	151.			

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Table 59-3. Aluminum (at. no., 13; at. wt., 26.97)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Al(CH_3)_3$	trimethylaluminum	Fusion	c	liq		288.6	15.4			
		Vaporization	liq	g	43	323.	50.	9.7	30.0	
$Al(C_2H_5)_3$	triethylaluminum	Vaporization	liq	g	5.9	353.	80.	13.	37.	
$(CH_3)_2O \cdot Al(CH_3)_3$	trimethylaluminum dimethyl ether	Fusion	c	liq		243.3	-29.9			
		Vaporization	liq	g	25	333.	60.	10.6	31.8	
$[(CH_3)_2AlO(CH_3)]_3$	tris(dimethylaluminum methoxide)	Fusion	c	liq		308.	35.			
		Vaporization	liq	g	30	364.	91.	13.1	36.0	
$[CH_3AlCl_2]_2$	bis(methylaluminum dichloride)	Fusion	c	liq		344.7	71.5			
$[(CH_3)_2AlCl]_2$	bis(dimethylaluminum chloride)	Fusion	c, II	liq		228.	-45.			
		Fusion	c, I	liq		252.2	-21.0			
		Vaporization	liq	g	760	397.	124.	9.1	22.9	

Table 59-4. Aluminum (at. no., 13; at. wt., 26.97)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$(CH_3)_2O \cdot Al(CH_3)_2Cl$	dimethylaluminum chloride dimethyl ether	Vaporization	liq	g	40	390.	117.	10.6	27.2	
$(C_2H_5)_2O \cdot AlCl_3$	aluminum chloride diethyl ether	Fusion	c	liq		310.	37.			
$[(CH_3)_2AlBr]_2$	bis(dimethylaluminum bromide)	Fusion	c	liq		253.	-20.			
		Vaporization	liq	g	40	341.	68.	10.3	30.2	
$(C_2H_5)_2O \cdot AlBr_3$	aluminum bromide diethyl ether	Fusion	c	liq		320.	47.			
$(CH_3)_2S \cdot Al(CH_3)_3$	trimethylaluminum dimethyl sulfide	Fusion	c	liq		253.	-20.			
		Vaporization	liq	g	32	340.	67.	11.3	33.2	
$[(CH_3)_2AlSCH_3]_2$	bis(methylmercaptodimethylaluminum)	Fusion	c	liq		376.	103.			
		Vaporization	liq	g	26	404.	131.	13.6	33.7	

Table 59-5. Aluminum (at. no., 13; at. wt., 26.97)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$AlH_3 \cdot N(CH_3)_3$	aluminum hydride trimethylamine	Fusion	c	liq		338.	65.			
$Al(CH_3)_3 \cdot NH(CH_3)_2$	trimethylaluminum dimethylamine	Fusion	c	liq		324.	51.			
		Vaporization	liq	g	10	346.	73.	12.0	34.7	
$Al(CH_3)_3 \cdot N(CH_3)_3$	trimethylaluminum trimethylamine	Sublimation	c	g	79	378.	105.	12.	32.	
		Vaporization	liq	g	79	378.	105.	11.	29.	
$AlH_3 \cdot 2N(CH_3)_3$	aluminum hydride di(trimethylamine)	Fusion	c	liq		363.	90.			
$[(CH_3)_2AlN(CH_3)_2]_2$	bis(dimethylamino dimethylaluminum)	Sublimation	c	g	16	358.	85.	12.9	36.0	
		Fusion	c	liq		428.	155.			
$AlCl_3 \cdot C_2H_5NH_2$	aluminum chloride ethylamine	Fusion	c	liq		336.	63.			
$Al(CH_3)_2Cl \cdot (CH_3)_3N$	dimethylaluminum chloride trimethylamine	Sublimation	c	g	7.1	370.	97.	13.3	35.9	
		Fusion	c	liq		397.	124.			

Table 59-6. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$(CH_3)_2PH \cdot Al(CH_3)_3$	trimethylaluminum dimethylphosphine	Vaporization	liq	g	50	363.	90.	11.3	31.1	
$(CH_3)_3P \cdot Al(CH_3)_3$	trimethylaluminum trimethylphosphine	Sublimation	c	g	7.9	335.7	62.5	14.5	43.2	
		Vaporization	liq	g	7.9	335.7	62.5	11.7	34.8	
$[(CH_3)_2AlP(CH_3)_2]_3$	tris (dimethylphosphinodimethylaluminum)	Sublimation	c	g	20	460.	187.	14.	30.	
$Al_2O_3 \cdot SiO_2$		Fusion	c	liq		2085.	1812.			
$Al_2Cl_6 \cdot SnCl_2$		Fusion	c	liq		482.5	209.3			
$Al_2Cl_6 \cdot 2SnCl_2$		Fusion	c	liq		431.7	158.5			
$Al_2Br_6 \cdot SnBr_2$		Fusion	c	liq		478.	205.			
$Al_2Br_6 \cdot 2SnBr_2$		Fusion	c	liq		456.	183.			
$Al_2Br_6 \cdot PbBr_2$		Fusion	c	liq		547.	274.			

Table 59–7. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
AlGa		Fusion	c	liq		647.	374.			
$AlGa_2$		Fusion	c	liq		554.	281.			
Al_2Ga		Fusion	c	liq		740.	467.			
$Al_2Cl_6 \cdot 2TlCl$		Fusion	c	liq		570.	297.			
$Al_2Br_6 \cdot TlBr$		Fusion	c	liq		385.	112.			
$Al_2Br_6 \cdot 2TlBr$		Fusion	c	liq		483.	210.			
$AlTl(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		364.	91.			
$Al_2O_3 \cdot ZnO$		Fusion	c	liq		2218.	1945.			
$Al_2Br_6 \cdot ZnBr_2$		Fusion	c	liq		384.7	111.5			
$Al_2Br_6 \cdot CdBr_2$		Fusion	c	liq		497.	224.			

Table 59-8. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Al_2Br_6 \cdot HgBr_2$		Fusion	c	liq		377.	104.			
$Al_2Br_6 \cdot Hg_2Br_2$		Fusion	c	liq		534.	261.			
AlCu		Fusion	c	liq		898.	625.			
$AlCu_3$		Fusion	c	liq		1323.	1050.			
Al_2Cu		Fusion	c	liq		863.	590.			
$Al_2Cl_6 \cdot Cu_2Cl_2$		Fusion	c	liq		506.	233.			
$AlAg_2$		Fusion	c	liq		994.	721.			
$AlAg_3$		Fusion	c	liq		1044.	771.			
$Al_2Br_6 \cdot 2AgBr$		Fusion	c	liq		488.8	215.6			
$AlAu_2$		Fusion	c	liq		896.	623.			
Al_2Au		Fusion	c	liq		1330.	1057.			

Table 59-9. Aluminum (at. no., 13; at. wt., 26.97)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NiAl		Fusion	c	liq		1915.	1642.			
$Al_2O_3 \cdot NiO$		Fusion	c	liq		2288.	2015.			
CoAl		Fusion	c	liq		1900.	1627.			
$Al_2O_3 \cdot CoO$		Fusion	c	liq		2228.	1955.			
$FeAl_3$		Fusion	c	liq		1423.	1150.			
Al_3Ti		Fusion	c	liq		1628.	1355.			
Al_4Ti		Fusion	c	liq		1598.	1325.			
$Al_2O_3 \cdot TiO_2$		Fusion	c	liq		2128.	1855.			
$Al_2O_3 \cdot 2TiO_2$		Fusion	c	liq		2168.	1895.			
$Al(BH_4)_3$	aluminum borohydride	Fusion	c	liq		208.7	-64.5			
		Vaporization	liq	g	760	318.	45.	7.2	22.6	
$Al(BH_4)_3 \cdot N(CH_3)_3$	aluminum borohydride trimethylamine	Fusion	c	liq		352.	79.			

Table 60-1. Scandium (at. no., 21; at. wt., 45.10)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Sc		Fusion	c	liq		1673.	1400.			
		Vaporization	liq	g	760	4173.	3900.			
$ScCl_3$		Sublimation	c	g	684	1233.	960.	61.1	49.6	
		Fusion	c	liq	684	1233.	960.			
$ScBr_3$		Sublimation	c	g	760	1200.	927.	62.4	52.0	
		Fusion	c	liq		1233.	960.			
ScI_3		Sublimation	c	g	760	1183.	910.	60.5	51.1	
		Fusion	c	liq		1218.	945.			
ScN		Fusion	c	liq		2920.	2647.			

Table 61-1. Yttrium (at. no., 39; at. wt., 88.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Y		Fusion	c	liq		1773.	1500.			
		Vaporization	liq	g	760	4373.	4100.			
YCl_3		Fusion	c, Y	liq		973.	700.			
YBr_3		Fusion	c	liq		1177.	904.			
YI_3		Fusion	c	liq		1273.	1000.			
$Y_2(MoO_4)_3$		Fusion	c	liq		1620.	1347.			

Table 62-1. Lutetium (at. no., 71; at. wt., 174.99)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$LuCl_3$		Fusion	c, Y	liq		1165.	892.			
LuI_3		Fusion	c	liq		1318.	1045.			

Table 63-1. Ytterbium (at. no., 70; at. wt., 173.04)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$YbCl_3$		Fusion	c, Y	liq		1127.	854.			
$YbBr_3$		Fusion	c	liq		1213.	940.			

Table 64-1. Thulium (at. no., 69· at. wt., 169.4)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Tm		Vaporization	liq	g	760	3773.	3500.			
$TmCl_3$		Fusion	c, γ	liq		1118.	845.			
TmI_3		Fusion	c	liq		1288.	1015.			

Table 65-1. Erbium (at. no., 68 at. wt., 167.2)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$ErCl_3$		Fusion	c, Y	liq		1047.	774.			
$ErBr_3$		Fusion	c	liq		1223.	950.			
ErI_3		Fusion	c	liq		1293.	1020.			

Table 66-1. Holmium (at. no., 67; at. wt., 164.94)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$HoCl_3$		Fusion	c, Y	liq		991.	718.			
$HoBr_3$		Fusion	c	liq		1187.	914.			
HoI_3		Fusion	c	liq		1283.	1010.			

Table 67-1. Dysprosium (at. no., 66; at. wt., 162.46)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$DyCl_3$		Fusion	c, β	liq		928.	655.			
$DyBr_3$		Fusion	c	liq		1154.	881.			
DyI_3		Fusion	c	liq		1228.	955.			

Table 68-1. Terbium (at. no., 65; at. wt., 159.2)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$TbCl_3$		Fusion	c, β	liq		861.	588.			

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Table 69-1. Gadolinium (at. no., 64; at. wt., 156.9)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$GdCl_3$		Fusion	c, α	liq		882.	609.			
$GdBr_3$		Fusion	c	liq		1038.	765.			
GdI_3		Fusion	c	liq		1199.	926.			

Table 70-1. Europium (at. no., 63; at. wt., 152.0)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$EuCl_3$		Fusion	c, α	liq		896.	623.			

Table 71-1. Samarium (at. no., 62; at. wt., 150.43)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Sm		Fusion	c	liq		1623.	1350.			
$SmCl_2$		Fusion	c	liq		1013.	740.			
$SmCl_3$		Fusion	c, α	liq		955.	682.			
$SmBr_3$		Fusion	c	liq		937.	664.			
SmI_3		Fusion	c	liq		1093.	820.			
$Sm_2(MoO_4)_3$		Fusion	c	liq		1347.	1074.			

Table 73-1. Neodymium (at. no., 60; at. wt., 144.27)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Nd		Transition	c, IV	c, III		109.	-164.			
		Transition	c, III	c, II		781.	508.			
		Transition	c, II	c, I		987.	714.			
		Fusion	c, I	liq		1113.	840.			
NdF_3		Fusion	c	liq		1683.	1410.			
$NdCl_3$		Fusion	c, α	liq		1033.	760.			
$NdCl_3 \cdot 6H_2O$		Fusion	c	liq		399.	126.			
$NdBr_3$		Fusion	c	liq		957.	684.			
NdI_3		Fusion	c	liq		1048.	775.			
$Nd_2(MoO_4)_3$		Fusion	c	liq		1449.	1176.			

Table 74-1. Praseodymium (at. no., 59; at. wt., 140.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
Pr		Fusion	c, I	liq		1205.	932.	2.7	2.2	
PrF_3		Fusion	c	liq		1643.	1370.			
$PrCl_3$		Fusion	c, α	liq		1096.	823.			
$PrCl_3 \cdot 7H_2O$		Fusion	c	liq		379.	106.			
$PrBr_3$		Fusion	c	liq		966.	693.			
PrI_3		Fusion	c	liq		1006.	733.			
$PrSn_3$		Fusion	c	liq		1423.	1150.			
Pr_2Sn		Fusion	c	liq		1683.	1410.			
Pr_2Sn_3		Fusion	c	liq		1433.	1160.			

Table 74-2. Praseodymium (at. no., 59; at. wt., 140.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PrPb		Fusion	c	liq		1458.	1185.			
$PrPb_3$		Fusion	c	liq		1385.	1112.			
Pr_2Pb		Fusion	c	liq		1585.	1312.			
$PrGa_2$		Fusion	c	liq		1743.	1470.			
PrTl		Fusion	c	liq		1423.	1150.			
$PrTl_3$		Fusion	c	liq		1333.	1060.			
$PrCu_2$		Fusion	c	liq		1114.	841.			
$PrCu_6$		Fusion	c	liq		1235.	962.			
$PrAg_1$		Fusion	c	liq		1201.	928.			
$PrAg_3$		Fusion	c	liq		1228.	955.			

Table 74-3. Praseodymium (at. no., 59; at. wt., 140.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PrAu		Fusion	c	liq		1523.	1350.			
$PrAu_2$		Fusion	c	liq		1483.	1210.			
$PrAu_3$		Fusion	c	liq		1473.	1200.			
$PrAu_4$		Fusion	c	liq		1473.	1200.			
PrNi		Fusion	c	liq		1003.	730.			
$PrNi_5$		Fusion	c	liq		1638.	1365.			
Pr_3Ni		Fusion	c	liq		803.	530.			
$Pr_2(MoO_4)_3$		Fusion	c	liq		1303.	1030.			
$PrAl_2$		Fusion	c	liq		1713.	1440.			

Table 75-1. Cerium (at. no., 58; at. wt., 140.13)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ce		Transition	c, IV	c, III		140.	-133.			
		Transition	c, III	c, II		666.	393.			
		Transition	c, II	c, I		713.	440.			
		Fusion	c, I	liq		1048.	775.	2.1	2.0	
Ce_2O_3		Fusion	c	liq		1960.	1687.			
CeF_3		Fusion	c	liq		1733.	1460.			
$CeCl_3$		Fusion	c, α	liq		1095.	822.	8.	7.	
$CeBr_3$		Fusion	c	liq		1005.	732.			
CeI_3		Fusion	c	liq		1025.	752.			

Table 75-2. Cerium (at. no., 58; at. wt., 140.13)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CeBi		Fusion	c	liq		1798.	1525.			
Ce_4Bi_3		Fusion	c	liq		1903.	1630.			
$CeSn_2$		Fusion	c	liq		1408.	1135.			
$CeSn_3$		Fusion	c	liq		1436.	1163.			
Ce_2Sn		Fusion	c	liq		1673.	1400.			
Ce_2Sn_3		Fusion	c	liq		1438.	1165.			
$CePb_3$		Fusion	c	liq		1453.	1180.			
Ce_2Pb		Fusion	c	liq		1663.	1390.			
CeTl		Fusion	c	liq		1508.	1235.			
$CeTl_3$		Fusion	c	liq		1353.	1080.			

Table 75-3. Cerium (at. no., 58; at. wt., 140.13)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949 (Corrected)

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$CeZn_9$		Fusion	c	liq		1245.	972.			
$CeCu_2$		Fusion	c	liq		1093.	820.			
$CeCu_6$		Fusion	c	liq		1213.	940.			
CeAg		Fusion	c	liq		1128.	855.			
$CeAg_3$		Fusion	c	liq		1263.	990.			
CeAu		Fusion	c	liq		1623.	1350.			
$CeAu_2$		Fusion	c	liq		1403.	1130.			
$CeAu_3$		Fusion	c	liq		1423.	1150.			

National Bureau of Standards — Washington, D.C.

Table 75-4. Cerium (at. no., 58; at. wt., 140.13)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949; March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CeNi		Fusion	c	liq		913.	640.			
$CeNi_5$		Fusion	c	liq		1593.	1320.			
Ce_3Ni		Fusion	c	liq		758.	485.			
Ce_3Co		Fusion	c	liq		753.	480.			
$Ce_2O_3 \cdot Cr_2O_3$		Fusion	c	liq		2713.	2440.			
$Ce_2(MoO_4)_3$		Fusion	c	liq		1146.	873.			
$Ce_2(WO_4)_3$		Fusion	c	liq		1362.	1089.			
$CeAl_2$		Fusion	c	liq		1733.	1460.			
$CeAl_4$		Transition	c, II	c, I		1278.	1005.			
Ce_3Al		Fusion	c	liq		888.	615.			

Table 76–1. Lanthanum (at. no., 57, at. wt., 138.92)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
La		Transition	c, IV	c, III		110.	−163.			
		Transition	c, III	c, II		821.	548.			
		Transition	c, II	c, I		982.	709.			
		Fusion	c, I	liq		1153.	880.			
La_2O_3		Fusion	c	liq		2578.	2305.			
$LaCl_3$		Fusion	c, α	liq		1143.	870.			
$LaBr_3$		Fusion	c	liq		1056.	783.			
LaI_3		Fusion	c	liq		1034.	761.			
$La(NO_3)_3 \cdot 6H_2O$		Transition	c, II	c, I		316.	43.			
		Fusion	c, I	liq		339.7	66.5			

Table 76-2. Lanthanum (at. no., 57; at. wt., 138.92)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$LaSn_3$		Fusion	c	liq		1408.	1135.			
La_2Sn		Fusion	c	liq		1694.	1421.			
La_2Sn_3		Fusion	c	liq		1465.	1192.			
LaPb		Fusion	c	liq		1518.	1245.			
$LaPb_3$		Fusion	c	liq		1363.	1090.			
La_2Pb		Fusion	c	liq		1590.	1317.			
LaTl		Fusion	c	liq		1455.	1182.			
$LaTl_3$		Fusion	c	liq		1369.	1096.			
$LaCu_2$		Fusion	c	liq		1107.	834.			
$LaCu_6$		Fusion	c	liq		1198.	925.			
$LaZn_9$		Fusion	c	liq		1235.	962.			

Table 76-3. Lanthanum (at. no., 57; at. wt., 138.92)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

December 31, 1949

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
LaAg		Fusion	c	liq		1159.	886.			
$LaAg_3$		Fusion	c	liq		1228.	955.			
LaAu		Fusion	c	liq		1632.	1359.			
$LaAu_2$		Fusion	c	liq		1486.	1213.			
$LaAu_3$		Fusion	c	liq		1476.	1203.			
LaNi		Fusion	c	liq		958.	685.			
$LaNi_5$		Fusion	c	liq		1598.	1325.			
La_3Ni		Fusion	c	liq		788.	515.			
$La_2(MoO_4)_3$		Fusion	c	liq		1454.	1181.			
$LaAl_2$		Fusion	c	liq		1695.	1422.			
$LaAl_4$		Transition	c, II	c, I		1089.	816.			

Table 79-1. Plutonium (at. no., 94; at. wt., 239.)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
PuF_3		Sublimation	c	g	0.00036	1329.	1056.	96.9	72.9	
		Vaporization	liq	g	0.079	1562.	1289.	80.9	51.8	
$PuCl_3$		Sublimation	c	g	0.0017	1033.	760.	65.	63.	
		Vaporization	liq	g	0.0017	1033.	760.	59.7	57.8	
$PuBr_3$		Sublimation	c	g	0.0019	954.	681.	70.6	74.0	
		Vaporization	liq	g	0.0019	954.	681.	57.2	60.0	

Table 80-1. Neptunium (at. no., 93; at. wt., 237.)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NpF_6		Fusion	c	liq		326.	53.			
$NpCl_3$		Fusion	c	liq		1075.	802.			
$NpCl_4$		Fusion	c	liq		811.	538.			
$NpBr_4$		Fusion	c	liq		740.	467.			
NpI_3		Fusion	c	liq		1040.	767.			

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Table 81-1. Uranium (at. no., 92; at. wt., 238.07)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
U		Transition	c, III	c, II		938.	665.	0.665	0.709	
		Transition	c, II	c, I		1049.	776.	1.165	1.110	
		Fusion	c, I	liq		1405.	1132.			
UF_4		Sublimation	c	g	3.8	1309.	1036.	68.9	52.6	
		Vaporization	liq	g	3.8	1309.	1036.	63.2	48.3	
		Vaporization	liq	g	760	1690.	1417.	57.5	34.1	
UF_6		Sublimation	c	g	760	329.	56.	11.8	35.9	
		Sublimation	c	g	1133	337.2	64.0	11.8	35.0	
		Fusion	c	liq	1133	337.2	64.0	4.59	13.61	8.81
		Vaporization	liq	g	1133	337.2	64.0	7.2	21.4	

Table 81-2. Uranium (at. no., 92; at. wt., 238.07)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
UCl_3		Sublimation	c	g	0.027	1108.	835.	63.	57.	
		Vaporization	liq	g	0.027	1108.	835.	54.	49.	
UCl_4		Sublimation	c	g	15.5	863.	590.	46.3	53.6	
		Vaporization	liq	g	15.5	863.	590.	36.0	41.7	
UBr_3		Sublimation	c	g	0.0065	1025.	752.	68.6	66.9	
		Fusion	c	liq	0.0065	1025.	752.	11.0	10.7	
		Vaporization	liq	g	0.0065	1025.	752.	57.6	56.2	
UBr_4		Sublimation	c	g	4.78	792.	519.	41.9	52.9	
		Vaporization	liq	g	4.78	792.	519.	43.8	43.8	
		Vaporization	liq	g	760	1039.	766.	31.0	29.8	

Table 81-3. Uranium (at. no., 92; at. wt., 238.07)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
UC_2		Fusion	c	liq		2700.	2427.			
U_2C_3		Fusion	c	liq		2700.	2427.			
$(UO_2)Cl_4(CH_2NH_3)_2$	ethylene diammonium uranyl chloride	Fusion	c	liq		492.	219.			
$(UO_2)(NO_3)_4(CH_2NH_3)_2$	ethylene diammonium uranyl nitrate	Fusion	c	liq		488.	215.			
$U(BH_4)_4$	uranium borohydride	Vaporization	liq	g	0.866	318.	45.	19.	60.	
$U(BH_4)_3(BH_3CH_3)$		Vaporization	liq	g	5.8	318.	45.	14.	45.	
$U(BH_3CH_3)_4$		Vaporization	liq	g	0.30	318.	45.	13.	41.	

Table 82-1. Protactinium (at. no., 59; at. wt., 140.92)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$PaCl_5$		Fusion	c	liq		574.	301.			

Table 83-1. Thorium (at. no., 90; at. wt., 232.12)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Th		Transition	c, I	c, II		498.	225.			
		Fusion	c	liq		2173.	1840.			
ThO_2		Fusion	c	liq		3323.	3050.			
$ThCl_4$		Sublimation	c	g	81.3	1043.	770.	58.0	55.6	
		Vaporization	liq	g	81.3	1043.	770.	37.9	36.3	
		Vaporization	liq	g	760	1194.	921.	35.0	29.3	
$ThBr_4$		Sublimation	c	g	42.7	952.	679.	45.0	47.2	
		Vaporization	liq	g	42.7	952.	679.	33.8	35.5	
		Vaporization	liq	g	760	1130.	857.	30.4	26.9	
ThI_4		Fusion	c	liq		839.	566.			
		Vaporization	liq	g	760	1110.	837.	28.8	25.9	
$Th(BH_4)_4$		Sublimation	c	g	0.1	412.	139.	23.	56.	

Table 85-1. Beryllium (at. no., 4; at. wt., 9.013)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Be		Sublimation	c	g	0.034	1556.	1283.	75.2	48.3	
		Fusion	c	liq	0.034	1556.	1283.	2.3	1.5	
BeO		Sublimation	c	g	0.00076	2327.	2054.	147.4	63.3	
		Sublimation	c	g	0.196	2823.	2550.	145.4	51.5	
		Fusion	c	liq	0.196	2823.	2550.			
$BeCl_2$		Sublimation	c	g, $BeCl_2$	2	678.	405.	29.2	43.1	
		Vaporization	liq	g, $BeCl_2$	2	678.	405.	26.2	38.6	
		Vaporization	liq	g, $BeCl_2$	760	820.	547.	25.	30.	
		Sublimation	c	g, Be_2Cl_4	127	678.	405.	15.4	22.7	
$BeBr_2$		Sublimation	c	g, $BeBr_2$	405	761.	488.	27.4	36.0	
		Fusion	c	liq	405	761.	488.			
		Sublimation	c	g, Be_2Br_4	677	761.	488.	13.2	17.4	
BeI_2		Sublimation	c	g, BeI_2	543	753.	480.	24.5	32.5	
		Fusion	c	liq	543	753.	480.			
		Sublimation	c	g, Be_2I_4	360	753.	480.	27.6	36.6	

Table 85-2. Beryllium (at. no., 4; at. wt., 9.013)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$BeO \cdot 3Be(C_2H_3O_2)_2$		Sublimation	c, II	g	0.036	421.	148.	31.7	75.3	
		Sublimation	c, I	g	0.036	421.	148.	27.1	64.4	
		Transition	c, II	c, I	0.036	421.	148.	4.6	10.9	
		Fusion	c, I	liq	112	559.9	286.7	6.5	11.6	
$BeCl_2 \cdot 2(C_2H_5)_2O$		Fusion	c	liq		317.	44.			
$BeBr_2 \cdot 2(C_2H_5)_2O$		Fusion	c	liq		322.	49.			
BeB_2H_8	beryllium borohydride	Sublimation	c	g	29.6	315.0	41.8	14.8	47.0	
$BeB_2H_8 \cdot N(CH_3)_3$		Vaporization	liq	g	3.7	373.8	100.6	13.4	35.8	
		Fusion	c	liq		308.	35.			
$3BeO \cdot 2ZrO_2$		Fusion	c	liq		2808.	2535.			
$BeO \cdot Al_2O_3$		Fusion	c	liq		2143.	1870.			

Table 86-1. Magnesium (at. no., 12; at. wt., 24.32)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mg		Fusion	c	liq	3	923.	650.	2.2	2.4	
		Vaporization	liq	g	760	1393.	1120.	31.5	22.6	
MgO		Fusion	c	liq		3173.	2800.	18.5	5.8	
MgF_2		Fusion	c	liq		1536.	1263.	13.9	9.0	
		Vaporization	liq	g	760	2500.	2227.	65.	26.	
$MgCl_2$		Fusion	c	liq		987.	714.	10.3	10.4	
		Vaporization	liq	g	760	1691.	1418.	32.7	19.3	
$MgCl_2 \cdot 6H_2O$		Fusion	c	liq		390.	117.	8.2	21.0	
$MgBr_2$		Fusion	c	liq		984.	711.	8.3	8.4	
$MgBr_2 \cdot 6H_2O$		Fusion	c	liq		445.6	172.4			
$MgSO_4$		Fusion	c	liq		1400.	1127.	3.5	2.5	

Table 86-2. Magnesium (at. no., 12; at. wt., 24.32)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mg_3N_2		Transition	c, II	c, I		1061.	788.	0.26	0.24	
		Transition	c, III	c, II		823.	550.	0.22	0.27	
$Mg(NO_3)_2 \cdot 2H_2O$		Fusion	c	liq		403.	130.			
$Mg(NO_3)_2 \cdot 6H_2O$		Fusion	c	liq		363.1	89.9	9.8	27.0	
$Mg_2P_2O_7$		Transition	c, II	c, I		341.	68.			
		Fusion	c, I	liq		1653.	1380.			
$Mg_3(PO_4)_2$		Fusion	c	liq		1457.	1184.	11.	9.	
Mg_3As_2		Fusion	c	liq		1073.	800.			
Mg_3Sb_2		Transition	c, II	c, I		1203.	930.			
$3Mg(NO_3)_2 \cdot 2Bi(NO_3)_3 \cdot 24H_2O$		Fusion	c	liq		344.	71.			
$Mg(CH_3COO)_2 \cdot 4H_2O$		Fusion	c	liq		341.	68.			

Table 86-3. Magnesium (at. no., 12; at. wt., 24.32)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$MgBr_2 \cdot 6HCOOH$		Fusion	c	liq		361.	88.			
$MgBr_2 \cdot 6CH_3OH$		Fusion	c	liq		463.	190.			
$MgBr_2 \cdot 6CH_3COOH$		Fusion	c	liq		385.	112.			
$MgBr_2 \cdot 6C_2H_5OH$		Fusion	c	liq		381.7	108.5			
$MgI_2 \cdot 6CH_3OH$		Fusion	c	liq		483.	210.			
$MgI_2 \cdot 6CH_3COOH$		Fusion	c	liq		415.	142.			
$MgI_2 \cdot 6C_2H_5OH$		Fusion	c	liq		419.7	146.5			
$MgBr_2 \cdot 3CH_3CN$		Fusion	c	liq		405.	132.			
$MgBr_2 \cdot 6CH_3CONH_2$		Fusion	c	liq		442.	169.			
$MgI_2 \cdot 6CH_3CONH_2$		Fusion	c	liq		450.	177.			

Table 86-4. Magnesium (at. no., 12; at. wt., 24.32)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mg_2Si		Fusion	c	liq		1375.	1102.			
$MgSiO_3$		Fusion	c	liq		1798.	1525.	14.7	8.2	
Mg_2SiO_4		Fusion	c	liq		2158.	1885.			
Mg_2Ge		Fusion	c	liq		1388.	1175.			
Mg_5Tl_2		Fusion	c	liq		682.	409.			
$MgZn_2$		Fusion	c	liq		863.	590.	8.3	9.6	
$MgCu_2$		Fusion	c	liq		1092.	819.			
Mg_2Cu		Fusion	c	liq		841.	568.			
MgCuSb		Fusion	c	liq		1203.	830.			
AgMg		Fusion	c	liq		1093.	820.			
Ni_2Mg		Fusion	c	liq		1418.	1145.			

Table 86-5. Magnesium (at. no., 12; at. wt., 24.32)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$MgO \cdot Fe_2O_3$		Fusion	c	liq		2033.	1760.			
$MgO \cdot 2TiO_2$		Fusion	c	liq		1953.	1680.			
$2MgO \cdot TiO_2$		Fusion	c	liq		2108.	1835.			
$MgO \cdot ZrO_2$		Fusion	c	liq		2393.	2120.			
$MgO \cdot B_2O_3$		Fusion	c	liq		1464.	1191.			
$2MgO \cdot B_2O_3$		Fusion	c	liq		1653.	1380.			
$3MgO \cdot B_2O_3$		Fusion	c	liq		1673.	1400.			
$MgCl_2 \cdot 5MgO \cdot 7B_2O_3$	boracite	Transition	c, II	c, I		538.	265.			
Mg_2Al_3		Fusion	c	liq		723.	450.			
Mg_3Al_2		Fusion	c	liq		728.	455.			

Table 86-6. Magnesium (at. no., 12; at. wt., 24.32)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Mg_4Al_3		Fusion	c	liq		738.	465.			
$MgO \cdot Al_2O_3$		Fusion	c	liq		2383.	2110.			
MgPr		Fusion	c	liq		1159.	886.			
Mg_3Pr		Fusion	c	liq		1025.	752.			
MgCe		Fusion	c	liq		1003.	730.			
$MgCe_4$		Fusion	c	liq		893.	620.			
Mg_3Ce		Fusion	c	liq		1063.	790.			
MgLa		Fusion	c	liq		1016.	743.			
Mg_3La		Fusion	c	liq		1071.	798.			
$MgO \cdot La_2O_3$		Fusion	c	liq		2303.	2030.			

Table 87-1. Calcium (at. no., 20; at. wt. 40.08)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ca		Transition	c, II	c, I		723.	450.	0.2	0.3	-0.5
		Sublimation	c, I	g	0.35	1123.	850.	44.0	39.2	
		Fusion	c, I	liq		1123.	850.	2.2	2.0	
CaO		Fusion	c	liq		2873.	2600.	12.	4.2	
CaF_2		Transition	c, II	c, I		1424.	1151.	1.14	0.80	
		Fusion	c, I	liq		1691.	1418.	7.1	4.2	
		Vaporization	liq	g	11	2145.	1872.	83.	3.9	
$CaCl_2$		Sublimation	c	g	0.018	934.6	661.4	54.	58.	
		Fusion	c	liq		1055.	782.	6.78	6.43	
$CaCl_2 \cdot 6H_2O$		Fusion	c	liq		303.4	30.2			
$4CaCl_2 \cdot CaO$		Fusion	c	liq		1112.	839.			
$CaBr_2 \cdot 6H_2O$		Fusion	c	liq		307.4	34.2			

Table 87-2. Calcium (at. no., 20; at. wt., 40.08)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$CaSO_4$		Transition	c, II	c, I		1466.	1193.			
		Fusion	c, I	liq		1573.	1400.	6.7	4.3	
Ca_3N_2		Fusion	c	liq		1468.	1195.			
$Ca(NO_3)_2$		Fusion	c	liq		834.	561.	5.1	6.1	
$Ca(NO_3)_2 \cdot 3H_2O$		Fusion	c	liq		324.3	51.1			
$Ca(NO_3)_2 \cdot 4H_2O$		Fusion	c, II	liq		312.9	39.7			
		Fusion	c, I	liq		315.8	42.6			
$CaO \cdot P_2O_5$		Fusion	c	liq		1248.	975.			
$2CaO \cdot P_2O_5$		Fusion	c	liq		1573.	1300.			
$3CaO \cdot P_2O_5$		Transition	c, II	c, I		1373.	1100.	3.7	2.7	
		Fusion	c, I	liq		2003.	1730.			
$4CaO \cdot P_2O_5$		Fusion	c	liq		1973.	1700.			

Table 87-3. Calcium (at. no., 20; at. wt., 40.08)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Ca_3(AsO_4)_2$		Fusion	c	liq		1723.	1450.			
Ca_3Bi_2		Fusion	c	liq		1201.	928.			
CaC_2		Transition	c, II	c, I		720.	447.	1.33	1.85	-1.20
$CaC_2 \cdot CaO$		Fusion	c	liq		2243.	1970.			
$CaCl_2 \cdot 3CH_3OH$		Fusion	c	liq		450.	177.			
$CaCl_2 \cdot 3C_2H_5OH$		Fusion	c	liq		370.	97.			
$CaSi_2$		Fusion	c	liq		1493.	1220.			
$CaSiO_3$		Transition	c, II	c, I		1463.	1190.			
		Fusion	c, I	liq		1803.	1530.			
Ca_2SiO_4		Transition	c, III	c, II		948.	675.	0.35	0.37	0.58
		Transition	c, II	c, I		1673.	1400.	0.77	0.46	
		Fusion	c, I	liq		2393.	2120.			

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Table 87-4. Calcium (at. no., 20; at. wt., 40.08)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$CaSn_3$		Fusion	c	liq		897.	624.			
$CaPb_3$		Fusion	c	liq		923.	650.			
Ca_2Pb		Fusion	c	liq		1423.	1150.			
CaTl		Fusion	c	liq		1243.	970.			
$CaCl_2 \cdot TlCl$		Fusion	c	liq		956.	683.			
$CaZn_{10}$		Fusion	c	liq		1003.	730.			
Ca_2Zn_3		Fusion	c	liq		963.	690.			
$CaCd_3$		Fusion	c	liq		892.	619.			
$CaCu_4$		Fusion	c	liq		1208.	935.			
CaAg		Fusion	c	liq		938.	665.			
$CaAg_2$		Fusion	c	liq		868.	595.			
$CaAg_3$		Fusion	c	liq		998.	725.			
$CaAg_4$		Fusion	c	liq		956.	683.			

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Table 87-5. Calcium (at. no., 20; at. wt., 40.08)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$CaAu_2$		Fusion	c	liq		1137.	864.			
$CaAu_4$		Fusion	c	liq		1153.	880.			
$CaO \cdot 3FeO$		Fusion	c	liq		1583.	1310.			
$2CaO \cdot 3Fe_2O_3$		Fusion	c	liq		1673.	1400.			
$CaO \cdot FeO \cdot SiO_2$		Fusion	c	liq		1481.	1208.			
$CaCrO_4$		Fusion	c	liq		2433.	2160.			
$CaTiO_3$		Transition	c, II	c, I		1530.	1257.	0.55	0.36	-0.23
$CaO \cdot TiO_2 \cdot SiO_2$		Fusion	c	liq		1658.	1385.			
$CaO \cdot ZrO_2$		Fusion	c	liq		2618.	2345.			
$CaO \cdot B_2O_3$		Fusion	c	liq		1435.	1162.	17.67	12.31	17.06
$CaO \cdot 2B_2O_3$		Fusion	c	liq		1260.	987.	27.06	21.48	31.90
$2CaO \cdot B_2O_3$		Transition	c, II	c, I		804.	531.	1.1	1.4	2.87
		Fusion	c, I	liq		1585.	1312.	24.09	15.20	12.11

Table 87-6. Calcium (at. no., 20; at. wt., 40.08)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$3CaO \cdot B_2O_3$		Fusion	c	liq		1760.	1487.	35.49	20.16	19.64
$5CaO \cdot B_2O_3 \cdot SiO_2$		Fusion	c	liq		1690.	1417.			
$CaAl_2$		Fusion	c	liq		1353.	1080.			
$CaAl_3$		Fusion	c	liq		968.	695.			
$CaO \cdot Al_2O_3$		Fusion	c	liq		1873.	1600.			
$12CaO \cdot 7Al_2O_3$		Fusion	c	liq		1723.	1450.			
$CaBr_2 \cdot AlBr_3$		Fusion	c	liq		579.	306.			
$CaO \cdot Al_2O_3 \cdot 2SiO_2$		Fusion	c	liq		1823.	1550.	29.4	16.1	
$2CaO \cdot Al_2O_3 \cdot SiO_2$		Fusion	c	liq		1857.	1584.			
$CaMg_2$		Fusion	c	liq		1003.	730.			
$CaMg(SiO_3)_2$	diopside	Fusion	c	liq		1665.	1392.			

Table 88-1. Strontium (at. no., 38; at. wt., 87.63)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Sr		Fusion	c	liq		1043.	770.	2.2	2.1	
		Vaporization	liq	g	760	1657.	1384.	33.8	20.4	
SrO		Fusion	c	liq		2688.	2415.			
SrF_2		Fusion	c	liq		1673.	1400.	4.3	2.6	
$SrCl_2$		Fusion	c	liq		1148.	875.	4.1	3.6	
$4SrCl_2 \cdot SrO$		Fusion	c	liq		1268.	995.			
$SrCl_2 \cdot SrF_2$		Fusion	c	liq		1235.	962.			
$SrBr_2$		Fusion	c	liq		916.	643.	4.8	5.2	
SrI_2		Fusion	c	liq		788.	515.			

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Table 88-2. Strontium (at. no., 38; at. wt., 87.63)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$SrSO_4$		Transition	c, II	c, I		1425.	1152.			
		Fusion	c, I	liq		1878.	1605.			
$Sr(NO_3)_2$		Fusion	c	liq		918.	645.			
$Sr(AsO_4)_2$		Fusion	c	liq		1903.	1630.			
$Sr_3(PO_4)_2$		Fusion	c	liq		2040.	1767.	18.5	9.1	
$SrCO_3$		Transition	c, II	c, I		1198.	925.			
		Fusion	c, I	liq		1770.	1497.			
$SrO \cdot SiO_2$		Fusion	c	liq		1848.	1575.			
$2SrO \cdot SiO_2$		Fusion	c	liq		1861.	1588.			
$SrPb_3$		Fusion	c	liq		949.	676.			

Table 88-3. Strontium (at. no., 38; at. wt., 87.63)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
SrAg		Fusion	c	liq		953.	680.			
$SrAg_4$		Fusion	c	liq		1054.	781.			
Sr_3Ag_2		Fusion	c	liq		939.	666.			
Sr_3Ag_5		Fusion	c	liq		1030.	757.			
$SrO \cdot B_2O_3$		Fusion	c	liq		1373.	1100.			
$SrO \cdot 2B_2O_3$		Fusion	c	liq		1213.	940.			
$2SrO \cdot B_2O_3$		Fusion	c	liq		1403.	1130.			
$SrO \cdot Al_2O_3$		Fusion	c	liq		2283.	2010.			
$SrMg_2$		Fusion	c	liq		953.	680.			
$SrMg_9$		Fusion	c	liq		876.	603.			

Table 89-1. Barium (at. no., 56; at. wt., 137.36)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ba		Transition	c, II	c, I		648.	375.			
		Sublimation	c, I	g	0.0063	977.	704.	41.1	42.1	
		Fusion	c, I	liq		977.	704.			
		Vaporization	liq	g	760	1911.	1638.	35.7	18.7	
BaO		Sublimation	c	g	0.00076	1650.	1377.	89.	54.	
		Fusion	c	liq		2190.	1917.			
$Ba(OH)_2$		Fusion	c	liq		681.	408.	3.4	5.0	
BaF_2		Fusion	c	liq		1593.	1320.	3.0	1.9	
		Vaporization	liq	g	42	2072.	1799.	83.	40.	
$BaCl_2$		Transition	c, II	c, I		1198.	925.			
		Fusion	c, I	liq		1235.	962.	5.4	4.4	
		Vaporization	liq	g	6.3	1462.	1189.	57.	39.	
$Ba(ClO_4)_2$		Transition	c, II	c, I		557.	284.			

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Table 89-2. Barium (at. no., 56; at. wt., 137.36)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$BaBr_2$		Fusion	c	liq		1123.	850.	6.	5.	
BaI_2		Fusion	c	liq		1013.	740.			
$BaSO_4$		Transition	c, II	c, I		1422.	1149.			
		Fusion	c, I	liq		1623.	1350.	9.7	6.0	
$Ba(NO_3)_2$		Fusion	c	liq		868.7	595.5	6.	7.	
$Ba_3(PO_4)_2$		Fusion	c	liq		2000.	1727.	18.6	9.3	
$Ba_3(AsO_4)_2$		Fusion	c	liq		1878.	1605.			
$BaCO_3$		Transition	c, II	c, I		1083.	810.	3.55	3.28	7.93
$BaSiO_3$		Fusion	c	liq		1878.	1605.			
$BaO \cdot 2SiO_2$		Fusion	c	liq		1698.	1425.			

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Table 89-3. Barium (at. no., 56; at. wt., 137.36)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$BaAg_4$		Fusion	c	liq		1002.	729.			
Ba_2Ag_3		Fusion	c	liq		1121.	848.			
$BaO \cdot Fe_2O_3$		Fusion	c	liq		1663.	1390.			
$Ba(MoO_4)$		Fusion	c	liq		1753.	1480.			
$2BaO \cdot V_2O_5$		Fusion	c	liq		1136.	863.			
$BaTiO_3$		Transition	c, II	c, I		385.8	112.6			
$BaO \cdot ZrO_2$		Fusion	c	liq		2973.	2700.			
$BaO \cdot B_2O_3$		Fusion	c	liq		1323.	1050.			
$BaO \cdot 2B_2O_3$		Fusion	c	liq		1083.	810.			

Table 89-4. Barium (at. no., 56; at. wt., 137.36)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$BaO \cdot 4B_2O_3$		Fusion	c	liq		1023.	750.			
$2BaO \cdot B_2O_3$		Fusion	c	liq		1263.	990.			
$3BaO \cdot B_2O_3$		Fusion	c	liq		1593.	1320.			
$BaO \cdot 3B_2O_3$		Fusion	c	liq		1013.	740.			
$BaO \cdot Al_2O_3$		Fusion	c	liq		2273.	2000.			
$BaMg_2$		Fusion	c	liq		880.	607.			
$BaMg_9$		Fusion	c	liq		980.	707.			
$BaBeF_4$		Fusion	c	liq		1268.	995.			
$BaBe_2F_6$		Fusion	c	liq		1173.	900.			

Table 90-1. Radium (at. no., 88; at. wt., 226.05)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Ra		Fusion	c	liq		973.	700.			
$RaCl_3$		Fusion	c	liq		1173.	900.			

Table 91-1. Lithium (at. no., 3; at. wt., 6.940)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Li		Transition	c, II	c, I		77.	-196.			
		Fusion	c, I	liq		353.	180.	1.	3.	
		Vaporization	liq	equil g		1599.	1326.			
LiOH		Fusion	c	liq		735.	462.			
LiF		Fusion	c	liq		1118.	845.	2.4	2.1	
		Vaporization	liq	g	760	1954.	1681.	51.0	26.1	
LiCl		Sublimation	c	g	0.014	883.	610.	46.2	52.3	
		Fusion	c	liq		883.	610.	3.2	3.6	
		Vaporization	liq	g	760	1655.	1382.	36.0	21.8	
$LiClO_3$		Transition	c, III	c, II		314.7	41.5			
		Transition	c, II	c, I		372.	99.			
		Fusion	c, I	liq		400.8	127.6			
$LiClO_3 \cdot 3H_2O$		Fusion	c	liq		281.	8.			
$LiClO_4$		Fusion	c	liq		509.	236.			
LiBr		Fusion	c	liq		823.	550.	2.9	3.5	
		Vaporization	liq	g	760	1583.	1310.	35.4	22.4	

Table 91-2. Lithium (at. no., 3; at. wt., 6.940)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
LiI		Fusion	c	liq		722.	449.			
		Vaporization	liq	g	760	1444.	1171.	40.8	28.2	
Li_2SO_4		Transition	c, II	c, I		848.	575.	6.8	8.0	
		Fusion	c, I	liq		1132.	859.	3.0	2.6	
$LiNO_3$		Fusion	c	liq		527.	254.	6.1	11.6	0.45
$LiNO_3 \cdot 3H_2O$		Fusion	c	liq		303.1	29.9	8.7	29.	
Li_3PO_4		Fusion	c	liq		1130.	857.			
Li_3Bi		Fusion	c	liq		1418.	1145.			
Li_2CO_3		Fusion	c	liq		1008.	735.			
$LiC_2H_3O_2$	lithium acetate	Fusion	c	liq		553.	280.			
$LiC_2H_3O_2 \cdot 2H_2O$	lithium acetate dihydrate	Fusion	c	liq		331.	58.			
Li_2SiO_3		Fusion	c	liq		1461.	1188.	7.2	4.9	
Li_4SiO_4		Fusion	c	liq		1523.	1250.	7.4	4.8	

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Table 91-3. Lithium (at. no., 3; at. wt., 6.940)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Li_2GeO_3		Fusion	c	liq		1513.	1240.			
Li_4GeO_4		Fusion	c	liq		1568.	1295.			
$LiReO_4$		Fusion	c	liq		699.	426.			
$LiCl \cdot CoCl_2$		Fusion	c	liq		838.	565.			
Li_2MoO_4		Fusion	c	liq		978.	705.	4.2	4.3	
Li_2WO_4		Fusion	c	liq		1015.	742.	7.	7.	
$Li_2W_2O_7$		Transition	c, II	c, I		960.	687.			
		Fusion	c, I	liq		1018.	745.			
$LiVO_3$		Fusion	c	liq		894.	621.			
$2LiSiO_4 \cdot 3ZrSiO_4$		Fusion	c	liq		1425.	1152.			

Table 91-4. Lithium (at. no., 3; at. wt., 6.940)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$LiBO_2$		Fusion	c	liq		1118.	845.	6.	5.	
$Li_2O \cdot B_2O_3$		Fusion	c	liq		1033.	760.			
$Li_2O \cdot 2B_2O_3$		Fusion	c	liq		1198.	925.			
$Li_2O \cdot 3B_2O_3$		Fusion	c	liq		1023.	750.			
$Li_2O \cdot 4B_2O_3$		Fusion	c	liq		1003.	730.			
$Li_2O \cdot 5B_2O_3$		Fusion	c	liq		953.	680.			
$3LiF \cdot AlF_3$		Fusion	c	liq		1063.	790.			
$LiCl \cdot AlCl_3$		Fusion	c	liq		417.	144.			
$LiBr \cdot AlBr_3$		Fusion	c	liq		470.	197.			
$LiBr \cdot 7AlBr_3$		Fusion	c	liq		388.	115.			
Li_2BeF_4		Fusion	c	liq		748.	475.			

Table 92-1. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^oK	^oC	kcal/mole	cal/deg mole	cal/deg mole
Na		Fusion	c	liq		371.	98.	0.63	1.7	0.51
		Vaporization	liq	g, equil	760	1162.	889.			
Na_2O_2		Fusion	c	liq		733.	460.			
NaOH		Transition	c, II	c, I		572.8	299.6	1.	2.	
		Fusion	c, I	liq		593.	320.	1.7	2.9	1.2
$NaOH \cdot H_2O$		Fusion	c	liq		337.4	64.2			
$NaOH \cdot 3\ 1/2H_2O$		Fusion	c	liq		288.7	15.5			
NaF		Sublimation	c	g	0.5	1268.	995.	63.	49.	
		Fusion	c	liq	0.5	1268.	995.	7.8	6.2	0.65
		Vaporization	liq	g	760	1977.	1704.	50.	25.	
NaCl		Sublimation	c	g	0.5	1081.	808.	51.5	47.6	
		Fusion	c	liq	0.5	1081.	808.	6.8	6.3	0.8
		Vaporization	liq	g	760	1738.	1465.	40.8	23.5	
$NaClO_3$		Fusion	c	liq		528.	255.	5.4	10.2	4.9
$NaClO_4$		Transition	c, II	c, I		581.	308.			

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Table 92-2. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NaBr		Sublimation	c	g	0.40	1023.	750.	49.3	48.2	
		Fusion	c	liq		1023.	750.	6.1	5.9	
		Vaporization	liq	g	760	1665.	1392.	38.7	23.2	
NaI		Fusion	c	liq		935.	662.	5.2	5.6	
		Vaporization	liq	g	760	1577.	1304.	38.2	24.2	
Na_2S		Fusion	c	liq		1223.	950.	1.6	1.3	
Na_2S_2		Fusion	c	liq		718.	445.			
Na_2S_3		Fusion	c	liq		593.	320.			
Na_2S_4		Fusion	c	liq		548.	275.			
Na_2S_5		Fusion	c	liq		493.	220.			
Na_4S_3		Fusion	c	liq		1045.	772.			
Na_4S_5		Fusion	c	liq		618.	345.			
Na_4S_7		Fusion	c	liq		568.	295.			
Na_4S_9		Fusion	c	liq		483.	210.			

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Table 92-3. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Na_2SO_4		Transition	c, II	c, I		513.	240.			
		Fusion	c, I	liq		1163.	890.	5.8	5.0	
$Na_2S_2O_3 \cdot 5H_2O$		Fusion	c, I	liq		321.7	48.5	5.6	17.	20.4
NaSH		Transition	c, II	c, I		358.	85.	0.7	2.	
$NaHSO_4$		Fusion	c	liq		455.	182.			
NaSeH		Transition	c, II	c, I		359.	86.	0.7	2.	
Na_2Te		Transition	c, II	c, I		725.	452.			
$NaNO_2$		Transition	c, II	c, I		435.	162.			
$NaNO_3$		Transition	c, II	c, I		548.	275.			
		Fusion	c, I	liq		583.	310.	3.8	6.5	0.3
$NaNH_2$		Fusion	c	liq		481.	208.			
$NaPO_3$		Fusion	c	liq		898.	625.			
$Na_4P_2O_7$		Fusion	c	liq		1243.	970.	14.	11.	

Table 92-4. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
NaH_2PO_3		Fusion	c	liq		315.	42.			
NaBi		Fusion	c	liq		718.	445.			
Na_3Bi		Fusion	c	liq		1048.	775.			
Na_2CO_3		Transition	c, IV	c, III		629.	356.			
		Transition	c, III	c, II		759.	486.			
		Transition	c, II	c, I		891.	618.			
		Fusion	c, I	liq		1127.	854.	8.	7.	
$NaCHO_2$	sodium formate	Fusion	c	liq		573.	300.			
$NaC_2H_3O_2$	sodium acetate	Transition	c, II	c, I		471.	198.			
NaCN		Transition	c, III	c, II		172.1	-101.1	0.15	0.87	
		Transition	c, II	c, I		288.5	15.3	0.70	2.43	
		Fusion	c, I	liq		835.	562.	4.	5.	
		Vaporization	liq	g	760	1770.	1497.	37.	21.	
NaCNS		Fusion	c	liq		596.	323.	4.4	7.4	
Na_2SiO_3		Fusion	c	liq		1362.	1089.	12.5	9.2	-1.07
$Na_2Si_2O_5$		Fusion	c	liq		1147.	874.	8.5	7.4	

Table 92-5. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Na_2GeO_3		Fusion	c	liq		1353.	1080.			
$Na_2Ge_2O_5$		Fusion	c	liq		1072.	799.			
$Na_2Ge_4O_9$		Fusion	c	liq		1325.	1052.			
NaSn		Transition	c, II	c, I		756.	483.			
		Fusion	c, I	liq		849.	576.			
Na_2Sn		Fusion	c	liq		750.	477.			
NaPb		Fusion	c	liq		641.	368.			
Na_2Pb		Fusion	c	liq		678.	405.			
Na_2Pb_5		Fusion	c	liq		592.	319.			
Na_4Pb		Fusion	c	liq		653.	380.			
Na_5Pb_2		Fusion	c	liq		673.	400.			
$NaCd_2$		Fusion	c	liq		658.	385.			
$NaCd_5$		Fusion	c	liq		633.	360.			
$NaReO_4$		Fusion	c	liq		687.	414.			

Table 92–6. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$Na_2O \cdot Fe_2O_3$		Fusion	c	liq		1618.	1345.			
Na_2CrO_4		Transition	c, II	c, I		686.	413.			
		Fusion	c, I	liq		1065.	792.			
$Na_2CrO_4 \cdot 10H_2O$		Fusion	c	liq		293.1	19.9	15.	51.	
$Na_2Cr_2O_7$		Fusion	c	liq		629.9	356.7			
Na_2MoO_4		Transition	c, II	c, I		713.	440.	14.6	20.5	
		Fusion	c, I	liq		960.	687.	3.6	3.8	
Na_2WO_4		Transition	c, III	c, II		860.8	587.6	7.4	8.6	
		Transition	c, II	c, I		862.0	588.8	1.0	1.2	
		Fusion	c, I	liq		968.7	695.5	5.7	5.9	
Na_2TiO_3		Transition	c, II	c, I		560.	287.	0.4	0.7	-1.31
		Fusion	c, I	liq		1303.	1030.	16.8	12.9	-1.2
$Na_2Ti_2O_5$		Fusion	c	liq		1258.	985.			
$Na_2Ti_3O_4$		Fusion	c	liq		1401.	1128.			

Table 92-7. Sodium (at. no., 11; at. wt., 22.997)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$NaBO_2$		Fusion	c	liq		1239.	966.			
$NaO \cdot B_2O_3$		Fusion	c	liq		1238.	965.			
$Na_2O \cdot B_2O_3 \cdot 8H_2O$		Fusion	c	liq		326.7	53.5			
$Na_2O \cdot 2B_2O_3$		Fusion	c, I	liq		1015.	742.			
$Na_2O \cdot 4B_2O_3$		Fusion	c	liq		1089.	816.			
$2Na_2O \cdot B_2O_3$		Fusion	c	liq		898.	625.			
Na_3AlF_6		Transition	c, II	c, I		838.	565.	1.5	1.8	5.5
		Fusion	c, I	liq		1273.	1000.	20.8	16.3	12.8
$NaAlSiO_4$		Transition	c, II	c, I		1521.	1248.			
		Fusion	c, I	liq		1796.	1526.			
$Na_2SO_4 \cdot MgSO_4$		Transition	c, III	c, II		563.	290.			
		Transition	c, II	c, I		783.	510.			
		Fusion	c, I	liq		943.	670.			

Table 93-1. Potassium (at. no., 19; at. wt., 39.076)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
K		Fusion	c	liq		336.6	63.4	0.57	1.69	
		Vaporization	liq	g, equil.	760	1030.	757.			
KO_2		Transition	c, II	c, I		197.7	-75.5			
K_2O_2		Fusion	c	liq		763.	490.			
K_2O_3		Fusion	c	liq		703.	430.			
KOH		Transition	c, II	c, I		522.	249.	1.52	2.91	
		Fusion	c, I	liq		673.	400.	1.8	2.6	
		Vaporization	liq	g	760	1600.	1327.	30.8	19.3	
$KOH \cdot H_2O$		Fusion	c	liq		416.	143.			
KF		Fusion	c	liq		1129.	856.	6.8	6.0	1.5
		Vaporization	liq	g	760	1775.	1502.	41.3	23.3	
$KF \cdot 4H_2O$		Fusion	c	liq		290.7	17.5			
KHF_2		Transition	c, II	c, I		469.2	196.0	2.659	5.670	
		Fusion	c, I	liq		511.9	238.7	1.58	3.09	

Table 93-2. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KF·2HF		Fusion	c	liq		344.9	71.7			
KF·3HF		Fusion	c	liq		339.0	65.8			
KF·4HF		Fusion	c	liq		345.2	72.0			
2KF·5HF		Fusion	c	liq		337.5	64.3			
KCl		Sublimation	c	g	0.40	1045.	772.	49.5	47.4	
		Fusion	c	liq	0.40	1045.	772.	6.1	5.8	0.61
		Vaporization	liq	g	760	1680.	1407.	38.8	23.1	
$KClO_4$		Transition	c, II	c, I		572.7	299.5	3.29	5.74	
KBr		Sublimation	c	g	0.3	1008.	735.	48.9	48.5	
		Fusion	c	liq	0.3	1008.	735.	7.	7.	
		Vaporization	liq	g	760	1656.	1383.	37.1	22.4	
KI		Sublimation	c	g	0.36	958.	685.	47.2	49.3	
		Fusion	c	liq		958.	685.			
		Vaporization	liq	g	760	1597.	1324.	34.7	21.7	
KI_3		Fusion	c	liq		352.	79.			

Table 93-3. Potassium (at. no., 19; at. wt., 39.096)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KIO_3		Fusion	c	liq		833.	560.			
$KIBr_2$		Fusion	c	liq		331.	58.			
K_2S		Transition	c, II	c, I		419.6	146.4	0.085	0.20	
K_2S_5		Fusion	c	liq		479.	206.			
K_2SO_4		Transition	c, II	c, I		856.	583.	1.94	2.27	-4.79
		Fusion	c, I	liq		1342.	1069.	8.76	6.53	-6.49
$K_2SO_4 \cdot 3K_2S$		Fusion	c	liq		1033.	760.			
KSH		Transition	c, II	c, I		453.	180.	0.55	1.2	
$KHSO_4$		Transition	c, III	c, II		437.4	164.2	0.49	1.12	
		Transition	c, II	c, I		453.7	180.5	0.095	0.21	
		Fusion	c	liq		491.8	218.6			
$K_2SO_4 \cdot 3H_2SO_4$		Fusion	c	liq		364.7	91.5			

Table 93-4. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KSeH		Transition	c, II	c, I		448.	175.	0.45	1.0	
KN_3		Fusion	c	liq		628.	354.			
KNO_2		Fusion	c	liq		713.	440.			
KNO_3		Transition	c, IV	c, III	2.84×10^6	294.5	21.3	-0.512	-1.74	
		Transition	c, IV	c, II	2.84×10^6	294.5	21.3	-0.381	-1.29	
		Transition	c, III	c, II	2.84×10^6	294.5	21.3	0.131	0.445	
		Transition	c, III	c, II	61500	401.18	128.02	-0.502	-1.25	
		Transition	c, III	c, I	61500	401.18	128.02	0.558	1.39	
		Transition	c, II	c, I	61500	401.18	128.02	1.060	2.64	
		Transition	c, II	c, I	760	400.9	127.7	1.3	3.2	2.9
		Fusion	c, I	liq		610.	337.	2.8	4.6	0.7
KNH_2		Fusion	c	liq		603.	330.			
$KNO_3 \cdot 2HNO_3$		Fusion	c	liq		295.	22.			

Table 93-5. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KPO_3		Transition	c, II	c, I		723.	450.			
		Fusion	c, I	liq		1083.	810.	2.1	1.9	
K_3PO_4		Fusion	c	liq		1613.	1340.	8.9	5.5	
$K_4P_2O_7$		Transition	c, II	c, I		551.	278.			
		Fusion	c, I	liq		1363.	1090.	14.	10.	
KH_2PO_4		Transition	c, II	c, I		121.97	-151.19	0.085	0.70	
$K_2HPO_4 \cdot 6H_2O$		Fusion	c	liq		288.01	14.85			
$KPO_3 \cdot KF$		Transition	c, II	c, I		813.	540.			
		Fusion	c, I	liq		1153.	880.			
KH_2AsO_4		Transition	c, II	c, I		95.57	-177.59	0.084	0.88	
KSb		Fusion	c	liq		878.	605.			
K_3Sb		Fusion	c	liq		1085.	812.			

Table 93-6. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KBi_2		Fusion	c	liq		825.	552.			
K_2Bi		Fusion	c	liq		827.	554.			
K_3Bi		Fusion	c	liq		944.	671.			
K_3Bi_2		Fusion	c	liq		715.	442.			
K_2CO_3		Transition	c, IV	c, III		523.	250.			
		Transition	c, III	c, II		701.	428.			
		Transition	c, II	c, I		895.	622.			
		Fusion	c, I	liq		1169.	896.	7.8	6.8	
$KCHO_2$	potassium formate	Fusion	c	liq		440.7	167.5			
$KC_2H_3O_2$	potassium acetate	Fusion	c	liq		568.	295.			
$KCHO_2 \cdot HCO_2H$		Fusion	c	liq		555.0	381.8			
$KC_2H_3O_2 \cdot HC_2H_3O_2$		Fusion	c	liq		421.	148.			
KCN		Transition	c, II	c, I		168.3	-104.9	0.30	1.8	
		Fusion	c, I	liq		883.	610.	3.5	4.0	

Table 93-7. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KCNS		Transition	c, II	c, I		413.8	140.6	0.030	0.075	
		Fusion	c, I	liq		450.	177.	2.5	5.6	
K_2SiO_3		Fusion	c	liq		1249.	976.			
$K_2O \cdot 2SiO_2$		Fusion	c	liq		1318.	1045.			
$K_2O \cdot 4SiO_2$		Transition	c, II	c, I		865.	592.	0.78	0.90	
		Fusion	c, I	liq		1038.	765.	11.7	11.3	
$K_2O \cdot GeO_2$		Fusion	c	liq		1115.	842.			
$K_2O \cdot 4GeO_2$		Fusion	c	liq		1311.	1038.			
$2KF \cdot GeF_4$		Fusion	c	liq		1003.	730.			
$KPtI_3$		Fusion	c	liq		622.	349.			
$K_2SO_4 \cdot 2PbSO_4$		Transition	c, II	c, I		817.	544.			
		Fusion	c, I	liq		1221.	948.			
KTl		Fusion	c	liq		608.	335.			

Table 93-8. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
KCd		Fusion	c	liq		760.	487.			
$KReO_4$		Sublimation	c	g	3.2×10^{-3}	824.	551.	72.8	88.3	
		Fusion	c	liq		824.	551.	20.4	23.9	
$K_2SO_4 \cdot 2CoSO_4$		Fusion	c	liq		1009.	736.			
$KFe(SO_4)_2 \cdot 12H_2O$		Fusion	c	liq		301.	28.			
$KCl \cdot MnCl_2$		Fusion	c	liq		768.	495.			
$K_2SO_4 \cdot 2MnSO_4$		Fusion	c	liq		1118.	845.			
K_2CrO_4		Transition	c, II	c, I		938.	665.	2.45	2.61	
		Fusion	c, I	liq		1253.	980.	6.9	5.5	
$K_2Cr_2O_7$		Transition	c, II	c, I		514.8	241.6			
		Fusion	c, I	liq		671.	398.	8.5	13.	23.9

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Table 93-9. Potassium (at. no., 19; at. wt., 39.096)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
K_2MoO_4		Transition	c, IV	c, III		596.	323.			
		Transition	c, III	c, II		731.	458.			
		Transition	c, II	c, I		753.	480.			
		Fusion	c, I	liq		1199.	926.	4.	3.	
$K_2Mo_2O_7$		Fusion	c	liq		757.	484.			
$K_2O \cdot 3MoO_3$		Fusion	c	liq		844.	571.			
K_2WO_4		Transition	c, II	c, I		623.	350.			
		Fusion	c, I	liq		1203.	930.	4.4	3.6	
$K_2W_2O_7$		Fusion	c	liq		828.	555.			
KVO_3		Fusion	c	liq		793.	520.			
KBO_2		Fusion	c	liq		1220.	947.	5.7	4.7	
$K_2O \cdot B_2O_3$		Fusion	c	liq		1243.	970.			
$K_2O \cdot 2B_2O_3$		Fusion	c	liq		1088.	815.			
$K_2O \cdot 4B_2O_3$		Fusion	c	liq		1130.	857.			

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Table 93-10. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
KBF_4		Transition	c, II	c, I		548.	275.			
		Fusion	c, I	liq		803.	530.			
$KPO_3 \cdot KBO_2$		Fusion	c	liq		1145.	872.			
$3KF \cdot AlF_3$		Fusion	c	liq		1308.	1035.			
$KBr \cdot AlBr_3$		Fusion	c	liq		464.7	191.5			
$KBr \cdot 2AlBr_3$		Fusion	c	liq		369.0	95.8			
$KAl(SO_4)_2 \cdot 12H_2O$		Transition	c, II	c, I		57.9	-215.3	0.047	0.8	
		Fusion	c, I	liq		364.	91.	6.7	18.4	
$KAlSi_2O_6$	lincite	Transition	c, II	c, I		893.	620.			
		Fusion	c, I	liq		1958.	1685.			
$K_2SO_4 \cdot BeSO_4$		Fusion	c	liq		1188.	915.			

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Table 93-11. Potassium (at. no., 19; at. wt., 39.096)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
$KF \cdot MgF_2$		Fusion	c	liq		1363.	1090.			
$KCl \cdot MgCl_2$		Fusion	c	liq		760.	487.	12.69	16.7	
$2KCl \cdot MgCl_2$		Fusion	c	liq		706.	433.			
$K_2SO_4 \cdot 2MgSO_4$		Fusion	c	liq		1203.	930.			
$KCl \cdot CaCl_2$		Fusion	c	liq		1027.	754.			
$K_2SO_4 \cdot 2CaSO_4$		Transition	c, II	c, I		1211.	938.			
		Fusion	c	liq		1277.	1004.			
$KCaPO_4$		Transition	c, II	c, I		978.	705.			
$K_2O \cdot CaO \cdot SiO_2$		Fusion	c	liq		1903.	1630.			
$K_2O \cdot 3CaO \cdot 6SiO_3$		Fusion	c	liq		1293.	1020.			
$2K_2O \cdot CaO \cdot 3SiO_2$		Fusion	c	liq		1232.	959.			
$2K_2O \cdot CaO \cdot 6SiO_2$		Fusion	c	liq		1278.	1005.			
$4K_2O \cdot CaO \cdot 10SiO_2$		Fusion	c	liq		1219.	946.			

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Table 93-12. Potassium (at. no., 19; at. wt., 39.096)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$KBr \cdot 2SrBr_2$		Fusion	c	liq		847.	574.			
$2KBr \cdot SrBr_2$		Fusion	c	liq		832.	559.			
$K_2SO_4 \cdot 2SrSO_4$		Transition	c, II	c, I		1048.	775.			
$2KBr \cdot BaBr_2$		Fusion	c	liq		907.	634.			
$K_2SO_4 \cdot Li_2SO_4$		Fusion	c	liq		989.	716.			
$K_2MoO_4 \cdot Li_2MoO_4$		Transition	c, II	c, I		685.	412.			
		Fusion	c, I	liq		844.	571.			
$K_2WO_4 \cdot Li_2WO_4$		Fusion	c	liq		905.	632.			

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Table 94-1. Rubidium (at. no., 37; at. wt., 85.48)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	^{o}K	^{o}C	kcal/mole	cal/deg mole	cal/deg mole
Rb		Transition	c, II	c, I		243.	−30.			
		Sublimation	c, I	g	.01	312.0	38.8	20.47	65.61	
		Fusion	c, I	liq		312.0	38.8	0.52	1.67	
		Vaporization	liq	g	760	952.	679.	18.11	19.02	
RbOH		Transition	c, II	c, I		518.	245.	1.70	3.28	
		Fusion	c, I	liq		574.	301.	1.62	2.82	
RbF		Fusion	c	liq		1048.	775.	4.13	3.94	
		Vaporization	liq	g	760	1681.	1408.	39.51	23.50	
RbF·HF		Fusion	c	liq		478.	205.			
RbF·2HF		Fusion	c	liq		324.8	51.6			

Table 94-2. Rubidium (at. no., 37; at. wt., 85.48)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
RbCl		Fusion	c	liq		990.	717.	4.40	4.44	
		Vaporization	liq	g	760	1654.	1381.	36.92	22.32	
RbBr		Fusion	c	liq		953.	680.	3.7	3.9	
		Vaporization	liq	g	760	1625.	1352.	37.12	22.84	
RbI		Fusion	c	liq		913.	640.	2.99	3.27	
		Vaporization	liq	g	760	1577.	1304.	35.96	22.80	
Rb_2S_2		Fusion	c	liq		693.	420.			
Rb_2S_3		Fusion	c	liq		486.	213.			
Rb_2S_5		Fusion	c	liq		504.	231.			
Rb_2S_6		Fusion	c	liq		474.	201.			

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Table 94-3. Rubidium (at. no., 37; at. wt., 85.48)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Rb_2SO_4		Transition	c, II	c, I		923.	650.			
		Fusion	c, I	liq		1347.	1074.			
RbSH		Transition	c, II	c, I		403.	130.	0.4	1.0	
RbSeH		Transition	c, II	c, I		420.	147.			
RbN_3		Fusion	c	liq		594.	321.			
$RbNO_3$		Transition	c, IV	c, III		438.	165.			
		Transition	c, III	c, II		498.	225.			
		Transition	c, II	c, I		564.	291.			
		Fusion	c, I	liq		589.	316.	1.34	2.28	
$RbNO_3 \cdot HNO_3$		Fusion	c	liq		335.	62.			

Table 94-4. Rubidium (at. no., 37; at. wt., 85.48)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Rb_2CO_3		Fusion	c	liq		1108.	835.			
$RbCHO_2$	rubidium formate	Fusion	c	liq		443.	170.			
$RbC_2H_3O_2$	rubidium acetate	Fusion	c	liq		519.	246.			
RbCNS		Fusion	c	liq		468.	195.			
$RbBF_4$		Fusion	c	liq		863.	590.			
$3RbF \cdot AlF_3$		Fusion	c	liq		1258.	985.			
$RbNO_3 \cdot LiNO_3$		Fusion	c	liq		464.	191.			
$RbOH \cdot 2NaOH$		Fusion	c	liq		551.	278.			
$2RbOH \cdot KOH$		Fusion	c	liq		672.	399.			

Table 95-1. Cesium (at. no., 55; at. wt., 132.91)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cs		Sublimation	c	g	1.2×10^{-6}	301.9	28.7	18.82	62.34	
		Fusion	c	liq	1.2×10^{-6}	301.9	28.7	0.50	1.6	
		Vaporization	liq	g	760	963.	690.	16.32	16.95	
Cs_2O		Fusion	c	liq		763.	490.			
Cs_7O		Fusion	c	liq		276.	3.			
CsOH		Transition	c, II	c, I		496.	223.	1.76	3.55	
		Fusion	c, I	liq		545.5	272.3	1.61	2.93	
CsF		Fusion	c	liq		955.	682.	2.45	2.56	
CsF·HF		Fusion	c	liq		449.	176.			
CsF·2HF		Fusion	c	liq		323.4	50.2			
CsF·3HF		Fusion	c	liq		305.8	32.6			
CsF·6HF		Fusion	c	liq		230.9	-42.3			

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Table 95-2. Cesium (at. no., 55: at. wt., 132.91)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
CsCl		Transition	c, II	c, I		718.	445.	1.8	2.5	
		Fusion	c, I	liq		918.	645.	3.60	3.92	
		Vaporization	liq	g	760	1573.	1300.	35.69	22.69	
CsBr		Fusion	c	liq		909.	636.	1.7	1.9	
		Vaporization	liq	g		1573.	1300.	35.99	22.88	
$CsBrO_3$		Fusion	c	liq		693.	420.			
CsI		Fusion	c	liq		894.	621.			
		Vaporization	liq	g		1573.	1300.	35.93	22.84	
Cs_2S_2		Fusion	c	liq		733.	460.			
Cs_2S_3		Fusion	c	liq		490.	217.			
Cs_2S_5		Fusion	c	liq		483.	210.			
Cs_2S_6		Fusion	c	liq		459.	186.			

Table 95-3. Cesium (at. no., 55; at. wt., 132.91)
HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION
March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
Cs_2SO_4		Transition	c, II	c, I		933.	660.			
		Fusion	c, I	liq		1292.	1019.			
CsN_3		Fusion	c	liq		599.	326.			
$CsNH_2$		Fusion	c	liq		535.	262.			
$CsNO_3$		Transition	c, II	c, I		429.	156.			
		Fusion	c, I	liq		690.	417.	3.25	4.71	
$CsNO_3 \cdot 4H_2O$		Fusion	c	liq		315.9	42.7			
$CsNO_3 \cdot HNO_3$		Fusion	c	liq		373.	100.			

Table 95-4. Cesium (at. no., 55; at. wt., 132.91)

HEAT, TEMPERATURE, AND ENTROPY OF TRANSITION, FUSION, AND VAPORIZATION

March 31, 1950

Substance		Type of Process	State		Pressure	Temperature		ΔH	ΔS	ΔC_p
Formula	Description		Initial	Final	mm Hg	°K	°C	kcal/mole	cal/deg mole	cal/deg mole
$CsHCO_2$	cesium formate	Fusion	c	liq		538.	265.			
$CsHCO_2 \cdot H_2O$		Transition	c, II	c, I		314.	41.			
		Fusion	c, I	liq		318.	45.			
$CsC_2H_3O_2$	cesium acetate	Fusion	c	liq		467.	194.			
$CsCl \cdot 2CuCl$		Fusion	c	liq		547.	274.			
Cs_2TiF_6		Fusion	c	liq		963.	690.			
$CsBF_4$		Fusion	c	liq		823.	550.			
$3CsF \cdot AlF_3$		Fusion	c	liq		1096.	823.			

IV. SPECIFIC REFERENCES FOR THE TABLES OF PROPERTIES OF SERIES I

Table 1

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
O		g	1,2,3		4	4
O^{n+}		g	5,6,7,8,9,10			
O^-		g	11,12,13,14			
O_2		g			15,16,17	15,16,17, 18
		aq	19,20,21			
O_2^+		g	22,23,24			
O_3	ozone	g	25,26,27		28,29,30	4
		aq	31,32			
O_4		g	33,34			

REFERENCES

1. Knauss and Ballard-1
2. Herzberg-9
3. Bichowsky and Rossini-1
4. Calculated
5. Moore-1
6. Edlen-5
7. Edlen-7
8. Kruger and Shoupp-1
9. Cady-4
10. Robinson-5
11. Senftleben-1
12. Born and Gerlach-1
13. Hanson-2
14. Vier and Mayer-1
15. Wagman, Kilpatrick, Taylor, Pitzer, and Rossini-1
16. Johnston and Walker-2
17. Woolley-1
18. Trautz and Ader-1
19. Winkler-1,7,9
20. Cassuto-1
21. Washburn and Strachan-1
22. Tanaka and Takamine-1
23. Mulliken and Stevens-1
24. Hagstrum and Tate-1
25. Kailan and Jahn-1
26. Mulder and van der Meulen-2
27. Günther, Wassmuth, and Schryver-1
28. Kelley-24
29. Shand and Spurr-1
30. Kassel-3
31. Fischer and Tropsch-1
32. Rothmund-1
33. Lewis-4
34. Kondrat'ev-1

Table 2

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
H		g	1,2,3,4		5,6	5,6
H^+		g	7			
		aq				
H_2		g			6,8,9,10,11,12	6,8,9,10,12
OH		g	13,14,15,16,17,18,19,20,21		5,11,17	5,17
OH^-		g	22			
		aq	1,23,24	25,26,27		23,28
H_2O	water	g	8,29,30		5,31,32,11,33	5,31,32,34
		liq	1,8,29		35,36	30,35
H_2O_2		g	37			
		liq	38,39			
		aq	40,41,42			

REFERENCES

1. Bichowsky and Rossini-1
2. Beutler-2
3. Beutler and Junger-2
4. Herzberg-9
5. Calculated
6. Giauque-2
7. Moore-1
8. Wagman, Kilpatrick, Taylor, Pitzer, and Rossini-1
9. Woolley, Scott, and Brickwedde-1
10. Davis and Johnston-1
11. Zeise-1
12. Johnston et al-1
13. Bonhoffer and Haber-1
14. Bonhoffer and Reichardt-1,2
15. Bates-6
16. Tanaka and Koana-1
17. Johnston and Dawson-1
18. Senftleben and Riechemeier-1
19. Lewis and von Elbe-3
20. Dwyer and Oldenberg-1
21. Avramenko and Kondrat'ev-1
22. Lederle-2
23. Pitzer-3
24. Rossini-5
25. Harned and Hamer-1
26. Harned and Copsone-1
27. Harned and Owen-1
28. Rossini-6
29. Rossini-16
30. Osborne, Stimson, and Ginnings-2
31. Gordon-2
32. Wilson, Jr.-1
33. Giauque and Ashley-1
34. Trautz and Ader-1
35. Giauque and Stout-1
36. Kelley-24
37. Maass and Hiebert-1
38. Matheson and Maass-1
39. de Forcrand-33
40. Thomsen-16
41. Berthelot-28,61
42. Roth, Grau, and Meichsner-1

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Table 2a

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
^1H		g	1		2	2
$^1H^+$		g	3			
$^1H^-$		g	4			
$^1H_2$		g			2,5	2
$^1H_2^+$		g	6,7			
^1H_2O		g	8,9,10		2,5	2
		liq	9,10		2	

REFERENCES

1. Herzberg-9
2. Calculated
3. Moore-1
4. Hylleraas-5
5. Urey and Rittenberg-1
6. Beutler and Junger-2
7. Hagstrum and Tate-1
8. Rossini, Knowlton, and Johnston-1
9. Wagman, Kilpatrick, Taylor, Pitzer, and Rossini-1
10. Rossini-16

Table 2b

^2H		g	1,2,3		4	4
$^2H^+$		g	5,6			
$^2H^-$		g	7			
$^2H_2$		g			8,9,10	8,9
$^1H^2H$		g	3,4,8		9,11	8,9
^2H_2O		g	11		11,12,13	4
		liq	11		11,13,14	13,15
$^1H^2HO$		g	11		4	4
		liq	16	4,16		4

REFERENCES

1. Beutler-1
2. Beutler-2
3. Herzberg-9
4. Calculated
5. Birge-12
6. Moore-1
7. Hylleraas-5
8. Johnston and Long-2
9. Woolley, Scott, and Brickwedde-1
10. Clusius and Bartholomé-3
11. Rossini, Knowlton, and Johnston-1
12. Libby-1
13. Long and Kemp-1
14. Kelley-24
15. Bartholomé and Clusius-1
16. Wahl and Urey-1

Table 3

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
He		g			1	1
He^{n+}		g	2,3			

REFERENCES

1. Calculated
2. Moore-1
3. Bacher and Goudsmit-1

Table 4

Ne		g			1	1
Ne^{n+}		g	2,3			

REFERENCES

1. Calculated
2. Moore-1
3. Paul and Polster-1

Table 5

A		g			1	1
$A \cdot 5H_2O$		c	2			
A^{n+}		g	3			

REFERENCES

1. Calculated
2. deForcrand-69
3. Moore-1

Table 6

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Kr		g			1	1
$Kr \cdot 5H_2O$		c	2			
Kr^{n+}		g	3,4,5,6			

REFERENCES

1. Calculated
2. de Forcrand-69
3. Boyce-1
4. de Bruin, Humphreys, and Meggers-1
5. Humphreys-3
6. Tate and Smith-2

Table 7

Xe		g			1,2	1
$Xe \cdot 6H_2O$		c	3			
Xe^{n+}		g	4,5,6,7			

REFERENCES

1. Calculated
2. Clusius and Riccoboni-1
3. de Forcrand-71
4. Tate and Smith-2
5. Humphreys and Meggers-1
6. Humphreys-1
7. Humphreys-2

Table 8

Rn		g			1	1
Rn^{n+}		g	2,3			

REFERENCES

1. Calculated
2. Rasmussen-1
3. Rasmussen-4

Table 9

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
F		g	1,2,6		3,4,5	3
F^{n+}		g	4			
F^-		g	3,7,8			
		aq	3,9,14		10	16,17,18
F_2		g			3	3
F_2O		g	11,15,19		12,13	
HF		g	19,20,21		3,5,25	3,5
		aq	9,17,20,22,23,24		10	16,17,18,19
HF_2^-		aq	3			
$(HF)_6$		g	26			

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3. Calculated
4. Moore-1
5. Murphy and Vance-1
6. Desai- 5
7. Dukel'skii and Ionov-1
8. Wu-2
9. Roth-2
10. Latimer, Pitzer, and Smith-1
11. von Wartenberg and Klinkott-1
12. Kelley-24
13. Potter-2
14. Elmore, Hatfield, Mason, and Jones-1
15. von Wartenberg-8
16. Thorvaldson and Bailey-1
17. Roth, Pahlke, Bertram, and Börger-1
18. Pranschke and Schwiete-1
19. Ruff and Menzel-1
20. von Wartenberg and Fitzner-1
21. von Wartenberg and Schütza-2
22. Petersen-7
23. Guntz-1
24. Roth-25
25. Herzberg-9
26. Long, Hildebrand, and Morrell-1

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Table 10

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Cl		g	1,2,3		4,5	4
Cl^{n+}		g	5			
Cl^-		g	6,7,8,9			
		aq	4			10,34
Cl_2		g			4,11,12	4,12,13
		aq	14,15,16,17			
	in CCl_4		18			
$Cl_2 \cdot 8H_2O$		c	19,20,54			
Cl_3		g	21			
ClO		g	22			
ClO^-		aq	4		4,23	
ClO_2		g	24,25,26		27	
		aq	24			
ClO_2^-		aq	4		4,28	
ClO_3		g	29			
ClO_3^-		aq	4		4	
ClO_4^-		aq	4		4	
Cl_2O		g	25,30,31,32	33	27	
		aq	30,31			
Cl_2O_7		g	34			
HCl		g	35,36,37,38		4,12,39,40,41	4,41
		aq	30,37,42,43,44,45,46,47,48,49,50,51,52			10,45,51,52
	in CCl_4		18			
	in C_2H_5OH		53			
HClO		aq	30,31			
$HClO_2$		aq	45			
$HClO_3$		aq	30			
$HClO_4$		liq	55			
		aq	55			
$HClO_4 \cdot H_2O$		c	55,56			
$HClO_4 \cdot 2H_2O$		liq	55			
ClF		g	57,58,59		60	60
ClF_3		g	59,61,62		62	62

Table 10 (Continued)

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13. Trautz and Ader-2
14. Thomsen-16
15. Baker-2
16. Berthelot-24
17. von Wartenberg and Werth-3
18. Noyes and Tuley-1
19. de Forcrand-39
20. Roozeboom-2,5
21. Bodenstein and Plaut-1
22. Finkelnburg and Schumacher-1
23. Latimer, Pitzer, and Smith-1
24. Booth and Bowen-1
25. Wallace and Goodeve-1
26. Mayer-4
27. Kelley-24
28. Smith, Pitzer, and Latimer-1
29. Goodeve and Marsh-3
30. Thomsen-16
31. Neumann and Muller-2,3
32. Gunther and Wekua-1
33. Yost and Felt-1
34. Goodeve and Marsh-1
35. Rossini-9
36. von Wartenberg and Hanisch-1
37. Roth and Richter-2
38. Bichowsky and Rossini-1
39. Giauque and Wiebe-1
40. Linnett-2
41. Gordon and Barnes-1
42. Vrevskii and Savaritskii-1
43. Berthelot and Louguinine-1
44. Becker and Roth-4
45. Pitzer-3
46. Roth and Bertram-2
47. Roth, Börger, and Siemonsen-1
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49. Slansky-1
50. Rossini-4
51. Thorvaldson, Brown, and Peaker-2
52. Sturtevant-7
53. Berthelot-15B
54. Harris-1
55. Berthelot-79,80
56. Arlman-1
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58. Wahrhaftig-1
59. Schmitz and Schumacher-4
60. Potter-2
61. Schmitz and Schumacher-3
62. Schäfer and Wicke-1

Table 11

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Br		g	1,2,3,4		5	5
Br^{n+}		g	6,7,8,9,10			
Br^-		g	11,12,13,14,15			
		aq	5	16	5	17
Br_2		g	18,19,20		5,21,22	5,22
		liq			5,23,38	
		aq	24,25,26,27			
	in CCl_4		26,28			
	in $CHCl_3$		26			
	in CS_2		26			
$Br_2 \cdot 10H_2O$		c	29,30			
Br_3^-		aq	31,32,33,34,35			
Br_5^-		aq	32			
BrO_3^-		aq	5		5	5
HBr		g	33,36,37,39		5,22	5,22
		aq	33,39,40,41,11		5	17
$HBrO_3$		aq	39		5	
BrCl		g	28,43		5,43	5
	in CCl_4		28			

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11. Bichowsky and Rossini-1
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13. Doty and Mayer-1
14. Glockler and Calvin-1
15. Beutler and Levi-1
16. Jones and Baeckstrom-1
17. Rossini-6
18. Smits and Cannegieter-1
19. Berthelot and Ogier-6
20. Lewis and Randall-7
21. Brown-1
22. Gordon and Barnes-2
23. Kelley-24
24. Berthelot-99
25. Thomsen-2
26. Pickering-9
27. Bray and Connolly-1
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Table 11 (Continued)

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31. Berthelot-104	
32. Linhart-1	
33. Roth, Börger, and Siemonsen-1	
34. von Wartenberg and Klinkott-1	
35. Hieber and Woerner-3	
36. Roth and Börger-2	
37. Roth-17	
38. Latimer and Hoenschel-1	
39. Thomsen-16	
40. Roth and Bertram-2	
41. Harned and Hamer-2	
42. Giauque and Wiebe-2,3	
43. Beeson and Yost-1	

Table 12
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
I		g	1,2,3,4,5,7		6,8,9	6
I^{n+}		g	10,11,12			
I^-		g	13,14,15,16,17			
		aq	6	20,21	6	6,18
I_2		g	7		6,7	6
		c			7,19	19
		aq	22,23			
	in C_6H_6		24,25			
	in C_2H_5OH		25			
	in $(C_2H_5)_2O$		24,25			
	in CCl_4		24			
	in $CHCl_3$		24,25			
	in CS_2		24,25			
I_3^-		aq	24,26,27,28	29		
IO^-		aq	6			
IO_3^-		aq	6		6	6
I_2O_5		c	30,31,32,33			
$3I_2O_5 \cdot H_2O$		c	30			
HI		g	31,34,35,36,37,38		6,37,41	6
		aq	4,31,39,40,42	20,21		18
HIO		aq	43,44			
HIO_3		c	30,31,32,33			
		aq	31,45			
HIO_6^{----}		aq	31			
$H_2IO_6^{---}$		aq	31			
$H_3IO_6^{--}$		aq	31			
$H_4IO_6^-$		aq	31			
H_5IO_6		c	31			
		aq	31			
$I_2O_5 \cdot HIO_3$		c	33			
ICl		g	46,47,48,49		6,47	6
	in CCl_4		50			
ICl_3		c	31,49,51	51		
IBr		g	52,53,54,55,56,57		6,46	6
	in CCl_4		50	58		

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14. Sutton and Mayer-1,2
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18. Rossini-6
19. Kelley-24
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21. Gerke-1
22. Hartley and Campbell-1
23. Sammet-1
24. Pickering-9
25. Waentig-1
26. Bertram and Roth-1
27. Shomate-5
28. Jones and Kaplan-1
29. Lewis and Randall-7
30. Moles and Vitoria-1
31. Thomsen-16
32. Ditte-4
33. Berthelot-46
34. Datta-2
35. Gunther and Wekua-1
36. Bodenstein-1
37. Murphy-1
38. Stegmuller-1
39. Roth-25
40. Roth, Börger, and Siemonsen-1
41. Giauque and Wiebe-3
42. Berthelot-17
43. Angelescu and Popescu-1
44. Skrabal-1
45. Skrabal and Buchta-1
46. Herzberg-9
47. McMorris and Yost-2
48. Brown and Gibson-1
49. Berthelot-63
50. Blair and Yost-1
51. Nies and Yost-1
52. McMorris and Yost-1
53. Badger and Yost-1
54. Brown-7
55. Bodenstein and Schmidt-1
56. Cordes and Sponer-1
57. Muller-17
58. Yost, Anderson, and Skoog-1

Table 14
SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
S		g	24		23,3	23,3
		liq	12,10,13,14,15,8,1, 11			
		c	6,7,8,9,10,11,4,12		4	4
	in CS_2		5,16,17			
S^{n+}		g	23			
S^{--}		g	25			
		aq	3	26		
S_2		g	20,31,21,64,65,66		1,2	2,3
S_2^{--}		aq	27,3			
S_3^{--}		aq	27,3			
S_4^{--}		aq	27,3			
S_6		g	20,21			
S_8		g	11,18,19,21,22			
SO		g	28,29		28	
SO_2		g	30,31		32,36	32,36
		aq	33,34,35,37,31			
$SO_2 \cdot 7H_2O$		c	38,39			
SO_3		g	44,42,43,41,40,47		44	44
		c	48,42,43,49,50			
		liq	45,46,40			
SO_3^{--}		aq	45,51,52,3,34	20		
SO_4^{--}		aq	45,81,41,82,83,84, 85,86,87,92	90,91	89	88
$S_2O_3^{--}$		aq	3,45,55	3		
$S_2O_4^{--}$		aq	53,3	54		
$S_2O_5^{--}$		aq	31,56,77			
$S_2O_6^{--}$		aq	45,3			
S_2O_7		c	58			
$S_2O_8^{--}$		aq	59,60			
$S_3O_6^{--}$		aq	55,3			
$S_4O_6^{--}$		aq	45,55,3,57	54		
$S_5O_6^{--}$		aq	55,3			
HS^-		aq	67	26		
H_2S		g	67,31		1,69,70,71	1
		aq	67,45	54		
$H_2S \cdot 6H_2O$		c	68,72,73,74,75			
H_2S_2		liq	3			
H_2S_5		liq	76			
HSO_3^-		aq	45,51,78,52,35	35		
HSO_4^-		aq	79	80		
H_2SO_3		aq	33,34,35,37,31	35		

Table 14 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
H_2SO_4		liq	82,83			95
		aq	45,81,41,82,83,84, 85,86,87,92	90,91	89	88
	in $C_2H_5OC_2H_5$		93			
$H_2SO_4 \cdot H_2O$		liq	94			
$H_2S_2O_4$		aq	3			
$H_2S_2O_6$		aq	45,3			
$H_2S_2O_7$		liq	45,96,97			
$H_2S_2O_8$		aq	98			
$H_2S_4O_6$		aq	3			
SF_6		g	99		100,101,3	
SCl_4		liq	102,103			
S_2Cl_2		liq	45,61,103,14			103
S_2Cl_4		liq	103,14			
$SOCl_2$		liq	62,103			62
SO_2Cl_2		liq	45,62			62
$S_2O_5Cl_2$		liq	62			62
HSO_3Cl		liq	103			
S_2Br_2		liq	63			

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13. Person-1
14. Trautz-6
15. Iitaka-1
16. Berthelot-1
17. Berthelot-134
18. Taillade-1
19. Fouretier-1
20. Kelley-22
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22. Awbery-3
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SPECIFIC REFERENCES

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53. Berthelot-40
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58. Giran-6
59. Berthelot-62
60. Berthelot-109
61. Batalin and Shcherbakov-1
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78. Lindner-1
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B3. Brönsted-8
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B7. Harned and Hamer-3
BB. Craig and Vinal-1
89. Latimer, Pitzer, and Smith-1
90. Smith and Mayer-1
91. Harned and Owen-1
92. Becker and Roth-6
93. Hantzsch-1
94. Berthelot-10
95. Pickering-5
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97. Auerbach-1
9B. Berthelot-62,109
99. Yost and Claussen-1
100. Yost-1
101. Eucken and Schröder-1
102. Trautz-9
103. Ogier-6

Table 15

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Se		g	4,2,23,24,25		1	1
		c			7	7
		gls	5,1			7
		amorp	5,1			7
Se^{n+}		g	3			
Se^{--}		aq	13,1	15		
Se_2		g	1,2,4,5,6,8,7,23, 24,25		1	1
SeO		g	9			
SeO_2		c	10,11			
		aq	10			
SeO_3^{--}		aq	10,1	15		
SeO_4^{--}		aq	10,1	15		
HSe^-		aq	13,1	15		
H_2Se		g	13		19	
		aq	20,13	20		
$HSeO_3^-$		aq	10,1	15		
$HSeO_4^-$		aq	10,1	15		
H_2SeO_3		c	11,12			
		aq	10,11	15		
H_2SeO_4		c	14			
		aq	10,13,1			
$H_2SeO_4 \cdot H_2O$		c	14			
SeF_6		g	16		17,1	17,1
$SeCl_2$		g	21			
$SeCl_4$		c	10			
Se_2Cl_2		liq	10,18			
$Se(OH)_3ClO_4$		c	22			
$SeO_2 \cdot SO_3$		c	14			

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10. Thomsen-16
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13. Fabre-1
14. Metzner-1,2
15. Latimer-1
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17. Yost-1
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19. Kelley-24
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Table 15 (Continued)

SPECIFIC REFERENCES

REFERENCES

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Table 16

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Te		g	17,1		1	1
		c			2,16	2,16
		amorp	28			
Te^{n+}		g	4,5,6,7,8,9,10,11, 12			
Te_2		g	13,29,30,31,1		3,1	3,1
TeO		g	14,15			
TeO_2		c	18,21	18		18,19
TeO_3^{--}		aq	21,1			
TeO_4^{--}		aq	23,1,21			
H_2Te		g	22		1	
H_2TeO_3		c	21	20		
		aq	21			
H_2TeO_4		aq	21,22			
$H_2TeO_4 \cdot 2H_2O$		c	23		26	
TeF_6		g	25		27,1	
$TeCl_4$		c	21			
$TeBr_4$		c	24			
$(TeO_2)_2SO_3$		c	23			

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10. Rao-6
11. Bacher and Goudsmit-1
12. Kruger and Shoupp-1
13. Kelley-18
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16. Anderson-16
17. Kondrat'ev and Lauris-1
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19. Gehlen and Gehlen-Keller-1
20. Kasarnowsky-3
21. Thomsen-16
22. Berthelot and Fabre-1
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27. Yost-1
28. Damiens-1
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30. Doolan and Partington-1
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Table 17

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Po		c				
Po^{++}		aq		1,2		
PoO_2		c		1,2		

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Table 18
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
N		g	1,2,3,4,5,6		7,8	7
N^{n+}		g	9,10,11,12			
N_2		g			13,14,15	13,14,16
N_2^{n+}		g	4,5,17,18,19,20			
N_3^-		aq	7			
NO		g	1,4,5,13,21		13,22,23,24	13,22,23,24
NO_2		g	25,26,27,28		27	28
NO_2^-		aq	7			
NO_3		g	29			
NO_3^-		aq	7		7,30	
N_2O		g	31,32,33,34,35		36,37,38	36
$N_2O_2^{--}$		aq	7,39,40		7,40	
N_2O_3		g	41,42			
N_2O_4		g	26,27,28,43,44		27	27,28
N_2O_5		g	45			
		c	45,46,47			
NH		g	5,48,49			
NH_3		g	1,50		51,52,53, 54,55	51,55,56, 57
		aq	1,58	59		
NH_4^+		g	60,71			
		aq	32,50,61,62	63,64		
N_2H_4		liq	65,66			
		aq	66,67,68,69,70			
$N_2H_4 \cdot H_2O$		liq	65,70			
$N_2H_4H^+$		aq	7			
$N_2H_4H_2^{++}$		aq	7			
HN_3		g	72		73	73
		aq	72,74			
NH_4N_3		c	75			
		aq	74,75			
HNO_2		aq	1,76,32			
HNO_3		g			77	
		liq	77		77	77
		aq	77,32,78,79,80	59	7,81,30	
$HNO_3 \cdot nH_2O$		liq	77		77	77
NH_2OH		c	83			
		aq	32,82			
$NH_2OH \cdot H^+$		aq	7			
NH_4OH		aq	7,1,58			
$HN_2O_2^-$		aq	40	40		

Table 18 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$H_2N_2O_2$		aq	40		64	
NH_4NO_2		c	32,84			
		aq	85			
NH_4NO_3		c	50			86
		aq	1,32,50			
$NH_4NO_3 \cdot 1\ 1/2NH_3$		liq	87			
$NH_2OH \cdot HNO_3$		c	88			
		aq	32,88			
$N_2H_4 \cdot nHNO_3$		aq	74			
NF_3		g	89			
NH_4F		c	90			
		aq	7,90			
NCl_3	in CCl_4		91,92			
NOCl		g	1,93,94		93,95	
NH_4Cl		c	1,96		99	99
		aq	1,97,32,98			
$NH_4Cl \cdot nNH_3$		liq	100			
$N_2H_4 \cdot nHCl$		c	74,103			
		aq	74,101,102			
$NH_2OH \cdot HCl$		c	82			
		aq	82,104			
NH_4ClO_4		c	105			
		aq	7,105			
NOBr		g	106,107	107		
NH_4Br		c	32,108			
		aq	7			
$NH_4Br \cdot nNH_3$		liq	109,110			
NH_4I		c	32,111			
		aq	7			
$NH_4I \cdot nNH_3$		liq	109			
N_4S_4		c	112			
NH_4HS		c	113			
		aq	32,114			
NH_4S_4		c	115			
		aq	115			
$(NH_4)_2S$		aq	32,114			
$(NH_4)_2S_5$		c	115			
		aq	115			
NH_4HSO_3		c	116,117			
		aq	7,116,117			

Table 1B (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
NH_4HSO_4		c	32			119
		aq	32,11B			
$NH_2OH \cdot H_2SO_4$		c	32			
		aq	104			
$N_2H_4 \cdot H_2SO_4$		c	75,66,67			
		aq	74,75,122			
$(NH_4)_2SO_3$		c	116,117			
		aq	116,117			
$(NH_4)_2SO_3 \cdot H_2O$		c	117,121			
$(NH_4)_2SO_4$		c	32,62		119	99,119,125
		aq	32,62,123			
$(NH_2OH)_2 \cdot H_2SO_4$		c	82			
		aq	32,B2			
$(NH_4)_2S_2O_5$		aq	7			
$(NH_4)_2S_2O_8$		c	126			
		aq	7			
$(N_2H_4)_2H_2SO_4$		aq	74			
N_4Se_4		c	127			
NH_4HSe		aq	124			
$(NH_4)_2Se$		aq	7			

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26. Thomsen-14
27. Giauque and Kemp-1
28. Kelley-27
29. Schumacker and Sprenger-2
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43. Wourtzel-1
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62. Roth and Zeumer-1
63. Stephenson-1
64. Latimer-1
65. Hughes, Corruccini, and Gilbert-1
66. Roth-17
67. Berthelot-110
68. Jirsa-4
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110. Roozeboom-7
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122. Gilbert and Bushnell-1
123. Bouzat-1
124. Fabre-1
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126. Berthelot-109
127. Berthelot and Vieille-5

Table 19
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
P		g	3,5,7		6	6
		c	1,2,4		9,6,12	8
P^{n+}		g	10			
P_2		g	7,11		3,6	3,6
P_4		g	12,13,14,15,16		7	7,6
		liq	8,17,18,19,20			8
PO		g	3			
PO_3^-		aq	21,4,6			
PO_4^{---}		aq	22	22,23		
$P_2O_7^{----}$		aq	4,6,21			
P_4O_{10}		c	24,4			
		amorp	4			
PH_3		g	7,25,26,27		7,28,29,30 31	
$PH_3 \cdot 6H_2O$		c	32,52			
P_2H		c	25			
HPO_3		c	33,4			
		aq	33,4			
HPO_3^{--}		aq	21,6			
HPO_4^{--}		aq	34,22	34,35,36		
$H_2PO_3^-$		aq	21,6			
$H_2PO_4^-$		aq	35,22	35	37	
H_3PO_2		c	21			
		liq	21			
		aq	21			
H_3PO_3		c	21			
		liq	21			
		aq	21			
H_3PO_4		c	21			
		aq	21,4,33,38,39,22			
$H_3PO_4 \cdot 1/2H_2O$		c	39			
		liq	39			
$HP_2O_7^{---}$		aq	4,6			
$H_2P_2O_7^{--}$		aq	21,6,4			
$H_3P_2O_7^-$		aq	21,6,4			
$H_4P_2O_5$		aq	66			
$H_4P_2O_7$		c	4			
		aq	4			
$H_4P_2O_7 \cdot 1\ 1/2H_2O$		c	65			
		liq	65			
PF_3		g			7,31,40	

Table 19 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
PCl_3		liq	21,45			
		g	41		7,31,40	
PCl_5		c	21			
		g	7		7	
$POCl_3$		liq	21,42			
		g	43		7	
PH_4Cl		g	1,3,4			
PBr_3		g	46		7	
		liq	42			
	in CS_2		2			
PBr_5		c	47			
$POBr_3$		c	48,47			
PH_4Br		c	25,49			
PI_3		c	42,47			
P_2I_4		c	47			
PH_4I		c	25,50			51
$PSCl_3$		g			7	
PN		g	54,55		53	53
1/n(PN)n		c	56			
P_3N_5		c	58			57
$NH_4H_2PO_4$		c	62,61,59		63	63
		aq	59,60,61,62			
$(NH_4)_2HPO_4$		c	59,62,64			64
		aq	62,59			
$(NH_4)_3PO_4$		c	59			
		aq	59			
$(NH_4)_3PO_4 \cdot 3H_2O$		c	59			

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Table 20
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
As		g	10,2,17		2	2
		c	19,21		16	16
		amorp	19,20			
As^{n+}		g	11,12,13,14,15			
As_2		g	1,2		3	4,2
As_4		g	1,6,7,8,9,5		5	
AsO		g	18,4,2			
AsO^+		aq		22		
AsO_2^-		aq		22		
AsO_4^{---}		aq	23,2,24	23		
As_2O_5		c	24		3,16	
		aq	24			
$As_2O_5 \cdot 4H_2O$		c	23			
$3As_2O_5 \cdot 5H_2O$		c	23			
As_4O_6		c	32,24,26	26	3,16	
		aq	24,25			
$As_2O_3 \cdot As_2O_5$		c	27,28			
AsH_3		g	29			
$AsH_3 \cdot 6H_2O$		c	30			
$HAsO_2$		aq	24,25	26		
$HAsO_3^{--}$		aq	24			
$HAsO_4^{--}$		aq	23,24	22		
$H_2AsO_3^-$		aq	24			
$H_2AsO_4^-$		aq	23,24	31		
H_3AsO_3		aq	24,25			
H_3AsO_4		c	24			
		aq	24	22		
AsF_3		g	33		33,39	
		liq	34		33	33
$AsCl_2$		g	35		38,39	
$AsCl_3$		g	24			
		liq	5,36,37	5,36,37		
$AsBr_3$		c	40			
AsI_3		c	40,41			
As_2S_2		g	43,44			
		c	27,42			
As_2S_3		c	27,42,44			
$As_2O_3 \cdot SO_3$		c	27,44			
AsN		g	4,45			4,2
$NH_4H_2AsO_4$		c	23		46	
		aq	23			

Table 20 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$(NH_4)_2HAsO_4$		c	23			
		aq	23			
$(NH_4)_3AsO_4$		c	23			
		aq	23			
$(NH_4)_3AsO_4 \cdot 3H_2O$		c	23			

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Table 21
SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Sb		g	1,3		1,2	1
		c	5		4	4
Sb^{n+}		g	6,7			
Sb_2		g	8		1,2	1,2
Sb_4		g	9,10			
SbO		g	3,12			
SbO^+		aq		13		
Sb_2O_3		aq	15			
Sb_2O_4		c	14,19		4	4
Sb_2O_5		c	14		4	4
		aq	15			
Sb_4O_6		c	16,17,14	11	4	4
Sb_6O_{13}		c	19			
H_3SbO_4		aq	15			
SbF		g	3,12			
SbF_3		c	16,18			
		aq	16,17,18			
H_3SbF_6		aq	16,18			
SbCl		g	3,12			
$SbCl_3$		g	1		2,1	2,1
		c	14		1	
$SbCl_5$		g	20			
		liq	14			
SbOCl		c	16,30			
$Sb_4O_5Cl_2$		c	14,16,30			
$SbBr_3$		c	5,16,18,22			
	in CS_2		5			
SbI_3		c	24			
		aq	25			
SbS_3^{---}		aq	27,1			
Sb_2S_3		c	27,28,29			
		amorp	26			
$Sb_2(SO_4)_3$		c	23			
SbN		g	3,12			
$SbF_3 \cdot nNH_3$		c	21			

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Table 22

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Bi		g	1,2,7,8		6	6
		c			5	5
Bi^{n+}		g	10,11,12,13,14,15			
Bi_2		g	1,2,3,4,6,7,8		4,6,9	4,6,9
BiO		g	3			
		c	19			
BiO^+		aq		21		
Bi_2O_3		c	16,1B		5	5
BiH		g	3			
$Bi(OH)_3$		c	16			
BiF		g	3			
BiCl		g	3		20	
$BiCl_3$		g	B,6		22,6	22,6
		c	16		B,6	
		aq	19			
BiOCl		c	16,17	17		
BiBr		g	3		20	
BiI		g	3		20	
Bi_2S_3		c	23,24,25,26	23,24,25,26		
$Bi_2(SO_4)_3$		c	27			

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Table 23

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
C		g	4,2,7,8		1,5	1,5
		c	3,6,4		3,39,40,41	3,39,40,41
C^{n+}		g	1			
CO		g	9,10,11,12,13,14,4		3,5,42	3,5
CO^+		g	15,16,17,18,19			
CO_2		g	12,6,20,21		3,5,43	3,5
		aq	25,26,27,28,66	25		
$CO_2 \cdot 6H_2O$		c	22,23			
CO_2^+		g	24			
CO_3^{--}		aq	69,63	69		
CH		g	15			
CH_3		g	29,31,32,33,34,35			
CH_4		g	9,13,14,30		30,44,45,46	30
$CH_4 \cdot 6H_2O$		c	22			
$HCOO^-$	formate ion	aq	60,62,26,27,5	60		
HCO_3^-	bicarbonate ion	aq	63,5,64,65,66,67,68			
CH_2O	formaldehyde	g	70,71		72	72
		aq	73			
	in CH_3OH		73			
CH_2O_2	formic acid	g	26,36,49,51,52		47,49	
		liq	49,47,51,52,53,54,55,56		48,49	47,50
		aq	57,58,26,59	61		
H_2CO_3	carbonic acid	aq	66,25,26,27,28			
CH_3OH	methanol	g	74,75,76,77,4		89,5,90,91	
		liq	77,78,4,5		48,79,80	48,79,80
		aq	82,83,84	81		
CF_4	tetrafluoromethane	g	85,92,93		86,87	
CH_3F	fluoromethane	g			94	94
CH_2F_2	difluoromethane	g				94
CHF_3	trifluoromethane	g				94
CCl_4	tetrachloromethane	g	26,97,96		98,99,88,101,102	103
		liq	104,105,106,107,4			98
$COCl_2$	carbonyl chloride	g	26,111,112,113,114,115,116		108,110	110
CH_3Cl	chloromethane	g	26,117		109,102	103
$CH_3Cl \cdot 9H_2O$		c	118			
CH_2Cl_2	dichloromethane	g	123,4,5		102	103,121
		liq	119,5		122,123,4,5	120

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$CHCl_3$	trichloromethane	g	26,124,97		102	103
		liq	95,123,5,4		123,5,4	125
CF_3Cl	trifluorochloromethane	g				126
CF_2Cl_2	difluorodichloro-methane	g				126
$CFCl_3$	fluorotrichloromethane	g			127	126,128
		liq				127,128
CH_2FCl	fluorochloromethane	g				128,121
CHF_2Cl	difluorochloromethane	g				129,128
$CHFCl_2$	fluorodichloromethane	g				128,129
CBr_4	tetrabromomethane	g	5		102	102
		c				130
$COBr_2$	carbonyl bromide	g	8			
		liq	133			
CH_3Br	bromomethane	g	26,134		102,131	102
CH_2Br_2	dibromomethane	g	5		94,102	94,102
$CHBr_3$	tribromomethane	g	5		102	102
		liq	95		5	
CF_3Br	trifluorobromomethane	g				135,5
CF_2Br_2	difluorodibromo-methane	g				135,5
$CFBr_3$	fluorotribromomethane	g				135,5
CH_2FBr	fluorobromomethane	g				135,5
CHF_2Br	difluorobromomethane	g				135,5
$CHFBr_2$	fluorodibromomethane	g				121
CCl_3Br	trichlorobromomethane	g				121
CCl_2Br_2	dichlorodibromomethane	g				121
$CClBr_3$	chlorotribromomethane	g				121
CH_2ClBr	chlorobromomethane	g				135,5
$CHCl_2Br$	dichlorobromomethane	g				121
$CHClBr_2$	chlorodibromomethane	g				121
$CHFClBr$	fluorochlorobromo-methane	g				135,5
CH_3I	iodomethane	g	26		94	94
		liq	136,5		5	
CH_2I_2	diiodomethane	g				121
		liq	136			
CHI_3	triiodomethane	c	136			
CS		g			15,5	15,5
$1/n(CS)n$		c	137			
CS_2	carbon disulfide	g	26,140,141	140,141	138,141	141
		liq	97,139,5,4		138	138

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
COS	carbon oxysulfide	g	140,141,26,111,4	140,141	141,142	141
CH_4S	methanethiol	g	26		5,143,144	5,143,144
$CSCl_2$	carbon sulfochloride	g			110	110
CSe_2	carbon diselenide	liq	145			
CN		g			15,5,146	15,5
CN^-	cyanide ion	aq	172,26,173,149	168,170		
CN_4	cyanogen azide	c	147			
$1/n(CN_4)n$		c	147			
CNO^-	cyanate ion	aq	161,164,5,169	165,166,167, 168,169		
$C(NO_2)_4$	tetranitromethane	liq	148			
HCN	hydrogen cyanide	g	26,150,151		151,152,153	5,151,152, 153
		liq	149,5,4,152		152,87	152
	hydrocyanic acid	aq	149,171	168,170		
CH_5N	methyl amine	g	26,154		159,160	158,160
		aq	155,156,157			
CH_6N^+	methyl ammonium ion	aq	156			
CH_2N_2	cyanamide	c	161,162			
		aq	161,162			
NH_4CN	ammonium cyanide	c	149			
		aq	149			
CH_5N_3	guanidine	c	174			
		aq	174			
$CH_6N_3^+$	guanidine ion	aq	174,5			
HCNO	cyanic acid	aq	149,161	168		
$CH_2O_2N^-$	nitromethane ion	aq	177,182			
CH_3ON	formamide	liq	176			
		aq	175			
CH_3O_2N	nitromethane	liq	26,177,123,178, 180,181		178,179	178
		aq	177			
CH_5O_2N	ammonium formate	c	183			
		aq	63,183,5			
NH_4HCO_3	ammonium bicarbonate	c	184			
		aq	5,184,185	5		
CH_4ON_2	urea	c	186,187,4		186,188	186,188
		aq	26,174,189,163, 190,191,192,194	193		
NH_4CNO	ammonium cyanate	c	163			
		aq	163			
$CH_6O_2N_2$	ammonium carbamate	c	196,197,198	198		
		aq	195,196			

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$(NH_4)_2CO_3$	ammonium carbonate	aq	63,5,26,185	63,5		
CHO_6N_3	trinitromethane	liq	180			
$CH_5O_4N_3$	urea nitrate	c	26,174			
$CH_2O_2N_4$	nitroguanidine	c	100			
$CH_6O_3N_4$	guanidine nitrate	c	174			
		aq	174			
CNCl	cyanogen chloride	g	149		199,5	199,5
CH_6NCl	methylamine hydrochloride	c			156	156
		aq	156,201,202			
CH_6ON_3Cl	semicarbazide hydrochloride	c				203
CN8r	cyanogen bromide	g			199,5	199,5
CNI	cyanogen iodide	g	5		199,5	199,5
		c	149		5	
		aq	149	204		
CNS^-	thiocyanate ion	aq	205,5			
HCNS	thiocyanic acid	aq	205			
CH_4N_2S	thiourea	c	206,174			
		aq	174			
NH_4CNS	ammonium thiocyanate	c	174			
		aq	205			
$CH_5O_3N_3S$	thiourea nitrate	c	174			
CP		g			15,5	15,5
C_2		g	2,207,208,209,210,211,212,213,214			
$C_2O_4^{--}$	oxalate ion	aq	5	5		
C_2H_2	ethyne (acetylene)	g	218,4	218	218,221	218,221
		aq	215,216			
$C_2H_2 \cdot 6H_2O$		c	217			
C_2H_4	ethene (ethylene)	g	218,225,4,226	218	218,222,219,223	218,222,223
$C_2H_4 \cdot 6H_2O$		c	217			
C_2H_6	ethane	g	218,227,4	218	218,224,220,223	218,224,223
$HC_2O_4^-$	bioxalate ion	aq	5			
C_2H_2O	ketene	g	229			
$C_2H_2O_2$	glyoxal	c	230			
		aq	230			
$C_2H_2O_4$	oxalic acid	c	231,4,232,233		234	235,236
		aq	26,57,238			
	in CH_3OH		237			
	in C_2H_5OH		237			
	in C_3H_7OH		237			

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔGf°	S°	C_p°
Formula	Description	State				
$C_2H_2O_4 \cdot 2H_2O$	oxalic acid dihydrate	c	233, 237, 26, 238, 239, 240, 241			
$C_2H_3O_2^-$	acetate ion	aq	242, 243			
$C_2H_3O_3^-$	glycollate ion	aq	244, 5			
C_2H_4O	acetaldehyde	g	245, 26, 4		246	
		aq	247			
C_2H_4O	ethylene oxide	g	248, 26, 249, 253		250, 251	252
$C_2H_4O_2$	acetic acid	liq	254, 255, 256		234	257
		aq	26, 258, 259, 260, 261, 262, 263, 264, 265			
	in H_2SO_4		266			
	in CH_3COCH_3		266			
	in $C_2H_5OC_2H_5$		266			
	in C_5H_{12}		266			
	in C_6H_6		266			
$C_2H_4O_2$	methyl formate	g	26, 267			
		liq	268, 5			269
		aq	267			
$C_2H_4O_3$	hydroxyacetic acid (glycollic acid)	c	270			
		aq	244			
$C_2H_4O_4$	dihydroxyacetic acid (glyoxylic acid)	c	271			
		aq	272			
$C_2H_4O_4$	formic acid dimer	g	26, 36, 49, 51, 52		49, 48, 47	
C_2H_6O	ethanol	g	4, 75, 77		281, 5	
		liq	5, 77		279, 280	279, 280
		aq	265, 83, 273, 274, 275, 276			
	in H_2SO_4		266			
	in C_6H_6		277			
C_2H_6O	dimethyl ether	g	26, 278		282	283
		aq	278			
$C_2H_6O_2$	1,2-ethanediol (ethylene glycol)	liq	284, 285, 253, 288		280	
		aq	286			
$C_2H_6O_2$	ethyl hydrogen peroxide	liq	287			
C_2F_6	hexafluoroethane	g	290			
$C_2H_3F_3$	1,1,1-trifluoroethane	g			291	
$C_2H_3O_2F$	fluoroacetic acid	c	292			
C_2H_5OF	2-fluoroethanol	liq	292, 293			
$C_2H_2O_2F_2$	difluoroacetic acid	liq	292			
$C_2H_4OF_2$	2,2-difluoroethanol	liq	292, 293			
C_2Cl_4	tetrachloroethene	liq	26			294
C_2Cl_6	hexachloroethane	c	97, 5			236

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$C_2O_2Cl_3^-$	trichloroacetate ion	aq	5,26,295			
C_2OCl_4	trichloroacetyl chloride	liq	296			
C_2H_3Cl	chloroethene	g	5,26			
C_2H_5Cl	chloroethane	g	26,97		250,297	236
$C_2H_2Cl_2$	cis-1,2-dichloroethene	liq				269
$C_2H_2Cl_2$	trans-1,2-dichloro-ethene	liq				269
$C_2H_4Cl_2$	1,1-dichloroethane	liq	26,5,267			
$C_2H_4Cl_2$	1,2-dichloroethane	liq	95,299,26		298	298
C_2HCl_3	trichloroethene	liq				294
$C_2H_3Cl_3$	1,1,1-trichloroethane	liq			300	300
$C_2H_2Cl_4$	1,1,2,2-tetrachloro-ethane	liq				294
C_2HCl_5	pentachloroethane	liq				294
$C_2H_2O_2Cl^-$	chloroacetate ion	aq	265,295			
C_2H_3OCl	acetylchloride	liq	259,296,301			236
C_2H_3OCl	chloroacetaldehyde	liq	296			
$C_2H_3O_2Cl$	chloroacetic acid	c	254,302,303,305			303
		aq	295,303			
C_2H_5OCl	2-chloroethanol	liq	304,306			
C_2H_7OCl	dimethyl ether hydro-chloride	g	307,308,309	307,308,309		
$C_2HO_2Cl_2$	dichloroacetate ion	aq	26,5			
$C_2H_2OCl_2$	chloroacetyl chloride	liq	296			
$C_2H_2O_2Cl_2$	dichloroacetic acid	liq	254			303,295
		aq	303,295			
C_2HOCl_3	trichloroacetaldehyde (chloral)	liq	310,311			310
		aq	310,311			
$C_2HO_2Cl_3$	trichloroacetic acid	c	254,305			303
		aq	295,303,266			
	in C_2H_5OH		266			
	in CH_3COCH_3		266			
	in $C_2H_5OC_2H_5$		266			
	in C_5H_{12}		266			
$C_2H_3O_2Cl_3$	trichloroacetaldehyde monohydrate	c	310,311,312,313			310
		aq	5			
	in $CHCl_3$		312			
$C_2F_3Cl_3$	1,1,2-trifluoro-1,2,2-trichloroethane	liq				5
C_2H_5Br	bromoethane	g	26,314			5
		liq	5			236
$C_2H_4Br_2$	1,2-dibromoethane	liq	95,299,304,316		315	315

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔGf°	S°	C_p°
Formula	Description	State				
C_2H_3OBr	acetyl bromide	liq	259			
$C_2H_3O_2Br_3$	tribromoacetaldehyde monohydrate	c	316			
		aq	316			
C_2H_4ClBr	1-chloro-2-bromoethane	liq				317
C_2I_4	tetraiodoethene	c	136			
C_2H_5I	iodoethane	liq	26,136			236
$C_2H_4I_2$	1,2-diiodoethane	c	136,318,319			
C_2H_3OI	acetyl iodide	liq	259			
C_2H_4BrI	1-bromo-2-iodoethane	c	314			
C_2H_6S	ethanethiol	liq	26,289			
C_2H_6S	dimethyl sulfide	g	26		320,321	
		liq	321		321	321
C_2H_6OS	dimethyl sulfoxide	liq	322			
$C_2H_6O_2S$	dimethyl sulfone	c	322			
$C_2H_6O_4S$	ethylsulfuric acid	aq	83			
C_2N_2	cyanogen	g	200,323,26,324,325		326	327,199,72
C_2H_3N	acetonitrile	g	26,161		72,328	72,328
		liq	5		5	
C_2H_3N	methyl isocyanide	g	5		328	328
		liq	329,330			
C_2H_7N	ethylamine	g	26,162,331			332
		aq	331,333,334			
C_2H_7N	dimethylamine	g	26,154,338		335	332
		aq	336			
$C_2H_8N^+$	ethylammonium ion	aq	5			
$C_2H_8N^+$	dimethylammonium ion	aq	5			
$C_2H_8N_2$	1,2-ethanediamine (ethylenediamine)	liq	339,340			
		aq	340			
$C_2H_8N_2 \cdot H_2O$	1,2-ethanediamine monohydrate	c	340			
$C_2H_4N_4$	dicyandiamide	c	161,341			236
		aq	161			
$C_2H_2O_3N^-$	oxamate ion	aq	174,5			
C_2H_3ON	methyl isocyanate	liq	342			
C_2H_3ON	glycollonitrile	liq	343			
$C_2H_3O_3N$	oxamic acid	c	174,344			
		aq	174			
$C_2H_4O_2N^-$	aminoacetate ion	aq	345,5,295			
$C_2H_4O_2N^-$	nitroethane ion	aq	271,182			
C_2H_5ON	acetamide	c	176,175,346			348
		aq	175,176,346,191			
	in C_2H_5OH		191			

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔH_f°	ΔF_f°	S°	C_p°
Formula	Description	State				
C_2H_5ON	acetaldehyde oxime	c	349			
$C_2H_5O_2N$	aminoacetic acid (glycine)	c	350,351,352		188	188
		aq	295,353,345,354, 355,356			
$C_2H_5O_2N$	nitroethane	liq	271,26,5			271
		aq	5,182			
$C_2H_5O_2N$	ethyl nitrite	g	26			
$C_2H_5O_3N$	ethyl nitrate	liq	26,5			
$C_2H_7O_2N$	ammoniumacetate	c	348			
		aq	26,358,359,360,175			
$C_2H_7O_3N$	methylammonium bicarbonate	aq	361			
$C_2H_7O_3N$	ammonium glycollate	c	244			
		aq	244			
$C_2H_5O_4N$	ammonium bioxalate	c				235
		aq	348			
$C_2H_6O_2N^+$	glycinium ion	aq	354			
$C_2H_7O_4N$	ammonium glyoxylate	aq	174			
$C_2H_4O_2N_2$	glyoxime	c	362			
$C_2H_4O_2N_2$	oxamide	c	344			
$C_2H_4O_2N_2$	formylurea	c	174			
		aq	174			
$C_2H_4O_6N_2$	glycol dinitrate	liq	363			
$C_2H_6ON_2$	dimethylnitrosamine	liq	181			
$C_2H_6O_2N_2$	ethylnitramine	liq	364,365			
$C_2H_8O_4N_2$	ammonium oxalate	c	348,5			235,366
		aq	348,233			
$C_2H_8O_4N_2 \cdot H_2O$	ammonium oxalate monohydrate	c	348,233			
$C_2H_7O_4N_5$	guanylurea nitrate	c	341			
$C_2H_5F_2N$	2,2-difluoroethylamine	liq	292,293			
C_2H_4OFN	fluoroacetamide	c	292,293			
$C_2H_3OF_2N$	difluoroacetamide	c	292,293			
$C_2H_4O_2F_2N_2$	2,2-difluoroethyl-nitramine	liq	292,293			
C_2H_8ClN	ethylamine hydro-chloride	aq	331,26			
C_2H_8ClN	dimethylamine hydrochloride	aq	26,201,202			
$C_2H_{10}Cl_2N_2$	1,2-ethanediamine dihydrochloride	c	339,340			
		aq	367,368,369,370, 371,340,339			
C_2H_4OClN	chloroacetamide	c	357,254,364			
		aq	175			

Table 23 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$C_2H_6O_2ClN$	glycine hydrochloride	aq	5			
$C_2H_6O_2ClN$	ammonium chloroacetate	aq	357,5			
$C_2H_3OCl_2N$	dichloroacetamide	aq	175			
$C_2H_2OCl_3N$	trichloroacetamide	c	364,365,254			
		aq	175			
$C_2H_4O_2Cl_3N$	ammonium trichloro-acetate	aq	357,5			
C_2H_3SN	methyl thiocyanate	liq	26,5,372			
C_2H_3SN	methyl isothiocyanate	c	26,5,372			
$C_2H_7O_3SN$	2-aminoethylsulfonic acid (taurine)	c	97		373	373
		aq	355			

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93. Ruff and Bretschneider-2
94. Edgell and Glockler-1
95. Kablukov and Perelman-1
96. Bodenstein, Gunther, and Hoffmeister-1
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98. Hicks, Hooley, Stephenson-1
99. Lord, Jr., and Blanchard-1
100. Stull-1
101. Yost and Blair-1
102. Stevenson and Beach-1
103. Vold-1
104. Pitzer-8
105. Kolosovskiĭ and Mezhenin-1
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107. Kolosovskiĭ and Alimov-1
108. Giauque and Jones-1
109. Messerly and Aston-1
110. Thompson-6
111. Berthelot-51
112. Bodenstein and Plaut-1
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114. Atkinson, Heycock, and Pope-1
115. Christiansen-1
116. Weigert-2
117. Berthelot-70
118. Villard and de Forcrand-1
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121. Glockler and Edgell-3
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131. Egan and Kemp-2
132. Trautz-8
133. Schumacher and Lenher-1
134. 8erthelot-118
135. Glockler and Edgell-2
136. 8erthelot-123
137. Dewar-2
138. 8rown and Manov-1
139. 8erthelot-73
140. Terres and Wesemann-1
141. Cross-2
142. Kemp and Giauque-1
143. Barrow and Pitzer-1
144. Russell, Osborne, and Yost-1
145. Merten and Schlüter-1
146. Zeise-1
147. Darzens-1
148. Roth and Isecke-1
149. Berthelot-25
150. 8erthelot-76
151. Gordon-5
152. Giauque and Ruehrwein-1
153. Badger and Woo-2
154. Muller-4
155. Felsing and Wohlford-1
156. Aston and Ziemer-1
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158. Felsing and Jessen-1
159. Aston, Siller, and Messerly-1
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161. Lemoult-1
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163. Walker and Wood-1
164. 8erthelot-111
165. Walker and Hambley-1
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167. Fawsitt-1
168. Lewis and Randall-7
169. Walker-2
170. Latimer-1
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172. von Steinwehr-1
173. Varet-3
174. Matignon-1
175. Calvet-1,3
176. Stohmann and Schmidt-4
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178. Jones and Giauque-1
179. Pitzer and Gwinn-1
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182. Turnball and Maron-1
183. Berthelot-10
184. 8erthelot and Andre-1
185. 8erthelot-4
186. Ruehrwein and Huffman-2
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22B. Rossini-11
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Table 24

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Si		g	1,2,3,4,5		1,5	1,5
		c			1,8,9	1,8,9
		amorp	10			
Si^{n+}		g	6,7			
SiO		g	13,14		1,12	1,12
SiO_2		c	10,15,16,18,19,21, 22,54		22,23	23,24
		gls	20,25,26		24	24
		aq	26			
SiH_4		g	10,27,28		24	1,24
H_2SiO_3		c	29,26			
H_4SiO_4		c	29,26			
SiF_4		g	30,31,32		24,33	1,24
SiF_6^{--}		aq	1,46			
H_2SiF_6		aq	18,25,26,31,32,46, 53			
$SiCl_4$		g	40,41,42,43,44		24,38,39	37
		liq	11,34,35,36		24	24
$SiBr_4$		liq	35,45			
SiI_4		c	35			
SiS_2		c	51			
Si_3N_4		c	17,47,52			
$(NH_4)_2SiF_6$		c	46			
		aq	46			
SiC		c	19,30,48,49,50		50	50
$Si(C_2H_5O)_4$	tetraethoxy silane	liq	27			

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12. Saper-1
13. Gaydon-1
14. Herzberg-9
15. Roth and Becker-3
16. Roth-9
17. Kelley-23
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22. Sosman-3
23. Anderson-13
24. Kelley-24
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44. Kearby-1
45. Pohland-1
46. Truchot-2
47. Matignon-13,16
48. Ruff and Greiger-1
49. Ruff and Konschak-1
50. Kelley-13
51. Sabatier-1
52. Hincke and Brantley-1
53. Ray-1
54. Potter-1

Table 25

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ge		g	1		2,3	2,3
		c	6,1		1,4,6	1,4,6
Ge^{n+}		g	5,7			
GeO		g	9,10,11,12		3,8	3,B
GeO_2		amorp	13,14			
		aq	15,16			
GeH_4		g			3,17	3,17
H_2GeO_3		aq	15,16			
GeCl		g	3,12,18			3,12,1B
$GeCl_4$		liq	19			
GeBr		g	3,12,1B			3,12,18
GeS		g	3,12,20			3,12,20
GeSe		g				3,21
GeTe		g				3,21
Ge_3N_4		c	14,22			

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11. Shaw-1
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Table 26

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Sn		g	1,2,3,4			
		c	6,7,8		5	5
Sn^{n+}		g	9,10			
SnO		g			1,9	1,9
		c	11,13,14	12,13	5,15	5,15
SnO_2		c	14,17,18,19,20,21,22		5,15	5,15
$Sn(OH)^+$		aq		11		
$HSnO_2^-$		aq		11		
$Sn(OH)_2$		c	23	11		
$Sn(OH)_4$		c	23			
SnF_6^{--}		aq	23,1			
H_2SnF_6		aq	23			
$SnCl_2$		c	23,29,30			
		aq	23,25,26,27			
$SnCl_2 \cdot 2H_2O$		c	23,28			
$SnCl_4$		liq	23,30		5	5
		aq	23,31			
$SnOCl_2$		aq	32			
$SnBr_2$		c	30			
		aq	30,29			
$SnBr_4$		c	30			
		aq	30,33,34			
$SnBr_4 \cdot 8H_2O$		liq	33			
SnI_2		c	30			
		aq	35,29			
SnS		c	36,37,38,39,40,41	40,41		
$Sn(SO_4)_2$		c	42			
$SnX_2 \cdot nNH_3$		c	29			
$SnCl_4 \cdot 1\ 1/2PH_3$		c	43			
$SnH_{20}C_8$	tetraethyltin	liq	44			
$SnH_{28}C_{12}$	tetra-n-propyltin	liq	44			
$SnH_{36}C_{16}$	tetra-n-butyltin	liq	44			
$SnH_{44}C_{20}$	tetra-n-amyltin	liq	44			

Table 26 (Continued)

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Table 27

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Pb		g	1,2,3	1,2,3		3,4
		c			3	3
Pb^{n+}		g	5,6			
Pb^{++}		aq	7,8	9,10		
Pb_2		g	11			
PbO		g			12	
		c	13,16,17,21	13,14,15, 18,19	12,17	12
PbO_2		c	21	17,20,22		12
Pb_2O		c	23			
Pb_3O_4		c	25,26,27	17,24	12	12
$HPbO_2^-$		aq		10,28		
$Pb(OH)_2$		c	10,29		30	
PbF_2		c	31,32	10,33		
		aq	34			
PbF_4		c	32			
$PbCl_2$		c	37,38	15,35,36		37
		aq	7,8,34		34	
$PbCl_2 \cdot nPbO$		c	39			
$PbBr_2$		c	42	15,36,38, 41,43	12	12
		aq	34		34	
$PbBr_2 \cdot nPbO$		c	39			
PbI_2		c	15,34,36,44	15,36,44		
		aq	34	15,45		
PbI_3^-		aq		45		
PbI_4^{--}		aq		45		
$PbI_2 \cdot HI \cdot 5H_2O$		c	46			
PbS		c	47,48,50,51	49,50	12	12
$PbSO_4$		c	20,34		9,12	12
PbS_2O_3		c	52			
PbS_3O_6		c	52			
		aq	52			
$PbSO_4 \cdot nPbO$		c	53,54,55			
PbSe		c	56			
$PbSeO_4$		c	57			
PbTe		c	56			
$Pb(N_3)_2$		c	58			
$Pb(NO_3)_2$		c	8			
		aq	34,59,60,61,67		34	
$Pb(OH)NO_3$		c	67			
$PbCl_2 \cdot nNH_3$		c	62			

Table 27 (Continued)
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$2PbCl_2 \cdot NH_4Cl$		c	63			
$PbBr_2 \cdot nNH_3$		c	62			
$PbI_2 \cdot nNH_3$		c	62			
$3PbI_2 \cdot 4NH_4I$		c	64			
$3PbI_2 \cdot 4NH_4I \cdot 6H_2O$		c	64			
$PbSO_4 \cdot (NH_4)_2SO_4$		c	65			
$Pb_3(PO_4)_2$		c	61	10		12
$PbHPO_3$		c	66			
$3PbI_2 \cdot PI_3$		c	64			
$3PbI_2 \cdot PI_3 \cdot 12H_2O$		c	64			
$3PbI_2 \cdot AsI_3$		c	64			
$3PbI_2 \cdot AsI_3 \cdot 12H_2O$		c	64			
$3PbI_2 \cdot SbI_3$		c	64			
$3PbI_2 \cdot SbI_3 \cdot 12H_2O$		c	64			
$PbCO_3$		c	7,67,69	68	70	12,70
PbC_2O_4	lead oxalate	c	71			
$PbO \cdot PbCO_3$		c	69,72		12	12
$2PbO \cdot PbCO_3$		c	72		34	
$Pb(C_2H_5)_4$	tetraethyllead	liq	73			
$Pb(CHO_2)_2$	lead formate	c	74			
		aq	74			
$Pb(C_2H_3O_2)_2$	lead acetate	c	74			
		aq	8,51			
$Pb(C_2H_3O_2)_2 \cdot 3H_2O$		c	74,75			
$Pb(C_2H_3O_3)_2$	lead glycollate	c	76			
		aq	76			
$Pb(CN)_2 \cdot 2PbO \cdot H_2O$		c	77			
$Pb(CNS)_2$		c	77			
$PbSiO_3$		c	78		34	
		amorp	78			
Pb_2SiO_4		c	78		34	
		amorp	78			
$PbI_2 \cdot SnI_2$		c	64			
$PbI_2 \cdot SnI_2 \cdot 8H_2O$		c	64			

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76. de Forcrand-3
77. Joannis-1
7B. Nacken-4

Table 28

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ga		g		1,2	3	2
		c				5
Ga^{n+}		g	6			
Ga^{+++}		aq	8,9	3,7		
GaO		g	10,11			
GaO_3^{---}		aq		12		
Ga_2O		c	13			
Ga_2O_3		c	13,14			15
$Ga(OH)^{++}$		aq		12		
$HGaO_3^{--}$		aq		12		
$Ga(OH)_2^{+}$		aq		12		
$H_2GaO_3^{-}$		aq		12		
$Ga(OH)_3$		c		12		
GaCl		g	11,16			
$GaCl_3$		c	17			
		aq	7,9	3	3	
GaBr		g	11			
$GaBr_3$		c	9			
		aq	17			
GaI		g	11			
GaI_3		c	9			
		aq	11			
$Ga_2(SO_4)_3$		c				15
GaN		c	18			
$GaX_3 \cdot nNH_3$		c	9			
$Ga_2(C_2O_4)_3$	gallium oxalate	c	19			
$Ga_2(C_2O_4)_3 \cdot nH_2O$		c	19			

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16. Miescher and Wehrli-1
17. Klemm and Jacobi-1
18. Hahn and Juza-1
19. Centola-1

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Table 29

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
In		g	3	1	2	3
		c			5,6	4
In^{n+}		g	2			
In^{+++}		aq	7,8	8	3	3
InO		g	9			
In_2O_3		c	10,11			12
InH		g	9	3	3,13,14	3
$In(OH)^{++}$		aq		7		
$In(OH)_3$		c	3,15	15	3,15	
InCl		g	9	3	3,13,14	3
		c	16			
$InCl_2$		c	16			
$InCl_3$		c	16			
		aq	8,17			
InBr		g	9	3	3,13,14	3
$InBr_3$		c	17			
		aq	3			
InI		g	9	3	3,13,14	3
InI_3		c	17			
		aq	3			
$In_2(SO_4)_3$		c	18			12
InN		c	19			
$InX_3 \cdot nNH_3$		c	17			

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17. Klemm-3
18. Seward-1
19. Hahn and Juza-1

Table 30
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Tl		g	1	1,2,3		4
		c			5	6
Tl^{n+}		g	7,8			
Tl^{+}		aq	4,9	9,10,11		
Tl^{+++}		aq	4	10		
Tl_2O		c	12,13,14	10		
TlH		g	15		16	
TlOH		c	12	10		
		aq	12			
$Tl(OH)_3$		c	17			
TlF		g	15			
		aq	18,19			
$HTlF_2$		aq	19			
TlCl		g	15		16,21	4
		c	12,14,24,25	21,22,23	5,23	
		aq	9,14,24	9,10		
$TlCl_3$		c	26			
		aq	4			
$TlCl_3 \cdot 4H_2O$		c	26			
TlBr		g	15		16,20	20
		c	14	25,27,28		
		aq	4	25,27,28		
$TlBr_3$		c	14			
$TlBr_3 \cdot 4H_2O$		c	26			
$TlBrO_3$		c	25			
		aq	4	4		
$TlClBr_2$		aq	26			
$TlClBr_2 \cdot 4H_2O$		c	26			
TlI		c	14,15	27,29,30	16,20	20
		aq	4	4		
$TlIO_3$		c		26		
		aq	4	4		
Tl_2S		c	10,14			
Tl_2SO_4		c	12,14,31			
		aq	4	4		
$TlHSO_4$		aq	12,14			
Tl_2Se		c	32			
Tl_2Te		c	32			
TlN_3	thallous azide	c	33			
$TlNO_3$		c	11,14		4	
		aq	11,14		4	

Table 30 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$TlCl \cdot 3NH_3$		c	34			
$TlCl_3 \cdot 3NH_3$		c	34,35			
$TlBr \cdot 3NH_3$		c	34			
$TlI \cdot 3NH_3$		c	34			
$Tl(C_2H_3O_2)$	thallous acelate	aq	18			
$TlOC_2H_5$	thallous ethoxide	liq	1B			
	in C_2H_5OH		18			
TlONC	thallous fulminate	c	33			

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35. Ephraim and Millman-1

Table 31

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Zn		g	1,2		3	3
		c			4	4
	in Hg		5	5		
Zn^{n+}		g	6			
Zn^{++}		aq	3	3		
ZnO		c	7,9,10,11,12,13	8,13	4	4
$ZnO_2 \cdot 2H_2O$		c	14			
$Zn_3O_5 \cdot nH_2O$		c	14			
ZnH		g	16		3,15	3,15
$Zn(OH)_2$		c	11,17,18,19			7,34
ZnF_2		aq	20,17,21,19,22			
ZnCl		g	16		3,15	3,15
$ZnCl_2$		c	24,26,18,39,40,29, 28,27	26,28,27		34
		aq	18,23,25,5,30,31, 32,33,35,36,37,38, 7, 44	25,5		
	in C_2H_5OH		39			
$ZnCl_2 \cdot 3ZnO \cdot 5H_2O$		c	41			
$ZnCl_2 \cdot 4ZnO \cdot 11H_2O$		c	41			
$ZnCl_2 \cdot 5ZnO \cdot 8H_2O$		c	41			
$ZnCl_2 \cdot 8ZnO \cdot 10H_2O$		c	41			
ZnBr		g			42,3	42,3
$ZnBr_2$		c	18,28	28		
		aq	43	43		
$ZnBr_2 \cdot 2H_2O$		c	45	45		
$ZnBr_2 \cdot 4ZnO \cdot 13H_2O$		c	41			
ZnI		g	16		15,3,42	15,3
ZnI_2		c	28,46	28,46		
		aq	47,48,3,49	3		
$ZnI_2 \cdot 5ZnO \cdot 11H_2O$		c	50			
ZnS		g	16			
		c	18,51,57,54,58,59, 60,55,56	57	61,4	34
$ZnSO_4$		c	64,18,66,67,71	64		68
		aq	18,14,62,63,4,65, 69,70,71	4		
$ZnSO_4 \cdot nH_2O$		c	18,66,72,63,73,74, 75	64		34
ZnS_2O_4		aq	3			
ZnS_2O_6		aq	3			
$ZnS_2O_6 \cdot 6H_2O$		c	18			
$Zn(HSO_3)_2$		aq	3			
ZnSe		c	77			

Table 31 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	$-S^\circ$	C_p°
Formula	Description	State				
ZnTe		g	16			
		c	77,78	78		
$Zn(N_3)_2$	zinc azide	c	79,80			
Zn_3N_2		c	81			82
$Zn(NO_3)_2$		c	83			
		aq	18,83			
$Zn(NO_3)_2 \cdot nH_2O$		c	18,83			
$Zn(NH_2)_2$		c	84			
$ZnCl_2 \cdot nNH_3$		c	86,87,88			
$ZnCl_2 \cdot 2N_2H_4$		c	85			
$ZnCl_2 \cdot 5NH_3 \cdot 2H_2O$		c	41			
$2ZnCl_2 \cdot 4NH_3 \cdot 1/2H_2O$		c	41			
$3ZnCl_2 \cdot 6NH_4Cl \cdot H_2O$		c	41			
$2ZnCl_2 \cdot 8NH_4Cl \cdot ZnO$		c	41			
$3ZnCl_2 \cdot 10NH_4Cl \cdot ZnO$		c	41			
$6ZnCl_2 \cdot 12NH_3 \cdot ZnO$		c	41			
$ZnBr_2 \cdot nNH_3$		c	50,86,87			
$ZnBr_2 \cdot 2N_2H_4$		c	85			
$ZnI_2 \cdot nNH_3$		c	50,86			
$ZnI_2 \cdot 2N_2H_4$		c	85			
$ZnSO_4 \cdot nNH_3$		c	76,89,90			
$Zn(NH_4)_2(SO_4)_2 \cdot nH_2O$		c	91,92			
ZnSb		c	93			34
$ZnCO_3$		c	94,95,97		96	96
$Zn(CH_3)_2$	dimethylzinc	liq	99			
$Zn(C_2H_5)_2$	diethylzinc	liq	98,99			
$ZnC_2O_4 \cdot 2H_2O$	zinc oxalate dihydrate	c	100			
$Zn(CHO_2)_2$	zinc formate	c	101,102			
		aq	101,102			
$Zn(CHO_2)_2 \cdot 2H_2O$	zinc formate dihydrate	c	101,102			
$Zn(C_2H_3O_2)_2$	zinc acetate	c	101,102			
		aq	18,103			
$Zn(C_2H_3O_2)_2 \cdot nH_2O$		c	101,102			
$Zn(C_2H_3O_3)_2$	zinc glycollate	c	104			
		aq	104			
$Zn(C_2H_3O_3)_2 \cdot 2H_2O$	zinc glycollate dihydrate	c	104			
$Zn(CN)_2$		c	105,106			
$Zn(CN)_2 \cdot ZnO$		c	105,106			
$Zn(CN)_4^{--}$		aq	106			
$ZnCl_2 \cdot C_2H_4(NH_2)_2$	zinc chloride ethylenediamine	c	95			

Table 31 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$ZnCl_2 \cdot 3C_2H_4(NH_2)_2$	zinc chloride tris-ethylenediamine	c	95			
$ZnBr_2 \cdot C_2H_4(NH_2)_2$	zinc bromide ethylene-diamine	c	95			
$ZnBr_2 \cdot 3C_2H_4(NH_2)_2$	zinc bromide tris-ethylenediamine	c	95			
$ZnI_2 \cdot C_2H_4(NH_2)_2$	zinc iodide ethylene-diamine	c	95			
$ZnI_2 \cdot 3C_2H_4(NH_2)_2$	zinc iodide tris-ethylenediamine	c	95			
$Zn(CHO_2)_2 \cdot nNH_3$		c	89, 90			
$ZnSiO_3$		c	20			
Zn_2SiO_4		c	20			
		gls	20			
$2ZnI_2 \cdot PbI_2$		c	48			

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Table 31 (Continued)

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Table 32
SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Cd		g	1	2,3		4
		c		6,7,8	5	4,9
	in Hg			8		
Cd^{n+}		g	10			
Cd^{++}		aq	4	11		
Cd_2		g	12,13			
CdO		c	14,15		5	5
CdH		g	12,13		4,12	
$(CdH)^+$		g	13			
$Cd(OH)_2$		c	16,17	18		
CdF_2		c	11,19,20,21,23	11,19,21,23		
		aq	24			
CdCl		g	13		4,25,26	
$CdCl_2$		c	27,28,30,31	8,18,27,28		
		aq	27,32	8,18,27,28		
$CdCl_2 \cdot nH_2O$		c	30,33	34		
$CdCl_2 \cdot 2HCl \cdot 7H_2O$		c	35			
$CdCl_2 \cdot CdO \cdot H_2O$		c	36			
CdBr		g	13	26		
$CdBr_2$		c	39,40,41	37,38,42		
		aq	32			
$CdBr_2 \cdot 4H_2O$		c	17,38	38		
$CdBr_2 \cdot CdO \cdot H_2O$		c	36			
CdI		g	13,43	4,12,13		
CdI_2		c	17,28,44	28,37		
		aq	32			
$CdI_2 \cdot CdO \cdot H_2O$		c	36			
CdS		c	45,47,48,49	46		
$CdSO_4$		c	17,50	51		
		aq	17,52	8,11		
$CdSO_4 \cdot nH_2O$		c	17,50	51,54		
$CdSO_4 \cdot 2\ 1/2H_2SO_4$		c	53			
CdS_2O_6		aq	4,17			
CdSe		g	55			
CdTe		c	56	56		
$Cd(N_3)_2$	cadmium azide	c	57			
Cd_3N_2		c	58			
$Cd(NO_3)_2$		c	59			
		aq	17,59	4		
$Cd(NO_3)_2 \cdot nH_2O$		c	59			

Table 32 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$Cd(NH_2)_2$		c	60			
$CdCl_2 \cdot nNH_3$		c	36,61			
$CdCl_2 \cdot NH_4Cl \cdot 1/2H_2O$		c	36			
$CdCl_2 \cdot 4NH_4Cl$		c	36			
$CdBr_2 \cdot nNH_3$		c	36,61			
$CdBr_2 \cdot NH_4Br \cdot 1/2H_2O$		c	36			
$CdI_2 \cdot NH_4I \cdot 1/2H_2O$		c	36			
$CdI_2 \cdot nNH_3$		c	36,61,62			
$CdSO_4 \cdot nNH_3$		c	62			
CdSb		c	63,64			
Cd_3Sb_2		c	63	63		
$CdCO_3$		c	17,65	4		
		amorp	17			
$Cd(CH_3)_2$		liq	66			
$Cd(C_2H_5)_2$		liq	66			
$Cd(CN)_2$		c	29			
		aq	4,17,29			
$Cd(ONC)_2$	cadmium fulminate	c	57			
$2Cd(CN)_2 \cdot CdO \cdot 5H_2O$		c	29			
$2CdI_2 \cdot PbI_2$		c	22			

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Table 33

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Hg		g	3,12		3	3
		liq			g	g
Hg^{n+}		g	2			
Hg^{++}		aq		4,5		
Hg_2		g	6			
Hg_2^{++}		aq		4,7		
HgO		c	10,11,12,13,14,34	5,8,15		9
Hg_2O		c	34,16			
HgH		g	6,17		1,6	1,6
$HHgO_2^-$		aq		5		
$Hg(OH)_2$		aq		5		
HgF		g	6			
HgCl		g	6,17,18		1,6,18	1,6,18
$HgCl_2$		c	34,20			
		aq	34,21,22,23,24,25,26			
$HgCl_3^-$		aq	1,19			
Hg_2Cl_2		c	16,27,32,28,29,30	27,28,29,30,33,69		g
$HgCl_2 \cdot nHgO$		c	21,35			
HgBr		g	6,17,18		1,6,18	1,6,18
$HgBr_2$		c	16,36			
		aq	36			
$HgBr_4^{--}$		aq	34,19			
Hg_2Br_2		c	37,38,39,16	37,38		
$HgBr_2 \cdot nHgO$		c	21,35			
HgI		g	6,17,18		1,6,18	1,6,18
HgI_2		c	16			
HgI_4^{--}		aq	34,19			
Hg_2I_2		c	41,42,16	41,42		40
HgS		g	6			
		c	34,16,43,44,45	44,45		
$HgSO_4$		c	16,46			
Hg_2SO_4		c	47	47,48,50,69	g	
$HgSO_4 \cdot 2HgO$		c	16			
HgSe		g	6			
		c	49			
$Hg_2(N_3)_2$	mercurous azide	c	51,52			
$Hg(NO_3)_2$		aq	34,16			
$Hg(NO_3)_2 \cdot 1/2H_2O$		c	16			
$Hg_2(NO_3)_2$		aq	34			

Table 33 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
$Hg_2(NO_3)_2 \cdot 2H_2O$		c	16			
$Hg(NO_3)_2 \cdot 2HgO \cdot H_2O$		c	16			
$(Hg_2N)_2O$	millon's oxide	c	53			
Hg_2NOH	millon's hydroxide	c	53,54			
$Hg_2NOH \cdot 1\ 1/2H_2O$		c	53,54			
$Hg_2NOH \cdot 2H_2O$	millon's base	c	53,54			
$Hg_2NCl \cdot nH_2O$		c	53,54			
$Hg_2NCl \cdot 1/2HgCl_2$		c	53			
$HgCl_2 \cdot nNH_3$		c	55,56			
$Hg_2NCl \cdot nNH_3$		c	53,54			
$Hg_2NCl \cdot nNH_4Cl$		c	53,54			
Hg_2NBr	millon's bromide	c	53			
$HgBr_2 \cdot nNH_3$		c	55,56			
$Hg_2NBr \cdot nNH_4Br$		c	53,54			
$Hg_2NBr \cdot nHgBr_2$		c	54			
$HgI_2 \cdot nNH_3$		c	56			
$Hg(CH_3)_2$	dimethylmercury	liq	57,58			
$Hg(C_2H_5)_2$	diethylmercury	liq	57			
HgC_2O_4	mercuric oxalate	c	59			
$Hg(C_2H_3O_2)_2$	mercuric acetate	c	59			
		aq	59			
$Hg_2(C_2H_3O_2)_2$	mercurous acetate	c	16			
$HgCl_2 \cdot CH_3OH$		c	60			
$Hg(CN)_2$		c	34,61,62			
		aq	34,16			
$Hg(CN)_4^{--}$		aq	53,61			
$Hg(ONC)_2$	mercuric fulminate	c	51,63			
$Hg(CN)_2 \cdot HgO$		c	64			
$3Hg(CN)_2 \cdot HgO$		c	64			
$HgX_2 \cdot C_2H_4(NH_2)_2$		c	65			
$Hg(CN)_2 \cdot NH_4Cl \cdot 3/4H_2O$		c	66			
$Hg(CN)_2 \cdot NH_4Br \cdot 1/2H_2O$		c	66			
$Hg(CN)_2 \cdot NH_4I \cdot 1/4H_2O$		c	66			
$Hg(CNS)_2$		c	64			
Hg_5Tl_2		c	67			
$Hg(CN)_2 \cdot ZnCl_2 \cdot 7H_2O$		c	66			
$2Hg(CN)_2 \cdot ZnBr_2 \cdot 8H_2O$		c	66			
$Hg(CN)_2 \cdot CdCl_2 \cdot 2H_2O$		c	66,68			
$Hg(CN)_2 \cdot CdBr_2 \cdot 3H_2O$		c	66,68			
$2Hg(CN)_2 \cdot CdI_2 \cdot 8H_2O$		c	66,68			

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64. Joannis-1
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67. Biltz and Meyer-2
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69. Müller and Reuther-2

Table 34

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Cu		g	3,4		6	6
		c			1	1
	in Hg			2		
Cu^{n+}		g	5			
Cu^{+}		aq	8	12,9,22		
Cu^{++}		aq	6	9,10,11,12		
CuO		g	13			
		c	15,16,17,18,19,20	21,19	14	14,15
CuO_2^{--}		aq		27		
Cu_2O		c	15,23,26	21,19,23,25,26	14	14,15
CuH		g	13		28,6	28,6
$HCuO_2$		aq		27		
$Cu(OH)_2$		c	17,18,29,30,31			
CuF		g	13			
CuF_2		c	32,33			
$CuF_2 \cdot 2H_2O$		c	34	34		
CuCl		g	13,35		28,36,6	28,36,6
		c	37,38,18,39,22,40,41	37,38,9		
		aq	22			
$CuCl_2$		c	18,42,44,45,46			
		aq	39,17,31,18,43,47,48,49,50,51			
	in C_2H_5OH		42			
$CuCl_2 \cdot 2H_2O$		c	52,53,18			
$CuCl_2^-$		aq	22	22		
$Cu(ClO_3)_2$		aq	18,6			
$Cu(ClO_4)_2$		aq	12,6			
$CuCl_2 \cdot nCuO$		c	48,77			
$CuCl_2 \cdot 3CuO \cdot 4H_2O$		c	77			
CuBr		g	13		28,36,6	28,36,6
		c	55,18,56,57	56		
$CuBr_2$		c	59,18,60			
		aq	58,18			
$CuBr_2 \cdot 4H_2O$		c	59			
$CuBr_2^-$		aq	59	61		
$CuBr_2 \cdot 3Cu(OH)_2$		c	62			
CuI		g	13		28,36,6	28,36,6
		c	61,56,18,65,41	64,56	14	
CuI_2		c	6			63
		aq	6			

Table 34 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^{o}	ΔFf^{o}	S^{o}	C_p^{o}
Formula	Description	State				
CuS		c	18,67,70,69	67	68	68
Cu_2S		c	18,69,71,72,73,75,74	72,75	68	68
$CuSO_4$		c	79,67,80,81,18,82	19,79,67		63
		aq	10,11,18,76,31,77,78	10,11		
$CuSO_4 \cdot nH_2O$		c	18,80,81,82,19,83,79,84,85	19,67,79		63
CuS_2O_6		aq	6			
$CuS_2O_6 \cdot 5H_2O$		c	18			
Cu_2SO_4		c	86			
		aq	12			
$CuSO_4 \cdot 3CuO \cdot 4H_2O$		c	62			
CuSe		c	87			
Cu_2Se		c	87,88			92
$CuSeO_4$		aq	89			
$CuSeO_4 \cdot 5H_2O$		c	89			
CuN_3	cuprous azide	c	90			
Cu_3N		c	91			92
$Cu(NO_3)_2$		c	94			
		aq	18,93,30			
$Cu(NO_3)_2 \cdot nH_2O$		c	62,18			
$Cu(NO_3)_2 \cdot 3CuO \cdot 3H_2O$		c	62			
$4CuO \cdot 3N_2O_5$		c	95			
$Cu(NH_3)^{+}$		aq		96		
$Cu(NH_3)^{++}$		aq		96		
$Cu(NH_3)_2^{+}$		aq		96		
$Cu(NH_3)_2^{++}$		aq	31	96		
$Cu(NH_3)_3^{++}$		aq		96		
$Cu(NH_3)_4^{++}$		aq	31	96		
$Cu(NH_3)_5^{++}$		aq		96		
$Cu(NO_3)_2 \cdot nNH_3$		c	97,98			
$CuCl \cdot nNH_3$		c	102			
$CuCl_2 \cdot nNH_3$		c	99,31,100			
$CuCl_2 \cdot 2NH_3 \cdot 1/4H_2O$		c	31			
$CuCl_2 \cdot 2NH_4Cl$		c	31,101			
$CuCl_2 \cdot 2NH_4Cl \cdot 2H_2O$		c	31,101			
$CuCl_2 \cdot 4NH_3 \cdot 2H_2O$		c	31			
$CuCl_2 \cdot 5NH_3 \cdot nH_2O$		c	31			
$CuBr \cdot nNH_3$		c	102			
$CuBr_2 \cdot nNH_3$		c	100			
$CuI \cdot nNH_3$		c	102			

Table 34 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
$CuI_2 \cdot nNH_3$		c	100,6		-	
$CuSO_4 \cdot nNH_3$		c	31,103,104			
$CuSO_4 \cdot (NH_4)_2SO_4$		c	31			
$CuSO_4 \cdot (NH_4)_2SO_4 \cdot nH_2O$		c	31,105			
$CuSO_4 \cdot 4NH_3 \cdot 1\ 1/2H_2O$		c	31			
CuP_2		c	106			
Cu_3P		c	107			
$CuX \cdot nPH_3$		c	108			
Cu_2Sb		c				92
Cu_3Sb		c	109			92
$CuCO_3$		c	112	110,111	6	
$Cu(CHO_2)_2$	cupric formate	aq	113,114			
$Cu(CHO_2)_2 \cdot 4H_2O$		c	113,114			
$Cu(C_2H_3O_2)_2$	cupric acetate	c	113,93			
		aq	113,93,18			
$Cu(C_2H_3O_2)_2 \cdot H_2O$		c	18,93,113			
$Cu(C_2H_3O_3)_2$	cupric glycollate	c	115			
		aq	115			
$2CuCl \cdot CO$		aq	116			
$2CuCl \cdot CO \cdot 2H_2O$		c	116			
$2CuCl \cdot C_2H_2$		c	117			
$CuCl_2 \cdot 2CH_3OH$		c	118			
$Cu(C_2H_5SO_4)_2$	cupric ethylsulfate	aq	18			
$CuCN$		aq	119			
$CuONC$	cuprous fulminate	c	90			
$Cu(CHO_2)_2 \cdot nNH_3$		c	120			
$Cu(C_2H_3O_2)_2 \cdot nNH_3$		c	120			
$Cu(C_2H_3O_3)_2 \cdot nNH_3$		c	120			
$CuCl_2 \cdot nC_2H_4(NH_2)_2$		c	121			
$CuBr_2 \cdot nC_2H_4(NH_2)_2$		c	121			
Cu_3Si		c				122
$CuSIO_3 \cdot H_2O$		c				92
Cu_3Sn		c	51,66			
Cu_2Zn_3		c	51,66			
Cu_2Cd_3		c	109,51			

Table 34 (Continued)

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Table 35

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ag		g	1		2	2
		c			2	2
Ag^{n+}		g	3,4,5			
Ag^+		aq	7,10	8,9		6
Ag_2O		c	7,13,14	11,12		7
Ag_2O_2		c	15			
AgH		g	12,17		12	12
AgF		c	18,19,34		6	
		aq	6,20,21,22,23			
$AgF \cdot nH_2O$		c	19,23,34	23		
AgF_2		c	24			
Ag_2F		c	25			
$AgHF_2$		aq	26			
AgCl		g	1		6,16,27,28,29	6,16,27,28,29
		c	31	30,32,33	35	35
Ag_2Cl		c	112			
$AgClO_2$		c	37	8,37		38
$AgClO_3$		c	40			
		aq	6			
$AgClO_4$		c	41			
		aq	42			
AgBr		c	31,47	35,43,44,45,46	38	38
AgI		c	31,49,50,51,54	48,52,53		38
$AgIO_3$		c			55,56,57	57
$Ag_2H_3IO_6$		c	58			
$3AgI \cdot HI \cdot 7H_2O$		c			59	6,59
Ag_2S		c	60,61,63,64,65,67,68	61,62	66	
Ag_2SO_4		c	70	8	69	69
		aq	51,72			
$Ag_2S_2O_6$		aq	6			
$Ag_2S_2O_6 \cdot 2H_2O$		c	51			
$Ag(S_2O_3)_2^{---}$		aq	35,39			
$Ag_2SO_4 \cdot 2HCl$		c	73			
Ag_2Se		c	74			
Ag_2SeO_4		c	8,75			
AgN_3	silver azide	c	76			
$AgNO_2$		c	77,78		79	79
		aq	6	6,80		
$AgNO_3$		c	81,82,83,84,85		85	38
		aq	6	8,46		

Table 35 (Continued)

SPECIFIC REFERENCES

Substance			ΔH_f°	ΔF_f°	S°	C_p°
Formula	Description	State				
$Ag_2N_2O_2$		c	86			
$Ag(NH_3)_2^+$		aq	85			
$AgNO_3 \cdot nNH_3$		c	87,88,89,90,91			
		aq	88,89			
$AgCl \cdot nNH_3$		c	92,93			
$AgClO_4 \cdot nNH_3$		c	89			
		aq	89			
$AgBr \cdot nNH_3$		c	92,93			
$AgI \cdot nNH_3$		c	92			
AgP_2		c	94			
AgP_3		c	94			
Ag_2C_2	silver acetylide	c	88			
Ag_2CO_3		c	51,95,96,98	97	99	99
$Ag_2C_2O_4$	silver oxalate	c	100			
$AgC_2H_3O_2$	silver acetate	c	101			
		aq	102,103			
$Ag_2C_2 \cdot AgCl$		c	88			
$(Ag_2C_2)_2 \cdot AgCl$		c	88			
$Ag_2C_2 \cdot AgI$		c	88			
$Ag_2C_2 \cdot 2AgI$		c	88			
$Ag_2C_2 \cdot Ag_2SO_4$		c	88			
$(Ag_2C_2)_2 \cdot Ag_2SO_4$		c	88			
AgCN		c	51	8,104		
$Ag(CN)_2^-$		aq	51	104		
Ag_2CN_2	silver cyanamide	c	90			
AgCNO	silver cyanate	c	8,90			
AgONC	silver fulminate	c	106			
$Ag_2C_2 \cdot AgNO_3$		c	88			
$AgCl \cdot CH_3NH_2$		c	107			
$AgBr \cdot CH_3NH_2$		c	107			
$AgI \cdot nCH_3NH_2$		c	107			
AgSCN		c	6			
		aq	8,108			
Ag_2Zn_3		c	109			
Ag_3Hg_4		c	110			
Ag_2HgI_4		c	105			

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89. Bruni and Levi-2
90. Lemoult-1
91. Joannis and Croizier-1
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93. Isambert-5
94. Haraldsen and Biltz-1
95. Centnerszwer and Krustinson-1
96. Watanabe-12
97. Walker, Bray, and Johnston-1
98. Berthelot-11
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104. Randall and Halford-1
105. Ketalaar-1
106. Wöhler and Martin-2
107. Jarry-1
108. Kirschner-1
109. Samson and Himmelstjerna-1
110. Berthelot-125

Table 36

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Au		g	1,2,3,4,5,6		1	1
		c			7	6
Au^+		g	8			
AuO_3^{---}		aq		9		
Au_2O_3		c	10	11,12		
$HAuO_3^{--}$		aq		9		
$H_2AuO_3^-$		aq		9		
$Au(OH)_3$		c	13	9		
		aq		9		
AuCl		c	14,15,16			
$AuCl_3$		c	14			
		aq	14			
$AuCl_3 \cdot 2H_2O$		c	14			
$AuCl_4^-$		aq		11,17		
$HAuCl_4$		aq	13,14	13,14		
$HAuCl_4 \cdot nH_2O$		c	13			
AuBr		c	13,14,18			
$AuBr_2^-$		aq		11		
$AuBr_3$		c	14,18			
		aq	13			
$AuBr_4^-$		aq	13	11		
$HAuBr_4$		aq	13			
$HAuBr_4 \cdot 5H_2O$		c	13			
AuI		c	13,14,18			
$AuCl \cdot nNH_3$		c	16,19			
$AuBr \cdot nNH_3$		c	19			
$AuI \cdot nNH_3$		c	19			
Au_2P_3		c	20			
$AuI \cdot PH_3$		c	21			
$AuSb_2$		c	22			
$Au(CN)_2^-$		aq	19	11		
AuSn		c	23			

Table 36 (Continued)

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9. Johnston and Leland-1	
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11. Latimer-1	
12. Gerke and Rourke-1	
13. Thomsen-16	
14. Fischer and Biltz-1	
15. Matignon-12	
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23. Biltz, Rohlff, and Vogel-1	

Table 37

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Pt		g	4		2,3	2,3
		c			1	1
Pt^+		g	2			
$Pt(OH)_2$		c	5	6		
PtCl		c	7			
$PtCl_2$		c	7			
$PtCl_3$		c	7			
$PtCl_4$		c	7,8			
		aq	7,8			
$PtCl_4 \cdot 5H_2O$		c	8			
$PtCl_4^{--}$		aq	5,9	6		
$PtCl_6^{--}$		aq	3	10	3	
$HPtCl_5 \cdot 2H_2O$		c	8			
H_2PtCl_6		aq	5,8,11			
$H_2PtCl_6 \cdot 6H_2O$		c	8			
$PtBr_4$		c	8			
		aq	8			
$PtBr_4^{--}$		aq	5			
$PtBr_6^{--}$		aq	5,8			
H_2PtBr_6		aq	8			
$H_2PtBr_6 \cdot 9H_2O$		c	8			
PtI_4		c	8			
PtI_6^{--}		aq	8			
PtS		c	12,13			
PtS_2		c	12,13			
$(NH_4)_2PtCl_4$		c	5			
		aq	5			
$Pt(OH)_2 \cdot 4NH_3$		c	5			
$PtCl_2 \cdot 2NH_3$		c	14,15			
$PtCl_2 \cdot 4NH_3$		c	15			
		aq	3			
$PtCl_2 \cdot 4NH_3 \cdot H_2O$		c	5			
$PtCl_2 \cdot 5NH_3$		c	15			
$PtSO_4 \cdot 4NH_3$		c	5			
$PtSb_2$		c	16			
PtSn		c	17			
Ag_2PtCl_6		c	8			
Ag_2PtBr_6		c	8			

Table 37 (Continued)

SPECIFIC REFERENCES

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14. Isambert-1	
15. Ephraim and Millman-1	
16. Poppema and Jaeger-1	
17. Jaeger and Bottema-1	

Table 38

SPECIFIC REFERENCES

Substance			ΔHf^{o}	ΔFf^{o}	S^{o}	C_p^{o}
Formula	Description	State				
Ir		g		3	1,2,3,4	3
		c			5	6
Ir^{+}		g	4			
IrO_2		c	7,8,9			7,10
IrF_6		liq	11			
IrCl		c	12			
$IrCl_2$		c	12			
$IrCl_3$		c	12,13			
$IrCl_6^{--}$		aq	1			
$IrCl_6^{---}$		aq	1			
IrS_2		c	14			
Ir_2S_3		c	14			

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7. Wohler and Jochim-1
8. Wohler and Witzman-1
9. Biltz-2
10. Jaeger-1
11. Ruff and Fischer-1
12. Wohler and Streicher-1
13. Remy-1
14. Biltz, Laar, Ehrlich, and Meisel-1

Table 39

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Os		g	2		2	1
		c			3	3
Os^+		g	4			
OsO_4		g	6		5	
		c	6,7	6,7		
		aq		5		
$HOsO_5$		aq		8		
H_2OsO_5		aq		8		
OsS_2		c	9			
OsP_2		c	10			

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9. Juza-1
10. Biltz, Ehrhorn, and Meisel-1

Table 40

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Re		g	2		1	
		c				
ReO_3		c			3	4
ReO_4^-		aq	5			
Re_2O_7		c	5			
Re_2O_8		c	6			
$HReO_4$		aq	7			
ReF_6		g	8			
ReS_2		c	9			
$ReAs_2$		c	10			

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8. Ruff and Kwasnik-2
9. Juza and Biltz-2
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Table 41

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Pd		g	3		3	15
		c			1	2
Pd^{n+}		g	4			
PdO		c	5,6,7			5
Pd_2H		c	8,9,10			
$Pd(OH)_2$		c	11,12			
$Pd(OH)_4$		c	11			
$PdCl_2$		c	11,12,13			
$PdCl_4^{--}$		aq		14		
$PdCl_6^{--}$		aq		14		
H_2PdCl_4		aq	11			
H_2PdCl_6		aq	15			
$PdBr_2$		c	12			
$PdBr_4^{--}$		aq	15			
$PdI_2 \cdot H_2O$		c	11,12			
$PdCl_2 \cdot nNH_3$		c	16			
PdSb		c				2
$PdSb_2$		c				2
$PdSb_3$		c				2
$Pd(CN)_2$		c	12			
PdCu		c				2
$PdCu_3$		c				2

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Table 42

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Rh		g	1		2	3
		c			2	4
Rh^{n+}		g	5			
RhO		c	6,7			6
Rh_2O		c	6,7			6
Rh_2O_3		c	6,7			6
RhCl		c	7			
$RhCl_2$		c	7			
$RhCl_3$		c	7			
$RhCl_6^{---}$		aq	3			

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Table 43

SPECIFIC REFERENCES

Substance			$\Delta H f^\circ$	$\Delta F f^\circ$	S°	C_p°
Formula	Description	State				
Ru		g	1		2,4	
		c			2	3
RuO_2		c	5			
$RuCl_3$		c	5			
RuS_2		c	6			

REFERENCES

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3. Kelley-18
4. Calculated
5. Remy-1
6. Kelley-22

Table 44

Tc		c			1	

REFERENCES

1. Calculated

Table 45

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ni		g	1,2		1	1
		c			3,4,5,6,7	3,4,5,6,7
Ni^{n+}		g	8			
Ni^{++}		aq	7		7	
NiO		g	9		9	
		c	10,11,12,13,14,15, 16,17,18,19,20		21	21
NiH		g	22			
		c	23			
NiH_2		c	23			
$Ni(OH)_2$		c	26,27	24,25		
$Ni(OH)_3$		c	26			
NiF_2		c	28,29			
		aq	30,31,32,33			
$NiF_2 \cdot 4H_2O$		c		32		
NiCl		g	22			
$NiCl_2$		c	26,34,35		24	24
		aq	26,37			
$NiCl_2 \cdot nH_2O$		c	26,32,38,39			
$NiBr_2$		c	40,41			
		aq	42			
$NiBr_2 \cdot 3H_2O$		c	7,40,41			
NiI_2		c	42			
		aq	7			
$Ni(IO_3)_2$		c	43			
		aq	43			
$Ni(IO_3)_2 \cdot 2H_2O$		c	43			
$Ni(IO_3)_2 \cdot 4H_2O$		c	43			
NiS		c	26,44,45			
Ni_3S_2		c	46			
$NiSO_4$		c	47,48		47,48	49
		aq	26,37		50	
$NiSO_4 \cdot 6H_2O$		c	48,51,52		48	49
$NiSO_4 \cdot 7H_2O$		c	26,33	33,53		
$Ni_2S_2O_6$		aq	7			
$Ni_2S_2O_6 \cdot 6H_2O$		c	28			
NiSe		c	40			
NiTe		c	54			
$Ni(N_3)_2 \cdot H_2O$	nickel azide hydrate	c	55			
$Ni(NO_3)_2$		c	56			
		aq	7			

Table 45 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$Ni(NO_3)_2 \cdot 6H_2O$		c	7,28			
$Ni(NH_3)_4^{++}$		aq		45		
$Ni(NH_3)_6^{++}$		aq		45		
$Ni(NO_3)_2 \cdot 6NH_3$		c	57			
$NiCl_2 \cdot nNH_3$		c	58,59,60,61,62			
$NiBr_2 \cdot nNH_3$		c	58,60,61,62			
$NiI_2 \cdot nNH_3$		c	58,60,61,62			
$NiSO_4 \cdot nNH_3$		c	62			
Ni_2P		c	63			
Ni_3P		c	63			
Ni_5P_2		c	63			
NiSb		c	64			
Ni_5Sb_2		c	64			
Ni_3C		c	65			
$NiCO_3$		c		66,67		
$Ni(CO)_4$		g			36	
		liq			36	
$NiBr_2 \cdot 6CH_3OH$		c			68	
$Ni(CN)_2$		c	69			
$Ni(CN)_4^{--}$		aq	69			
NiSi		c	70			67
Ni_2Si		c	70			67
NiSn		c	71			
Ni_3Sn		c				67
Ni_3Sn_2		c	71			
$2NI_2 \cdot PbI_2$		c	72			
$2NI_2 \cdot PbI_2 \cdot 3H_2O$		c	72			

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Table 45 (Continued)

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Table 46

SPECIFIC REFERENCES

Substance			ΔHf^{o}	ΔFf^{o}	S^{o}	C_p^{o}
Formula	Description	State				
Co		g	1		1,2	1
		c			4	3
Co^{n+}		g	1			
Co^{++}		aq	5		6	
Co^{+++}		aq		5,7		
CoO		c	8,12,13	9,10,11,13		
Co_3O_4		c	12,14,15			
CoH		c	16			
CoH_2		c	16			
$Co(OH)_2$		c	17			
$Co(OH)_3$		c	17			
CoF_2		c	18,19,20			
		aq	21			
$CoF_2 \cdot 4H_2O$		c	22			
CoF_3		c	20,23,24			
$CoCl_2$		c	17,25,26,28		24	24
		aq	17,29			
$CoCl_2 \cdot nH_2O$		c	17,25,26,28			
$CoBr_2$		c	30,31,32			
		aq	5			
$CoBr_2 \cdot 6H_2O$		c	30			
CoI_2		c	32,33,34			
		aq	35			
$Co(IO_3)_2$		c	36			
		aq	36			
$Co(IO_3)_2 \cdot nH_2O$		c	36			
CoS		c	6,17,37,38			3
Co_2S_3		c	5			
$CoSO_4$		c	39,40		39,40	
		aq	17			
$CoSO_4 \cdot nH_2O$		c	17,28,41			40
CoSe		c	31			
CoTe		c	31			
$Co(NO_3)_2$		c	5,42			
		aq	17			
$Co(NO_3)_2 \cdot 6H_2O$		c	17			
$Co(NH_3)_6^{++}$		aq		43		
$Co(NH_3)_6^{+++}$		aq		43		
$[Co(NH_3)_5H_2O]^{+++}$		aq	5	43		
$[Co(NH_3)_5NO_3]^{++}$		aq	44			

Table 46 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$[Co(NH_3)_5NO_3](NO_3)_2$		c	44			
		aq	44			
$[Co(NH_3)_5H_2O](NO_3)_3$		c	44			
		aq	44			
$[Co(NH_3)_5H_2O]F_3$		c	45			
$CoCl_2 \cdot nNH_3$		c	46,47,48			
$CoCl_2 \cdot 2N_2H_4$		c	49,50			
$[Co(NH_3)_4Cl_2]^+$		aq	51			
$[Co(NH_3)_4Cl_2]Cl$		c	51			
		aq	51			
$[Co(NH_3)_5Cl]^{++}$		aq	52	52		
$[Co(NH_3)_5Cl]Cl_2$		c	44			
		aq	44			
$CoCl_3 \cdot 6NH_3$		c	53			
$[Co(NH_3)_5H_2O]Cl_3$		c	44			
		aq	44			
$CoBr_2 \cdot nNH_3$		c	46,47,48			
$CoBr_2 \cdot 2N_2H_4$		c	49			
$[Co(NH_3)_5Br]^{++}$		aq	44			
$[Co(NH_3)_5Br]Br_2$		c	44			
		aq	44			
$[Co(NH_3)_5H_2O]Br_3$		c	44			
		aq	44			
$CoI_2 \cdot nNH_3$		c	46,48			53
$CoI_3 \cdot 6NH_3$		c				53
$CoSO_4 \cdot nNH_3$		c	47			
$[Co(NH_3)_5SO_4]^+$		aq		52		
CoP		c	54			
CoP_3		c	54			
Co_2P		c	55			
$CoAs_2 \cdot CoS_2$		c				3
CoSb		c	56			3
$CoSb_2$		c	56			
Co_3C		c	57		57	
$CoCO_3$		c	58			
$CoCl_2 \cdot nC_2H_5OH$		c	50,59			
$CoCl_2 \cdot 3C_2H_4(OH)_2$		c	50			
$CoBr_2 \cdot 2CH_3OH$		c	50			
$CoBr_2 \cdot nC_2H_5OH$		c	50,59			
$CoBr_2 \cdot nC_2H_4(OH)_2$		c	50			
$CoCl_2 \cdot C_2H_4(NH_2)_2$		c	49,50			

Table 46 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$[Co[C_2H_4(NH_2)_2]_2Cl_2]^+$		aq	51			
$[Co[C_2H_4(NH_2)_2]Cl_2]Cl$		c	51			
		aq	51			
$[Co[C_2H_4(NH_2)_2]_2Cl_2]Cl \cdot nNH_3$		c	60			
$CoCl_2 \cdot 3C_2H_4(NH_2)_2$		c	49,50			
$CoBr_2 \cdot nC_2H_4(NH_2)_2$		c	49,50			
$CoI_2 \cdot 3C_2H_4(NH_2)_2$		c	49,50			
$Co(C_2H_5SO_4)_2$	cobalt ethylsulfate	aq	17			
CoSi		c	61			
$CoSi_2$		c	61			
$CoSi_3$		c	61			
Co_2Si		c	61			
Co_2Sn		c	62,63			

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Table 47

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Fe		g	3	1	1,9	1
		c			4,41	9
Fe^{n+}		g	5,6,28			
Fe^{++}		aq	1	7		
Fe^{+++}		aq	1,8,12,13	8,11,10,15,14		
$Fe_{0.95}O$	"FeO" wustite	c	16,17,20,21	18,19,21		
Fe_2O_3	hematite	c	16,23,24,25	22	9	9
Fe_3O_4	magnetite	c	23,20,9,7,27,2,16,25	26,7,27		
$Fe(OH)^{++}$		aq	29	10,30		
$Fe(OH)_2$		c	34,31	7		
$Fe(OH)_2^+$		aq		30		
$Fe(OH)_3$		c	32,34			
FeF_2		aq	33			
FeF_3		aq	33			
$FeCl^{++}$		aq	29	35		
$FeCl_2$		c	34,38,39,40	40	36,37	36,37
		aq	1,42			
$FeCl_2 \cdot nH_2O$		c	42,43,44			
$FeCl_3$		c	44,45,46			
		aq	34,16			
$FeCl_3 \cdot 6H_2O$		c	43,44			
$FeBr^{++}$		aq	29	29		
$FeBr_2$		c	47			
		aq	48			
$FeBr_3$		aq	47			
FeI_2		c	49,47			
		aq	48,50			
FeS		c	50,52,51,53,54,55,56,57,58,59,60,7		61	61
FeS_2		c	7,62,63,64		65	65
$FeSO_4$		c	66			
		aq	34,32			
$FeSO_4 \cdot nH_2O$		c	66,67			
$Fe_2(SO_4)_3$		aq	34,32,68			
$Fe(HSO_4)_3$		aq	32			
FeSe		c	69			
		amorp	69			
FeTe		c	70			
Fe_2N		c	80,71		80	72

Table 47 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Fe_4N		c	80,73,74		80	80,72
$Fe(NO_3)_3$		aq	34			
$Fe(NO_3)_3 \cdot 9H_2O$		c	75			
$Fe(NO)Cl_2$		aq	76,77			
$FeCl_2 \cdot nNH_3$		c	78,79,81,82			
$FeCl_3 \cdot 6NH_3$		c	83			
$FeBr_2 \cdot nNH_3$		c	79,78,84,83			
$FeI_2 \cdot nNH_3$		c	79,78,84			
$Fe(NO)SO_4$		aq	76,77			
$FeSO_4 \cdot nNH_3$		c	85			
FeP		c	86,87			
FeP_2		c	90			
Fe_2P		c	89,90			
Fe_3P		c	90			
$FePO_4$		c	89			
$FePO_4 \cdot nH_2O$		c	91			
FeSb		c	92			
$FeSb_2$		c	92			
Fe_3C	cementite	c	23,50,8,94,95,96,97		93	9
$FeCO_3$	siderite	c	23,99,100,101		98,100	98
$Fe(CO)_5$		liq	23,102,103			
$Fe_2(C_2O_4)_3$	ferric oxalate	aq	104			
$Fe(HC_2O_4)_3$	ferric bioxalate	aq	104			
$Fe(C_2H_3O_2)_3$	ferric acetate	aq	34,32			
$Fe(CO)_4Br_2$		c	47			
		aq	48			
$Fe(CO)_4I_2$		c	47			
$Fe(CN)_6^{----}$		aq	106			
$Fe_4[Fe(CN)_6]_3$		c	105			
$FeCO(CN)_5^{---}$		aq	106			
$Fe_2CO(CN)_5$		c	109			
$HFe(CN)_6^{---}$		aq	106			
$H_2Fe(CN)_6^{--}$		aq	106			
$H_3Fe(CN)_6$		aq	1			
$H_3Fe(CN)_6^{-}$		aq	106			
$H_4Fe(CN)_6$		c	107			
		aq	105			
$(NH_4)_4Fe(CN)_6$		aq	108			
$(NH_4)_4Fe(CN)_6 \cdot 6H_2O$		c	108			
$HFeCO(CN)_5^{--}$		aq	106			

Table 47 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$H_2FeCO(CN)_5^-$		aq	106			
$H_3FeCO(CN)_5$		aq	109			
$H_3FeCO(CN)_5 \cdot H_2O$		c	109			
FeSi		c	110			111
Fe_3Si		c	112,113			
$FeSiO_3$		c	115,116,114			
Fe_2SiO_4		c	22	88		88
$2FeI_2 \cdot PbI_2$		c	49			
$Zn_2Fe(CN)_6$		c	108			

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33. Petersen-4
34. Thomsen-16
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36. Kelley and Moore-2
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Table 48
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Mn		g	2,3		1	1
		c	2,5		2	2
Mn^{n+}		g	4,5			
Mn^{++}		aq	1	1		
Mn^{+++}		aq	1			
MnO		g	7			
		c	8,9,10,12,13,1,14 15,16		19	19
MnO_2		c	20,22,23,16,10,15, 24	17,21	17,21,25	25
MnO_4^-		aq	1	1		
Mn_2O_3		c	10,16,24,26,27,28			32
Mn_3O_4		c	9,16,22,29,15		9	
$Mn(OH)_2$		amorp	20,33	34,35		
$Mn(OH)_3$		amorp	36			
MnF_2		c	38		37	37,55
		aq	36			
MnF_3		aq	1			
$MnCl_2$		c	20,39,40		41	41
		aq	20,39,42,43			
$MnCl_2 \cdot nH_2O$		c	20,44,45,46,47,48, 49,50			
H_2MnCl_6		aq	51			
$MnBr_2$		c	52			
		aq	1			
$MnBr_2 \cdot nH_2O$		c	53			
$MnBr_3$		aq	54			
MnI_2		c	52,56			
		aq	1			
$MnI_2 \cdot nH_2O$		c	57			
MnS		c	39,20,33,58,59,60, 70,71,72		72	72
$MnSO_4$		c	8,20,74		73	73
		aq	22,8,78	1,75,77,76		
$MnSO_4 \cdot nH_2O$		c	74,20,79,80,81,82			32
MnS_2O_6		aq	1			
$MnS_2O_6 \cdot nH_2O$		c	20		83	83
$Mn_2(SO_4)_3$		c	84			
		aq	1			
MnSe		c	54		85	85
MnTe		c			85	85
$Mn(N_3)_2$	manganese azide	c	86			
Mn_5N_2		c	87,88,89			89

Table 48 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Mn_3N_2		c	89			90
$Mn(NO_3)_2$		c	91,92			
		aq	20,92,93			
$Mn(NO_3)_2 \cdot nH_2O$		c	94			
$Mn(NO_3)_2 \cdot 6H_2O$		liq	94			95
$MnCl_2 \cdot nNH_3$		c	96,97			
$MnCl_2 \cdot 2NH_4Cl \cdot 2H_2O$		c	48			
$MnBr_2 \cdot nNH_3$		c	96,98,99			
$MnI_2 \cdot nNH_3$		c	96,98,99			
$MnSO_4 \cdot nNH_3$		c	100			
$MnSO_4 \cdot (NH_4)_2SO_4 \cdot nH_2O$		c	101,102			
$Mn_2(PO_4)_3$		c	103			
Mn_3C		c	15,10,11,29,9		25	25
$MnCO_3$		c	20,104,105,10,42, 106,11,15		19,107	19
		aq	1,61			
MnC_2O_4	manganese oxalate	c	62			
$MnC_2O_4 \cdot nH_2O$		c	62,63			
$Mn(CHO_2)_2$	manganese formate	c	63			
		aq	63			
$Mn(CHO_2)_2 \cdot 2H_2O$		c	63			
$Mn(C_2H_3O_2)_2$	manganese acetate	c	63,64			
		aq	63,64			
$Mn(C_2H_3O_2)_2 \cdot 4H_2O$		c	63,64			
$MnSiO_3$		c	15,65,66,67		68	68
		gls	65			
$MnI_2 \cdot PbI_2$		c	69			
$MnI_2 \cdot PbI_2 \cdot 3H_2O$		c	69			
$ZnMnO_4$		aq				30

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Table 48 (Continued)

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Table 49
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Cr		g	1,2,4		3	3
		c	2,3		2	2
Cr^{n+}		g	5,6			
Cr^{++}		aq	3			
$[Cr(6H_2O)]^{+++}$		aq	3			
CrO		g	7			
CrO_3		c	8,9,10,11			
		aq	21,22,23			
CrO_4^{--}		aq	3		3	
Cr_2O_3		c	8,10,11,12,13,14,15		2	2
$Cr_2O_3 \cdot nH_2O$		c	16			
$Cr_2O_7^{--}$		aq	3	3,17		
$Cr_2O_9^{--}$		aq	20			
Cr_7H_2		c	18			
$[Cr(5H_2O)(OH)]^{++}$		aq	35			
$HCrO_4^-$		aq	3	17		
$[Cr(4H_2O)(OH)_2]^+$		aq	35			
H_2CrO_4		aq	3	17		
$Cr(OH)_3$		c	19			
$[Cr(4H_2O)(OH)_2](OH)$		c	19			
$[Cr(5H_2O)(OH)](OH)_2$		c	19			
$HCr_2O_9^{--}$		aq	20			
CrF_2		c	24			
CrF_3		c	25,26			
$[Cr(6H_2O)]F_3$		aq	27			
$H_3[Cr(6H_2O)]F_6$		aq	27			
$[Cr(5H_2O)Cl]^{++}$		aq	3			
$CrCl_2$		c	3,28,19		2,30	2,30
		aq	19			
$CrCl_2 \cdot nH_2O$		c	19,29			
$[Cr(4H_2O)Cl_2]^+$		aq	3			
$CrCl_3$		c	19,28,25		2,30,31	2,30
$[Cr(4H_2O)Cl_2]Cl$		c	36			
		aq	32,33,34			
$[Cr(4H_2O)Cl_2]Cl \cdot nH_2O$		c	19,36			
$[Cr(5H_2O)Cl]Cl_2$		aq	3			
$[Cr(6H_2O)]Cl_3$		c	19			
		aq	19,35			
$CrCl_4$		g	28			
CrO_2Cl_2		liq	37,38,39			

Table 49 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$[Cr(4H_2O)(OH)_2]Cl$		aq	35			
$[Cr(5H_2O)(OH)]Cl_2$		aq	35			
$[Cr(4H_2O)Br_2]Br$		aq	19			
$[Cr(4H_2O)Br_2]Br \cdot 2H_2O$		c	19			
$[Cr(6H_2O)]Br_3$		c	19			
		aq	19			
CrI_2		c	40			
		aq	3			
$[Cr_2(6H_2O)(SO_4)_3]$		aq	41,43			
$[Cr_2(6H_2O)(SO_4)_3] \cdot 2H_2O$		c	43			
$[Cr_2(8H_2O)(SO_4)_2](SO_4)$		aq	41,43			
$[Cr_2(10H_2O)(SO_4)_2]$		aq	41,43			
$[Cr_2(12H_2O)(SO_4)_3]$		aq	41,32,43			
$[Cr_2(12H_2O)](SO_4)_3 \cdot nH_2O$		c	43,42			
CrN		c	44,45			
Cr_2N		c	45			
$(NH_4)_2CrO_4$		c	23			
		aq	21,95,3			
$(NH_4)_2Cr_2O_7$		c	47,46			
		aq	47,46,21			
CrSb		c				48
$CrSb_2$		c				48
Cr_3C_2		c	15,49		15	15
Cr_4C		c	15		15	15
Cr_7C_3		c	15		15	15
$PbCrO_4$		c	50,51			
$2CrI_2 \cdot PbI_2$		c	40			
$2CrI_2 \cdot PbI_2 \cdot 3H_2O$		c	40			
Ag_2CrO_4		c	54	52,53	54	54
$FeCr_2O_4$		c	55		56	56

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Table 50

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Mo		g	1		2	
		c			3	3
Mo^+		g	4			
MoO_2		c	5,6,7			
MoO_3		c	5,8,9,10		11	
		aq	12			
MoO_4		aq	14			
MoO_4^{--}		aq	13,14			
MoO_5		aq	14			
H_2MoO_4		c	13			
		aq	13			
$H_2MoO_4 \cdot H_2O$		c	13			
$MoCl_2$		c	2			
$MoCl_3$		c	2			
$MoCl_4$		c	2			
$MoCl_5$		c	2			
$MoCl_6$		c	2			
$MoBr_2$		c	2			
$MoBr_3$		c	2			
$MoBr_4$		c	2			
$MoBr_5$		c	2			
MoI_2		c	2			
MoI_3		c	2			
MoI_4		c	2			
MoI_5		c	2			
MoS_2		c		15,17	16	15
MoS_3		c	17			
Mo_2C		c	18	18		
$PbMoO_4$		c	19			
$CuMoO_4$		c	19			
$FeMoO_4$		c	19			
$Fe_2(MoO_4)_3$		c	19			

Table 50 (Continued)

SPECIFIC REFERENCES

REFERENCES

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3. Kelley-24
4. Bacher and Goudsmit-1
5. Mixter-10
6. Tonasaki-1
7. Chaudron-1
8. Neumann, Kröger, and Kunz-2
9. Moore and Paar-1
10. Delépine-2
11. Seltz, Dunkerley, and DeWitt-1
12. Hüttig and Kurre-1
13. Pechard-1
14. Pissarjewsky-3,5
15. Makolkin-1
16. Anderson-14
17. Kelley-22
18. Kelley-23
19. Tammann and Westerholt-1

Table 51

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
W		g	2		1,3	3
		c			4	4
W^+		g	1			
WO_2		c	5,6,7			
WO_3		c	7,8,9,10,11,12,13		13	
WO_4^{--}		aq	15			
W_2O_5		c	5,16			
H_2WO_4		c	15			
WCl_2		c	2			
WCl_4		c	2			
WCl_5		c	2			
WCl_6		c	2,18			
WBr_2		c	2			
WBr_4		c	2			
WBr_5		c	2			
WBr_6		c	2			
WI_2		c	2			
WI_4		c	2			
WI_5		c	2			
WS_2		c	17			
WC		c	19			
$CuWO_4$		c	20			
$CuWO_4 \cdot 2H_2O$		c	20			
$FeWO_4$		c	20			
$FeWO_4 \cdot 3H_2O$		c	20			
$Fe_2(WO_4)_3 \cdot 8H_2O$		c	20			

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2. Brewer et al-1
3. Calculated
4. Kelley-24
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6. Chaudron-1,2
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9. Mixter-6
10. Delépine-6
11. Moose and Parr-1
12. von Liempt-7
13. Weiss, Martin, and Stimmelmayr-1
14. Seltz, Dunkerley, and DeWitt-1
15. Hüttig and Kurre-1
16. Chaudron-1
17. Roth-1
18. Kellev-22
19. McGraw, Seltz, and Snyder-1
20. Tammann and Westerhold-1

Table 52

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
V		g	1	1,2	2	2
		c			2	2
V^{n+}		g	3			
VO		g	4			
VO_4^-		aq	5			
VO_5^-		aq	2			
V_2O_2		c	6,7			
V_2O_3		c	8,11	10	9	2
V_2O_4		c	7,8,12	13,14,15	9	2
V_2O_5		c	7,8,11		9	2
$V_3O_9^{---}$		aq	2			
$HV_6O_{17}^{---}$		aq		16		
$H_2V_6O_{17}^{--}$		aq		16		
VCl_2		c	11		17	17
VCl_3		c	11	18	17	
VCl_4		liq	11			
$VOCl_3$		c	11			
$VOSO_4$		c	14,19			
VN		c	21		20	20
NH_4VO_3		c	22		23	23
VC		c			20	20

REFERENCES

1. Brewer et al-1
2. Calculated
3. Bacher and Goudsmit-1
4. Gaydon-1
5. Pissarjewsky-5
6. Kobayashi-2
7. Mixter-14
8. Siemonson and Vlich-1
9. Anderson-11
10. Spencer and Justice-2
11. Ruff and Friedrich-1
12. Muller-6
13. Milan-1
14. Flood and Kleppa-1
15. Iwase and Nasu-1
16. Latimer-1
17. Shomate-9
18. Simons and Powell-1
19. Neumann and Sonntag-1
20. Shomate and Kelley-2
21. Kelley-23
22. Matignon-15
23. Todd and Coughlin-1

Table 53

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Cb		g	3		1,2	1,2
		c			1	
Cb_2O_4		c	4,5,6			
Cb_2O_5		c	7			8

REFERENCES

1. Calculated
2. Roth-2
3. Reimann and Grant-1
4. Sue-2
5. Sue-3
6. Grube, Kubaschewski, and Zwiauer-1
7. Becker and Roth-5
8. Kelley-18

Table 54

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ta		g	1,2,3		1,4	1,4
		c			5	5
Ta_2O_5		c	6,7,8		10	10
TaN		c	7			9
TaC		c			10	10

REFERENCES

1. Calculated
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3. Brewer et al-1
4. Kiess and Kiess-1
5. Kelley-16
6. Becker and Roth-4
7. Neumann, Kröger, and Kunz-2
8. Moose and Parr-1
9. Sato-12
10. Kelley-12

Table 55

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ti		g	2,27	1,3	1,3	1,3
		c			4	4
Ti^{n+}		g	3,5			
TiO		g	6			
		c			7	7
TiO_2	rutile, III	c	8,9,10,11,12		13	13
	anatase, III	c			13	13
		amorp	14			
Ti_2O_3		c	2	2	7	7
Ti_3O_5		c	2	2	7	7
TiF_2		c	2			
TiF_3		c	2			
TiF_4		c	2			
H_2TiF_6		aq	16			
TiCl		g	6			
$TiCl_2$		c	2			
$TiCl_3$		c	2			
$TiCl_4$		g			1,2	1,2
		liq	15		16,17,19	16,18,20
		aq	15			
$TiBr_2$		c	2			
$TiBr_3$		c	2			
$TiBr_4$		c	2			
TiI_2		c	2			
TiI_3		c	2			
TiI_4		c	2			
$TiCl_4 \cdot nH_2S$		c	21			
$TiBr_4 \cdot nH_2S$		c	21			
TiN		c	9	7	7	7
$TiCl_4 \cdot nPH_3$		c	22			
$TiBr_4 \cdot nPH_3$		c	22,2			
TiC		c	23,24	24,4	4	4
$FeTiO_3$		c	26,25	26,25	26,25	26,25

Table 55 (Continued)

SPECIFIC REFERENCES

REFERENCES

1. Calculated
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3. Bacher and Goudsmit-1
4. Kelley-2
5. Moore-1
6. Gaydon-1
7. Shomate-6
8. Roth and Becker-3
9. Neumann, Kröger, and Kunz-2
10. Roth and Wolf-1
11. Mixter-8
12. Sieverts and Gotta-3
13. Shomate-8
14. Roth and Richter-1
15. Thomsen-16
16. Latimer-2
17. Yost and Blair-1
18. Herman-1
19. Kelley-19
20. Kelley-20
21. Biltz and Keunecke-1
22. Höltje-1
23. Brantly and Beckman-1
24. Naylor-3
25. Shomate, Naylor and Boericke-1
26. Shomate-4
27. Blocher and Campbell-2

Table 56

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Zr		g	3	3	1,2	1,2
		c			1	
Zr^{n+}		g	2			
ZrO^{++}		aq	1,4			
ZrO_2		c	6,7,8,9	6,7,8,9	5	
$ZrO_2 \cdot 5H_2O$		amorp	1,4			
$ZrO(OH)_2$		c	4			
$Zr(OH)_4$		c	4			
$Zr(OH)_4 \cdot nH_2O$		c	4			
ZrF_2		c	3			
ZrF_3		c	3			
ZrF_4		c	3			
$ZrCl_2$		c	3			
$ZrCl_3$		c	3			
$ZrCl_4$		c	3	3	1	
$ZrOCl_2$		aq	10			
$ZrOCl_2 \cdot nH_2O$		c	10,14			
$ZrBr_2$		c	3			
$Zr8r_3$		c	3			
$Zr8r_4$		c	3			
$ZrOBr_2$		aq	1			
$ZrO8r_2 \cdot nH_2O$		c	1,12			
ZrI_2		c	3			
ZrI_3		c	3			
ZrI_4		c	3			
$ZrOSO_4$		aq	11,12,7,15			
$Zr(SO_4)_2$		c	11,12			
$Zr(SO_4)_2 \cdot nH_2O$		c	11,12			
ZrN		c	6	1,6	1	
$ZrO(NO_3)_2$		aq	1			
$ZrO(NO_3)_2 \cdot nH_2O$		c	13			
ZrC		c	16			
$ZrSiO_4$		c			17	17

Table 56 (Continued)

SPECIFIC REFERENCES

REFERENCES

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3. Brewer et al-1
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5. Kelley-2
6. Neumann, Kröger, and Kunz-2
7. Roth, Börger and Siemonsen-2
8. Roth and Becker-3
9. Weiss and Neumann-1
10. Chauvenet-5
11. Beck-1
12. Chauvenet-6
13. Chauvenet and Nicolle-1
14. Chauvenet-3
15. Chauvenet-7
16. Prescott-1
17. Kelley-14

Table 57

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Hf		g			1	
		c			2	2
HfO_2		c	3			

REFERENCES

1. Calculated
2. Kelley-24
3. Roth and Becker-3

Table 58

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
B		g	2	2	1,2	2
		c			3	3
		amorp	2		3	3
B^{n+}		g	1			
B_2		g	5,6			
BO		g	7	2	2	2
BO_2^-		aq	8			
B_2O_3		c	8		3,9	
		gls	8		8	
BH		g	8	2	2	2
B_2H_6	diborane	g	11		12	12
B_5H_9	pentaborane	g	11		3	3
		liq	3		3	
$B_{10}H_{14}$	decaborane	c	2			
HBO_2		c	14,15	14		
		aq	8			
$H_2BO_3^-$		aq	8	8		
H_3BO_3		c	14,16		3	3
		aq	2,9,19	17,18		
$H_2B_4O_7$		c	15			
BF		g	7			
BF_3		g	20		21	
		aq	22			
BF_4^-		aq	2	23		
HBF_4		aq	22			
BCl		g	2,5,7			2
BCl_3		g	24	21		2
		liq	25,26	21		
BBr		g	2			
BBr_3		g	2,27,24	21		2
		liq	24,27	24		
B_2S_3		c	28,29			
BN		g	5			
		c		30		30
$B_3N_3H_6$	hexahydro-s-triaza-triborine, borazole	g			31	31
NH_4BO_2		aq	32			
NH_4BO_3		aq	32			
$NH_4BO_3 \cdot H_2O$		c	32			
$(NH_4)_2HBO_3$		aq	10			
B_4C		c			4	4
$B(CH_3)_3$		liq	13			

Table 58 (Continued)

SPECIFIC REFERENCES

REFERENCES

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2. Calculated
3. Johnston et al-1
4. Kelley-24
5. Gaydon-1
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7. Herzberg-9
8. Owen-1
9. Southard-2
10. Berthelot-4
11. Prosen, Johnson, and Yenchius-1
12. Webb, Neu, and Pitzer-1
13. Long and Norrish-1
14. von Stackelberg, Quatram, and Dressel-1
15. Gilbert and Levi-1
16. Roth, Börger, and Bertram-1
17. Seidell-1
18. Blasdale and Slansky-1
19. Torgeson and Shomate-1
20. Hammerl-2
21. Spencer-2
22. Thomsen-16
23. Latimer-1
24. Kelley-19
25. Berthelot-50,155
26. Troost and Hautefeuille-4,5
27. Berthelot-50
28. Sabatier-3,6
29. Stock and Popenberg-1
30. Kelley-23
31. Crawford and Edsall-1
32. Tanatar-10

Table 59

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Al		g		2,3,4	1,5	1,5
		c			6	6
Al^{n+}		g	1			
Al^{+++}		aq	7	5,7		
AlO		g	8,9			
AlO_2^-		aq	10			
Al_2O_3	corundum	c	11,13		12	12
$Al_2O_3 \cdot H_2O$		c	5		14	14
$Al_2O_3 \cdot 3H_2O$	hydrargillite	c	10,15		14	14
AlH		g	9,16			
$Al(OH)_3$		amorp	17,18,19			
AlF		g	9			
AlF_3		c	5,19		3	
		aq	20,21			
$AlF_3 \cdot nH_2O$		c	19	22,23	5	
H_3AlF_6		aq	24			
AlCl		g	9,16			
$AlCl_3$		c	25,26		3	3
		aq	27,28,29,30,31			
$AlCl_3 \cdot 6H_2O$		c	33	23,32		
Al_2Cl_6		g	4,34			
AlBr		g	9,16			
$AlBr_3$		c	34,35		3	34
		aq	17			
AlI		g	9,16			
AlI_3		c	34,35		5	
		aq	17			
Al_2S_3		c	36		5	
$Al_2(SO_4)_3$		c	25		37	37
		aq	18			
$Al_2(SO_4)_3 \cdot nH_2O$		c	13		37	37
$AlCl_3 \cdot nSO_2$		c	19			
$AlCl_3 \cdot nH_2S$		c	19,38			
$AlBr_3 \cdot H_2S$		c	19,38			
$AlI_3 \cdot nH_2S$		c	19,38			
AlN		c	39		41	40
$Al(NO_3)_3$		aq	29	23,32		
$Al(NO_3)_3 \cdot nH_2O$		c	25		5,42	42
$AlF_3 \cdot 2NH_4F \cdot 3/2H_2O$		c	19			
$AlCl_3 \cdot nNH_3$		c	19,35			19
$AlCl_3 \cdot NH_4Cl$		c	5,19			

Table 59 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$AlCl_3 \cdot NH_4Cl \cdot 6NH_3$		c	5,19			
$AlBr_3 \cdot nNH_3$		c	35			
$AlI_3 \cdot nNH_3$		c	35			
$(NH_4)Al(SO_4)_2$		c	13		13	13
		aq	13,43			
$(NH_4)Al(SO_4)_2 \cdot 12H_2O$		c	13		13	13
$(NH_4)_2O \cdot 3Al_2O_3 \cdot 4SO_3 \cdot 6H_2O$	ammonium alunite	c	13			
$(NH_4)_2O \cdot 3Al_2O_3 \cdot 5SO_3 \cdot 9H_2O$	ammonium basic alum	c	13			
$AlCl_3 \cdot PH_3$		c	44			
$AlBr_3 \cdot PH_3$		c	44			
$AlI_3 \cdot PH_3$		c	44			
Al_4C_3		c	45		46	46
$Al(CH_3)_3$		liq	47			
Al_2SiO_5	andalusite	c	48		49	49
	disthene	c	48		49	49
	sillimanite	c	48		49	49
$2AlI_3 \cdot 3PbI_2$		c	50			
$2AlI_3 \cdot 3PbI_2 \cdot 10H_2O$		c	50			
AlCu		c	51,52,53,54			
$AlCu_2$		c	51,52			
Al_2Cu		c	51,53			
$AlCl_3 \cdot AgCl$		c	19			
AlNi		c	51			
$AlNi_3$		c	51			
Al_2Ni		c	51			
Al_3Ni		c	51			
AlCo		c	18,29,51,54,55			
Al_4Co		c	51,54			
Al_5Co_2		c	18,29,51,54,55			
AlFe		c	51			
Al_2Fe		c	51			
Al_3Fe		c	51,29,56,57			

Table 59 (Continued)

SPECIFIC REFERENCES

REFERENCES

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2. Baur and Brunner-1
3. Brewer et al-1
4. Kelley-19
5. Calculated
6. Giauque and Meads-1
7. Latimer and Greensfelder-1
8. Roy-1
9. Gaydon-1
10. Roth, Wirths, and Berendt-1
11. Snyder and Seltz-1
12. Johnston et al-1
13. Kelley, Shomate, Young, Naylor, Salo, and Huffman-1
14. Shomate and Cook-1
15. Roth and Richter-1
16. Herzberg-9
17. Berthelot-50
18. Thomsen-16
19. Baud-1
20. Bichowsky and Rossini-1
21. Fricke and Wullhorst-1
22. Ehret and Frere-1
23. Latimer-1
24. Mulert-1
25. Young-2
26. Roth and Büchner-1
27. Canneri and Rossi-1
28. Roth and Wolf-3
29. Young-1
30. Biltz and Hohorst-1
31. Richard, Rowe, and Burgess-1
32. Seidell-1
33. Sabatier-2
34. Fischer-2
35. Klemm and Tanke-1
36. Korshunov-4
37. Shomate-2
38. Biltz and Keunecke-1
39. Neumann, Kröger, and Haebler-2
40. Sato-6
41. Kelley-22
42. Shomate and Kelley-1
43. Perreu-13
44. Höltje-1
45. Meichsner and Roth-1
46. Kelley-23
47. Long and Norrish-1
48. Neumann-2
49. Kelley-24
50. Mosnier-1
51. Oelsen and Middel-1
52. Oelsen-1
53. Rolla-2
54. Weibke and Kubaschewski-1
55. Biltz, Wagner, Pieper, and Holverscheit-1
56. Biltz and Hasse-1
57. Roth, Umbach, and Chale-1

Table 60

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Sc		g	1		2,3	2,3
		c				
Sc^{n+}		g	3			
Sc^{+++}		aq	7	5		
Sc_2O_3		c				6
$ScCl_3$		c	8			
		aq	7	2		
$ScBr_3$		c	8			
		aq	2	2		
$Sc_2(SO_4)_3$		c				6
$ScF_3 \cdot 3NH_4F$		c				4
$Sc_2(C_2O_4)_3$	scandium oxalate	c				9
$Sc(CHO_2)_3$	scandium formate	c				9

REFERENCES

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2. Calculated
3. Sitterly-1
4. Kelley-25
5. Noddack and Brukl-1
6. Nilson and Pettersson-2
7. Bommer and Hohmann-2
8. Bommer and Hohmann-3
9. Turska-1

Table 61

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Y		g	4		2,3	2,3
		c				
Y^{n+}		g	3			
Y^{+++}		aq	8	5		
Y_2O_3		c				6
$Y(OH)_3$		c	7	9		
YCl_3		c	10			
		aq	8	2		
YI_3		c	12			
		aq	2	2		
$Y_2(SO_4)_3$		c				6
		aq	7,2	2		
$Y_2(SO_4)_3 \cdot 8H_2O$		c	7	1,11,13		
$Y(NO_3)_2$		c				1
$Y_2(MoO_4)_3$		c				1

REFERENCES

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2. Calculated
3. Sitterly-1
4. Brewer et al-1
5. Noddack and Brukl-1
6. Nilson and Pettersson-2
7. Thomsen-16
8. Bommer and Hohmann-2
9. Endres-1
10. Bommer and Hohmann-3
11. Seidell-1
12. Hohmann and Bommer-1
13. Jackson and Reinácker-1

Table 62

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Lu		g	2		2,3	2,3
		c				
Lu^{n+}		g	3			
Lu^{+++}		aq	4	5		
$LuCl_3$		c	6			
		aq	4	2		
LuI_3		c	1			
		aq	2	2		
$Lu_2(SO_4)_3$		aq	2	2		
$Lu_2(SO_4)_3 \cdot 8H_2O$		c		7		

REFERENCES

1. Hohmann and Bommer-1
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-2
7. Jackson and Reinäcker-1

Table 63

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Yb		g	2	2,3	2,3	
		c				
Yb^{n+}		g	3			
Yb^{++}		aq		1,4,5		
Yb^{+++}		aq	2	5		
$YbCl_3$		c	6			
		aq	2	5		
$Yb_2(SO_4)_3$		aq	2	2		
$Yb_2(SO_4)_3 \cdot 8H_2O$		c		7		

REFERENCES

1. Laitinen and Taebel-1
2. Calculated
3. Sitterly-1
4. Laitinen-1
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Jackson and Reinåcker-1

Table 64

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Tm		g			2,3	
		c				
Tm^+		g				
Tm^{+++}		aq	4	5		
$TmCl_3$		c	6			
		aq	4	2		
TmI_3		c	1			
		aq	2	2		

REFERENCES

1. Hohmann and Bommer-1
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3

Table 65

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Er		g				
		c				
Er^+		g				
Er^{+++}		aq	4	5		
Er_2O_3		c				3
$Er(OH)_3$		c	1			
$ErCl_3$		c	6			
		aq	4	2		
ErI_3		c	8			
		aq	2	2		
$Er_2(SO_4)_3$		c				3
		aq	2	2		
$Er_2(SO_4)_3 \cdot 8H_2O$		c		7		3
$Er(C_2H_3O_2)_3$	erbium acetate	aq	2			
$Er(C_2H_3O_2)_3 \cdot 4H_2O$		c	1			

REFERENCES

1. Thomsen-16
2. Calculated
3. Nilson and Pettersson-2
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Jackson and Reinäcker-1
8. Hohmann and Bommer-1

Table 66

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Ho		g				
		c				
Ho^+		g				
Ho^{+++}		aq	4	5		
$HoCl_3$		c	6			
		aq	4	2		
HoI_3		c	1			
		aq	2	2		
$Ho_2(SO_4)_3$		aq	2	2		
$Ho_2(SO_4)_3 \cdot 8H_2O$		c		3		

REFERENCES

1. Hohmann and Bommer-1
2. Calculated
3. Jackson and Reinäcker-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3

Table 67

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Dy		g	2			
		c				
Dy^{n+}		g	3			
Dy^{+++}		aq	4	5		
$Dy(OH)_3$		c		7		
$DyCl_3$		c	6			
		aq	4	2		
DyI_3		c	8			
		aq	2	2		
$Dy_2(SO_4)_3$		aq	2	2		
$Dy_2(SO_4)_3 \cdot 8H_2O$		c		1		

REFERENCES

1. Jackson and Reinacker-1
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Endres-1
8. Hohmann and Bommer-1

Table 68

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Tb		g	2			
		c				
Tb^{n+}		g	3			
Tb^{+++}		aq	2	5		
$TbCl_3$		c	1			
		aq	2	2		
$Tb_2(SO_4)_3$		aq	2	2		
$Tb_2(SO_4)_3 \cdot 8H_2O$		c		4		

REFERENCES

1. Bommer and Hohmann-3
2. Calculated
3. Sitterly-1
4. Jackson and Reinäcker-1
5. Noddack and Brukl-1

Table 69

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Gd		g	2		2,3	2,3
		c			2	
Gd^{n+}		g	3			
Gd^{+++}		aq	4	5	2	
$Gd(OH)_3$		c		7		
$GdCl_3$		c	6			
		aq	4	2		
GdI_3		c	8			
		aq	2	2		
$Gd_3(SO_4)_2$		aq	2	2		
$Gd_3(SO_4)_2 \cdot 8H_2O$		c		10,11	1,12	9,12,13

REFERENCES

1. Kelley-24
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Endres-1
8. Hohmann and Bommer-1
9. Ahlberg and Clark-1
10. Jackson and Reinäcker-1
11. Seidell-1
12. Coulter and Latimer-1
13. Giauque and Clark-1

Table 70

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Eu		g	2		2,3	2,3
		c				
Eu^{n+}		g	3			
Eu^{++}		aq		5,7,8		
Eu^{+++}		aq	2	5		
$EuCl_3$		c	6			
		aq	2	2		
$Eu_2(SO_4)_3$		aq	2	2		
$Eu_2(SO_4)_3 \cdot 8H_2O$		c		4		1

REFERENCES

1. Kelley-25
2. Calculated
3. Sitterly-1
4. Jackson and Reinäcker-1
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. McCoy-1
8. Laitinen and Taebel-1

Table 71

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Sm		g	2		2,3	2,3
		c				
Sm^{n+}		g	3			
Sm^{+++}		aq	2	5		
$Sm(OH)_3$		c		7		
$SmCl_3$		c	6			
		aq	2	2		
SmI_3		c	8			
		aq	2	2		
$Sm_2(SO_4)_3$		aq	2	2		
$Sm_2(SO_4)_3 \cdot 8H_2O$		c		9		
$SmCl_3 \cdot nNH_3$		c	1,4			

REFERENCES

1. Matignon and Trannoy-2
2. Calculated
3. Sitterly-1
4. Matignon-8
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Endres-1
8. Hohmann and Bommer-1
9. Jackson and Reinäcker-1

Table 72

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Pm		g				
		c				
Pm^+		g				
Pm^{+++}		aq	1			
$PmCl_3$		c	1			
$PmCl_3$		aq	1			

REFERENCES

1. Calculated

Table 73

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Nd		g	2			
		c				1
Nd^{n+}		g	3			
Nd^{+++}		aq	4	5		
Nd_2O_3		c	13,14			
$Nd(OH)_3$		c		7		
$NdCl_3$		c	6,13			
		aq	4	2		
$NdCl_3 \cdot 6H_2O$		c	13			
NdI_3		c	8,15,9			
		aq	2	2		
Nd_2S_3		c	15			
$Nd_2(SO_4)_3$		c	15,9			
		aq	15,9,2	2		
$Nd_2(SO_4)_3 \cdot 5H_2O$		c	15,9			
$Nd_2(SO_4)_3 \cdot 8H_2O$		c	15,9	10,11		
$NdCl_3 \cdot nNH_3$		c	12			

REFERENCES

1. Kelley-25
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Endres-1
8. Hohmann and Bommer-1
9. Matignon-22
10. Jackson and Reinäcker-1
11. Seidell-1
12. Matignon and Trannoy-2
13. Matignon-5
14. Muthmann and Weiss-1
15. Matignon-11

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Table 74

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Pr		g	2			
		c				12
Pr^{n+}		g	3			
Pr^{+++}		aq	4,1,9	5		
PrO_2		c	15			
Pr_2O_3		c	13,14			
Pr_6O_{11}		c	15			
$Pr(OH)_3$		c		7		
$PrCl_3$		c	1,6			
		aq	4,9	2		
$PrCl_3 \cdot nH_2O$		c	13			
PrI_3		c	8			
		aq	2	2		
$Pr_2(SO_4)_3$		aq	2	2		
$Pr_2(SO_4)_3 \cdot 8H_2O$		c		11,10		
$Pr(NO_3)_2$		aq	15			
$PrAl_4$		c	9			

REFERENCES

1. Sieverts and Gotta-2
2. Calculated
3. Sitterly-1
4. Bommer and Hohmann-2
5. Noddack and Brukl-1
6. Bommer and Hohmann-3
7. Endres-1
8. Hohmann and Bommer-1
9. Canneri and Rossi-3
10. Jackson and Reinäcker-1
11. Seidell-1
12. Kelley-25
13. Matignon-6
14. Muthmann and Weiss-1
15. Prandtl and Hüttner-1

Table 75

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ce		g	1			
		c			2	3
Ce^{n+}		g	4			
Ce^{+++}		aq		5,6,7,9	8	
Ce^{++++}		aq	10,11			
CeO_2		c	12,13,14			15
$CeO_3 \cdot 2H_2O$		c	16			
Ce_3H_8		c	17			
$Ce(OH)^{+++}$		aq		9		
$Ce(OH)_2^{++}$		aq		9		
$CeCl_3$		c	17,18,19,20			
		aq	19		22	
CeI_3		c	19			
		aq	19		22	
CeS_2		c	23			
Ce_2S_3		c	23			
$Ce(SO_4)_2$		c	16,24			
$Ce_2(SO_4)_3$		c				15
		aq	25	26		
$Ce_2(SO_4)_3 \cdot nH_2O$		c	25	26		
CeN		c	20			27
$CeCl_3 \cdot nNH_3$		c	28			
$CeHg_4$		c	29			
$Ce_2(MoO_4)_3$		c	30			
$CeAl_4$		c	18,21,31			
Ce_3Al		c	18,21,31			

REFERENCES

1. Brewer et al-1
2. Kelley-24
3. Kelley-25
4. Sitterly-1
5. Noddack and Brukl-1
6. Müller and Schmidt-1
7. Walters and de Vries-1
8. Kapustinskiĭ-12
9. Sherrill, King, and Spooner-1
10. Fontana-1
11. Evans-1
12. Moose and Parr-1
13. Hirsch-1
14. Muthmann and Weiss-1
15. Nilson and Pettersson-2
16. Pissarjewsky-1
17. Sieverts and Gotta-2
18. Biltz and Pieper-1
19. Bommer and Hohmann-2
20. Neumann, Kröger, and Kunz-1

Table 75 (Continued)

SPECIFIC REFERENCES

REFERENCES

21. Muthmann and Beck-1
22. Calculated
23. Biltz-1
24. Beck-1
25. Thomsen-16
26. Seidell-1
27. Kellenberger and Kraft-1
28. Barre-2
29. Biltz and Meyer-2
30. Cane-1
31. Biltz and Hohorst-1

Table 76

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
La		g	2		1	
		c			3	4
La^{n+}		g	1			
La^{+++}		aq	1	5	6	
La_2O_3		c	7,8,9,10,11,12,13			14
La_3H_8		c	15			16
$La(OH)_3$		c		17		
$LaCl_3$		c	15,18,19,20			
		aq	12,18		21	
LaI_3		c	18			
		aq	18		21	
LaS_2		c	13			
La_2S_3		c	13			
$La_2(SO_4)_3$		c				14
		aq	22	21		
$La_2(SO_4)_3 \cdot 9H_2O$		c		21		14
LaN		c	19,23			16
$La(NO_3)_3 \cdot 6H_2O$		c				4
$La(CHO_2)_3$	lanthanum formate	c				24
$La_2(CN_2)_3$	lanthanum cyanamide	c	25			
$La_2(MoO_4)_3$		c				26
$LaAl_2$		c	20,27			
$LaAl_4$		c	20,27			

REFERENCES

1. Sitterly-1
2. Brewer et al-1
3. Kelley-24
4. Kelley-25
5. Noddack and Brukl-1
6. Kapuetinskiĭ-12
7. Roth, Wolf, and Fritz-1
8. Moose and Parr-1
9. Muthmann and Weiss-1
10. Kremers and Stevens-1
11. Beck-1
12. Matignon-9
13. Biltz-4
14. Nilson and Pettersson-2
15. Sieverts and Gotta-2
16. Kellenberger and Kraft-1
17. Sadolin-1
18. Bommer and Hohmann-2
19. Neumann, Krőger, and Kunz-1
20. Canneri and Rossi-1
21. Calculated
22. Thomsen-16
23. Neumann, Krőger, and Hoebler-1
24. Turska-1
25. Hartmann, Eckelmann, and Beerman-1
26. Cane-1
27. Muthmann and Beck-1

Table 79

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Pu		c				
Pu^{+++}		aq	1,3			
Pu^{++++}		aq	1,2,3,4			
PuO_2		c	1,5,6			
PuO_2^{+}		aq	5			
PuO_2^{++}		aq	3,5			
PuH_2		c	7			
PuF_3		aq	1,2			
$PuCl_3$		c	2			
PuOCl		c	2			
$PuBr_3$		c	1,2			
		aq	1			
PuI_3		c	5			

REFERENCES

1. Calculated
2. Seaborg, Manning, and Katz-1
3. Evans-1
4. Connick et al-1
5. Brewer et al-1
6. Abraham and Davidson-1
7. Johns-1

Table 80

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Np		c				
Np^{+++}		aq	1,2,3			
Np^{++++}		aq	1,2,3			
NpO_2^+		aq	1,2,3			
NpO_2^{++}		aq	1,2,3			
NpF_3		c	1			
NpF_4		c	1			
$NpCl_3$		c	1			
		aq	1			
$NpCl_4$		c	1,2			
$NpCl_5$		c	1			
$NpBr_3$		c	1			
$NpBr_4$		c	1			
NpI_3		c	1			

REFERENCES

1. Calculated
2. Brewer et al-1
3. Seaborg, Manning and Katz-1
4. Westrum-1

Table 81
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
U		g	1,2			
		c			1	3,4
U^+		g	2			
U^{+++}		aq	5	1		
U^{++++}		aq	5	1		
UO_2		c	6		1	
UO_2^+		aq	1	7		
UO_2^{++}		aq	5		5	
UO_3		c	6,8		1	
$UO_3 \cdot nH_2O$		c	8,9			
$UO_4 \cdot 2H_2O$		c	10			
U_3O_8		c	1,6			
UH_3		c	11			
$U(OH)^{+++}$		aq	5	5		
UF_3		c	1		12	
UF_4		c	1,14		13	12
UF_5		c	1		1	
UF_6		g	1		13,15	
		c	15		13	
UO_2F_2		c			16	16
UCl_3		c	1,5,17		1	
UCl_4		c	1,17		1	
UCl_5		c	1		1	
UCl_6		c	1		1	
UO_2Cl_2		aq	9			
UBr_3		c	1		1	
UBr_4		c	1		1	
UO_2Br_2		aq	9			
UI_3		c	1		1	
UI_4		c	1		1	
UCl_3I		c	1		1	
UBr_3I		c	1			
UO_2SO_4		aq	9	12		
$UO_2SO_4 \cdot 3H_2O$		c	9,19,21	19,20		
$U(SO_4)_2$		c	18			
UN		c	1		1	
U_2N_3		c	1		1	
$UO_2(NO_3)_2$		c	8		12	
		aq	12		12	
$UO_2(NO_3)_2 \cdot nH_2O$		c	8,22	23	12	

Table 81 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
UC_2		c	1,24,25		12	
$UO_2(C_2H_3O_2)_2$	uranyl acetate	aq	9			
$UO_2(C_2H_3O_2)_2 \cdot 2H_2O$		c	9			
$UO_2(C_2H_3O_2)_2 \cdot NH_4 C_2H_3O_2 \cdot 6H_2O$		c	9			
UO_2CrO_4		aq	12			
$UO_2CrO_4 \cdot 5\ 1/2H_2O$		c	9			

REFERENCES

1. Brewer et al-1
2. Sitterly-1
3. Moore and Kelley-2
4. Ginnings and Corruccini-2
5. Fontana-1
6. Mixter-14
7. Kraus and Nelson-1
8. de Forcrand-1
9. Aloy-1
10. Pissarjewsky-3
11. Spedding, Newton, Warf, Johnson, Nottorf, Johns, and Daane-1
12. Calculated
13. Brickwedde, Hoge, and Scott-1
14. Domange and Wohlhuter-1
15. Weinstock and Crist-1
16. Wacker and Cheney-1
17. Biltz and Fendius-1
18. Beck-1
19. de Coninck-2
20. Secoy-1
21. Colani-1
22. Coulter, Pitzer, and Latimer-1
23. Latimer-1
24. Heuse and Otto-2
25. Kelley-23

Table 83

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Th		g			1	
		c			3	4
Th^{++++}		aq	2,1			
ThO_2		c	7,8,9,10			11
ThH_4		c	12			
$Th(OH)_4$		c	2			
ThF_4		c	14			
$ThCl_4$		c	14			
		aq	7,8			
$ThCl_4 \cdot nH_2O$		c	8			
$ThOCl_2$		c	8			
$Th(OH)Cl_3 \cdot H_2O$		c	8			
$ThBr_4$		c	14			
		aq	8			
$ThBr_4 \cdot nH_2O$		c	8			
$ThOBr_2$		c	8			
ThI_4		c	8,14			
$ThOI_2$		c	8			
$ThOI_2 \cdot 3\ 1/2H_2O$		c	8			
$Th(OH)I_3 \cdot 10H_2O$		c	8			
Th_2S_3		c	14			
$ThOSO_4$		c	13			
$Th(SO_4)_2$		c	16			4
		aq	1,15			
$Th(SO_4)_2 \cdot nH_2O$		c	15			
Th_3N_4		c	10,17			18
$Th(NO_3)_4$		aq	19			
$Th(NO_3)_4 \cdot NH_4NO_3 \cdot nH_2O$		c	20			
$5Th(NO_3)_4 \cdot 4NH_4NO_3 \cdot nH_2O$		c	20			
$ThCl_4 \cdot NH_4Cl$		c	8,21			
$ThCl_4 \cdot 2NH_4Cl \cdot 10H_2O$		c	8,21			
$ThCl_4 \cdot nNH_3$		c	8,21			
$[Th(NH_3)_6]Cl_4$		c	8,21			
$[Th(NH_3)_6]Cl_4 \cdot nNH_3$		c	8,21			
ThC_2		c	5,6			

Table 83 (Continued)

SPECIFIC REFERENCES

REFERENCES

1. Calculated
2. Sitterly-1
3. Kelley-24
4. Kelley-25
5. Kelley-23
6. Prescott and Hincke-1
7. von Wartenberg-15
8. Chauvenet-2
9. Roth and Becker-4
10. Neumann, Kröger, and Kunz-2
11. Southard-1
12. Matignon and Delepine-1
13. Wöhler, Pluddemann, and Wöhler-1
14. Brewer et al-1
15. Koppel-1
16. Beck-1
17. Neumann, Kröger, and Haebler-3
18. Sato-19
19. Fricke-1
20. Braseliten-1
21. Chauvenet-1

Table 85
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Be		g	3	3	1	1
		c			2	2
Be^{n+}		g	4			
Be^{++}		aq	1			
BeO		g	1,7,8,9		5,6	5
		c	10,11,12,13,14,16,26		2,17	2
BeO_2^{--}		aq	18,19			
BeH		g	20		1,6,20	1,6,20
$Be(OH)_2$		c	21,18,19			
$BeO \cdot Be(OH)_2$		c	22,23			
BeF_2		aq	18,19,24,25,26,27			
$BeCl_2$		c	14			
		aq	18,19,29,30			
	in C_2H_5 I		31			
$BeCl_2 \cdot 4H_2O$		c	29			
$BeBr_2$		c	29,30			
		aq	1			
BeI_2		c	29,30			
		aq	1			
BeS		c	32			
$BeSO_4$		c	18,19,33,34			
		aq	22,35			
$BeSO_4 \cdot nH_2O$		c	18,19,36,22,33			
$BeSO_4 \cdot 4BeO$		c	34,37			
$BeBr_2 \cdot 2H_2S$		c	38			
$BeI_2 \cdot 2H_2S$		c	38			
Be_3N_2		c	12,16			
$Be(NO_3)_2$		aq	22,18			
$BeCl_2 \cdot nNH_3$		c	29,30			
$BeBr_2 \cdot nNH_3$		c	29,30			
$BeI_2 \cdot nNH_3$		c	29,30		17	17
Be_2SiO_4		c	17			
$BeMoO_4$		c	15			
$Be(AlO_2)_2$		c				28

Table 85 (Continued)

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SERIES I

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Table 86

SPECIFIC REFERENCES

Substance			ΔHf°	ΔGf°	S°	C_p°
Formula	Description	State				
Mg		g	2,3,4,5		1	1
		c			6	6
Mg^{n+}		g	7			
Mg^{++}		aq	1	1		
MgO		c	8,9,10,11,12		6,13,14	6,13,14
MgO_2		c	15			
MgH		g	17		1,16,17	
$Mg(OH)_2$		c	20,21,22,23,24,14,25,26	18,19,1	14	14
MgF		g	17		1,16	1,16
MgF_2		c	22,27,28		29	29
MgCl		g	17			
$MgCl_2$		c	8,30,31		32	32
		aq	20,8,14,23,24,33,34,35,36,37,38,39,40,41,42,	1		
$MgCl_2 \cdot nH_2O$		c	8,43,20,44,45,46,47,49,50,51		32,48	32,48
$MgO \cdot MgCl_2$		c	52			
$MgO \cdot MgCl_2 \cdot nH_2O$		c	53			
$Mg(ClO_4)_2$		c	1,53			
		aq	1,53			
$Mg(ClO_4)_2 \cdot nH_2O$		c	1,53			
Mg(OH)Cl		c	54			
$MgBr_2$		c	1,55			
		aq	55	1,56		
$MgBr_2 \cdot 6H_2O$		c	57	1		
MgI_2		c	1,58			
		aq	1,58	1		
MgS		c	60,			
$MgSO_3$		c	63			
$MgSO_3 \cdot nH_2O$		c	63			
$Mg(O_4$		c	20,42,64,65		66	
			20,67,68			
			4,69,70,71,72			
						75
					81	81
				1		

Table 86 (Continued)
SPECIFIC REFERENCES

Substance			ΔH_f°	ΔF_f°	S°	C_p°
Formula	Description	State				
$Mg(NH_3)_2^{++}$		aq	1,21			
$MgCl_2 \cdot nNH_3$		c	87			
$MgCl_2 \cdot 2NH_3$		aq	21			
$MgBr_2 \cdot nNH_3$		c	87			
$MgI_2 \cdot 2NH_3$		c	87			
$Mg(NH_3)_2SO_4$		aq	21			
$3MgSO_3 \cdot (NH_4)_2SO_3 \cdot nH_2O$		c	88			
$Mg_3(PO_4)_2$		c	89			
$MgHPO_4$		aq	90			
$Mg(NH_4)PO_4 \cdot 6H_2O$		c	91			
$Mg_3(AsO_4)_2$		c	92			
$MgHAsO_4$		aq	92			
$Mg(H_2AsO_4)_2$		aq	92			
$Mg(NH_4)AsO_4 \cdot 6H_2O$		c	92			
Mg_3Sb_2		c	93			
Mg_3Bi_2		c	94,95,96			
$MgCO_3$		c	97,98,10[illegible]		99	
$Mg(C_2H_3O_3)_2$	magnesium glycollate	c	101			
		aq	20,101			
$Mg(C_2H_3O_3)_2 \cdot 2H_2O$		c	101,20			
$MgCl_2 \cdot 6CH_3OH$		c	102			
$MgCl_2 \cdot 6C_2H_5OH$		c	102			
$MgCN_2$	magnesium cyanamide	c	103,104			
$Mg(CN)_2$		aq	105			
$Mg(NO_3)_2 \cdot 6CH_3OH$		c	102			
$Mg(NO_3)_2 \cdot 6C_2H_5OH$		c	102			
Mg_2Si		c	106			
$MgSiO_3$		c	22	[illegible]	[illegible]	
Mg_2SiO_4	[illegible]rite	c	22	[illegible]	[illegible]	
Mg_2Sn		c	93,10[illegible],107,[illegible]			
Mg_3P_2		c	95			
$3MgI_2 \cdot PbI_2$		c	111			
$MgTl$		c	110			
$MgZn_2$		c	113			
$MgCd$		c	113			
$MgBr_2 \cdot nHgBr_2$		[illegible]	114			
$Mg(Cl)_2 \cdot nHg(Cl)_2$		[illegible]	115			
$2Mg(Cl)_2 \cdot Hg(Cl)_2$		[illegible]	115			
$2Hg(CN)_2 \cdot Mg(CN)_2$		[illegible]	115			
$MgCrO_4$		[illegible]	116			
		aq	116			

Table 86 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$MgCr_2O_4$		c			117	117
$MgTiO_3$		c			118	118
Mg_4Al_3		c	96,113			
MgPr		c	119			
Mg_3Pr		c	119			
MgLa		c	40			
Mg_3La		c	40			
$2La(NO_3)_2 \cdot 3Mg(NO_3)_2 \cdot 24H_2O$		c	120		120	120
MgCe		c	110			
$MgCe_3$		c	110			

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Table 87

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ca		g	1,2,3,4,5		2	6
		c				
Ca^{n+}		g	1		7,8	6
Ca^{++}		aq	6	10		
CaO		c	11,12,13,14,15,16,17,18		24	24
CaO_2		c	19,20,21			
$CaO_2 \cdot 8H_2O$		c	20			
CaH		g	22,23,24			
CaH_2		c	11,25	8,25		
$Ca(OH)_2$		c	16,18,27,28		10	29
		aq	30		6	
$Ca(OH)_2 \cdot H_2O_2$		c	20			
CaF		g	24,31,32			
CaF_2		c	33,34,35	35	36	36
		aq	6	37		
CaCl		g	38,39			
$CaCl_2$		c	40,41,42,43,44		45	45
		aq	46,47,48,49,50,51	6		
[illegible]		c	51, 29,41			
[illegible]		c	53			
		aq	53			
[illegible]		c	53			
[illegible]		aq	54			
[illegible]		c	55			
[illegible]		c	55,56,57			
[illegible]		c	41,51,58		6	
		aq	6,47,57		6	
[illegible]		c	51			
[illegible]		c	57			
[illegible]		c	51,57,58,59		6	
		aq	6,57			
[illegible]		c	57			
[illegible]		c	57			
[illegible]		c	[illegible]		[illegible]	[illegible]
		aq	51			
[illegible]		c	[illegible]		[illegible]	[illegible]
[illegible]		c	[illegible]	35	[illegible]	[illegible]
[illegible]		c	[illegible]	37	[illegible]	[illegible]
		aq	[illegible]		[illegible]	[illegible]
[illegible]		c	[illegible]	51	[illegible]	[illegible]

Table 87 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
CaS_2O_3		aq	6,64			
$CaS_2O_3 \cdot 6H_2O$		c		45,73		
CaSe		c	74		6	
CaTe		c			6	
CaN_6	calcium azide	c	75			
Ca_3N_2		c	76,77,78		6	79
$CaN_2O_2 \cdot 4H_2O$		c	80			
$Ca(NO_2)_2$		c	81			
		aq	6			
$Ca(NO_3)_2$		c	15		82	82
		aq	41,47,45,51,83,84	6		
	in C_2H_5OH		85			
$Ca(NO_3)_2 \cdot nH_2O$		c	15,41,83,86	6,86	6	
$Ca(NH_2)_2$		c	46			
$Ca(NO_3)_2 \cdot Ca(OH)_2$		c	88			
$Ca(NO_3)_2 \cdot Ca(OH)_2 \cdot 2\ 1/2H_2O$		c	88			
$CaI_2 \cdot nNH_3$		c	89,90,91,92,93			
$CaBr_2 \cdot nNH_3$		c	89,92			
$CaI_2 \cdot nNH_3$		c	89			
Ca_3P_2		c	94			
$Ca_3(PO_4)_2$		c	8,95,97,98		96	8,96
$CaHPO_4$		c	95,97		6	
$CaHPO_4 \cdot 2H_2O$		c	97,99	37		
$Ca(H_2PO_4)_2$		c	95,97			
$Ca(H_2PO_4)_2 \cdot H_2O$		c	95,97			
$Ca(H_2PO_4)_2 \cdot 2H_2O \cdot nH_3PO_4$		c	100			
$Ca_3(AsO_4)_2$		c	101			
$CaHAsO_4$		aq	101			
$CaHAsO_4 \cdot H_2O$		c	101	37		
$Ca(H_2AsO_4)_2$		aq	101			
Ca_3Sb_2		c	102			
Ca_3Bi_2		c	102			
CaC_2		c	52,104,105,106		107	107
$CaCO_3$	calcite	c	108,109,110,111,112,113,114	108,113,114	115	115
	aragonite	c	113,116		115	115
$CaCO_3 \cdot nH_2O$		c	106,117,118,119	117,118,119	10	10
$Ca(HCO_2)_2$	calcium formate	c	120			
		aq	120			
$Ca(HCO_3)_2$		aq	121	106,121		

Table 87 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
$Ca(C_2H_3O_2)_2$	calcium acetate	c	120			
		aq	120			
$Ca(C_2H_3O_2)_2 \cdot H_2O$		c	120			
$Ca(C_2H_3O_3)_2$	calcium glycollate	c	122			
		aq	122			
$Ca(C_2H_3O_3)_2 \cdot nH_2O$		c	122			
$Ca(C_2H_5O)_2$	calcium ethylate	c	123			
$Ca(C_2H_5O)_2 \cdot 2C_2H_5OH$		c	123			
$3CaO \cdot 4C_2H_5OH$		c	124			
$CaCl_2 \cdot nC_2H_5OH$		c	125			
$CaCN_2$	calcium cyanamide	c	126,127,128			
$Ca(CN)_2$		c	129			
		aq	130			
$Ca(NO_3)_2 \cdot 2CH_3OH$		c	131			
$3CaO \cdot Ca(CN)_2 \cdot 15H_2O$		c	130			
$CaSi_2$		c	132,133,134			
Ca_2Si		c	134			
Ca_2Si_2		c	132,133,134			
$CaSiO_3$		c	34,112,135,136,137		8,138,140	8
Ca_2SiO_4		c	110,135,141,142			
Ca_3SiO_5		c	141,143			
CaSn		c	134			
$CaSn_3$		c	134,144			
Ca_2Sn		c	134			
CaPb		c	102			
$CaPb_3$		c	102			
Ca_2Pb		c	102			
$CaI_2 \cdot 2PbI_2$		c	146			
$CaI_2 \cdot 2PbI_2 \cdot 7H_2O$		c	146			
CaTl		c	102			
CaZn		c	147			
$CaZn_2$		c	147			
$CaZn_5$		c	147,148			
$CaZn_{13}$		c	147,148,149			
Ca_4Zn		c	148			
$CaCd_3$		c	148			
$CaHgBr_4$		aq	150			
$CaHg_2Br_6$		aq	150			
$CaHg(CN)_4$		aq	151			
$CaHg_2(CN)_6$		aq	151			
$CaX_2 \cdot 2Hg(CN)_2$		aq	151			

Table 87 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$CaX_2 \cdot 2Hg(CN)_2 \cdot nH_2O$		c	151			
$CaAg(CN)_3$		aq	150			
$CaAg_2(CN)_4$		aq	150			
$CaO \cdot Fe_2O_3$		c	152			
$CaH_2Fe(CN)_6$		aq	153			
$Ca_2Fe(CN)_6$		aq	37,153			
$Ca_2Fe(CN)_6 \cdot 11H_2O$		c	153			
$CaCrO_4$		c	37	37		
		aq	154			
$CaWO_4$		c	155			
$CaTiO_3$		c			156	156
$CaO \cdot nB_2O_3$		c	17,157		158	158
$CaO \cdot 2B_2O_3$		gls	157,159			
$2CaO \cdot nB_2O_3$		c	17,157,160		158	158
$2CaO \cdot 3B_2O_3 \cdot 13H_2O$	inyoite	c	160			
$3CaO \cdot B_2O_3$		c	139,157		158	158
$CaAl_3$		c	145,148			
$CaO \cdot Al_2O_3$		gls	161			
$2CaO \cdot Al_2O_3$		c	162			
		gls	161			
$2CaO \cdot Al_2O_3 \cdot 5H_2O$		c	162			
$3CaO \cdot Al_2O_3$		c	143,162,163			
		gls	161			
$3CaO \cdot Al_2O_3 \cdot 6H_2O$		c	163			
$4CaO \cdot Al_2O_3$		c	162			
$12CaO \cdot 7Al_2O_3$		c	164			
		gls	164			
$3CaCl_2 \cdot 4AlCl_3$		c	44			
$CaO \cdot Al_2O_3 \cdot 6SiO_2$	heulandite	c	103			
$3CaO \cdot Al_2O_3 \cdot 2SiO_2$		c	139			
$4CaO \cdot Al_2O_3 \cdot Fe_2O_3$		c	145			
$CaMg_2$		c	13			
$CaCl_2 \cdot 2MgCl_2 \cdot 2H_2O$		c	166			
$CaCO_3 \cdot MgCO_3$		c	165,167			

Table 87 (Continued)

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119. Pedersen-2
120. Berthelot-9
121. Randall-3
122. de Forcrand-3
123. de Forcrand-4
124. de Forcrand-23
125. Bonnell and Jones-1
126. Franck and Hochwald-1
127. Kameyama and Oka-2
12B. Krase and Yee-1
129. Franck and Bank-1
130. Joannis-1
131. Lloyd, Brown, Bonnell, and Jones-1
132. Wöhler and Schuff-1
133. Wöhler and Muller-1
134. Kubaschewski and Villa-1
135. Nacken-3
136. Wagner-1
137. Roth and Troitzsch-1
13B. Parks and Kelley-2
139. Tschernobaeff and Wologdine-1
140. Critescu and Simon-1
141. Johannson and Thorvaldson-1
142. von Gronow and Schwiete-3
143. von Gronow and Schwiete-4
144. Biltz and Meyer-2
145. Thorvaldson, Edwards, and Bailey-1
146. Mosnier-1
147. Weibke and Kubaschewski-1
14B. Biltz and Wagner-1
149. Roos-2
150. Varet-6
151. Varet-2
152. Marchal-7
153. Joannis-8
154. von Wartenberg, Reusch, and Saran-1
155. Tammann and Westerholt-1
156. Shomate-4
157. Griveau-1
158. Kelley, Todd, and Shomate-1
159. King, Torgeson, and Cook-1
160. Kurnakov, Nikolaev and Chelishcheva-1
161. Tschernobaeff-1
162. Cirilli-2
163. Thorvaldson, Brown, and Peaker-2
164. Roth and Wolf-3
165. Backstrom-2
166. van't Hoff, Keurick, and Dawson-1
167. Mitchell-1

Table 88

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Sr		g	2,3		1	1
		c	4	4	1	5
	amalgam		6			
Sr^+		g	7			
Sr^{++}		g	7			
		aq	8,9,10,11,12,13 33	14,15,16 17,18,19	1	
SrO		c	20,21,22		23	23
SrO_2		c	24,25,26,27,28			
$SrO_2 \cdot 8H_2O$		c	28			
Sr_2O		c	29			
SrH		g	30	31,32,1	31,32,1	
SrH_2		c	9,34			
$Sr(OH)_2$		c	11,35,36,37,38,39 21			
		aq	35,28,11,40	40	40	
$Sr(OH)_2 \cdot H_2O$		c	21,41,42			
$Sr(OH)_2 \cdot 8H_2O$		c	21,11,35,41,42			
SrF		g	30			
SrF_2		c	43,39			
SrCl		g	30			
$SrCl_2$		c	44,45,46,47,29,48 11,49		1	5
		aq	9,10,11,49,50	40	40	
$SrCl_2 \cdot nH_2O$		c	11,44,51,47,46,53 54,55			5
$SrOCl_2$		aq	56			
$Sr(OCl)_2$		aq	56			
$SrCl_2 \cdot SrO \cdot nH_2O$		c	57,58			
$SrBr_2$		c	11,44,59,60			5
		aq	40,50	40	40	
$SrBr_2 \cdot nH_2O$		c	51,11,44			5
$SrBr_2 \cdot SrO \cdot nH_2O$		c	59,60			
SrI_2		c	59,61,44			5
		aq	40,1	40	40	
$SrI_2 \cdot nH_2O$		c	44,62,59,51			5
SrS		g	63,30			
		c	64			
$SrSO_4$		c	11,65,66,67,68	68		
		aq	68,40	68,40	40	
SrS_2O_6		aq	40			
$SrS_2O_6 \cdot 4H_2O$		c	11			
$SrI_2 \cdot nSO_2$		c	69			

Table 88 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
SrSe		c	70			
$Sr(N_3)_2$		c	71,72			
Sr_3N_2		c	9			
$SrN_2O_2 \cdot 5H_2O$		c	73			
$Sr(NO_2)_2$		c	74,75			
		aq	74,75,40			
$Sr(NO_3)_2$		c	11,76,47,77			5
		aq	76,11,40,50,78	40	40	
$Sr(NO_3)_2 \cdot 4H_2O$		c	76,47,77,11			
$Sr(NH_2)_2$		c	9			
$Sr(NH_3)_6$		c	79			
$SrCl_2 \cdot nH_3$		c	80,81,82			
$SrBr_2 \cdot nNH_3$		c	80,81			
$SrI_2 \cdot nNH_3$		c	80,81			
$(NH_4)_2SO_4 \cdot SrSO_4$		c	83			
$Sr_3(PO_4)_2$		c	84			
$SrHPO_4$		c	84,85			
$Sr(H_2PO_4)_2 \cdot H_2O$		c	84			
$Sr_3(AsO_4)_2$		c	86			
$SrHAsO_4$		aq	86			
$Sr(H_2AsO_4)_2$		aq	86			
$SrCO_3$		c	11,87,14,15,8,40	14,15,17,18	19	19
$Sr(C_2O_4)$		aq	66	68	1	
$Sr(C_2O_4) \cdot H_2O$		c		68		
$Sr(C_2O_4) \cdot 2\ 1/2\ H_2O$		c	66		1	
$Sr(CHO_2)_2$	strontium formate	c	76,46			
		aq	40			
$Sr(CHO_2)_2 \cdot 2H_2O$		c	76,46			
$Sr(HCO_3)_2$		aq	88,40	88,40	40	
$Sr(C_2H_3O_2)_2$	strontium acetate	c	66			
		aq	66,40			
$Sr(C_2H_3O_2)_2 \cdot 1/2H_2O$		c	66			
$Sr(C_2H_3O_3)_2$	strontium glycollate	c	89			
		aq	89			
$SrBr_2 \cdot 1/2C_2H_5OH$		c	90			
$Sr(CN)_2$		aq	91			
$Sr(CN)_2 \cdot 4H_2O$		c	91			
SrSi		c	92			
$SrSi_2$		c	92			
$SrSiO_3$		c	93			
		gls	94			
Sr_2SiO_4		c	93			

Table 88 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$SrI_2 \cdot 2PbI_2$		c	95			
$SrI_2 \cdot 2PbI_2 \cdot 7\ H_2O$		c	95			
$SrHgBr_4$		aq	96			
$SrHg_2Br_6$		aq	96			
Sr_2HgBr_6		aq	96			
$SrHg(CN)_4$		aq	97			
$SrHg_2(CN)_6$		aq	97			
$SrX_2 \cdot 2Hg(CN)_2$		aq	97			
$SrX_2 \cdot 2Hg(CN)_2 \cdot nH_2O$		c	97			
$SrAg(CN)_3$		aq	98			
$SrAg_2(CN)_4$		aq	98			
$SrNi(CN)_4$		aq	99			
$Sr_3[FeCO(CN)_5]_2$		c	100,101			
		aq	100,101			
$Sr_3[FeCO(CN)_5]_2 \cdot 4H_2O$		c	100,101			
$SrWO_4$		c	102			
$SrAlCl_5$		c	45			

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15. Kelley-20
16. Kapustinskiĭ and Deziderveva-1
17. Townley, Whitney, and Felsing-1
18. Hogge and Johnston-1
19. Anderson-8
20. de Forcrand-49
21. de Forcrand-52
22. de Forcrand-12
23. Anderson-10
24. Centnerszwer and Blumenthal-4
25. Blumenthal-2
26. Holtermann and Laffitte-1
27. Holtermann-1
28. de Forcrand-29
29. Benoit-1
30. Gaydon-1
31. Humphreys and Fredrickson-1
32. Watson and Fredrickson-1
33. Guntz and Benoit-2
34. Guntz-17
35. Berthelot-21
36. Tamaru and Shiomi-1
37. Tamaru and Shiomi-2
38. Sano-19
39. Guntz-1
40. Calculated from the ions

Table 88 (Continued)

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47. Pickering-8
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49. Lehtonen-1
50. Lange and Streeck-1
51. Trip-1
52. Sabatier-2
53. Bell-1
54. Schumb-1
55. Baxter and Lansing-1
56. Neumann and Muller-2
57. Andre-1
58. Andre-3
59. Tassilly-1
60. Tassilly-5
61. Tassilly-3
62. Tassilly-4
63. Mathur-1
64. Sabatier-1
65. Chroustschoff and Martinoff-1
66. Berthelot-9
67. Kelley-22
68. Seidell-1
69. Ephraim and Kornblum-1
70. Fabre-1
71. Wöhler and Martin-1
72. Wöhler and Martin-2
73. Berthelot-106
74. Dodé-1
75. Dodé-2
76. Berthelot-8
77. Ewing, Rogers, Miller, and McGovern-1
78. Lange and Streeck-2
79. Biltz and Hüttig-3
80. Biltz-7
81. Hüttig-2
82. Buffington-1
83. Barre-1
84. Berthelot-52
85. Joly-4
86. Blarez-1
87. Berthelot-11
88. Randall and White-2
89. de Forcrand-3
90. Lloyd, Brown, Bonnell, and Jones-1
91. Joannis-1
92. Wöhler and Schuff-1
93. Nacken-3
94. Tschernobaeff-1
95. Mosnier-1
96. Varet-6
97. Varet-2
98. Varet-5
99. Varet-4
100. Muller-8
101. Muller-9
102. Tammann and Westerholt-1

Table 89

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
Ba		g	3,4,5		2	1
		c			2	1
Ba^{n+}		g	6,7			
Ba^{++}		aq	2			
BaO		g			2,8	2,8
		c	9,10,11,22,27		12,13	13
BaO_2		c	14,15,16,30			
$BaO_2 \cdot nH_2O$		c	14,17			
Ba_2O		c	1B			
BaH		g	19		2,8	2,8
BaH_2		c	20,21			
$Ba(OH)_2$		c	10,16,22,23			
		aq	10,11,17,24,25,26,27,28,29		2	
$Ba(OH)_2 \cdot nH_2O$		c	10,11,22,27,29			
$BaO_2 \cdot H_2O_2$		c	17,30			
BaF		g	19			
BaF_2		c	31,32		33	13
		aq	31,32			
BaCl		g	19			
		c	18			
$BaCl_2$		c	11,1B,34,35,36,37,3B,39,40		41	1
		aq	20,21,42,43,44,45	2		
$BaCl_2 \cdot nH_2O$		c	11,37,38,39,46,47,4B,49,50,51	2		1,13,41
$BaOCl_2$		aq	51			
$Ba(OCl)_2$		aq	52			
$Ba(ClO_2)_2$		c	11,53			
$Ba(ClO_3)_2$		c	11,54			
		aq	11,54			
$Ba(ClO_3)_2 \cdot H_2O$		c	11,54			1
$Ba(ClO_4)_2$		c	53			
		aq	11,55			
$Ba(ClO_4)_2 \cdot 3H_2O$		c	53			
$BaCl_2 \cdot BaO \cdot nH_2O$		c	56,57			
$BaBr_2$		c	11,58			
		aq	4B	2		
$BaBr_2 \cdot nH_2O$		c	11,48			
$BaOBr_2$		aq	59			
$Ba(BrO_3)_2 \cdot H_2O$		c			1,60	1,60
$BaBr_2 \cdot BaO \cdot nH_2O$		c	56			

Table 89 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
BaI_2		c	56			
		aq	2		2	
$BaI_2 \cdot nH_2O$		c	11,48			
$Ba(IO_3)_2$		aq	2,61			
$Ba(IO_3)_2 \cdot H_2O$		c	2,61			
$BaI_2 \cdot BaO \cdot nH_2O$		c	56			
BaS		g	19			
		c	62			
		aq	11,63			
$BaSO_3$		c	64			
$BaSO_4$		c	11,65,66,67,68	67	68	68
		aq	11,65,66,67,68			
BaS_2O_3		c				1
BaS_2O_6		aq	11			
$BaS_2O_6 \cdot 2H_2O$		c	11			
BaS_2O_8		aq	69			
$BaS_2O_8 \cdot 4H_2O$		c	69			
BaS_4O_6		aq	2.			
$BaS_4O_6 \cdot 2H_2O$		c	70			
$Ba(HS)_2$		aq	11			
$Ba(HSO_3)_2$		aq	64			
$BaSO_4 \cdot H_2SO_4$		c	71			
$BaSO_4 \cdot 2H_2SO_4 \cdot H_2O$		c	71			
$BaI_2 \cdot nSO_2$		c	72			
BaSe		c	73,74			
$BaSeO_4$		c	73,74			
$Ba(N_3)_2$		c	75			
		aq	75			
Ba_3N_2		c	21			
$Ba(NO_2)_2$		c	53,76,77,78			
		aq	53,76,77,78			
$Ba(NO_2)_2 \cdot H_2O$		c	53,78			
$Ba(NO_3)_2$		c	40	79	80	80
		aq	11,41,63,81,82,83,84,85		2	
BaNH		c	21			
$Ba(NH_2)_2$		c	21			
$Ba(NH_3)_6$		c	86,87			
$BaCl_2 \cdot 8NH_3$		c	87,88,89			
$BaBr_2 \cdot nNH_3$		c	87,88,89			
$BaI_2 \cdot nNH_3$		c	88			

Table 89 (Continued)

SPECIFIC REFERENCES

Substance			$\Delta H f^{\circ}$	$\Delta F f^{\circ}$	S°	C_p°
Formula	Description	State				
$Ba_3(PO_4)_2$		c	90,92,93			
		aq	90,92,93			
$BaHPO_4$		c	90,92,93			
$Ba(H_2PO_2)_2$		aq	11			
$Ba(H_2PO_2)_2 \cdot H_2O$		c	11			
$Ba(H_2PO_4)_2$		c	90,92,93			
$Ba_3(AsO_4)_2$		c	94,95			
$BaHAsO_4 \cdot H_2O$		c	94,95			
$Ba(H_2AsO_4)_2 \cdot 2H_2O$		c	94,95			
Ba_3Sb_2		c	96			
Ba_3Bi_2		c	96			
$BaCO_3$	witherite	c	11,97,100,101	98,99	12,13	12,13
		aq	2	9B,99		
$BaC_2O_4 \cdot 1/2H_2O$	barium oxalate	c	102			
$BaC_2O_4 \cdot nH_2O$		c	2,102			
$BaO \cdot BaCO_3$		c	97,103			
$Ba(CHO_2)_2$	barium formate	c	104			
		aq	39,104			
$Ba(HCO_3)_2$		aq	105		2	
$Ba(C_2H_3O_2)_2$	barium acetate	c	11,83			
		aq	11,83			
$Ba(C_2H_3O_2)_2 \cdot 3H_2O$		c	11,83			
$Ba(C_2H_3O_3)_2$	barium glycollate	c	64			
		aq	64			
$Ba(OC_2H_5)_2$	barium ethylate	c	106			
$3BaO \cdot 4CH_3OH$		c	106			
$3BaO \cdot 4C_2H_5OH$		c	106			
$Ba(HSO_3)_2 \cdot C_2H_2O_2$	barium bisulfite-glyoxal	aq	64			
$Ba(HSO_3)_2 \cdot C_2H_2O_2 \cdot 2\ 1/2H_2O$		c	64			
$Ba(OSO_3C_2H_5)_2$	barium ethylsulfate	aq	11			
$Ba(OSO_3C_2H_5)_2 \cdot 2H_2O$		c	11			
$BaCN_2$	barium cyanamide	c	107			
$Ba(CN)_2$		c	107,108			
		aq	107,10B			
$Ba(CN)_2 \cdot nH_2O$		c	107,10B			
$Ba(CNO)_2$	barium cyanate	c	109			
		aq	109			
$BaSi_3$		c	110			
Ba_2Si_2		c	110			
$BaSiO_3$		c	111,112,113,114			

Table B9 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ba_2SiO_4		c	111,113			
$BaSiF_6$		c	115			
$BaSn_3$		c	96			
Ba_2Sn		c	96			
$BaPb$		c	96			
$BaPb_3$		c	96			
Ba_2Pb		c	96			
$BaI_2 \cdot 2PbI_2$		c	116			
$BaI_2 \cdot 2PbI_2 \cdot 7H_2O$		c	116			
$BaHgBr_4$		aq	117			
$BaHg_2Br_6$		aq	117			
Ba_2HgBr_6		aq	117			
Ba_4HgBr_{10}		aq	117			
$BaHg(CN)_4$		aq	5B			
$BaHg_2(CN)_6$		aq	5B			
$BaCl_2 \cdot 2Hg(CN)_2$		aq	58			
$BaCl_2 \cdot 2Hg(CN)_2 \cdot 5H_2O$		c	5B			
$BaBr_2 \cdot 2Hg(CN)_2$		aq	5B			
$BaBr_2 \cdot 2Hg(CN)_2 \cdot 7H_2O$		c	5B			
$BaI_2 \cdot 2Hg(CN)_2$		aq	58			
$BaI_2 \cdot 2Hg(CN)_2 \cdot 6H_2O$		c	58			
$BaAg(CN)_3$		aq	117			
$BaAg_2(CN)_4$		aq	117			
$BaPtCl_6$		c	118,119			
		aq	11B,119			
$BaPtCl_6 \cdot 6H_2O$		c	118,119			
$BaOsCl_6$		c	120			
$BaPdCl_4$		c	120			
$Ba_3(RhCl_6)_2$		c	121			
$BaNi(CN)_4$		aq	122			
$Ba_2Fe(CN)_6$		aq	123			
$Ba_2Fe(CN)_6 \cdot 6H_2O$		c	123			
$BaH_2Fe(CN)_6$		aq	123			
$Ba_3[FeCO(CN)_5]_2$		c	124			
		aq	124			
$Ba_3[FeCO(CN)_5]_2 \cdot 11H_2O$		c	124			
$BaMnO_4$		c	125			
$BaCrO_4$		c	126			
$BaMoO_4$		c	127			
$BaWO_4$		c	127			
$BaCl_2 \cdot 2AlCl_3$		c	36			
$3BaCl_2 \cdot 4AlCl_3$		c	36			

Table B9 (Continued)

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55. Berthelot-79
56. Tassilly-1
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94. Blarez-2
95. Joly-5
96. Kubaschewski and Villa-1
97. Finkelstein-1
98. Hogges and Johnston-1
99. Townley, Whitney and Felsing-1
100. Roth-6
101. Berthelot-8
102. Berthelot-9
103. Dutoit-1
104. Berthelot-29
105. Randall and Tamele-1
106. de Forcrand-2,19,20
107. Frank and Bank-1
108. Joannis-1
109. Lemoult-1
110. Wöhler and Schuff-1
111. Nacken-3
112. Tschernobaeff-1
113. Grube and Trucksess-1
114. Jander-1
115. Hantke-1
116. Mosnier-1
117. Varet-6
118. Gire-3
119. Gire-2
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121. Gire and Puche-1
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Table 90

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Ra		g	2		1	1
		c			1	
Ra^{n+}		g	3,4,5			
Ra^{++}		aq	1	1		
RaO		c	1,6			
$RaCl_2$		c			1	
$RaCl_2 \cdot 2H_2O$		c		1,7	1	
$RaSO_4$		c		1,7	1	
$Ra(NO_3)_2$		c		1,7	1	

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Table 91
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Li		g	2,3	2,3	1	1
		c			4,5	4,5
Li^{n+}		g	1,6			
Li^+		aq	7,9,10	8,1,9,10,11		
Li_2		g	12,13,14,15		2	1
Li_2O		c	17,18			
Li_2O_2		c	19			
		aq	19			
LiH		g	12		1,20,21	1,20,21
		c	22,23,24		5	5
LiOH		c	10		1	
		aq	25,26,27,23,29,30	10		
$LiOH \cdot H_2O$		c	10,31		1	
$Li_2O_2 \cdot H_2O_2 \cdot 3H_2O$		c	19			
LiF		c	32,9		33	33
		aq	34,35	1		
$LiHF_2$		aq	1,35			
LiCl		g	37		1,36	1,36
		c	38,39,40,41,42,43,44,45,46			47
		aq	40,48,49,50,51,52,53	1		
	in CH_3OH		52,39,54			
	in C_2H_5OH		52,54,44			
$LiCl \cdot nH_2O$		c	46,55,56	8,17		47
LiClO		aq	57			
LiBr		g	37		1,36	1,36
		c	46,58			47
		aq	49,58,60	1		
$LiBr \cdot nH_2O$		c	46,56			47
LiI		g	37		1,36	1,36
		c	46,61,62,63			47
		aq	49		1	
$LiI \cdot nH_2O$		c	64,46			47
Li_2SO_4		c	65,41,66,67			
		aq	68,65,69	1		
$Li_2SO_4 \cdot H_2O$		c	66,65,41			
$LiI \cdot nSO_2$		c	70			
Li_2Se		c	71			
		aq	71			
$Li_2Se \cdot 9H_2O$		c	71			
Li_3N		c	72,73			74

Table 91 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$LiNO_2$		c	76			
$LiNO_3$		c	44,41,42			
		aq	50	1		
	in C_2H_5OH		44			
$LiNO_3 \cdot 3H_2O$		c	77			
$LiNH_2$		c	78,79			
$Li(NH_3)_4$		liq	80,81			
Li_2NH		c	78			
$LiCl \cdot nNH_3$		c	45,82,83,84,85,86			
$LiBr \cdot nNH_3$		c	45,87,84,86			
$LiI \cdot nNH_3$		c	86,84,88			
Li_3Sb_2		c	89			
Li_3Bi		c	90			
Li_2C_2		c	91			
Li_2CO_3		c	7,92	1,93	7	7
		aq	92,7,94	1,8		
$LiHCO_3$		aq	94,1	1		
$LiOCH_3$	in CH_3OH		95			
$LiOC_2H_5$	in C_2H_5OH		95			
$LiCN$		aq	1,96			
$LiCl \cdot nCH_3NH_2$		c	45,98,97			
$LiCl \cdot nC_2H_5NH_2$		c	45			
$LiCl \cdot n(CH_3)_2NH$		c	97			
$LiBr \cdot n(CH_3)_2NH$		c	97			
$LiBr \cdot nCH_3NH_2$		c	97			
$LiI \cdot n(CH_3)_2NH$		c	97			
$LiI \cdot nCH_3NH_2$		c	97			
Li_2SiO_3		gls	99			
Li_2SiO_6		c	100			
		aq	100,1			
$LiSn$		c	89			
$LiSn_2$		c	101			
Li_2Sn		c	101			
Li_4Sn		c	89			
Li_5Sn_2		c	101			
Li_7Sn_2		c	89			
$LiPb$		c	90			
Li_3Pb		c	101			
Li_4Pb		c	101			
Li_5Pb_2		c	101			
Li_7Pb_2		c	90			

Table 91 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
• $2LiI \cdot PbI_2$		c	61			
$2LiI \cdot PbI_2 \cdot 4H_2O$		c	61			
LiTl		c	101			
LiHg		c	69			
$LiHg_2$		c	69			
$LiHg_3$		c	69			
$LiHg_{99}$		liq	102			
$nLiBr \cdot HgBr_2$		aq	103			
$nLiX \cdot Hg(CN)_2$		aq	104			
$LiX \cdot Hg(CN)_2 \cdot nH_2O$		aq	104			
$LiCN \cdot Hg(CN)_2$		aq	104			
$2LiCN \cdot Hg(CN)_2$		aq	104			
$LiReO_4$		c	105			
$LiReO_4 \cdot nH_2O$		c	105			
$LiCl \cdot ThCl_4 \cdot 8H_2O$		c	75			
$2LiCl \cdot ThCl_4$		c	75			
$LiBH_4$		c	16			16
$LiAlH_4$		c	16			16

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Table 91 (Continued)

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101. Weibke and Kubaschewski-1
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103. Varet-6
104. Varet-2
105. Smith and Long-1

Table 92

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Na		g	2,3,4,5,6,7,8,10		1,12	1,12
		c			9	9
Na^{n+}		g	12			
Na^+		aq	13		9	
Na_2		g	2		2	
NaO_2		c	14			
Na_2O		c	15,17,18,19		16	10
Na_2O_2		c	17,18,20,21,22			
NaH		g	23,25,26		1,24	1,24
		c	27,28,29,30			
NaOH		c	31,32,33,34			10
		aq	1,34,29,35,36,37,38,39,40	1		
$NaOH \cdot H_2O$		c	33,45	42,43,44		
$NaHO_2$		aq	46			
NaF		g	23			
		c	47,48,49		49	
		aq	34,48	1		
$NaHF_2$		c	48,51			
		aq	34			
NaCl		g	1,23,24			
		c	54,55,56,57,58,59,60,61,62,63,64,65,66,67	42,44	52,53	52,53
		aq	50,39,68,69,70,71,72,73	1		
	in CH_3OH		62,66,74			
NaClO		aq	34,75,76			
$NaClO_2$		c	77			
		aq	1,77			
$NaClO_3$		c	78,79			
		aq	34			
$NaClO_4$		c	66,63,78,80			10
		aq	81,1	1,81		
	in CH_3OH		66			
	in C_2H_5OH		66			
NaBr		g	23			
		c	59,82,66			10
		aq	54,72,82,59,83,84,85,1	1		
	in CH_3OH		62,66			
	in C_2H_5OH		62,66			
$NaBr \cdot 2H_2O$		c	78,34,86,87			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
NaBrO		aq	34,88			
NaI		g	23			
		c	66,34,78,89,90,59			10
		aq	72	1		
	in CH_3OH		66,62			
	in C_2H_5OH		66,89			
$NaI \cdot 2H_2O$		c	78,34,91			
$NaIO_3$		aq	1			
Na_2S		c	92,93,94,95,96			
		aq	93,97,34			
$Na_2S \cdot nH_2O$		c	93			
Na_2S_2		aq	96,93			
Na_2S_3		aq	96,93			
Na_2S_4		c	96,93			
		aq	93,96			
Na_2SO_3		c	99		100	100
		aq	1,99,34,101			
$Na_2SO_3 \cdot 7H_2O$		c	102,103			
Na_2SO_4		c	34,104,105,106, 107,108,109,67, 110,111,112		105	105
		aq	34,113,114,115, 116,117,118,119, 120		1	
$Na_2SO_4 \cdot 10H_2O$		c	122,123,105,87, 111,67,112,78,34, 124	125,126,1	105	105
$Na_2S_2O_3$		c	127,128			10
		aq	129,34,130,131			
$Na_2S_2O_3 \cdot 5H_2O$		c	130,34,129,132			
$Na_2S_2O_5$		c	54,99			
		aq	54			
$Na_2S_2O_6$		c	1,34			
		aq	1,34			
$Na_2S_2O_6 \cdot 2H_2O$		c	34			
$Na_2S_3O_6$		aq	130			
$Na_2S_3O_6 \cdot 3H_2O$		c	130			
$Na_2S_4O_6$		aq	34,130,132			
$Na_2S_4O_6 \cdot 2H_2O$		c	130			
NaHS		c	93,133			
		aq	93,98,34,97			
$NaHS \cdot 2H_2O$		c	93			
$NaHSO_3$		aq	34,99,134			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$NaHSO_4$		c	78,34			
		aq	135,34			
$NaHSO_4 \cdot H_2O$		c	136			
$NaI \cdot nSO_2$		c	137,138			
Na_2Se		c	1,139			
		aq	1,139			
$Na_2Se \cdot nH_2O$		c	139			
Na_2SeO_3		aq	34			
Na_2SeO_4		c	140			
		aq	34,141,142			
NaHSe		c	133			
		aq	139			
$NaHSeO_3$		aq	34			
$NaHSeO_4$		aq	34,141			
Na_2Te		c	96			
Na_2Te_2		c	96			
Na_2TeO_4		c	140			
NaN_3	sodium azide	c				10
$NaNO_2$		c	143,144,145			
		aq	143,145,146			
$NaNO_3$		c	78,123,34,67,54, 167,148,149,150, 151,152,154,159		153	153
		aq	39,117,34,118,149, 84,151,155,156			
$NaNH_2$		c	157,158			
$NaCl \cdot 5NH_3$		c	160,161			
$NaBr \cdot nNH_3$		c	160			
$NaI \cdot nNH_3$		c	160,161			
$Na_2SO_4 \cdot (NH_4)_2SO_4 \cdot H_2O$		c	163			
$NaPO_3$		c	164			10
		aq	34,164,1			
Na_3PO_4		c	165			
		aq	167,34			
$Na_3PO_4 \cdot 12H_2O$		c	166			
$Na_4P_2O_7$		c	34			10
		aq	34,164,54			
$Na_4P_2O_7 \cdot 10H_2O$		c	168			
NaH_2PO_3		c	169			
		aq	34			
$NaH_2PO_3 \cdot 2\ 1/2H_2O$		c	169			
NaH_2PO_4		aq	167,34			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$NaH_3P_2O_7$		c	164			
		aq	34,164			
$NaH_3P_2O_7 \cdot H_2O$		c	164			
Na_2HPO_3		c	169			
		aq	34			
$Na_2HPO_3 \cdot 5H_2O$		c	169			
Na_2HPO_4		c	34,170,238			
		aq	34,167			
$Na_2HPO_4 \cdot nH_2O$		c	34,170,171,238			
$Na_2H_2P_2O_5$		c	169			
		aq	169			
$Na_2H_2P_2O_7$		c	164			
		aq	34,164			
$Na_2H_2P_2O_7 \cdot 6H_2O$		c	164			
$Na_3HP_2O_7$		c	164			
		aq	164,34,1			
$Na_3HP_2O_7 \cdot nH_2O$		c	164			
$NaNH_4HPO_4$		aq	167			
$NaNH_4HPO_4 \cdot 4H_2O$		c	34			
Na_3AsO_4		c	165			
		aq	34			
$Na_3AsO_4 \cdot 12H_2O$		c	166			
NaH_2AsO_3		aq	34			
NaH_2AsO_4		aq	34			
Na_2HAsO_4		aq	34			
Na_3Sb		c	172,174			
Na_3SbO_4		c	165			
Na_3SbS_3		aq	175			
Na_3Bi		c	173,174			
Na_3BiO_4		c	165			
Na_2C_2	sodium carbide	c	176,177			
Na_2CO_3		c	78,108,159,34,178,179,180,181,182,183,184		185	185
		aq	180,134,117,186,187			
$Na_2CO_3 \cdot nH_2O$		c	34,183,159,182,188,189			
$Na_2C_2O_4$	sodium oxalate	c	78			190
		aq	191,34			
$NaHC_2$		c	177			
$NaCHO_2$	sodium formate	c	78			
		aq	34,78,191,192			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔFf^o	S^o	C_p^o
Formula	Description	State				
$NaCHO_2 \cdot nH_2O$		c	193			
$NaHCO_3$	sodium bicarbonate	c	78,188,178,194		185	185
		aq	186,34,117			
$NaCH_3O$	in CH_3OH		195			
$NaHC_2O_4$	sodium acid oxalate	c	78			
		aq	34,191			
$NaHC_2O_4 \cdot H_2O$		c	78			
$NaC_2H_3O_2$	sodium acetate	c	34,191,182			
		aq	34,191,1,196,197, 198			
	in C_2H_5OH		89			
$NaC_2H_3O_2 \cdot 3H_2O$		c	194,34,182,78,199			
$NaC_2H_3O_3$	sodium glycollate	c	200			
		aq	200			
$NaC_2H_3O_3 \cdot 1/2H_2O$		c	200			
NaC_2H_5O	in C_2H_5OH		195			
$NaC_2H_5O_2$	monosodium glycol	c	201			
$NaC_2H_5O_2 \cdot CH_3OH$	monosodium glycol methanol	c	201			
$NaC_2H_3O_3 \cdot HC_2H_3O_3$	sodium acid glycollate	c	200			
$NaC_2H_5O_2 \cdot C_2H_5OH$	monosodium glycol ethanol	c	201			
$NaC_2H_5O_2 \cdot C_2H_6O_2$	monosodium glycol glycol	c	201			
$Na_2C_2H_2O_3$	disodium glycollate	c	200			
		aq	200			
$Na_2C_2H_2O_3 \cdot 2H_2O$		c	200			
$Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$	trona	c	178			
$NaCCl_3CO_2$	sodium trichloro-acetate	aq	34,202			
$NaCH_2ClCO_2$	sodium chloroacetate	aq	34,202			
$NaCHCl_2CO_2$	sodium dichloro-acetate	aq	34			
$NaI \cdot 3CH_3OH$		c	203			
$NaC_2H_5OSO_3$	sodium ethylsulfate	aq	34			
$2NaHSO_3 \cdot C_2H_2O_2 \cdot H_2O$	sodium bisulfite glyoxal	c	200			
		aq	200			
$NaCN$		c	204			
		aq	34			
$NaCN \cdot nH_2O$		c	204			
$NaCNO$	sodium cyanate	c	205			
		aq	1,205			
$NaCN_2H$	sodium cyanamid	aq	205			
$NaCO_2NH_2$	sodium carbamate	c	206			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
NaCNS	sodium thiocyanate	c	207,208			
		aq	204,208			
	in C_2H_5OH		208			
Na_2SiO_3		c	209,210,211,212		213	213
		gls	214,215,216			
$Na_2SiO_3 \cdot nH_2O$		c	217			
$Na_2Si_2O_5$		c			213	213
Na_4SiO_4		c			213	213
Na_2SiF_6		c	218,219,220			
		aq	34,219			
$NaHSiF_6$		aq	34			
NaSn		c	172,174,221,222			
$NaSn_2$		c	172,174,221,222			
Na_2Sn		c	172,174,221,222			
Na_4Sn		c	172,174,221,222			
Na_4Sn_3		c	172,174,221,222			
Na_2SnO_3		c	223			
Na_4SnO_4		aq	34			
NaPb		c	173,174			
Na_2Pb		c	173,174			
Na_2Pb_5		c	173,174			
Na_4Pb		c	173,174			
Na_5Pb_2		c	173,174			
Na_2PbO_3		c	224			
$2NaI \cdot PbI_2$		c	225			
$2NaI \cdot PbI_2 \cdot nH_2O$		c	225			
$2Na_2S_2O_3 \cdot PbS_2O_3$		c	226			
		aq	226			
Na_2ZnO_2		c	227			
$Na_2Zn(SO_4)_2$		c	228			
$Na_2Zn(SO_4)_2 \cdot 4H_2O$		c	228			
$NaCd_2$		c	173,174,229,230			
$NaCd_6$		c	173,174,229,230			
Na_2CdO_2		c	231			
NaHg		c	174,222,172,232, 233,234			
$NaHg_2$		c	174,222,172,232, 233,234			
$NaHg_4$		c	172,222,174,232, 233,234			
$NaHg_{27.5}$		liq	233,234,235			
$NaHg_{50}$		liq	233,234,235			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔGf°	S°	C_p°
Formula	Description	State				
$NaHg_{200}$		liq	233,234,235			
$NaHg_{500}$		liq	233,234,235			
Na_3Hg		c	174,222,172,232, 233,234			
Na_3Hg_2		c	174,222,172,232, 233,234			
Na_5Hg_2		c	174,222,172,232, 233,234			
Na_7Hg_8		c	174,222,172,232, 233,234			
Na_2HgBr_4		aq	236			
Na_2HgS_2		c	237			
$NaHg(CN)_3$		aq	239			
$Na_2Hg(CN)_4$		aq	239			
$NaCl \cdot Hg(CN)_2$		aq	239			
$NaCl \cdot Hg(CN)_2 \cdot 1\ 1/4H_2O$		c	239			
$2NaCl \cdot Hg(CN)_2$		aq	239			
$NaBr \cdot Hg(CN)_2$		aq	239			
$NaBr \cdot Hg(CN)_2 \cdot 2H_2O$		c	239			
$2NaBr \cdot Hg(CN)_2$		aq	239			
$NaI \cdot Hg(CN)_2$		aq	239			
$NaI \cdot Hg(CN)_2 \cdot 2H_2O$		c	239			
$2NaI \cdot Hg(CN)_2$		aq	239			
$Na_2O \cdot CuO_2$		c	240			
$Na_2CO_3 \cdot CuCO_3$		c	241			
$Na_2CO_3 \cdot CuCO_3 \cdot 3H_2O$		c	241			
$Na_2O \cdot Ag_2O_2$		c	240			
$Na_3Ag(S_2O_3)_2$		aq	226			
$NaAg(CN)_2$		aq	242			
$Na_2Ag(CN)_3$		aq	242			
Na_2PtCl_4		aq	34,245			
Na_2PtCl_6		c	34,243,244			
		aq	243,244			
$Na_2PtCl_6 \cdot nH_2O$		c	34			
Na_2PtBr_6		c	34			
		aq	34			
$Na_2PtBr_6 \cdot 6H_2O$		c	34			
Na_2PtI_6		aq	246			
Na_2IrCl_6		c	247			
Na_3IrCl_6		c	247			
Na_2OsCl_6		c	247			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf^o	ΔGf^o	S^o	C_p^o
Formula	Description	State				
$NaReO_4$		c	248			
		aq	248,1			
Na_3RhCl_6		c	243			
		aq	243,247			
$Na_3RhCl_6 \cdot 12H_2O$		c	243			
$Na_2Ni(CN)_4$		aq	242			
Na_2CoO_3		c	227			
$Na_2Fe_2O_4$		c	249,250,251			
$Na_3FeCO(CN)_5$		c	252,256			
		aq	252,256			
$Na_3FeCO(CN)_5 \cdot 7H_2O$		c	252,256			
Na_2MnO_4		c	227			
$Na_2SO_4 \cdot MnSO_4$		c	253			
$Na_2SO_4 \cdot MnSO_4 \cdot 2H_2O$		c	253			
Na_2CrO_4		c	255,257,258			
		aq	34,255			
$Na_2CrO_4 \cdot 4H_2O$		c	257,258			
$Na_2Cr_2O_7$		aq	34,254			
Na_2MoO_4		c	261			
		aq	259,260			
Na_2WO_4		c	255			
		aq	260			
$NaVO_5$		aq	262,263			
Na_3VO_4		c	264			
$Na_3V_3O_9$		aq	262			
Na_2TiO_3		c			265	265
$Na_2Ti_2O_5$		c			265	265
$Na_2Ti_3O_7$		c			265	265
$NaBO_2$		c	255			10
		aq	34,117,267			
$NaBO_3$		aq	268			
$NaBO_3 \cdot 4H_2O$		c	268			
$Na_2B_4O_7$		c	269			10
		aq	34,117,270			
$Na_2B_4O_7 \cdot nH_2O$		c	269			10
$NaBH_4$	sodium borohydride	c	272		271	271
$NaAlO_2$		c	255,273			
Na_3AlF_6		c	274			10
$Na_3AlF_6 \cdot 3\ 1/2H_2O$		c	274			
$NaCl \cdot AlCl_3$		c	274			
$3NaCl \cdot nAlCl_3$		c	274			

Table 92 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$NaCl \cdot AlCl_3 \cdot 6NH_3$		c	274			
$Na_2O \cdot Al_2O_3 \cdot 3SiO_2$	natrolite	c	275			
$Na_2O \cdot Al_2O_3 \cdot 4SiO_2$	dehydrated analcite	c	275			
Na_2UO_4		c	264			
$Na_2U_2O_7 \cdot 1\ 1/2H_2O$		c	260			
$(Na_2O_2)_2UO_4$		aq	260			
$(Na_2O_2)_2 \cdot UO_4 \cdot 9H_2O$		c	260			
$2NaCl \cdot ThCl_4$		c	276			
$2NaCl \cdot ThCl_4 \cdot 10H_2O$		c	276			
$Na_2SO_4 \cdot CaSO_4$		c	277			
$2Na_2SO_4 \cdot CaSO_4 \cdot 2H_2O$		c	277			
$NaSrPO_4 \cdot 9H_2O$		c	278,279,41			
$NaSrAsO_4 \cdot 9H_2O$		c	279			
$NaBaPO_4 \cdot 9H_2O$		c	278,279,41			
$NaBaAsO_4 \cdot 9H_2O$		c	279			
NaLiICl		c	121			

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Table 93

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
K		g	1	1		1
		c			2	2
K^{n+}		g	3			
K^+		aq	6,7	4,5,8,9,10		
K_2		g	11,12,13,14		15	
K_2O		c	7,16,17			
K_2O_2		c	18			
K_2O_3		c	18,19			
K_2O_4		c	18,20			
KH		g	21		2	
		c	22,23,24			
KOH		c	25,26,27,28			
		aq	29,30		31	
$KOH \cdot nH_2O$		c	25,32			
KF		c	33,34,35,36,37		37	37
		aq	33,35,38,39			
$KF \cdot nH_2O$		c	33,35,38,40		31	
KHF_2		c	37	37		37
		aq	35			
$KF \cdot nHF$		c	41			
KCl		g	14		31,42	31,42
		c	27,43,44,45,46,47,48,49		50,51	2
		aq	28,52,53,54,55,56,57		31	
KClO		aq	58,59,60			
$KClO_3$		c	61,62,64		63	63
		aq	26,28,65,66	9		
$KClO_4$		c	62,68		67	67
		aq	65,66,67,69,70	9		
KBr		g			31,42	31,42
		c	28,34,71,72,73,74,75		71	2
		aq	52,53,73,76		31	
	in CH_3OH		43,77			
KBr_3		aq	31,78			
KBr_5		aq	31			
KBrO		aq	28,79			
$KBrO_3$		c	28,34,66,80		80	80
		aq	28,31		9	
KI		g			42	42
		c	28,73,81,82,83,84,85		71	71

Table 93 (Continued)
SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
KI		aq	53,55,73		31	
	in CH_3OH		43,77,85			
	in C_2H_5OH		77,85			
	in CH_3COCH_3		85			
	in CH_3CN		85			
KI_3		c	86			
		aq	78,86,87,88			
KIO_3		c	28,31,66,89		80	80
		aq	28,89,90,91		31	
KIO_4		aq	28			
$KIO_3 \cdot HIO_3$		c	89			
		aq	28			
KH_4IO_6		aq	28			
$K_2H_3IO_6$		aq	28			
$KI \cdot KCl$	fresh melt	c	92			
K_2S		c	93,94,95			
		aq	95			
$K_2S \cdot nH_2O$		c	95			
K_2S_4		c	95			
		aq	95			
$K_2S_4 \cdot nH_2O$		c	95			
K_2SO_3		c	96,97			
		aq	96,98			
K_2SO_4		c	28,100,101,102, 107,110	103,104	99	99
		aq	28,102,105,106,108			
$K_2S_2O_3$		aq	31			
$K_2S_2O_5$		c	109			
		aq	109			
$K_2S_2O_5 \cdot 1\ 1/2H_2O$		c	109			
$K_2S_2O_6$		c	28,97			
		aq	28,111			
$K_2S_2O_8$		c	112			
		aq	31			
$K_2S_4O_6$		c	28,97			
		aq	31			
$K_2S_5O_6$		c				
		aq	113			
$K_2S_5O_6 \cdot 1\ 1/2H_2O$		c	114			
KHS		c	95,115			
		aq	95			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$KHS \cdot 1/4H_2O$		c	95			
$KHSO_3$		aq	116			
$KHSO_4$		c	26,28,117			
		aq	28,118			
$KI \cdot 4SO_2$		c	119			
K_2Se		c	120			
		aq	120			
$K_2Se \cdot nH_2O$		c	120			
K_2SeO_4		aq	121,122			
KHSe		c	115			
		aq	120			
$KHSeO_4$		aq	121,122			
K_2TeO_3		aq	121			
K_2TeO_4		aq	121			
KNO_2		c	123			
		aq	124			
KNO_3		c	29,45,125,126,127, 128,129,130,131		132	132
		aq	28,45,133,134		31	31
KNH_2		c	135			
$KBr \cdot 4NH_3$		c	136			
$KI \cdot nNH_3$		c	136			
KH_2PO_4		c	137,138,139			
		aq	137,138			
KH_2AsO_4		c	139		140	140
		aq	31			
K_2CO_3		c	26,28,81,141			
		aq	134,142			
$K_2CO_3 \cdot nH_2O$		c	26,28			
$K_2C_2O_4$	potassium oxalate	c	26			
		aq	26,106,143			
$K_2C_2O_4 \cdot H_2O$		c	26,28,138			
$KCHO_2$	potassium formate	c	26			
		aq	28,144			
$KHCO_3$		c	26,145,146			
		aq	134,142			
$KOCH_3$	in CH_3OH		147			
$KC_2H_3O_2$	potassium acetate	c	26,28			
		aq	26,28,143			
$KC_2H_3O_3$	potassium glycollate	aq	148			
KOC_2H_5	in C_2H_5OH		147,149			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$5(K_2CO_3 \cdot 1\ 1/2H_2O) \cdot 4KHCO_3$		c	145			
KCN		c	26,28,34			
		aq	150			
KCNO		c	26			
		aq	151			
KCO_2CONH_2	potassium oxamate	aq	152			
KCNS		c	153,154,155			
		aq	153,154,155			
$KCNS \cdot nSO_2$		c	119			
K_2SiF_6		c	156,157,158			
$K_2SnCl_4 \cdot H_2O$		c	28			
K_2SnCl_6		c	28			
		aq	28			
$KCl \cdot PbCl_2 \cdot 1/3H_2O$		c	159			
$KCl \cdot 2PbCl_2$		c	159			
$2KI \cdot PbI_2$		c	160			
$2KI \cdot PbI_2 \cdot 2H_2O$		c	160			
$4KI \cdot 3PbI_2$		c	160			
$4KI \cdot 3PbI_2 \cdot 6H_2O$		c	160			
$K_2SO_4 \cdot PbSO_4$		c	161,162			
$K_2SO_4 \cdot ZnSO_4$		c	28			
$K_2SO_4 \cdot ZnSO_4 \cdot nH_2O$		c	28,163			
$2KCN \cdot Zn(CN)_2$		c	164			
KHg		c	165			
KHg_2		c	165			
KHg_{12}		c	165	166,167		
KHg_{50}		liq	165,166,168,169			
KHg_{100}		liq	165,166,168,169			
KHg_{200}		liq	165,166,168,169			
KHg_{1000}		liq	165,166,168,169			
$KHgCl_3$		c	170			
		aq	170			
$KHgCl_3 \cdot H_2O$		c	170			
K_2HgCl_4		c	170			
		aq	28,170			
$K_2HgCl_4 \cdot H_2O$		c	28,170			
$4KCl \cdot 3HgCl_2$		c	170			
$4KCl \cdot 3HgCl_2 \cdot 3H_2O$		c	170			
$KHgBr_3$		c	170			
		aq	170,171			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$KHgBr_3 \cdot H_2O$		c	170			
$KHgI_3$		c	170			
$KHgI_3 \cdot H_2O$		c	170			
K_2HgI_4		c	28			
		aq	28,172			
$KHg(CN)_3$		aq	170,173			
$K_2Hg(CN)_4$		c	26			
		aq	170,173			
$KCN \cdot 2Hg(CN)_2$		aq	170			
$KCl \cdot Hg(CN)_2$		c	172			
$KCl \cdot Hg(CN)_2 \cdot H_2O$		c	172			
$KBr \cdot Hg(CN)_2$		c	170			
		aq	170,173			
$KBr \cdot Hg(CN)_2 \cdot 1\ 1/2H_2O$		c	170,173			
$KI \cdot Hg(CN)_2$		c	170			
		aq	170			
$KI \cdot Hg(CN)_2 \cdot 1/4H_2O$		c	170			
$KCl \cdot CuCl_2$		c	174			
$2KCl \cdot CuCl$		c	159			
$2KCl \cdot CuCl_2$		c	174			
$2KCl \cdot CuCl_2 \cdot 2H_2O$		c	175			
$K_2Cu(SO_4)_2$		c	28,176			
$K_2Cu(SO_4)_2 \cdot H_2O$		c	28			
$K_2Cu(SO_4)_2 \cdot 6H_2O$		c	28,177,178			
$K_2Cu(CO_3)_2$		c	179			
$KCl \cdot AgCl$		c	180			
$KBr \cdot AgBr$		c	180			
$3KBr \cdot AgBr \cdot 1/2H_2O$		c	180			
$KI \cdot AgI$		c	180			
$KI \cdot AgI \cdot 1/4H_2O$		c	180			
$2KI \cdot AgI \cdot 1/2H_2O$		c	180			
$3KI \cdot AgI$		c	180			
$3KI \cdot AgI \cdot 1/2H_2O$		c	180			
$3KI \cdot 2AgI \cdot H_2O$		c	172			
$KAg(CN)_2$		c	26,181			
		aq	164,171			
$K_2Ag(CN)_2$		aq	171			
$KAu(CN)_2$		aq	182			
K_2PtCl_4		c	28			
		aq	28			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
K_2PtCl_6		c	28,183			
		aq	182,183		184	184
K_2PtBr_4		c	184			
		aq	28			
K_2PtBr_6		c	28			
		aq	28			
K_2IrCl_6		c	183			
		aq	183			
K_3IrCl_6		c	183			
		aq	183			
K_2OsCl_6		c	185			
$KReO_4$		c	186			
		aq	186			
K_2PdCl_4		c	28,187			
		aq	28,187			
K_2PdCl_6		c	28,185			
		aq	31			
K_2PdBr_4		c	187			
		aq	187			
K_3RhCl_6		c	185			
$K_2Ni(CN)_4$		aq	171			
$K_2CO_3 \cdot CoCO_3$		c	188			
$K_2CO_3 \cdot CoCO_3 \cdot 4H_2O$		c	188			
$KFe(SO_4)_2$		aq	28			
$K_2Fe(SO_4)_2$		aq	189			
$K_2Fe(SO_4)_2 \cdot nH_2O$		c	163,190			
$K_3Fe(CN)_6$		c	154			
		aq	154			
$K_4Fe(CN)_6$		c	26,191			191
		aq	154,192,193			
$K_4Fe(CN)_6 \cdot 3H_2O$		c	26,191,194			
$KH_2Fe(CN)_6$		aq	154			
$KH_3Fe(CN)_6$		aq	195			
$K_2HFe(CN)_6$		aq	154			
$K_2H_2Fe(CN)_6$		aq	154,195			
$K_3HFe(CN)_6$		aq	195			
$K_3FeCO(CN)_5$		c	196			
		aq	196			
$K_3FeCO(CN)_5 \cdot 3\ 1/2H_2O$		c	196			
$KMnO_4$		c	197,198		199	199
		aq	28,197,198			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$K_2Mn(SO_4)_2$		c	28			
$K_2Mn(SO_4)_2 \cdot nH_2O$		c	28			
K_2CrO_4		c	198, 200			
		aq	198, 200, 201, 202, 203			
$K_2Cr_2O_7$		c	28, 198, 204			
		aq	198, 202, 204, 205			
$K_2Cr_2O_7 \cdot CrO_3$		c	139			
$KCl \cdot CrO_3$		c	200			
$KCr(SO_4)_2$		c	28, 203			
		aq	206			
$KCr(SO_4)_2 \cdot nH_2O$		c	28, 206			
KNH_4CrO_4		c	202			
		aq	202			
K_2MoO_4		aq	207			
KVO_3		aq	208			
KVO_4		c	208			
		aq	208			
KVO_5		aq	31			
$3KF \cdot AlF_3$		c	209			
		aq	209			
$3KF \cdot AlF_3 \cdot 3\ 1/2H_2O$		c	209			
$KCl \cdot AlCl_3$		c	209			
$3KCl \cdot AlCl_3$		c	209			
$3KCl \cdot 2AlCl_3$		c	209			
$KAl(SO_4)_2$		c	206, 210		211	211
		aq	28			
$KAl(SO_4)_2 \cdot nH_2O$		c	28, 206		211	211
$KCl \cdot AlCl_3 \cdot 6NH_3$		c	209			
$K_2O \cdot Al_2O_3 \cdot 4SiO_2$	leucite	c	212, 213			
		gls	213			
$K_2O \cdot Al_2O_3 \cdot 6SiO_2$		c	212, 213			
		gls	212, 213			
$2KCl \cdot UO_2Cl_2 \cdot 2H_2O$		c	214			
$KCl \cdot ThCl_4 \cdot 9H_2O$		c	215			
$2KCl \cdot ThCl_4$		c	215			
$KCl \cdot MgCl_2$		c	81			
$KCl \cdot MgCl_2 \cdot 6H_2O$	carnallite	c	81, 216			
$2KCl \cdot MgCl_2$	fresh melt	c	81			
$4KCl \cdot MgCl_2$	fresh melt	c	81			

Table 93 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$K_2SO_4 \cdot MgSO_4$		c	217,218			
	fresh melt	c	81,217			
$K_2SO_4 \cdot MgSO_4 \cdot nH_2O$		c	28,163,190,217,218			
$K_2SO_4 \cdot 2MgSO_4$	langbeinite	c	216			
$KCl \cdot MgSO_4$	hainite	c	216			
$2KCl \cdot CaCl_2$	fresh melt	c	81			
$K_2SO_4 \cdot CaSO_4 \cdot H_2O$		c	219			
$K_2SO_4 \cdot 5CaSO_4 \cdot H_2O$		c	219			
$KCaFeCO(CN)_5 \cdot 5H_2O$		c	220			
$K_2SO_4 \cdot SrSO_4$		c	219			
$KI \cdot LiCl$	fresh melt	c	221			
KNa		g	222			
		liq	6,223			
KNa_2		liq	6,223			
K_2Na		liq	6,223			
K_3Na		liq	6,223			
$KCl \cdot NaCl$	fresh melt	c	223			
$KI \cdot NaCl$	fresh melt	c	223			
KNa_2PO_4		aq	224			
$3KCNS \cdot NaCNS$		c	155			

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15. Gordon-4
16. Rengade-3
17. Beketoff-2
18. Centnerszwer and Blumenthal-1
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20. de Forcrand-66
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54. Berthelot-85
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60. Berthelot-24
61. Wöhler and Schuff-1
62. Hofmann and Marin-1
63. Latimer, Schutz, and Hicks Jr.-3
64. Brønsted-11
65. Andauer and Lange-1
66. Stackelberg-1
67. Latimer and Ahlberg-1
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69. Berthelot-79
70. Noyes and Sammet-1
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72. Brönsted-5
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82. Scholz-1
83. Hieber and Mühlbauer-1
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85. Walden-4
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87. von Wartenburg and Klinkott-1
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96. Berthelot-92
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110. Pickering-6
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143. Berthelot and Guntz-1
144. Berthelot-7
145. de Forcrand-54
146. Caven and Land-2
147. de Forcrand-17
14B. de Forcrand-3
149. Deventer and Reicher-2
150. Berthelot-25,B5,116
151. Berthelot-111
152. Matignon-1
153. Partington and Soper-1
154. Joannis-1
155. Wrzesnewsky-1
156. Caillot-1
157. Truchot-3
15B. Hantke-1
159. Bronsted-11
160. Berthelot-2
161. Bronsted-10
162. Barre-1
163. Caven and Ferguson-1
164. Berthelot-117
165. Berthelot-56
166. Armbuster and Crenshaw-1
167. Bent and Gilfillan-1
16B. Lewis and Keyes-1
169. Smith and Ball-1
170. Berthelot-83
171. Varet-6
172. Berthelot-86
173. Varet-2
174. Agostini-1
175. Bouzat and Chauvenet-2
176. Pickering-4
177. Pickering-6
178. Caven and Ferguson-2
179. Pickering-12
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182. Biltz and Wien-1
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207. Pechard-1	
208. Pissarjewsky-5	
209. Baud-1	
210. Young-2	
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212. Mulert-1	
213. Tammann-3	
214. Aloy-1	
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217. Pickering-4	
218. Pickering-6	
219. Barre-1	
220. Lecocq-1	
221. Beketoff-8	
222. Loomis and Arvin-1	
223. Kawakami-3	
224. Berthelot and Louguinine-3	

Table 94

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Rb		g	2,3,4		1	1
		c			4,5	4,5
Rb^+		aq	1	6,7	5	
Rb^{n+}		g	9,10,11			
Rb_2		g	12,13			
Rb_2O		c	14,15,16			
Rb_2O_2		c	17,18			
Rb_2O_3		c	17,18			
Rb_2O_4		c	17,18			
RbH		g	13			
RbOH		c	19,20			
		aq	15,14,20,1	1		
$RbOH \cdot nH_2O$		c	19,20			
RbF		c	21,22		23	
		aq	1,24	1		
$RbF \cdot nH_2O$		c	21			
$RbHF_2$		c	25			
		aq	1			
RbCl		c	22,26,27,28			23
		aq	7	1		
	in CH_3OH		29			
$RbClO_3$		c	31	1	5	5
		aq	1,30	1,30		
$RbClO_4$		c	31		32	
		aq	1	1,30		
RbBr		c	27,34,22		33	33
		aq	1	30		
RbI		c	22,27,36	30,35	33	33
		aq	1	1		
Rb_2S		c	37,38			
		aq	37			
Rb_2SO_4		c	26			
		aq	26,39	1		
RbHS		c	40			
		aq	1			
$RbHSO_4$		c	41			
		aq	26			
$RbI \cdot 4SO_2$		c	42,43			
RbHSe		c	40			
		aq	1			

Table 94 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
$RbNO_3$		c	44			
		aq	1	1		
$RbNH_2$		c	45			
$RbBr \cdot 3NH_3$		c	46			
$RbI \cdot 6NH_3$		c	46			
Rb_2CO_3		c	47,48			23
		aq	48			
$Rb_2CO_3 \cdot nH_2O$		c	47,48			
$RbHCO_3$		c	50,51			
		aq	1,49			
$3Rb_2CO_3 \cdot 2RbHCO_3 \cdot 4\ 1/2H_2O$		c	52			
RbCNS	rubidium thiocyanate	c	42			
		aq	1			
$RbCNS \cdot 1/2SO_2$		c	42			
Rb_2SiF_6		c	53			
$2RbI \cdot PbI_2$		c	36			
$2RbI \cdot PbI_2 \cdot 4H_2O$		c	36			
Rb_2CuCl_4		c	54			
$Rb_2CuCl_4 \cdot 2H_2O$		c	54			
Rb_2IrCl_6		c	55			
$RbReO_4$		c	56			
		aq	1			
$RbAl(SO_4)_2$		c	57			
$RbAl(SO_4)_2 \cdot nH_2O$		c	57			
$2RbCl \cdot ThCl_4$		c	58			
$2RbCl \cdot ThCl_4 \cdot 9H_2O$		c	58			
$4RbCl \cdot ThCl_4$		c	58			

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48. de Forcrand-53	
49. de Forcrand-54	
50. Caven and Land-2	
51. Caven and Ferguson-1	
52. de Forcrand-55	
53. Caillot-1	
54. Bouzat and Chauvenet-2	
55. Puche-1	
56. Smith and Long-1	
57. Kraus, Fricke and Querengässer-1	
58. Chauvenet-2	

Table 95
SPECIFIC REFERENCES

Substance			ΔHf^{o}	ΔFf^{o}	S^{o}	C_p^{o}
Formula	Description	State				
Cs		g	1		1	1
		c				
Cs^{n+}		g	3		1	2
Cs^{+}		aq	5	4		
Cs_2		g	6,7			
Cs_2O		c	8,9			
Cs_2O_2		c	10			
Cs_2O_3		c	10			
Cs_2O_4		c	10,11			
CsH		g	6		12,13	5
CsOH		c	14,15			
		aq	8,16		5	
$CsOH \cdot H_2O$		c	15			
CsF		c	17			
		aq	17		5	
$CsF \cdot nH_2O$		c	17			
$CsHF_2$		c	18			
		aq	18			
CsCl		c	17,19,20,21			
		aq	22,23	5		
$CsClO_4$		c	25	26,27	24	24
		aq	25	26,27		
CsBr		c	17,21,28	5		29
		aq	17,21,28	5		
CsI		c	17,21,30	5		29
		aq	17,21	26		
Cs_2S		c	5			
		aq	31			
Cs_2SO_4		c	20			
		aq	20,32	5		
CsHS		c	5,33			
		aq	5,33			
$CsHSO_4$		c	20			
		aq	20			
$CsI \cdot 4SO_2$		c	34,35			
CsHSe		c	33			
		aq	33			
$CsNO_3$		c	19			
		aq	23			
$CsNH_2$		c	36			

Table 95 (Continued)

SPECIFIC REFERENCES

Substance			ΔHf°	ΔFf°	S°	C_p°
Formula	Description	State				
Cs_2CO_3		c	37			
		aq	37,38			
$Cs_2CO_3 \cdot 3\ 1/2H_2O$		c	37,38			
$CsHCO_3$		c	39			
		aq	39,40,41			
$5Cs_2CO_3 \cdot 2CsHCO_3 \cdot nH_2O$		c	42			
Cs_2SiF_6		c	43			
Cs_2CuCl_4		c	44			
$Cs_2CuCl_4 \cdot 2H_2O$		c	44			
$CsReO_4$		c	45			
		aq	45			
$CsAl(SO_4)_2$		c	46			
$CsAl(SO_4)_2 \cdot nH_2O$		c	46	47		47
$2CsCl \cdot ThCl_4$		c	48			
$2CsCl \cdot ThCl_4 \cdot 8H_2O$		c	48			
$4CsCl \cdot ThCl_4$		c	48			
CsLiICl		c	30			
CsNaICl		c	30			
CsKICl		c	30			

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11. de Forcrand-57
12. Herzberg-9
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43. Caillot-1	
44. Bouzat and Chauvenet-2	
45. Smith and Long-1	
46. Kraus, Fricke, and Querengässer-1	
47. Latimer and Greensfelder-1	
48. Chauvenet-2	

V. SPECIFIC REFERENCES FOR THE TABLES OF PROPERTIES OF SERIES II

Table 1

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
O_2		Transition	1,7,9	1	1
		Fusion	1,6,7,8,9	1	1
		Vaporization	2	1,3	1,5
O_3		Vaporization	4	4	

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6. Lisman and Keesom-1
7. Aoyama and Kanda-4
8. Henning and Otto-1
9. Clusius-6

Table 2

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
H_2		Fusion	1	1	1
		Vaporization	1	1	
H_2O		Fusion	6	2,3	3,4,5
		Vaporization	6	4,7	4,7
H_2O_2		Fusion	8	8	
		Vaporization	8	8	

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7. Wagman, Kilpatrick, Taylor, Pitzer, and Rossini-1
8. Maass and Hiebert-1

Table 2a

$^1H_2$		Fusion	1	1	1
		Vaporization	1	1	

REFERENCES

1. Calculated

Table 2b

$^2H_2$		Fusion	1,2	1,2	1,2
		Vaporization	1,2,3		
$^1H^2H$		Fusion	1	4	4
		Vaporization	1	4	4
^2H_2O		Fusion	5,6	5,6,7,8,9	5,7,8
		Vaporization	10	10	
$^1H^2HO$		Vaporization	11	11	

REFERENCES

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2. Clusius and Bartholomé-2
3. Lewis and Hanson-1
4. Calculated
5. Long and Kemp-1
6. Redlich and Zentner-1,2
7. Brown, Barnes and Maass-1
8. Bartholome and Clusius-1
9. Jacobs-2
10. Rossini, Knowlton, and Johnston-1
11. Wahl and Urey-1

Table 3

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
He		Fusion	1,2,3,4,5	1,2,3,4,5	
		Transition	1,6	1,6	1,6
		Vaporization	1	1	

REFERENCES

1. Keesom-2
2. Keesom and Keesom-2
3. Keesom, Weber, and Schmidt-1
4. Kaishev and Simon-1
5. Simon and Steckel-1
6. Keesom, Weber and Norgaard-1

Table 4

Ne		Fusion	1,2	1,2	1,3,4
		Vaporization	3	3	1,3,4

REFERENCES

1. Clusius-8
2. Henning and Otto-1
3. Keesom and Haantjes-3
4. Clusius-5

Table 5

A		Fusion	1	1	1,3,4
		Vaporization	2	2	1,3,4

REFERENCES

1. Clusius-8
2. Frank and Clusius-2
3. Eucken and Hauch-1
4. Rice-1

Table 6

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Kr		Fusion	1	1	1,2
		Vaporization	2	2	1,2

REFERENCES

1. Clusius-8
2. Clusius, Kruis, and Konnertz-1

Table 7

Xe		Fusion	1	1	1
		Vaporization	1,2	1,2	1

REFERENCES

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Table 8

Rn		Fusion	1	2	
		Vaporization	1	2	

REFERENCES

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Table 9

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
F_2		Fusion	1	1,2,7	1,5
		Vaporization	3,4	3,4,7	1,5,6
F_2O		Vaporization	8	8,18	
HF		Fusion	9	9	9,13,14,15
		Vaporization	10,11,12,17,18	10,11,16,17	9,14,15,13

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14. Pranschke and Schwiete-1
15. Roth, Pahlke, Bertram and Borger-1
16. Kolosovskii-1
17. Simons-1
18. Kelley-19

Table 10

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Cl_2		Fusion	1,2,5,6,7,8,9	1,2,5,6,7,8,9	1,4
		Vaporization	1,2,3,32	1,2,3,32	1,4,12,13
ClO_2		Vaporization	3,10	3,10	
Cl_2O		Vaporization	3	3	
Cl_2O_7		Vaporization	11	11	
HCl		Transition	14	14	14
		Fusion	7,14,26	7,14,26	14
		Vaporization	6,14,16,17,18,19,20,21,22,23,24,25,32	6,14,16,17,18,19,20,21,22,23,24,25,32	14
$HCl \cdot 2H_2O$		Fusion	15,28,27	15,28,27	
ClF		Vaporization	29,30	29,30	
ClF_3		Vaporization	30	30	
ClO_2F		Vaporization	31	31	

REFERENCES

1. Giauque and Powell-1
2. Kelley-24
3. Goodeve-1
4. Brucksch, Jr, and Ziegler
5. Estreicher and Staniewski-1
6. Estreicher and Schneer-1
7. Eucken and Karwat-1
8. Harteck-2
9. Rideal-1
10. King and Partington-1
11. Goodeve and Powney-1
12. Kelley-18
13. Kelley-25
14. Giauque and Wiebe-1
15. Berthelot-47
16. Elliott and McIntosh-1
17. Steele, McIntosh, and Archibald-1
18. Tsurita-1
19. Faraday-1
20. Ansdell-1
21. McIntosh and Steele-1
22. Briner-4
23. Drozdowski and Pietrgale-1
24. Cardoso and Germann-1
25. Henning and Stock-1
26. Eucken and Donath-1
27. Roozeboom-4
28. Roozeboom-3
29. Ruff and Laass-1
30. Ruff and Krug-1
31. Schmitz and Schumacher-1
32. Kelley-19

Table 11

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Br_2		Fusion	1,2,3,4,5,6,7,8, 10	1,2,3,4,5,6, 7,8,10,11	9,11,12
		Vaporization	13,14,15,17,18, 19,20,21,22,23, 24,25,3,26,27, 28,29	13,14,16,17, 18,19,20,21, 22,23,24,25, 3,26,27,28,29	
HBr		Fusion	30,31,32,33,34, 35	30,31,32,33, 34,35	11,30
		Vaporization	30,31,33,34,36, 37,38	30,31,33,34, 36,37,38	
$HBr \cdot H_2O$		Fusion	39	39	
BrF_5		Fusion	10,40	10,40	
		Vaporization	11,40	11,40	

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16. Fleischman-1
17. Andrews-5
18. Andrews-9
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26. Ramsay and Young-1
27. Roozeboom-3
28. Roozeboom-4
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31. Eucken and Karwat-1
32. Henglein-3
33. Maass and McIntosh-1
34. Steele, McIntosh, and Archibald-1
35. Drozdowski and Pietrzak-1
36. Elliott and McIntosh-1
37. Estreicher and Schneer-1
38. Steele and Bagster-1
39. Roozeboom-6
40. Ruff and Menzel-2

Table 12

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
I_2		Fusion	1,2,3,4,5,6,7	1,2,3,4,5,6,7	
		Sublimation	8,9,10,11,12,13,14,15	8,9,10,11,12,13,14,15	
HI		Fusion	16,17	16,17	16
		Vaporization	16	16	
IF_5		Fusion	2,18	2,18	
		Vaporization	2,18	2,18	
IF_7		Sublimation	2,19	2,19	
ICl		Fusion	20,21,22,23,24	20,21,22,23,24	
		Vaporization	20,25,26,27	20,25,26,27	

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4. Stelzner and Niederschulte-1
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6. Rideal-1
7. Kelley-21
8. Giauque-3
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11. Ramsay and Young-1
12. Haber and Kerschbaum-1
13. Wohl-3
14. Dewar-1
15. Nernst-1
16. Giauque and Wiebe-3
17. Bates, Halford, and Anderson-1
18. Ruff and Braida-3
19. Ruff and Keim-1
20. Cornog and Bauer-1
21. Tanatar-6
22. Stortenbeker-1
23. Berthelot-63
24. Berthelot-144
25. Thorpe-1
26. McMorris and Yost-2
27. Cornog and Karges-1

Table 14

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
S		Transition	1,2,3,4,5,6,7,8,9,10,11	1,2,3,4,5,6,7,8,9,10,11	1,2,3,12
		Sublimation	3,13,14,15	3,13,14,15	
		Fusion	1,2,3,9,11,12,13,16,17,18	1,2,3,9,11,12,13,16,17,18	1,2,3,12,13
		Transition		8,10,19	
		Vaporization	3,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34	3,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34	
SO_2		Fusion	21,35,36,37,38,39,40	21,35,36,37,38,39,40	2,3,35,36,41,42,43
		Vaporization	35,36,42,43,44,45	35,36,42,43,44,45	35,43
SO_3		Fusion	3,37,38,39,40,46,47,48	3,37,38,39,40,46,47,48	
		Sublimation	3,37,38,39,40,46,47,48	3,37,38,39,40,46,47,48	
		Vaporization	3,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71	3,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71	
S_2O_7		Fusion	72		
H_2S		Transition	73,74,75,76	73,74,75,76	2,73,74,75
		Fusion	73,74,75	73,74,75	2,73,74,75
		Vaporization	40,51,73,74,77,78,79,80,81,82,83	40,51,73,74,77,78,79,80,81,82,83	2,73,74,77
H_2S_2		Fusion	84,85	3,84	3,84
		Vaporization	84,85	3,84	3,84
H_2S_3		Fusion	86,87		
		Vaporization	87		
H_2SO_4		Fusion	88,89,90,91,92,93	88,89,90,91,92,93	88
$H_2SO_4 \cdot H_2O$		Fusion	88,89,90,91,92,93,94	88,89,90,91,92,93,94	88
$H_2SO_4 \cdot 2H_2O$		Fusion	90		
$H_2SO_4 \cdot 4H_2O$		Fusion	94		
H_2SO_5		Fusion	95		
$H_2S_2O_7$		Fusion	96	96	96
$H_2S_2O_8$		Fusion	95		
SF_4		Fusion	97		
		Vaporization	97	97	
SF_6		Transition	98	98	98
		Sublimation	99,100	99,100	
		Fusion	98,99,100,101	98,99,100,101	98
		Vaporization	99,102	99,102	

Table 14 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
S_2F_2		Fusion	103		
		Vaporization	103		
S_2F_{10}		Fusion	104		
		Vaporization	104	104	
SOF_2		Fusion	105	105	
		Vaporization	105		
SO_2F_2		Fusion	106,107		
		Vaporization	106,107		
HSO_3F		Vaporization	108		
S_2Cl_2		Fusion	109		
		Vaporization	110,111,112,113	110,111,112, 113	
$SOCl_2$		Fusion	114		
		Vaporization	112,115,116	112,115,116	
SO_2Cl_2		Fusion	117		
		Vaporization	117	117	
$S_2O_5Cl_2$		Fusion	118		
		Vaporization	112,115,116,119	112,115,116, 119	
$SOFCl$		Fusion	120		
		Vaporization	120	120	
SO_2FCl		Fusion	121		
		Vaporization	121	121	
S_2Br_2		Fusion	122		
		Vaporization	122		
$SOBr_2$		Fusion	114		
		Vaporization	114	114	

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5. Mitscherlich-2
6. Tammann-2
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8. Lewis and Randall-1
9. Wigand-1
10. Mondain-Monval-1
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13. Neumann-4
14. Taillade-1
15. Fouretier-1
16. Person-1
17. Trautz-1
18. Iitaka-1
19. Berthelot-1
20. Kelley-22
21. Kelley-19
22. Ruff and Graf-1
23. Bodenstein-4
24. Gruener-1
25. Mathies-1
26. Preuner and Schupp-2
27. West and Menzies-1
28. Awbery-3

Table 14 (Continued)

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31. Barus-2
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35. Giauque and Stephenson-1
36. Perlick-3
37. Bergstrom-2
3B. Bergstrom-3
39. Burrell and Robertson-1
40. Steele and Bagster-1
41. Brucksch and Ziegler-1
42. Seger and Cramer-1
43. Riedel-2
44. Griffiths and Awbery-2
45. Roth and Zeumer-2
46. Smits and Schoenmaker-1
47. Smits and Schoenmaker-2
48. Miles, Niblock and Wilson-1
49. Eucken-2
50. Eucken-7
51. Estreicher and Schneer-1
52. Chappius-2
53. Estreicher-1
54. Mathias-1
55. Schneer-1
56. Cailletet and Mathias-2
57. Cailletet and Mathias-2
5B. Smith-1
59. Faraday-3
60. Young-5
61. Cardoso and Fiorentino-1
62. Henning and Stock-1
63. Mund-1
64. Mills-1
65. Bergstrom-2
66. Bergstrom-3
67. Burrell and Robertson-1
6B. Regnault-7
69. Pictet-1
70. Blumcke-2
71. Antoine-3
72. Berthelot-156
73. Giauque and Blue-1
74. Clusius and Frank-4
75. Clusius-1
76. Klemenc and Bankowski-1
77. Cross-1
7B. Clusius and Frank-4
79. Elliot and McIntosh-1
B0. Caillett and Bordet-1
81. Regnault-6
82. Maass and McIntosh-2
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B4. Butler and Maass-1
85. Walton and Parsons-1
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91. Berthelot-3
92. Berthelot-6
93. Berthelot-136
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96. Auerbach-1
97. Fischer and Jaenckner-1
9B. Eucken and Schröder-1
99. Klemm and Henkel-1
100. Yost and Claussen-1
101. Schumb and Gamble-3
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Table 14 (Continued)

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120. Booth and Mericola-1
121. Booth and Herrmann-1
122. Ruff and Winterfield-1

Table 14a

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$^{2}H_{2}S$		Transition	1	1	1
		Fusion	1	1	1
$^{1}H^{2}HS$		Transition	2	2	2
		Fusion	2	2	2

REFERENCES

1. Kruis and Clusius-1
2. Kruis-1

Table 15

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Se		Transition	1	1	1
		Fusion	1,2	1	1
		Vaporization	3,4	3,4	
SeO_2		Sublimation	5,6,7	5,6,7	
H_2Se		Transition	B	8	8
		Fusion	8	B	8
		Vaporization	8,9,10	9,10	
H_2SeO_4		Fusion	11,12	11	
$H_2SeO_4 \cdot H_2O$		Fusion	11,12	11	
$H_2SeO_4 \cdot 4H_2O$		Fusion	12		
SeF_4		Fusion	13		
		Vaporization	13		
SeF_6		Sublimation	14,15	14,15	
		Fusion	14,15	16	
		Vaporization	14,15	14,15	
$SeOF_2$		Fusion	17		
		Vaporization	17		
$SeCl_4$		Sublimation	1B		
		Fusion	1B		
$SeOCl_2$		Fusion	19	19	
		Vaporization	19	19	
$Se(OH)_3 \cdot ClO_4$		Fusion	20		
$SeOBr_2$		Fusion	21		
		Vaporization	21		

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3. Preuner and Brockmoller-1
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6. Ishikawa and Abe-1
7. Amelin and Belyakov-1
8. Kruis and Clusius-1
9. Stein-1
10. Bruylants and Dondeyne-1
11. Metzner-1,2
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Table 15a

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$^{2}H_{2}{}^{3}Se$		Transition	1	1	1
		Fusion	1	1	1
$^{1}H^{2}H^{3}Se$		Transition	1,2	1,2	1,2
		Fusion	2	2	2

REFERENCES

1. Kruis and Clusius-1
2. Kruis-1

Table 16

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Te		Transition	1,2	1,2	
		Fusion	1,2,3,4,5,6	1,2,3,4	1,2,3,4
		Vaporization	7,8,9,10,11	7,8,9,10	
H_2Te		Fusion	12,13	12	
		Vaporization	12,13,14	12,14	
TeF_6		Transition	15	15	
		Sublimation	15,16	15,16	
		Fusion	15,16	15,16	
		Vaporization	16	16	
$TeCl_4$		Fusion	17,18	17,18	17
		Vaporization	18	18	

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10. Deville and Troost-5
11. Silverman, Morey, and Rossini-1
12. Stein-1
13. Robinson and Scott-1
14. Bruylant-1
15. Yost and Claussen-1
16. Klemm and Henkel-1
17. Frederick and Hildebrand-2
18. Simons-2

Table 18

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
N_2		Transition	1	1	
		Fusion	1,2,3,4,5,6,7,8	1	
		Vaporization	1	1	
NO		Fusion	9	9	9
		Vaporization	9,10	9,10	
N_2O		Fusion	11,12	11,12	11,13
		Vaporization	11,12	11,12	
N_2O_3		Fusion	14		
		Vaporization	14,15	14,15	
N_2O_4		Fusion	16	16	16
		Vaporization	16	16	
N_2O_5		Sublimation	17	17	
NH_3		Fusion	18	15,18	
		Vaporization	18,19	15,18,19	
$NH_3 \cdot 1/2\ H_2O$		Fusion	20		
$NH_3 \cdot H_2O$		Fusion	20		
N_2H_4		Fusion	21,22,23		
		Vaporization	21,22	22	
$N_2H_4 \cdot H_2O$		Fusion	22		
		Vaporization	22		
HN_3		Fusion	24		
		Vaporization	24,25,26	26	
NH_4N_3		Sublimation	27	27	
		Fusion	28		
$N_2H_4HN_3$		Fusion	28		
HNO_3		Fusion	29	29	29
		Vaporization	30	30	
$HNO_3 \cdot H_2O$		Fusion	29	29	29
$HNO_3 \cdot 3H_2O$		Fusion	29	29	29
NH_2OH		Fusion	31		
		Vaporization	31		
NH_4NO_3		Transition	32,33,34,35	32,33,34,35	
		Fusion	32,33,36	32,33,36	
$N_2H_4 \cdot HNO_2$		Fusion	37		
$N_2H_4 \cdot HNO_3$	metastable	Fusion	38		
	stable	Fusion	38,39,40		
$N_2H_4 \cdot 2HNO_3$		Fusion	39		
$NH_4NO_3 \cdot 2HNO_3$		Fusion	41		
NF_3		Transition	42		
		Fusion	42		
		Vaporization	43	43	

Table 18 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
NOF		Fusion	44		
		Vaporization	44	44	
NO_2F		Fusion	44		
		Vaporization	44	44	
NO_3F		Fusion	45		
		Vaporization	45		
NH_2F		Sublimation	46		
NHF_2		Fusion	46		
		Vaporization	46		
$NH_4F \cdot HF$		Fusion	47		
$N_2H_4 \cdot 2HF$		Fusion	48		
NCl_3		Vaporization	49		
NOCl		Fusion	50		
		Vaporization	50	50	
NO_2Cl		Fusion	51		
		Vaporization	51	51	
NH_2Cl		Fusion	52		
NH_4Cl		Transition	53,54,55,56,57, 58,59,60	53,54,55,56, 57,58,59,60	
		Fusion	61		
$NH_4Cl \cdot 3NH_3$		Fusion	62		
$N_2H_4 \cdot HCl$		Fusion	63	63	
$N_2H_4 \cdot 2HCl$		Fusion	64		
NH_4ClO_4		Transition	65		
N_3Br		Fusion	66		
NOBr		Fusion	67		
$NOBr_3$		Fusion	67		
NH_4Br		Transition	59	59	
		Fusion	61		
$NH_4Br \cdot 3NH_3$		Fusion	62		
$N_2H_4 \cdot HBr$		Fusion	48		
$N_2H_4 \cdot 2HBr$		Fusion	48		
NH_4I		Transition	55,59,68	55,59,68	
		Fusion	61		
$NH_4I \cdot 3NH_3$		Fusion	62		
$NH_4I \cdot 4NH_3$		Fusion	62		
N_2H_4HI		Fusion	48		
$N_2H_4 \cdot 2HI$		Fusion	48		
NH_4Cl_2I		Fusion	69		
NH_4Cl_4I		Fusion	69		
NH_4IBr_2		Fusion	69		
N_2S_5		Fusion	70		

Table 1B (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
N_4S_4		Fusion	71,72,73		
$N_2O_3 \cdot 2SO_3$		Fusion	74		
		Vaporization	74		
NO_2SO_2OH		Fusion	75		
NH_4HSO_4		Transition	59		
		Fusion	76	76	
$N_2H_4 \cdot H_2SO_4$		Fusion	64		
$(NH_4)_2SO_4$		Fusion	77		
$(H_2NSO_2)_2NH$		Fusion	78		
$(N_2H_4)_2H_2SO_4$		Fusion	37		
$NOSO_3F$		Fusion	79		

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Table 19

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
P		Transition	1,2,3,4,5	1,2,3,4,5,6	
		Fusion	1,2,3,4,5	1,2,3,4,5	
		Vaporization	4,5	4,5	
P_4O_6		Fusion	7		
		Vaporization	7	7	
P_4O_{10}		Sublimation	8,9,10,11	8,9,10,11	
		Fusion	8,9,10,11,12	8,9,10,11,12	
		Vaporization	12	12	
PH_3		Transition	13,14	13,14	
		Fusion	13,14	13,14	
		Vaporization	13,14	13,14	
P_2H_4		Vaporization	15		
H_3PO_2		Fusion	16,17	17	
H_3PO_3		Fusion	17	17	
H_3PO_4		Fusion	18,19	17	
$H_3PO_4 \cdot 1/2\ H_2O$		Fusion	18,19,20	20	
$H_4P_2O_6$		Fusion	21		
$H_4P_2O_6 \cdot 2H_2O$		Fusion	21	21	
$H_4P_2O_7$		Fusion	22	22	
$H_4P_2O_7 \cdot 1\ 1/2H_2O$		Fusion	22	22	
$H_6P_4O_{13}$		Fusion	23		
PF_3		Fusion	24,25,26		
		Vaporization	24,26	24,26	
PF_5		Fusion	27	27	
		Sublimation	27	27	
		Vaporization	27	27	
POF_3		Vaporization	25,26,28,29	26,29	
		Sublimation	26	26	
		Fusion	26,29	26,29	
HPO_2F_2		Vaporization	26		
PCl_3		Fusion	30		
		Vaporization	30,31	31	
PCl_5		Sublimation	32	32	
		Fusion	32		
P_2Cl_4		Fusion	33		
$POCl_3$		Fusion	26,34,35,36	36	
		Vaporization	26,31,35,37,38,39	31,39	
PH_4Cl		Transition	40		
		Fusion	40		
PF_2Cl		Fusion	41		
		Vaporization	41	41	

Table 19 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$PFCl_2$		Fusion	41		
		Vaporization	41	41	
POF_2Cl		Fusion	29		
		Vaporization	29	29	
$POFCl_2$		Fusion	29		
		Vaporization	29	29	
PBr_3		Fusion	30		
		Vaporization	30,42,43	42	
PBr_5		Sublimation	44	44	
$POBr_3$		Fusion	45		
		Vaporization	38,46	46	
PF_2Br		Fusion	47		
		Vaporization	47	47	
$PFBr_2$		Fusion	47		
		Vaporization	47	47	
PF_3Br_2		Fusion	48		
POF_2Br		Fusion	49		
		Vaporization	49	49	
$POFBr_2$		Fusion	49		
		Vaporization	49	49	
$POCl_2Br$		Fusion	34		
$POClBr_2$		Fusion	34		
POClFBr		Vaporization	50		
PI_3		Fusion	38,51,52		
P_2I_4		Fusion	51		
P_2S_3		Fusion	6		
P_4S_3		Fusion	53		
		Vaporization	53		
P_4S_7		Fusion	54,55		
P_4S_{10}		Fusion	56,57		
$P_4O_6S_4$		Fusion	58		
		Vaporization	58		
PSF_3		Fusion	25,59		
		Vaporization	59		
$PSCl_3$		Fusion	59		
		Vaporization	34,37		
PSF_2Cl		Fusion	59		
		Vaporization	59	59	
$PSFCl_2$		Fusion	59		
		Vaporization	59	59	
$PSBr_3$		Fusion	60		

Table 19 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
PSF_2Br		Fusion	60		
		Vaporization	61	61	
$PSFBr_2$		Fusion	61		
		Vaporization	61	61	
$PSCl_2Br$		Fusion	34		
		Vaporization	34		
$PSClBr_2$		Fusion	34		
		Vaporization	34		
$NH_2OH \cdot H_3PO_2$		Fusion	62		
$NH_4H_2PO_3$		Fusion	62,66		
$N_2H_4 \cdot H_3PO_3$		Fusion	62		
$NH_4NH_2HPO_3$		Fusion	62		
$N_2H_4 \cdot H_3PO_4$		Fusion	62		
$N_2H_4 \cdot H_4P_2O_6$		Fusion	62		
$N_2H_4 \cdot (H_3PO_3)_2$		Fusion	62		
$(NH_4)_2H_2P_2O_6$		Fusion	62		
$N_3P_3F_8H_2 \cdot 2H_2O$		Fusion	64		
NH_4HPO_3F		Fusion	65		
$NH_4PO_2F_2$		Fusion	65		
$(PNCl_2)_3$		Fusion	66,67	66	
		Vaporization	66,67,68	66,68	
$(PNCl_2)_4$		Fusion	67		
		Vaporization	67,68	67,68	
$(PNCl_2)_5$		Fusion	67		
		Vaporization	67		
$(PNCl_3)_6$		Fusion	67		
		Vaporization	67		
$N_4P_4Cl_2F_6$		Fusion	67		
$PNBr_2$		Vaporization	67		
		Fusion	69		

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Table 20

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
As		Sublimation	1,2,3,4,5,6,7	1,2,3,4,5,6,7	
		Fusion	2,8,9,10,11		
		Vaporization	1,2,3,4,5,6,7,9,10,11,12		
As_4O_6		Sublimation	13,14,15,16,17,18,19,20,21	13,14,15,16,17,18,19,20,21	
		Fusion	13,14,15,16,17,18,19,20,21	13,14,15,16,17,18,19,20,21	
		Vaporization	15,16,18,20,22	15,16,18,20,22	
AsH_3		Fusion	23	23	
		Vaporization	23	23	
$H_3AsO_4 \cdot 1/2\ H_2O$		Fusion	24		
AsF_3		Fusion	25	25	
		Vaporization	25,26	25	
AsF_5		Fusion	27	27	
		Vaporization	27		
$AsCl_3$		Fusion	28,29	28,29	
		Vaporization	26,29,30,31,32,33,34,35,36,37	29,30,32,33,34,35,36,37	
$AsBr_3$		Fusion	30,36,37,38,39,40	30,38	
		Vaporization	30,37,39	30,41	
AsI_2		Fusion	42		
AsI_3		Fusion	30,43,44,45,46		
		Vaporization	46	46	
As_2S_2		Transition	47		
		Fusion	47,48		
		Vaporization	47		
As_2S_3		Transition	47		
		Fusion	47		

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Table 21

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Sb		Transition	1,2,3,4		
		Fusion	10	5,6,7,8,9,11	
		Vaporization	12,13		
Sb_4O_6		Transition	14	14	
		Fusion	14	14	
		Vaporization	14	14	
SbH_3		Fusion	15		
		Vaporization	15		
SbF_3		Fusion	16,17		
		Vaporization	18		
SbF_5		Fusion	19		
		Vaporization	20,21		
$2SbF_3 \cdot SbF_5$		Vaporization	20		
$SbCl_3$		Fusion	22,23,24,25,26,27	22,26,27	
		Vaporization	20,23,25,28,29,30,31,32,33	30,31,32,33	
$SbCl_5$		Fusion	24,34,35,36,37	34,35,37	
		Vaporization	30,34	30,34	
$SbCl_3F_2$		Fusion	38		
$SbBr_3$		Fusion	22,23,24,25,26,27	22,25,26,27	
		Vaporization	23		
SbI_3		Fusion	23,39,40		
Sb_4S_6		Fusion	41,42,43,44	42,44	
Sb_2Se_3		Fusion	45		
Sb_2Te_3		Fusion	46		
$3NH_4Cl \cdot 2SbCl_3$		Fusion	25		

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Table 22

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Bi		Fusion	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21	1,11,13,14,15,16,17,18,19,20,21	
		Vaporization	22,23,24		
Bi_2O_3		Fusion	21,25	21,25	
BiF_3		Fusion	26		
BiF_5		Sublimation	26		
$BiCl_3$		Fusion	7,21,27,28,29	21,27,28,29	
		Vaporization	24	24	
$BiCl_4$		Fusion	27		
$BiBr_3$		Transition	30		
		Fusion	7,27,28,29,30,31		
		Vaporization	32	32	
BiS		Fusion	33		
BiSe		Transition	34		
Bi_2Se_3		Fusion	10,34		
Bi_2Te_3		Fusion	2,4,8,12		
$Bi_2Te_3 \cdot Bi_2S_3$		Fusion	8,35		

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35. Amadori-12

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Table 23

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C	graphite	Sublimation	1	1	
CO	carbon monoxide	Transition	2,3	2,3	2,3
		Fusion	2,3	2,3	2,3
		Vaporization	2,4	2,4	
CO_2	carbon dioxide	Sublimation	4,5	4,5	
		Fusion	6	6	
CH_4	methane	Fusion	7,130	7,130	
		Vaporization	7,130	7,130	
CH_2O	formaldehyde	Fusion	8		
		Vaporization	8	8	
CH_2O_2	formic acid	Fusion	9,10	9,10	9
		Vaporization	10	10	
CH_3OH	methanol	Transition	11	11	
		Fusion	11	11	11
		Vaporization	12,13,14	12,13,14	
CH_4O_2	methyl hydrogen peroxide	Vaporization	15	15	
CF_4	tetrafluoromethane	Transition	16	16	
		Fusion	16,17	16,17	
		Vaporization	17	17	
COF_2	carbonyl fluoride	Fusion	18		
		Vaporization	18	18	
CH_3F	fluoromethane	Vaporization	19	19	
CH_2F_2	difluoromethane	Vaporization	20		
CHF_3	trifluoromethane	Fusion	21		
		Vaporization	21,22	21,22	
CCl_4	tetrachloromethane	Transition	23,24,57,26,27,28	23,24,57,27,28	
		Fusion	23,24,57,27,28,29,30,31,32	23,24,57,27,28,29,30,31,32	
		Vaporization	14,33,34	14,33,34	
$COCl_2$	carbonyl chloride	Fusion	35	35	
		Vaporization	35	35	
CH_3Cl	chloromethane	Fusion	36	36	36
		Vaporization	34,36	34,36	
CH_2Cl_2	dichloromethane	Fusion	37,38	37,38	
		Vaporization	14,39,40	14	
$CHCl_3$	trichloromethane	Fusion	37,41,42,43	37,42	
		Vaporization	14,34,39,40,41,44	14,34	
CF_3Cl	trifluorochloromethane	Fusion	45		
		Vaporization	46,47,48	46,47,48	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
CF_2Cl_2	difluorodichloromethane	Fusion	49,50		
		Vaporization	47,48,50,51	47,48,50	
$CFCl_3$	fluorotrichloromethane	Fusion	52	52	
		Vaporization	40,51,52,53	40,51,52,53	52,54
COFCl	carbonylfluorochloride	Fusion	55		
		Vaporization	55	55	
CH_2FCl	fluorochloromethane	Fusion			
		Vaporization	40,55	40,55	
CHF_2Cl	difluorochloromethane	Fusion	25		
		Vaporization	56,25	56,25	
$CHFCl_2$	fluorodichloromethane	Fusion	25		
		Vaporization	56,25	56,25	
CBr_4	tetrabromomethane	Transition	58,59	58,59	
		Fusion	59,60,61	59,60	
		Vaporization	62	62	
$COBr_2$	carbonyl bromide	Vaporization	63	63	
CH_3Br	bromomethane	Transition	64	64	
		Fusion	64	64	
		Vaporization	64	64	
CH_2Br_2	dibromomethane	Fusion	39,65,66,67	39,66,67	
		Vaporization	39,66,	39,66	
$CHBr_3$	tribromomethane	Fusion	68,69,70	69,70	
		Vaporization	39,71,72,73	71,72,73	
CF_3Br	trifluorobromomethane	Fusion			
		Vaporization	74		
CBr_2F_2	difluorodibromomethane	Fusion			
		Vaporization	75		
CBr_3F	fluorotribromomethane	Fusion			
		Vaporization	75		
CHF_2Br	difluorobromomethane	Fusion			
		Vaporization	76		
$CHFBr_2$	fluorodibromomethane	Fusion			
		Vaporization	77		
CI_4	tetraiodomethane	Fusion	39		
CH_3I	iodomethane	Fusion	78		
		Vaporization	39,66,79	39,66,79	
CH_2I_2	diiodomethane	Fusion	65,80	80	
		Vaporization	81		
CHI_3	triiodomethane	Fusion	37	37	
CHF_2I	difluoroiodomethane	Fusion	21		
		Vaporization	21	21	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$CHFI_2$	fluorodiiodomethane	Fusion	21		
		Vaporization	21	21	
CS_2	carbon disulfide	Fusion	82,83,84	83	
		Vaporization	14,84,85	14,84,85	
COS	carbonoxysulfide	Fusion	86,87	86,87	86
		Vaporization	86	86	
CH_4S	methanethiol	Transition	88	88	
		Fusion	88	88	88
		Vaporization	88	88	
H_2CS_3	trithiocarbonic acid	Fusion	89		
CSe_2	carbon diselenide	Fusion	90		
		Vaporization	90	90	
COSe	carbonoxyselenide	Fusion	91		
		Vaporization	91	91	
CSSe	carbon sulfoselenide	Fusion	92		
		Vaporization	92	92	
CSTe	carbon sulfotelluride	Fusion	93		
$C(NO_2)_4$	tetranitromethane	Fusion	25		
		Vaporization	94	94	
HCN	hydrogen cyanide	Transition	95	95	
		Fusion	95	95	95
		Vaporization	95	95	
CH_5N	methylamine	Fusion	96	96	
		Vaporization	96	96	
CH_2N_2	cyanamide	Fusion	97	97	
HNCO	hydrogen isocyanide	Fusion	98		
		Vaporization	99	99	
CH_3ON	formamide	Fusion	100,101,102	101	
CH_3O_2N	nitromethane	Fusion	103	103	
		Vaporization	14,103,104,105, 106	103	
CH_3O_2N	methyl nitrite	Fusion			
		Vaporization	107	107	
CH_3O_3N	methyl nitrate	Fusion			
		Vaporization	107	107	
CH_4ON_2	urea	Fusion	108,109	108,109	
CFN	cyanogen fluoride	Sublimation	110	110	
COF_3N	N,N-difluorofluoro-formamide	Fusion	111		
		Vaporization	111	111	
COF_3N	trifluoronitrosomethane	Fusion	111		
		Vaporization	111	111	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$CClN$	cyanogen chloride	Fusion	112,113	112	
		Vaporization	42	112	
CO_2Cl_3N	trichloronitromethane	Fusion			
		Vaporization	114,115	114,115	
CH_6ClN	methylamine hydrochloride	Transition	116	116	
$CBrN$	cyanogen bromide	Sublimation	114	114	
		Fusion	117,118		
		Vaporization	118		
CIN	cyanogen iodide	Sublimation	119,120	119,120	
		Fusion	118		
$HCNS$	hydrogen thiocyanate	Fusion	121		
NH_4SCN	ammonium thiocyanate	Transition	58	58	
COF_2NP	phosphorus difluoroisocyanate	Fusion	122		
		Vaporization	122	122	
CF_2SNP	phosphorus difluoroisothiocyanate	Vaporization	112	112	
CCl_2SNP	phosphorus dichlorothiocyanate	Fusion	113		
		Vaporization	113	113	
CH_5As	methyl arsine	Fusion	124		
		Vaporization	124	124	
CH_3F_2As	methyl difluoroarsine	Fusion	125		
		Vaporization	125	125	
CH_3Cl_2As	methyl dichloroarsine	Fusion	126		
		Vaporization	126	126	
C_2H_2	ethyne (acetylene)	Sublimation	127,130	127	
		Fusion	127	127	
		Vaporization	127	127	
C_2H_4	ethene (ethylene)	Fusion	128,129,130	128,129,130	
		Vaporization	7	7	
C_2H_6	ethane	Fusion	131,130	131,130	131
		Vaporization	130	130	130
C_2H_2O	ketene	Fusion	132		
		Vaporization	132		
$C_2H_2O_2$	glyoxal	Fusion	133		
		Vaporization	133	133	
$C_2H_2O_4$	oxalic acid	Sublimation	134	134	
C_2H_4O	acetaldehyde	Fusion	135,137	135,137	
		Vaporization	136,138,139	136,138,139	139
$C_2H_4O \cdot H_2O$	acetaldehyde monohydrate	Fusion	140	140	140
C_2H_4O	ethylene oxide	Fusion	141	141	141
		Vaporization	141,142	141,142	142

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$C_2H_4O_2$	acetic acid	Fusion	143,144,145,146	144,145	147
		Transition	144	144	
		Vaporization	143,144	148,149	
$C_2H_4O_2$	methyl formate	Fusion	137,150	150	
		Vaporization	14,137	14	
$C_2H_4O_2$	hydroxyacetaldehyde	Fusion	151		
$C_2H_4O_3$	hydroxyacetic acid (glycollic acid)	Fusion	152	152	
C_2H_6O	ethanol	Fusion	153	153	
		Vaporization	155,156	155	
C_2H_6O	dimethyl ether	Fusion	157	157	157
		Vaporization	157	157	157
$C_2H_6O_2$	1,2-ethanediol (ethylene glycol)	Fusion	158		
		Vaporization	159,160,161,162		
C_2F_4	tetrafluoroethane	Fusion	163		
		Vaporization	163	163	
C_2F_6	hexafluoroethane	Transition	164	164	164
		Fusion	163,164	163,164	164
		Vaporization	164	164	
C_2OF_4	trifluoroacetyl fluoride	Vaporization	165		
C_2H_3F	fluoroethene	Fusion	25		
		Vaporization	25	25	
C_2H_5F	fluoroethane	Vaporization	166,167		
$C_2H_4F_2$	1,1-difluoroethane	Fusion	25		
		Vaporization	25	25	
C_2HF_3	trifluoroethene	Vaporization	168		
$C_2H_3F_3$	1,1,1-trifluoroethane	Transition	169		
		Fusion	169	169	169
		Vaporization	169	169	
C_2H_3OF	acetyl fluoride	Vaporization	170,171	170	
$C_2H_3O_2F$	fluoroacetic acid	Fusion	172		
C_2H_5OF	2-fluoroethanol	Fusion	172,173		
		Vaporization	172,173,174	174	
$C_2H_2O_2F_2$	difluoroacetic acid	Fusion	172		
		Vaporization	172,175		
$C_2H_4OF_2$	2,2-difluoroethanol	Fusion	172,176,177		
		Vaporization	176,177		
$C_2HO_2F_3$	trifluoroacetic acid	Fusion	165		
		Vaporization	165		
$C_2H_3OF_3$	2,2,2-trifluoroethanol	Fusion	178		
		Vaporization	178		

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2Cl_2	dichloroethyne	Vaporization	179		
C_2Cl_4	tetrachloroethene	Fusion	37,137,143	37	
		Vaporization	14,25,137,143,180	14,25,180	
C_2Cl_6	hexachloroethane	Transition	181,182	181	
		Sublimation	181	181	
$C_2O_2Cl_4$	trichloromethyl chloroformate	Vaporization	183	183	
C_2H_3Cl	chloroethene	Fusion	184		
		Vaporization	184	184	
C_2H_5Cl	chloroethane	Fusion	185,186	185,186	185
		Vaporization	34,185,187	34,185,187	
$C_2H_2Cl_2$	1,1-dichloroethene	Fusion	25		
		Vaporization	25	25	
$C_2H_2Cl_2$	cis-1,2-dichloroethene	Fusion	25		
		Vaporization	188	188	
$C_2H_2Cl_2$	trans-1,2-dichloroethene	Fusion	25		
		Vaporization	188	188	
$C_2H_4Cl_2$	1,1-dichloroethane	Fusion	25,37	25,37	
		Vaporization	25,189,190	25,189,190	
$C_2H_4Cl_2$	1,2-dichloroethane	Fusion	191,192,193	191,192	192
		Vaporization	14,193,194	14,194	
C_2HCl_3	trichloroethene	Fusion	180,137		
		Vaporization	14,180,195	14,180,195	
$C_2H_3Cl_3$	1,1,1-trichloroethane	Transition	196	197	
		Fusion	37,196	37,196	
		Vaporization	25,37,190,196	196	
$C_2H_3Cl_3$	1,1,2-trichloroethane	Fusion	25,137		
		Vaporization	25	25	
$C_2H_2Cl_4$	1,1,1,2-tetrachloroethane	Fusion	25		
		Vaporization	25,190	25,190	
$C_2H_2Cl_4$	1,1,2,2-tetrachloroethane	Fusion	180,197		
		Vaporization	14,180,190,198	14,180,190,198	
C_2HCl_5	pentachloroethane	Fusion	37,137	37	
		Vaporization	180,190,193,198	180,190,198	
C_2H_3OCl	acetyl chloride	Fusion	199		
		Vaporization	200	200	
C_2H_3OCl	chloroacetaldehyde	Vaporization	201		
$C_2H_3O_2Cl$	chloroacetic acid	Fusion	202,203,204	202,203,204	202
		Vaporization	205	205	
C_2H_5OCl	2-chloroethanol	Fusion	193,197		
		Vaporization	14,193,197	14	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_5OCl	chloromethyl, methyl ether	Vaporization	206,207		
$C_2H_2OCl_2$	chloroacetyl chloride	Vaporization	208		
$C_2H_2OCl_2$	dichloroacetaldehyde	Vaporization	209		
$C_2H_2O_2Cl_2$	dichloroacetic acid	Fusion	203	203	203
		Vaporization	205	205	
$C_2H_4O_2Cl_2$	dichloroacetaldehyde monohydrate	Fusion	210		
C_2HOCl_3	trichloroacetaldehyde (chloral)	Fusion	25		
		Vaporization	25	25	
$C_2HO_2Cl_3$	trichloroacetic acid	Fusion	203,211	203,211	203
		Vaporization	25	25	
$C_2H_3OCl_3$	2,2,2-trichloroethanol	Fusion	212		
		Vaporization	212		
$C_2H_3O_2Cl_3$	trichloroacetaldehyde monohydrate	Fusion	213,214	214	214
C_2F_3Cl	trifluorochloroethene	Fusion	215		
		Vaporization	25,215	25	
C_2F_5Cl	pentafluorochloroethane	Vaporization	216		
$C_2F_2Cl_2$	1,1-difluoro-2,2-dichloro-ethene	Fusion	217		
		Vaporization	217		
$C_2F_2Cl_2$	cis-1,2-difluoro-1,2-dichloroethene	Fusion	216		
		Vaporization	216		
$C_2F_2Cl_2$	trans-1,2-difluoro-1,2-dichloroethene	Fusion	216		
		Vaporization	216		
$C_2F_4Cl_2$	1,1,1,2-tetrafluoro-2,2-dichloroethane	Vaporization	216		
$C_2F_4Cl_2$	1,1,2,2-tetrafluoro-1,2-dichloroethane	Fusion	25		
		Vaporization	25,218,219	25,218,219	
C_2FCl_3	fluorotrichloroethene	Fusion	215		
		Vaporization	215		
$C_2F_3Cl_3$	1,1,2-trifluoro-1,2,2-trichoroethane	Fusion	25		
		Vaporization	25,220,221	25,220,221	221
$C_2F_3Cl_3$	1,1,1-trifluoro-2,2,2-trichloroethane	Fusion	217		
		Vaporization	217		
$C_2F_2Cl_4$	1,2-difluoro-1,1,2,2-tetrachloroethane	Fusion	25,220		
		Vaporization	25,220	25,220	
$C_2F_2Cl_4$	1,1-difluoro-1,2,2,2-tetrachloethane	Fusion	217		
		Vaporization	216,217		
C_2FCl_5	fluoropentachloroethane	Fusion	216,222		
		Vaporization	216,222		
C_2OF_3Cl	trifluoroacetyl chloride	Fusion	223		
		Vaporization	223	223	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$C_2OF_2Cl_2$	difluorochloroacetyl chloride	Vaporization	224		
$C_2H_3F_2Cl$	1,1-difluoro-1-chloro-ethane	Fusion	219	219	219
		Vaporization	225	225	
$C_2H_3F_2Cl$	1,1-difluoro-2-chloro-ethane	Vaporization	176		
$C_2H_2F_3Cl$	1,1,2-trifluoro-2-chloro-ethane	Vaporization	166,226		
C_2HFCl_2	2-fluoro-1,1-dichloro-ethene	Vaporization	166,226		
$C_2H_2F_2Cl_2$	1,1-difluoro-2,2-dichloro-ethane	Vaporization	166,226		
$C_2H_2FCl_3$	1-fluoro-1,2,2-trichloro-ethane	Vaporization	166,226		
C_2HFCl_4	2-fluoro-1,1,1,2-tetra-chloroethane	Vaporization	226		
C_2H_2OFCl	fluoroacetyl chloride	Vaporization	227	227	
C_2H_2OFCl	chloroacetyl fluoride	Vaporization	227	227	
C_2HOF_2Cl	difluoroacetyl chloride	Vaporization	175		
$C_2HO_2F_2Cl$	difluorochloracetic acid	Fusion	228		
		Vaporization	228		
C_2HOFCl_2	dichloroacetyl fluoride	Vaporization	226,229		
C_2Br_4	tetrabromoethene	Sublimation	230		
		Fusion	231		
C_2H_3Br	bromoethene	Fusion	137		
		Vaporization	232,233		
C_2H_5Br	bromoethane	Fusion	67,234,235,236,237	67,234,235	
		Vaporization	234,236	234	238
$C_2H_2Br_2$	1,1-dibromoethene	Vaporization	231		
$C_2H_2Br_2$	cis-1,2-dibromoethene	Fusion	239		
		Vaporization	239		
$C_2H_2Br_2$	trans-1,2-dibromoethene	Fusion	239		
		Vaporization	239		
$C_2H_4Br_2$	1,1-dibromoethane	Vaporization	240		
$C_2H_4Br_2$	1,2-dibromoethane	Transition	241	241	241
		Fusion	241	241	241
		Vaporization	14,43	14	
$C_2H_3Br_3$	1,1,2-tribromoethane	Fusion	242		
		Vaporization	25,240	25	
$C_2H_2Br_4$	1,1,1,2-tetrabromoethane	Vaporization	243		
$C_2H_2Br_4$	1,1,2,2-tetrabromoethane	Fusion	224,244	244	
		Vaporization	240,245	240,245	
C_2HBr_5	pentabromoethane	Fusion	246		
C_2H_3OBr	acetyl bromide	Fusion	199		
		Vaporization	247	247	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_3OBr	bromoacetaldehyde	Vaporization	248		
$C_2H_3O_2Br$	bromoacetic acid	Fusion	249,250		
		Vaporization	251		
C_2H_5OBr	2-bromoethanol	Vaporization	252		
C_2H_5OBr	bromoethyl methyl ether	Vaporization	253		
$C_2H_2OBr_2$	bromoacetyl bromide	Vaporization	254		
$C_2H_2O_2Br_2$	dibromoacetic acid	Fusion	250,255		
		Vaporization	255		
$C_2H_4OBr_2$	bis(bromomethyl)ether	Vaporization	256	256	
C_2HOBr_3	tribromoacetaldehyde (bromal)	Vaporization	25	25	
$C_2HO_2Br_3$	tribromoacetic acid	Fusion	250,257		
$C_2H_3OBr_3$	2,2,2-tribromoethanol	Fusion	258		
$C_2H_3O_2Br_3$	tribromoacetaldehyde monohydrate	Fusion	259,260		
C_2F_3Br	trifluorobromoethene	Vaporization	168		
C_2F_5Br	pentafluorobromoethane	Vaporization	261		
$C_2F_4Br_2$	1,1,2,2-tetrafluoro-1,2-dibromoethane	Fusion	216,262		
		Vaporization	262	262	
C_2FBr_3	fluorotribromoethene	Vaporization	263		
$C_2F_2Br_4$	1,1-difluoro-1,2,2,2-tetrabromoethane	Fusion	243		
		Vaporization	243		
C_2OF_3Br	trifluoroacetyl bromide	Fusion	264		
		Vaporization	264	264	
C_2H_2FBr	1-fluoro-1-bromoethene	Vaporization	166		
C_2H_4FBr	1-fluoro-2-bromoethane	Vaporization	243		
C_2HF_2Br	1,1-difluoro-2-bromoethene	Vaporization	243		
$C_2H_3F_2Br$	1,1-difluoro-2-bromoethane	Vaporization	166,177,265,266		
$C_2H_2F_3Br$	1,1,2-trifluoro-1-bromoethane	Vaporization	243		
$C_2H_2F_3Br$	1,1,1-trifluoro-2-bromoethane	Vaporization	178		
$C_2H_3FBr_2$	2-fluoro-1,1-dibromoethane	Vaporization	266		
$C_2H_3FBr_2$	1-fluoro-1,2-dibromoethane	Fusion	265		
		Vaporization	265		
$C_2H_2F_2Br_2$	1,1-difluoro-2,2-dibromoethane	Vaporization	265		
$C_2H_2F_2Br_2$	1,1-difluoro-1,2-dibromoethane	Vaporization	267		
$C_2HF_3Br_2$	1,1,2-trifluoro-1,2-dibromoethane	Vaporization	168		
$C_2H_2FBr_3$	1-fluoro-1,2,2-tribromoethane	Vaporization	267		
$C_2H_2FBr_3$	1-fluoro-1,1,2-tribromoethane	Vaporization	243,266		

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$C_2HF_2Br_3$	1,1-difluoro-1,2,2-tribromoethane	Vaporization	243		
C_2HFBr_4	1-fluoro-1,1,2,2-tetrabromoethane	Vaporization	243		
$C_2H_2O_2FBr$	fluorobromoacetic acid	Fusion	226		
		Vaporization	226		
C_2HOFBr_2	fluorobromoacetyl bromide	Vaporization	226		
$C_2Cl_2Br_2$	1,2-dichloro-1,2-dibromoethene	Fusion	179,268		
		Vaporization	239,26B		
$C_2Cl_4Br_2$	1,1,2,2-tetrachloro-1,2-dibromoethane	Sublimation	269		
C_2OCl_3Br	trichloroacetyl bromide	Vaporization	25,20B	25	
$C_2OCl_2Br_2$	chlorodibromoacetyl chloride	Vaporization	270		
C_2H_2ClBr	cis-1-chloro-2-bromoethene	Fusion	239,271		
		Vaporization	239,271		
C_2H_2ClBr	trans-1-chloro-2-bromoethene	Fusion	239,271		
		Vaporization	239,271		
C_2H_4ClBr	1-chloro-1-bromoethane	Fusion	25		
		Vaporization	25,190	25,190	
C_2H_4ClBr	1-chloro-2-bromoethane	Fusion	25,191	25,191	191
		Vaporization	25,190	25,190	
C_2HCl_2Br	1,1-dichloro-2-bromethene	Fusion	272		
		Vaporization	272		
C_2HCl_2Br	cis-1,2-dichloro-1-bromoethene	Fusion	273,274		
		Vaporization	271,273		
C_2HCl_2Br	trans-1,2-dichloro-1-bromoethane	Fusion	271		
$C_2H_3Cl_2Br$	1,1-dichloro-2-bromethane	Vaporization	25		
$C_2H_2Cl_3Br$	1,2,2-trichloro-1-bromoethane	Fusion	239		
		Vaporization	239		
$C_2H_2Cl_2Br_2$	1,1-dichloro-1,2-dibromoethane	Fusion	197,274,275		
		Vaporization	275		
$C_2H_2Cl_2Br_2$	1,2-dichloro-1,2-dibromoethane	Fusion	137,276		
		Vaporization	137,276,277	277	
$C_2HCl_3Br_2$	1,1,2-trichloro-1,2-dibromoethane	Fusion	137		
$C_2HCl_3Br_2$	1,1,1-trichloro-2,2-dibromoethane	Fusion	278		
$C_2H_2ClBr_3$	2-chloro-1,1,2-tribromoethane	Fusion	239,276,278		
		Vaporization	239,276		
$C_2HCl_2Br_3$	1,2-dichloro-1,1,2-tribromoethane	Fusion	239,26B,278		
		Vaporization	239,26B		
$C_2HCl_2Br_2$	1,1-dichloro-1,2,2-tribromoethane	Fusion	272,275		
		Vaporization	272,275		

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_2OClBr	bromoacetyl chloride	Vaporization	279		
$C_2F_3Cl8r_2$	1,1,2-trifluoro-2-chloro-1,2-dibromoethane	Vaporization	216		
$C_2F_2Cl_2Br_2$	1,1-difluoro-2,2-dichloro-1,2-dibromoethane	Fusion	216,217		
		Vaporization	216		
$C_2F_2Cl_2Br_2$	1,2-difluoro-1,2-dichloro-1,2-dibromoethane	Fusion	216,217		
		Vaporization	216,217		
$C_2FCl_3Br_2$	1-fluoro-1,2,2-trichloro-1,2-dibromoethane	Fusion	216		
C_2OF_2ClBr	fluorochlorobromoacetyl-fluoride	Vaporization	270		
$C_2HFCl_2Br_2$	2-fluoro-1,1-dichloro-1,2-dibromoethane	Vaporization	226		
$C_2HOFClBr$	fluorobromoacetyl chloride	Vaporization	226		
C_2HO_2FClBr	fluorochlorobromoacetic acid	Fusion	270		
		Vaporization	270		
$(CI_2)_2$	tetraiodoethene	Fusion	280		
C_2H_5I	iodoethane	Fusion	68		
		Vaporization	66,281	66,281	
$C_2H_2I_2$	1,1-diiodoethene	Fusion	282		
$C_2H_2I_2$	cis-1,2-diiodoethene	Fusion	283		
		Vaporization	271		
$C_2H_2I_2$	trans-1,2-diiodoethene	Sublimation	284	284	
		Fusion	271,283		
		Vaporization	271		
$(CH_2I)_2$	1,2-diiodoethane	Sublimation	285	285	
		Fusion	285,286		
C_2H_3OI	acetyl iodide	Vaporization	287		
$C_2H_3O_2I$	iodoacetic acid	Fusion	288		
C_2H_5OI	2-iodoethanol	Vaporization	289		
C_2H_5OI	iodomethyl methyl ether	Vaporization	207		
$C_2H_3F_2I$	1,1-difluoro-2-iodoethane	Vaporization	267		
$C_2H_2F_3I$	1,1,1-trifluoro-2-iodo-ethane	Vaporization	290		
$C_2H_2O_2FI$	fluoroiodoacetic acid	Fusion	226		
C_2OCl_3I	trichloroacetyl iodide	Vaporization	208		
C_2H_2ClI	cis-1-chloro-2-iodoethene	Fusion	271		
		Vaporization	271		
C_2H_2ClI	trans-1-chloro-2-iodo-ethene	Fusion	271		
		Vaporization	271		
C_2H_2OClI	iodoacetyl chloride	Vaporization	288		
C_2H_6S	ethanethiol	Fusion	199		
		Vaporization	291,292	291,292	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_6S	dimethyl sulfide	Fusion	293	293	293
		Vaporization	291,293	291,293	
C_2H_6OS	dimethyl sulfoxide	Fusion	294		
		Vaporization	295	295	
$C_2H_6O_2S$	dimethyl sulfone	Fusion	294,296		
		Vaporization	294		
$C_2H_6O_3S$	dimethyl sulfite	Vaporization	294		
$C_2H_6O_4S$	dimethyl sulfate	Fusion	199,278		
		Vaporization	183,199,278		
$C_2H_6O_4S$	ethylsulfuric acid	Fusion	297		
$C_2H_6O_4S \cdot H_2O$	ethysulfuric acid monohydrate	Fusion	297		
$C_2H_5O_3FS$	ethyl fluorosulfonate	Vaporization	174	174	
$C_2H_5O_3ClS$	ethylchlorosulfonate	Vaporization	183		
$C_2H_4Br_2S$	bis(bromomethyl)sulfide	Vaporization	183	183	
C_2H_6Se	dimethylselenide	Vaporization	298		
$C_2H_6O_4Se$	dimethyl selenate	Vaporization	298		
C_2H_6Te	dimethyl telluride	Vaporization	299		
$C_2H_6F_2Te$	dimethyltellurium difluoride	Fusion	300		
$C_2H_6Cl_2Te$	dimethyltellurium chloride	Fusion	299		
$C_2H_6Br_2Te$	dimethyltellurium dibromide	Fusion	299		
$C_2H_6I_2Te$	dimethyltellurium diiodide	Fusion	299,301		
C_2N_2	cyanogen	Fusion	302	302	302
		Vaporization	302,303,304		
C_2H_3N	acetonitrile	Fusion	37,143,305	37,305	
		Vaporization	143,305,306	305,306	
C_2H_7N	ethylamine	Fusion	307		
		Vaporization	34,307	34,307	34
C_2H_7N	dimethylamine	Fusion	308	308	308
		Vaporization	308	308	308
$C_2H_8N_2$	1,2-ethanediamine (ethylenediamine	Fusion	309	309	
		Vaporization	309	309	
$C_2H_8N_2$	1,1-dimethylhydrazine	Vaporization	310		
$C_2H_8N_2$	1,2-dimethylhydrazine	Vaporization	310		
C_2H_5ON	acetamide	Fusion	311,312,313,314	311,313,314	314
		Transition	314	314	314
$C_2H_5O_2N$	nitroethane	Fusion	25		
		Vaporization	315	315	
$C_2H_5NO_2$	ethyl nitrite	Vaporization	315	315	
$C_2H_5NO_3$	ethyl nitrate	Fusion	316		
		Vaporization	315	315	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_7ON	2-aminoethanol	Fusion	316		
		Vaporization	316		
$C_2H_4O_3N_2$	nitroacetamide	Fusion	317		
$C_2H_4O_6N_2$	glycol dinitrate	Fusion	318	318	
		Vaporization	319		
$C_2H_6O_2N_2$	ethylnitramine	Fusion	320		
C_2F_3N	trifluoroacetamide	Vaporization	165		
$C_2F_6N_2$	hexafluoroazomethane	Fusion	321		
		Vaporization	321	321	
C_2H_2FN	fluoroacetamide	Vaporization	174	174	
$C_2H_5F_2N$	2,2-difluoroethylamine	Vaporization	322		
C_2HF_6N	bis(trifluoromethyl)amine	Vaporization	321	321	
C_2H_2OFN	fluoroacetamide	Fusion	172,175,266,322		
$C_2H_4O_2FN$	2-fluoroethylnitrite	Vaporization	174	174	
$C_2H_3OF_2N$	difluoroacetamide	Fusion	172,266,322		
		Vaporization	172,266,322		
$C_2H_2OF_3N$	trifluoroacetamide	Fusion	165		
		Vaporization	165		
$C_2H_4O_2F_2N_2$	2,2-difluoroethylnitramine	Fusion	172,320		
C_2H_2ClN	chloroacetonitrile	Vaporization	323		
C_2H_6ClN	N-chlorodimethylamine	Vaporization	324		
C_2H_4OClN	chloroacetamide	Fusion	325		
C_2H_4OClN	N-chloroacetamide	Fusion	326		
$C_2H_2OF_2ClN$	difluorochloroacetamide	Fusion	224		
		Vaporization	224		
C_2H_4OBrN	bromoacetamide	Fusion	327		
C_2H_4OBrN	N-bromoacetamide	Fusion	326		
$C_2H_2OBr_3N$	tribromoacetamide	Fusion	328		
$C_2H_2OFClBrN$	fluorochlorobromoacetamide	Fusion	270		
C_2H_3SN	methyl thiocyanate	Fusion	199		
		Vaporization	25	25	
C_2H_3SN	methyl isothiocyanate	Fusion	25		
		Vaporization	25	25	
$C_2H_6O_6TeN_2$	dimethyltellurium dinitrate	Fusion	299		
C_2H_7P	dimethylphosphine	Vaporization	329	329	
$C_2H_6O_3FP$	dimethylfluorophosphonate	Vaporization	174	174	
$C_2O_2FN_2P$	phosphorous fluorodiisocyanate	Fusion	330		
		Vaporization	330	330	
$C_2O_2ClN_2P$	phosphorous chlorodiisocyanate	Fusion	330		
		Vaporization	330	330	

Table 23 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
C_2H_7As	dimethylarsine	Vaporization	331		
C_2H_7As	ethylarsine	Vaporization	332		
C_2H_5OAs	ethylarsenic oxide	Vaporization	183	183	
$C_2H_5F_2As$	ethyldifluoroarsine	Fusion	125		
		Vaporization	125	125	
C_2H_6ClAs	dimethylchloroarsine	Vaporization	333		
$C_2H_5Cl_2As$	ethyldichloroarsine	Fusion	183		
		Vaporization	334	334	
$C_2H_2Cl_3As$	2-chlorovinyldichloro-arsine	Vaporization	174	174	
C_2H_2OClAs	2-chlorovinylarsine oxide	Fusion	335		
$C_2H_4O_3ClAs$	2-chlorovinylarsonic acid	Fusion	335		
$C_2H_2F_2ClAs$	2-chlorovinyldifluoroarsine	Vaporization	125		
C_2H_6BrAs	dimethylbromoarsine	Vaporization	333		
$C_2H_5Br_2As$	ethyldibromoarsine	Vaporization	174	174	
$C_2H_4O_3BrAs$	2-bromovinylarsonic acid	Fusion	335		
$C_2H_2ClBr_2As$	2-chlorovinyldibromoarsine	Vaporization	335		
C_2H_6IAs	dimethyliodoarsine	Vaporization	333		
$C_2H_2ClI_2As$	2-chlorovinyldiiodoarsine	Fusion	335		

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Table 24

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Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Si		Fusion	1,2,3	1,2,3	
SiO_2		Transition	4,5,6,7,8	4,5,6,7	
		Fusion	4,5,6,7,8	4,5,6,7	
SiH_4	silane	Transition	9	9	
		Fusion	9	9	9
		Vaporization	10,11,12,13	10,11,12,13	
Si_2H_6	disilane	Fusion	10		
		Vaporization	10,12,13	10,12,13	
Si_3H_8	trisilane	Fusion	10		
		Vaporization	10,13	10,13	
Si_4H_{10}	tetrasilane	Fusion	14		
		Vaporization	10,13,14	10,13,14	
$(SiH_3)_2O$	disiloxane	Fusion	15		
		Vaporization	15	15	
SiF_4	tetrafluorosilane	Sublimation	16,17,18,19,20	16,17,18,19,20	
		Fusion	18	18	
		Vaporization	16,17,18,19,20	16,17,18,19,20	
Si_2F_6	hexafluorodisilane	Sublimation	21	21	
		Fusion	21	21	
		Vaporization	21	21	
Si_2OF_6	hexafluorodisiloxane	Fusion	22		
		Vaporization	22	22	
SiH_3F	fluorosilane	Vaporization	23	23	
SiH_2F_2	difluorosilane	Fusion	23	23	
		Vaporization	23	23	
$SiHF_3$	trifluorosilane	Fusion	23,24		
		Vaporization	23,24	23,24	
$SiCl_4$	tetrachlorosilane	Fusion	15,25,26,27	15,26,27	
		Vaporization	15,28,29	15,28,29	
Si_2Cl_6	hexachlorodisilane	Fusion	30		
		Vaporization	30	30	
Si_3Cl_8	octachlorotrisilane	Vaporization	30,31	30	
Si_2OCl_3	hexachlorodisiloxane	Fusion	15		
		Vaporization	15	15	
SiH_3Cl	chlorosilane	Fusion	32		
		Vaporization	32	32	
SiH_2Cl_2	dichlorosilane	Fusion	32		
		Vaporization	32	32	
$SiHCl_3$	trichlorosilane	Fusion	24,33		
		Vaporization	24,33		

Table 24 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
SiF_3Cl	trifluorochlorosilane	Fusion	21,34		
		Vaporization	21,34	21,34	
SiF_2Cl_2	difluorodichlorosilane	Fusion	34		
		Vaporization	21,34	21,34	
$SiFCl_3$	fluorotrichlorosilane	Fusion	34		
		Vaporization	34	34	
$Si_2OF_4Cl_2$	1,1,1.3-tetrafluoro-3,3-dichlorodisiloxane	Fusion	22		
		Vaporization	22	22	
$Si_2OF_3Cl_3$	1,1,1-Trifluoro-3,3,3-trichlorodisiloxane	Fusion	22		
		Vaporization	22	22	
$SiHFCl_2$	fluorodichlorosilane	Fusion	24		
		Vaporization	24	24	
$SiBr_4$	tetrabromosilane	Fusion	35,36	35,36	
		Vaporization	35,36,37	35,36,37	
Si_2Br_6	hexabromodisilane	Fusion	38		
		Vaporization	38		
Si_3Br_8	octabromotrisilane	Fusion	38		
SiH_3Br	bromosilane	Fusion	39		
		Vaporization	39	39	
SiH_2Br_2	dibromosilane	Fusion	39		
		Vaporization	39	39	
$SiHBr_3$	tribromosilane	Fusion	40		
		Vaporization	40	40	
Si_2H_5Br	bromodisilane	Fusion	41		
		Vaporization	41	41	
SiF_3Br	trifluorobromosilane	Fusion	42		
		Vaporization	42	42	
SiF_2Br_2	difluorodibromosilane	Fusion	42		
		Vaporization	42	42	
$SiFBr_3$	fluorotribromosilane	Fusion	42		
		Vaporization	42	42	
$SiCl_3Br$	trichlorobromosilane	Vaporization	43		
$SiCl_2Br_2$	dichlorodibromosilane	Vaporization	43		
$SiClBr_3$	chlorotribromosilane	Fusion	43		
		Vaporization	43		
$SiFCl_2Br$	fluorodichlorobromosilane	Fusion	44		
		Vaporization	44	44	
$SiFClBr_3$	fluorochlorodibromosilane	Fusion	44		
		Vaporization	44	44	
SiI_4	tetraiodosilane	Fusion	37,45,46		
		Vaporization	45		

Table 24 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Si_2I_6	hexoiododisilane	Fusion	47		
SiH_3I	iodosilane	Fusion	46		
		Vaporization	46	46	
SiH_2I_2	diiodosilane	Fusion	46		
		Vaporization	46	46	
$SiHI_3$	triiodosilane	Fusion	48		
		Vaporization	48	48	
$SiCl_3I$	trichloroiodosilane	Vaporization	43		
$SiCl_2I_2$	dichlorodiiodosilane	Vaporization	43		
$SiClI_3$	chlorotriiodosilane	Fusion	43		
		Vaporization	43		
$SiBr_3I$	tribromoiodosilane	Fusion	43		
		Vaporization	43		
$SiBr_2I_2$	dibromodiiodosilane	Fusion	43		
		Vaporization	43		
$SiBrI_3$	bromotriiodosilane	Fusion	43		
		Vaporization	43		
SiS_2		Fusion	49		
$SiSCl_2$		Fusion	50		
$SiSBr_2$		Fusion	51		
$(SiH_3)_3N$	trisilylamine	Fusion	52		
		Vaporization	52	52	
$3Bi_2O_3 \cdot SiO_2$		Fusion	53		
$38i_2O_3 \cdot 2SiO_2$		Fusion	53		
$8i_2O_3 \cdot 8SiO_2$		Fusion	53		
SiH_6C	methylsilane	Fusion	32		
		Vaporization	32	32	
SiH_8C_2	ethylsilane	Vaporization	54	54	
SiH_8C_2	dimethylsilane	Fusion	32		
		Vaporization	32	32	
$SiH_{10}C_3$	n-propylsilane	Vaporization	54	54	
$SiH_{10}C_3$	trimethylsilane	Vaporization	55		
$SiH_{12}C_4$	diethylsilane	Vaporization	55	54	
$SiH_{12}C_4$	tetramethylsilane	Fusion	56	56	56
		Vaporization	56	56	
$SiH_{14}C_5$	trimethylethylsilane	Vaporization	57,58	57	
$SiH_{18}C_7$	methyltriethylsilane	Vaporization	57	57	
$SiH_{20}C_8$	tetramethylsilane	Vaporization	57	57	
$Si_2H_{18}C_6$	hexamethyldisilane	Fusion	59		
		Vaporization	59	59	
$SiH_{10}OC_3$	trimethylsilanol	Vaporization	60		

Table 24 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$SiH_{14}OC_5$	ethoxytrimethylsilane	Vaporization	61	61	
$SiH_{16}O_2C_6$	diethoxydimethylsilane	Vaporization	61	61	
$SiH_{18}O_3C_7$	triethoxymethylsilane	Vaporization	61	61	
$SiH_{20}O_4C_8$	tetraethoxysilane	Fusion	62	62	
		Vaporization	62	62	
$Si_2H_{18}OC_6$	hexamethyldisiloxane	Vaporization	63	63	
$Si_2O_3H_{22}C_8$	1,3-diethoxytetramethyl-disiloxane	Vaporization	62	62	
$Si_2H_{30}O_6C_{12}$	hexaethoxydisilane	Vaporization	64	64	
$Si_3H_{24}O_2C_8$	octamethyltrisiloxane	Vaporization	63	63	
$Si_3H_{28}O_4C_{10}$	1,5-diethoxyhexamethyl-trisiloxane	Vaporization	61	61	
$Si_4H_{24}O_4C_8$	octamethylcyclotetrasiloxane	Vaporization	63	63	
$Si_4H_{30}O_3C_{10}$	decamethyltetrasiloxane	Vaporization	63	63	
SiH_3F_3C	methyltrifluorosilane	Fusion	65		
		Vaporization	65	65	
$SiH_6F_2C_2$	dimethyldifluorosilane	Fusion	66		
		Vaporization	66	66	
$SiH_5F_3C_2$	ethyltrifluorosilane	Fusion	67		
		Vaporization	67	67	
SiH_9FC_3	trimethylfluorosilane	Fusion	66		
		Vaporization	66	66	
$SiH_{10}F_2C_4$	diethyldifluorosilane	Fusion	23		
		Vaporization	23	23	
SiH_5ClC	methylchlorosilane	Fusion	32		
		Vaporization	32	32	
SiH_4Cl_2C	methyldichlorosilane	Fusion	32		
		Vaporization	32	32	
SiH_3Cl_3C	methyltrichlorosilane	Fusion	65		
		Vaporization	65	65	
$SiH_6Cl_2C_2$	dimethyldichlorosilane	Fusion	66		
		Vaporization	66	66	
$SiH_5Cl_3C_2$	ethyltrichlorosilane	Fusion	67		
		Vaporization	67	67	
$SiHgClC_3$	trimethylchlorosilane	Fusion	66		
		Vaporization	66	66	
$SiH_{10}Cl_2C_4$	diethyldichlorosilane	Vaporization	61	61	
$SiH_{15}ClC_6$	triethylchlorosilane	Vaporization	61	61	
$SiH_5OCl_3C_2$	ethoxytrichlorosilane	Vaporization	61	61	
$SiH_8OCl_2C_3$	ethoxymethyldichlorosilane	Vaporization	61	61	
$Si_2H_{12}OCl_2C_4$	tetramethyl-1,3-dichloro-disilane	Fusion	68		
		Vaporization	68	68	

Table 24 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
SiH_3FCl_2C	methylfluorodichloro-silane	Fusion	65		
		Vaporization	65	65	
SiH_6FClC_2	dimethylfluorochlorosilane	Fusion	66		
		Vaporization	66	66	
$SiH_5F_2ClC_2$	ethyldifluorochlorosilane	Vaporization	67	67	
$SiH_5F_2Cl_2C_2$	ethylfluorodichlorosilane	Vaporization	67	67	
$SiO_4N_4C_4$	silicon tetracyanate	Fusion	69		
		Vaporization	69	69	
$SiO_4N_4C_4$	silicon tetraisocyanate	Fusion	69		
		Vaporization	69	69	
Si_2H_9NC	2-methyldisilazane	Vaporization	70,71	71	
$Si_2H_{11}NC_2$	2-ethyldisilane	Fusion	71		
		Vaporization	70,71	71	
SiH_9ONC_4	trimethylsilicon isocyanate	Fusion	72		
		Vaporization	72	72	
$SiH_6O_2N_2C_4$	dimethylsilicon diisocyanate	Fusion	72,73		
		Vaporization	72,73	72,73	
$SiH_3O_3N_3C_4$	methylsilicon triisocyanate	Fusion	72		
		Vaporization	72	72	
$SiH_5O_4N_3C_5$	ethoxysilicon triisocyanate	Vaporization	73	73	
$SiH_{10}O_4N_2C_6$	diethoxysilicon diiso-cyanate	Vaporization	73	73	
$SiH_{15}O_4NC_7$	triethoxysilicon iso-cyanate	Vaporization	73	73	
$SiOF_3NC$	trifluorosilicon iso-cyanate	Vaporization	74		
$SiO_2F_2N_2C_2$	difluorosilicon diiso-cyanate	Fusion	74		
		Vaporization	74	74	
$SiO_3FN_3C_3$	fluorosilicon triiso-cyanate	Fusion	74		
		Vaporization	74	74	
$SiS_4N_4C_4$	silicon tetraisothio-cyanate	Fusion	75		
		Vaporization	75	75	
SiH_9SNC_4	trimethylsilicon isothio-cyanate	Fusion	75		
		Vaporization	75	75	
$SiH_6S_2N_2C_4$	silicon diisothiocyanate	Fusion	75		
		Vaporization	75	75	
$SiH_3S_3N_3C_4$	methylsilicon triiso-thiocyanate	Fusion	75		
		Vaporization	75	75	
$SiH_9O_3SNC_4$	trimethoxysilicon-isothiocyanate	Vaporization	75	75	

Table 24 (Continued)

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Table 25

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ge		Fusion	1,2	1,2	
GeO		Sublimation	1		
GeO_2		Transition	1		
GeH_4	germane	Transition	5	5	
		Fusion	2,5,6	5	
		Vaporization	5,8	5	
Ge_2H_6	digermane	Fusion	2,9		
		Vaporization	8	8	
Ge_3H_8	trigermane	Fusion	9		
		Vaporization	9	9	
GeF_4		Sublimation	10	10	
		Fusion	2,10		
$GeCl_4$		Fusion	2,7,11		
		Vaporization	2,11,12,13,14	2,13,14	
$GeHCl_3$		Fusion	15		
		Vaporization	2,15	2,15	
GeF_3Cl		Fusion	11		
		Vaporization	11		
GeF_2Cl_2		Fusion	11		
		Vaporization	11	11	
$GeFCl_3$		Fusion	11		
		Vaporization	11	11	
$GeBr_4$		Fusion	2,7,16		
		Vaporization	2,16	2,16	
GeI_4		Fusion	2,7		
GeS		Fusion	3		
GeSe		Fusion	17		
$GeSe_2$		Fusion	17		
$Ge(CH_3)_4$	tetramethylgermane	Fusion	2,7		
		Vaporization	2,7	2,7	
$Ge(C_2H_5)_4$	tetraethylgermane	Fusion	2		
		Vaporization	2		
GeH_6OC_2	dimethylgermanium oxide	Fusion	18		
		Vaporization	18		
$GeH_5F_3C_2$	ethylgermanium trifluoride	Fusion	19		
		Vaporization	19		
GeH_3Cl_3C	methylgermanium trichloride	Vaporization	20		
$GeH_6Cl_2C_2$	dimethylgermanium dichloride	Fusion	20		
		Vaporization	20		
$GeH_5Cl_3C_2$	ethylgermanium trichloride	Vaporization	19		

Table 25 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$GeH_5Br_3C_2$	ethylgermanium tribromide	Vaporization	19		
$GeH_5I_3C_2$	ethylgermanium triiodide	Fusion	19		
		Vaporization	19		
GeH_6SC_2	dimethylgermanium sulfide	Fusion	18		
		Vaporization	18		
$GeO_4N_4C_4$	germanium tetraisocyanate	Fusion	21		
		Vaporization	21	21	

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Table 26

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Sn		Transition	1,2,3,4,5	1,2,3,4,5	
		Fusion	6,7	7	
		Vaporization	8,9,10		
SnO_2		Transition	11,12	11,12	
SnH_4	stannane	Fusion	13		
		Vaporization	13	13	
SnF_4		Vaporization	14		
$SnCl_2$		Fusion	15,16	15,16	
		Vaporization	17,18	17,18	
$SnCl_4$		Fusion	15,19,20,21,22	15,19	
		Vaporization	20,22,23,24,25	23	
$SnBr_2$		Fusion	15,16	15	
		Vaporization	18	18	
$SnBr_4$		Transition	21		
		Fusion	7,15,16,21,22	7,15	
		Vaporization	18,22	18	
$SnCl_3Br$		Fusion	26		
$SnCl_2Br_2$		Fusion	26		
$SnCl8r_3$		Fusion	26		
SnI_2		Fusion	27,28,29		
		Vaporization	18,29	18	
SnI_4		Fusion	27,29,30,31	30,31	31
		Vaporization	29,31	31	
SnS		Fusion	32,33		
SnSe		Fusion	33		
SnTe		Fusion	33		
SnH_6C	methylstannane	Vaporization	34	34	
SnH_8C_2	dimethylstannane	Vaporization	34	34	
$SnH_{10}C_3$	trimethylstannane	Vaporization	34	34	
$SnH_{12}C_4$	tetramethylstannane	Vaporization	34,35	34,35	
$SnH_{14}C_5$	ethyltrimethylstannane	Vaporization	35	35	
$SnH_{16}C_6$	n-propyltrimethylstannane	Vaporization	35	35	
$SnH_{20}C_8$	tetraethylstannane	Fusion	36		
		Vaporization	37		
SnH_3Cl_3C	methyltin trichloride	Fusion	38		
$SnH_6Cl_2C_2$	dimethyltin dichloride	Fusion	39		
SnH_9ClC_3	trimethytin chloride	Fusion	40		
$SnH_{15}ClC_6$	triethyltin chloride	Fusion	41		
		Vaporization	41		
SnH_38r_3C	methyltin tribromide	Fusion	38,42		
$SnH_68r_2C_2$	dimethyltin dibromide	Fusion	38,39		

Table 26 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
SnH_9BrC_3	trimethyltin bromide	Fusion	38		
$SnH_{15}BrC_6$	trimethyltin bromide	Fusion	36		
		Vaporization	36		
SnH_3I_3C	methyltin triiodide	Fusion	38,41		
$SnH_6I_2C_2$	dimethyltin diiodide	Fusion	38		
SnH_9IC_3	trimethyltin iodide	Fusion	36		
		Vaporization	38		
$SnH_{15}IC_6$	triethyltin iodide	Fusion	36		
		Vaporization	36		

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Table 27

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Pb		Fusion	1,2,3	1,2,3	
		Vaporization	2,4,5,6,7	2,4,6,7	
PbO		Transition	8,9		
		Fusion	1,10,11	1	
		Vaporization	4	4	
PbF_2		Fusion	1,12,13,18	1	
		Vaporization	4,14	4,14	
PbF_4		Fusion	15		
$PbCl_2$		Fusion	1,12,16,17,18, 19,20,21,24	1,16,17	
		Vaporization	2,4,14,22,23	2,4,14,22,23	
$PbCl_2 \cdot 2PbO$		Fusion	21		
$PbCl_2 \cdot 4PbO$		Fusion	21		
PbFCl		Fusion	13		
$PbBr_2$		Fusion	1,2,13,16,25	1,2,13,16	
		Vaporization	4,14,1,17,22,23	4,14,17,22, 23	
$PbBr_2 \cdot 2PbO$		Fusion	25		
PbBrF		Fusion	13		
PbI_2		Fusion	1,2,26,27	1,2,26	
		Vaporization	4,22,28	4,22,28	
PbS		Sublimation	29	29	
		Fusion	1,30	1	
$PbSO_4$		Transition	31	31	
		Fusion	1	1	
$PbSO_4 \cdot PbO$		Fusion	32		
$PbSO_4 \cdot 2PbO$		Fusion	32		
PbSe		Fusion	33		
PbTe		Fusion	34		
$Pb(PO_3)_2$		Fusion	24		
$Pb(PO_4)_2$		Fusion	12		
$Pb \cdot Pb_3(PO_4)_2$		Fusion	18		
$5PbO \cdot Pb_3(PO_4)_2$		Fusion	18		
$3Pb_3(PO_4)_2 \cdot PbF_2$		Fusion	12		
$3Pb_3(PO_4)_2 \cdot PbCl_2$		Fusion	18		
$Pb_3(AsO_4)_2$		Fusion	18		
$5PbO \cdot Pb_3(AsO_4)_2$		Fusion	18		
$3Pb_3(AsO_4)_2 \cdot PbF_2$		Fusion	18		
$3Pb_3(AsO_4)_2 \cdot PbCl_2$		Fusion	18		
$PbO \cdot Sb_2O_3$		Fusion	35		
$2PbO \cdot Bi_2O_3$		Fusion	36		

Table 27

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$2PbO \cdot 3Bi_2O_3$		Fusion	36		
$PbH_{12}C_4$	tetramethyllead	Fusion	37		
		Vaporization	38	38	
$PbH_{14}C_5$	ethyltrimethyllead	Vaporization	39	39	
$PbH_{16}C_6$	diethyldimethyllead	Vaporization	39	39	
$PbH_{18}C_7$	triethylmethyllead	Vaporization	39	39	
$PbH_{20}C_8$	tetraethyllead	Fusion	40		
		Vaporization	41	41	
$PbO \cdot SiO_2$		Fusion	10		
$2PbO \cdot SiO_2$		Fusion	10		
$4PbO \cdot SiO_2$		Transition	10		
$3PbS \cdot 2SiS_2$		Fusion	30		

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41. Thomson-1

Table 28

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ga		Transition	1	1	
		Fusion	1,2,3,4,5	1,2	
		Vaporization	6	6	
Ga_2O_3		Fusion	7		
GaF_3		Vaporization	8,9		
$GaCl_2$		Fusion	10		
Ga_2Cl_6		Sublimation	10,11	10,11	
		Fusion	10,11	10,11	
		Vaporization	10,11	10,11	
Ga_2Br_6		Fusion	12		
		Vaporization	11,12	11	
Ga_2I_6		Fusion	12		
		Vaporization	11,12	11	
GaS		Fusion	13,14		
Ga_2S_3		Fusion	13,14		
GaSe		Fusion	13		
GaTe		Fusion	13		
Ga_2Te_3		Fusion	13		
$GaCl_3 \cdot NH_3$		Fusion	15		
$GaBr_3 \cdot NH_3$		Fusion	15		
$GaI_3 \cdot NH_3$		Fusion	15		
$Ga(CH_3)_3$		Fusion	16,17		
		Vaporization	17	17	
$Ga(C_2H_5)_3$		Fusion	18		
		Vaporization	18	18	
$Ga(CH_3)_3 \cdot NH_3$		Fusion	17		
$Ga(CH_3)_3 \cdot N(CH_3)_3$		Fusion	16	16	
		Vaporization	16	16	
$Ga(CH_3)_3 \cdot N(C_2H_5)_3$		Sublimation	16	16	
		Fusion	16	16	
		Vaporization	16	16	
$Ga(CH_3)_2Cl \cdot NH_3$		Fusion	17		
$Ga(CH_3)_2Cl \cdot 2NH_3$		Fusion	17		

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Table 29

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
In		Fusion	1,2,3	1	
		Vaporization			
InF_3		Fusion	5,6		
InCl		Transition	7		
		Fusion	7,8		
		Vaporization	8,9	8,9	
$InCl_2$		Fusion	8,10		
		Vaporization	8,9	8,9	
$InCl_3$		Sublimation	8	8	
		Fusion	7		
InBr		Fusion	8		
		Vaporization	8,9	8,9	
$InBr_2$		Fusion	8		
		Vaporization	8,9	8,9	
$InBr_3$		Sublimation	8	8	
		Fusion	7,8		
InI		Fusion	8,11		
		Vaporization	8,9	8,9	
InI_3		Fusion	7		
InS		Fusion	12,13		
In_2S		Fusion	13		
In_2S_3		Fusion	12,13		
InSe		Fusion	12		
In_2Se_3		Fusion	12		
InTe		Fusion	12		
In_2Te_3		Fusion	12		
$In(CH_3)_3$		Sublimation	14	14	
		Fusion	14	14	
		Vaporization	14	14	

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Table 30

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Tl		Transition	1,2,3,4,5,6	1,2,5	
		Fusion	4,5,6,7,8,9	5,7	5
		Vaporization	10,11,12,13	11,12,13	
Tl_2O		Fusion	14		
		Vaporization	15		
Tl_2O_3		Fusion	16		
TlF		Fusion	17		
		Vaporization	17		
TlF_3		Fusion	18,19		
TlCl		Sublimation	20,21	20,21	
		Fusion	22,23,24,25,26,27	22,27	
		Vaporization	20	20	
$TlCl_3 \cdot 4H_2O$		Fusion	28		
$TlClO_4$		Transition	29,30		
		Fusion	31		
TlBr		Sublimation	20,21,32	20,21,32	
		Fusion	22	22	
		Vaporization	20,21	20,21	
TlI		Transition	33,34,35		
		Sublimation	20	20	
		Fusion	20,21,32	20,21,32	
		Vaporization	20	20	
Tl_2S		Fusion	36,37,38	38	
Tl_2S_3		Fusion	39		
Tl_2S_5		Fusion	39		
Tl_2SO_4		Fusion	23,38	38	
Tl_2Se		Fusion	36		
Tl_2Se_3		Transition	40		
Tl_2Te_3		Fusion	41		
$TlNO_2$		Fusion	42		
$TlNO_3$		Transition	43,44	43,44	
		Fusion	33,38,43,45,46	38	
		Vaporization	47		
$TlPO_3$		Fusion	48		
TlH_2PO_2		Fusion	42		
TlH_2PO_3		Fusion	49		
TlH_2PO_4		Fusion	48		
$TlAsS_2$		Fusion	37		
Tl_3Bi_5		Fusion	50		
$(TlCl)_3 \cdot BiCl_3$		Fusion	51		
Tl_2Co_3		Transition	52		

Table 30 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Tl_2Co_3		Fusion	23,38	38	
$Tl(C_2H_5)_3$		Fusion	53		
$TlCHO_2$	thallous formate	Fusion	54		
$TlC_2H_3O_2$	thallous acetate	Fusion	54		
$TlC_2F_3O_2$	thallous trifluoroacetate	Fusion	55		
		Vaporization	55		
$Tl_2CO_3 \cdot TlNO_3$		Fusion	46		
$Tl_2CO_3 \cdot 2TlNO_3$		Fusion	46		
$TlCl \cdot SnCl_2$		Fusion	56		
$3TlCl \cdot SnCl_2$		Fusion	56		
$TlCl \cdot 2PbCl_2$		Fusion	56		
$3TlCl \cdot PbCl_2$		Fusion	56		

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Table 31
SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Zn		Fusion	1,2,3,4	1,2,3	
		Vaporization	2,5,6	2,5,6	
ZnO		Fusion	7		
ZnF_2		Fusion	8		
		Vaporization	9	9	
$ZnCl_2$		Fusion	10,11,12,13	12,13	
		Vaporization	12,13	12,13	
$ZnCl_2 \cdot 1\ 1/2\ H_2O$		Fusion	14		
$ZnCl_2 \cdot 2H_2O$		Fusion	14		
$ZnCl_2 \cdot 2\ 1/2\ H_2O$		Fusion	14		
$ZnCl_2 \cdot 3H_2O$		Fusion	14		
$ZnBr_2$		Sublimation	13	13	
		Fusion	14,15		
		Vaporization	17		
$ZnBr_2 \cdot 2H_2O$		Fusion	14		
$ZnBr_2 \cdot 3H_2O$		Fusion	14		
ZnI_2		Sublimation	13	13	
		Fusion	14,15,18		
$ZnI_2 \cdot 2H_2O$		Fusion	14		
ZnS		Sublimation	19	19	
		Transition	20		
ZnTe		Fusion	21		
$Zn(NO_3)_2 \cdot H_2O$		Fusion	22		
$Zn(NO_3)_2 \cdot 2H_2O$		Fusion	22		
$Zn(NO_3)_2 \cdot 4H_2O$		Fusion	22		
$Zn(NO_3)_2 \cdot 6H_2O$		Fusion	22		
$2ZnCl_2 \cdot NH_4Cl$		Fusion	23		
$ZnAs_2$		Fusion	24		
ZnSb		Fusion	25		
Zn_3Sb_2		Fusion	25,26,27	26	
$Zn(CH_3)_2$		Vaporization	28	28	
$Zn(C_2H_5)_2$		Vaporization	28	28	
$ZnBr_2 \cdot 2CH_3OH$		Fusion	29		
$ZnSiO_3$		Fusion	30		
Zn_2SiO_4		Fusion	7		
$2TlCl \cdot ZnCl_2$		Fusion	11		
$TlCl \cdot 2ZnCl_2$		Fusion	11		

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Table 32

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Cd		Sublimation	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1	
		Fusion	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,6,7,17,18,19,20	
		Vaporization	1,4,9,11,21,22,23,24,25,26,27,28,29,30,31,32,33	1,9,24,26,27,28,29,30,31,32,33	
CdO		Sublimation	1,34,35	1,34,35	
CdF_2		Fusion	1,36,37	1	
		Vaporization	38	38	
$CdCl_2$		Sublimation	39,40,41,42	39,40,41,42	
		Fusion	1,43,44,45,46,47,48,49,50,51,52,53,54,55	1,54	
		Vaporization	39,40,41,42,46,54	39,40,41,42	
$CdBr_2$		Sublimation	42	42	
		Fusion	1,45,54,55	1,54	
		Vaporization	54		
CdI_2		Sublimation	37,42,44,45,51,52	42,44	
		Fusion	37,42,44,45,51,52	42,44	
CdS		Sublimation	57,58,59	58,59	
$CdSO_4$		Fusion	51		
CdTe		Fusion	60		
$Cd(NO_3)_2 \cdot 4H_2O$		Fusion	61,62	61	
$2CdCl_2 \cdot NH_4Cl$		Fusion	46		
CdSb		Fusion	63	63	
Cd_3Sb_2		Fusion	15,14		
$Cd(HCOO)_2 \cdot 3NH_3$	cadmium formate triammine	Fusion	64		
$CdSiO_3$		Fusion	65		
$TlCl \cdot CdCl_2$		Fusion	48,50		

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Table 33

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Hg		Sublimation	1,2,3,4,5	1,2,3,5	
		Fusion	1,2,3,4	1,2,3	
		Vaporization	5,7,8	5	
HgF_2		Sublimation	9	9	
		Fusion	9		
$HgCl_2$		Sublimation	1,10,11,12,13	1	
		Fusion	1,10,11,12,13	1	
		Vaporization	5,13,14	5	
$HgBr_2$		Sublimation	5,11,13,15	3,5	
		Fusion	5,11,13,15	5	
		Vaporization	3,5,13,14	3,5	
HgI_2		Transition	1,3,16,17,18,19	1,3	
		Sublimation	1,13,20	1	
		Fusion	1,13,20	1	
		Vaporization	5,13	5	
HgS		Transition	3,21,22,23	3,21,22	
$HgI_2 \cdot 2N_2H_5I \cdot H_2O$		Fusion	24		
$Hg(CH_3)_2$		Vaporization	25,26	25,26	
$Hg(C_2H_5)_2$		Vaporization	25	25	
Hg_2Tl		Fusion	27		
$HgCl_2$;TlCl		Fusion	28		
$HgCl_2 \cdot 2TlNO_3$		Fusion	13		

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Table 34

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	$\Delta\bar{H}$	ΔC_p
Formula	Description				
Cu		Fusion	1,2,3,4,5,6,7,8,9,10	1,2,3	
		Vaporization	11	11	
Cu_2O		Fusion	1,12,13,14,15	1,12	
CuCl		Fusion	1,16	1	
CuBr		F sion	17		
CuI		Fusion	16		
CuI_2		Transition	1		
Cu_2S		Transition	1	1	
		Fusion	1	1	
$CuSO_4 \cdot 5H_2O$		Transition	19		
Cu_2Se		Transition	1	1	1
		Fusion	20		
Cu_2Te		Fusion	21		
Cu_4Te_3		Transition	21		
		Fusion	21		
$Cu(NO_3)_2 \cdot 6H_2O$		Fusion	22		
Cu_3P		Fusion	23		
Cu_3As		Fusion	6		
Cu_5As_2		Fusion	6		
Cu_3Sb		Fusion	24,25		
Cu_5Sb_2		Fusion	26		
CuCN		Fusion	1		
$Cu(CH_3COO)_2 \cdot 2NH_3$	cupric acetate diammine	Fusion	27		
$Cu(CH_2ClCOO)_2 \cdot 2NH_3$	cupric chloroacetate diammine	Fusion	27		
$Cu(CCl_3COO)_2 \cdot 5NH_3$	cupric trichloroacetate pentammine	Fusion	27		
$CuBr_4(CH_2NH_3)_2$	ethylenediammonium cupric bromide	Fusion	27		
$(C_2H_5)_3PO \cdot CuCl_2$	triethylphosphine oxide cupric chloride	Fusion	28		
Cu_5Si		Fusion	29		
$4CuS \cdot SiS_2$		Fusion	30		
Cu_2Ga		Fusion	31		
Cu_2Cd_3		Fusion	32		

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Table 35
SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ag		Fusion	1,2	1	
		Vaporization	3	3	
AgF		Fusion	4		
AgCl		Fusion	1,5,6,7,8	1,5	
		Vaporization	9,10	9,10	
$AgClO_3$		Fusion	11		
AgBr		Transition	12		
		Fusion	1,13,14	1	
		Vaporization	15	15	
AgI		Transition	8,16,17,18	16,17,18	
		Fusion	1,19	1	
		Vaporization	3	3	
$Ag_2H_3IO_6$		Transition	20,21	20	
Ag_2S		Transition	22,23,24	23	
		Fusion	1,22	1	
Ag_2SO_4		Transition	25,26	25	
		Fusion	1,27,28	1	
$Ag_2SO_4 \cdot H_2SO_4$		Transition	29		
Ag_2Se		Transition	25	25	
AgTe		Transition	30		
Ag_2Te		Transition	30,31		
		Fusion	30,32,34		
Ag_3Te_2		Transition	32		
$AgNO_3$		Transition	25	25	25
		Fusion	1,34	1	1
$AgPO_3$		Fusion	13		
Ag_3PO_4		Fusion	13		
$Ag_4P_2O_7$		Fusion	13		
$Ag_2S \cdot As_2S_3$		Fusion	22		
$3Ag_2S \cdot As_2S_3$		Fusion	22		
$Ag_2S \cdot Sb_2S_3$		Fusion	22		
$2Ag_2S \cdot Sb_2S_3$		Fusion	22		
$3Ag_2S \cdot Sb_2S_3$		Fusion	22		
AgCN		Fusion	1	1	
Ag_2HgI_4		Transition	35	35	
$AgNO_3 \cdot HgI_2$		Transition	11		
$2AgNO_3 \cdot HgI_2$		Fusion	11		
Ag_3Cu_2		Fusion	36		

Table 35 (Continued)

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29. Kendall and Davidson-3	
30. Pellini and Quercigh-1	
31. Pellini-1	
32. Kracek and Ksanda-1	
33. Chikashige and Saito-1	
34. Scarpa-2	
35. Ketelaar-1	
36. Waidner and Burgess-2	

Table 36

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Au		Fusion	1,2,3,4,5,6,7,8	1,2,7	1
		Vaporization	9,10,11,12,13,14	9,10,11,12, 13,14	9,10,11,12
$AuTe_2$		Fusion	15		
$AuSb_2$		Transition	1,16	1,16	1
Au_28i		Fusion	17		
AuSn		Fusion	18,19	18	18
AuGa		Fusion	20		
$AuGa_2$		Fusion	20		
AuZn		Fusion	18	18	18
AuCd		Fusion	18	18	18

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Table 37

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Pt		Fusion	1,2,3,4,5,6,7,8	1	
		Vaporization	9,10		
$PtTe_2$		Fusion	11		
PtSb		Transition	12		
$PtSb_2$		Fusion	12		
$PtCl_2 \cdot CO$		Fusion	13,14		
$PtCl_2 \cdot 2CO$		Fusion	13,14		
$PtCl_4 \cdot 3CO$		Fusion	13,14		
$PtBr_2 \cdot CO$		Fusion	14		
$PtI_2 \cdot CO$		Fusion	15		
PtSi		Fusion	16		
Pt_2Si		Transition	16		
		Fusion	16		

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15. Mylius and Foerster-1
16. Woronow-1

Table 38

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ir		Fusion	1		
		Vaporization	2		
IrF_6		Vaporization	3	3	
$Ir_2Cl_5 \cdot 4(C_2H_5)_2S$		Fusion	4		

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Table 39

Os		Fusion	1		
		Vaporization	1,2		
OsO_4		Fusion	3,4	3,4	
		Vaporization	5	5	
OsF_6		Vaporization	6		
OsF_8		Fusion	6		
		Vaporization	6	6	
$Os(CO)_3Cl_2$		Fusion	7		

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Table 40

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Re		Fusion	1,2		
ReO_3		Fusion	3		
ReO_4		Fusion	4		
Re_2O_7		Fusion	4,5,6,7	5,7	
		Vaporization	5,7	5,7	
ReF_4		Fusion	8		
ReF_6		Fusion	9	9	
		Vaporization	9	9	
$ReOF_4$		Sublimation	8	8	
		Fusion	8	8	
ReO_3Cl		Fusion	10		
		Vaporization	10		
ReO_2Cl_3		Fusion	11		
$ReOCl_4$		Fusion	10		
$TlReO_4$		Fusion	12		
$AgReO_4$		Fusion	12		

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Table 41

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Pd		Fusion	1,2,3,4,5,6,7,8,9,10,11	1,2	
		Vaporization	12,13,14		
$PdCl_2$		Fusion	15	15	
PdS		Fusion	16		
PdSb		Fusion	17		
Pd_3Sb		Transition	10,17,18	10,18	
		Fusion	17		

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Table 42

Rh		Fusion	1,2,3		
		Vaporization	4,5		

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Table 43

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ru		Transition	1,2	1,2	
		Fusion	3		
		Vaporization	4		
RuO_4		Fusion	5,6,7		
RuF_5		Fusion	8		
		Vaporization	8		
$Ru(CO)_5$		Fusion	9		

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Table 45

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ni		Transition	1,2,3,4,5,6	1,2	1,2
		Fusion	1,2,7,8,9,10,11,12,13	1,2,9,13	1,2
		Vaporization	15,16,17	14,15,16	
NiO		Sublimation	18,19,20,21,22	18	
		Fusion	18,19,20,21,22		
$NiCl_2$		Sublimation	16,23	16	
		Fusion	23		
$NiBr_2$		Fusion	23		
NiI_2		Fusion	23		
NiS		Fusion	24		
Ni_2S		Fusion	25,26	25	
Ni_3S_2		Fusion	25,26,27	25	
$NiSO_4 \cdot 6H_2O$		Transition	28		
$Ni(NO_3)_2 \cdot 6H_2O$		Fusion	29		
$Ni(NO_3)_2 \cdot 6NH_3$		Transition	30	30	
Ni_2P		Fusion	31		
Ni_5P_2		Fusion	31		
NiSb		Fusion	32		
Ni_5Sb_2		Fusion	32		
$Ni(CO)_4$		Fusion	33,34		
		Vaporization	16	1,16	
$Ni(SCN)_4 \cdot C_2H_4(NH_3)_2$	nickel ethylenediammonium thiocyanate	Fusion	35		
NiSi		Fusion	36		
Ni_2Si		Fusion	36		
$NiZn_3$		Fusion	37,38,39		

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Table 46

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Co		Transition	1,2,3,4	1,2,3,4	
		Fusion	5,6,7,8	5	
		Vaporization	9,10		
CoO		Fusion	11,12,13,14,15		
$CoCl_2$		Fusion	5,16,17,18	5	
		Vaporization	19,20	19,20	
$CoBr_2$		Fusion	21		
CoI_2		Fusion	22,29		
CoS		Fusion	15		
$Co(NO_3)_2 \cdot 3H_2O$		Fusion	23		
$Co(NO_3)_2 \cdot 6H_2O$		Fusion	23,24	24	
$CoI_3 \cdot 6NH_3$		Transition	25	25	
Co_2P		Fusion	26		
CoSb		Fusion	8		
$Co(SCN)_4 \cdot C_2H_4(NH_3)_2$	cobalt ethylenediammonium thiocyanate	Fusion	27		
CoSi		Fusion	8		
$CoSi_2$		Fusion	8		
$CoSi_3$		Fusion	8		
Co_2Si		Fusion	8		
Co_2Sn		Fusion	8,28		

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Table 47

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Fe		Transition	1,2,3,4,5,6	1,2,3,4,5,6	
		Sublimation	1,5,7	1,5,7	
		Fusion	1,8,9,10,11,12,13	1,8	
		Vaporization	5,7,14	5,7,14	
$Fe_{0.95}O$	wüstite	Fusion	9	9	
Fe_2O_3		Transition	15,16		
Fe_3O_4		Fusion	17	17	
FeF_2		Fusion	18	18	
$FeCl_2$		Fusion	19,20,21,22		
		Vaporization	7	7	
$FeCl_3$		Sublimation	7,23,24,25	7,23,24,25	
		Fusion	8,26	8	8
		Vaporization	7	7	
$FeCl_3 \cdot 2H_2O$		Fusion	27		
$FeCl_3 \cdot 2\ 1/2\ H_2O$		Fusion	27		
$FeCl_3 \cdot 3\ 1/2\ H_2O$		Fusion	27		
$FeCl_3 \cdot 6H_2O$		Fusion	27		
$FeCl_3 \cdot HCl \cdot 2H_2O$		Fusion	27		
$FeCl_3 \cdot HCl \cdot 4H_2O$		Fusion	27		
$FeCl_3 \cdot HCl \cdot 6H_2O$		Fusion	27		
$FeBr_2$		Fusion	28		
FeI_2		Fusion	29		
$FeI_2 \cdot 4H_2O$		Fusion	30		
$FeI_2 \cdot 9H_2O$		Fusion	30		
FeS		Transition	6,31,32	6	6
$FeSO_4 \cdot 7H_2O$		Fusion	33		
$Fe(NO_3)_2 \cdot 6H_2O$		Fusion	34,35		
$Fe(NO_3)_3 \cdot 9H_2O$		Fusion	36		
$FeCl_3 \cdot NH_4Cl$		Fusion	26		
$NH_4Fe(SO_4)_2 \cdot 12H_2O$		Fusion	37		
Fe_2P		Fusion	38		
$Fe_2O_3 \cdot P_2O_5$		Fusion	39		
FeAs		Fusion	40		
Fe_2As		Fusion	40		
Fe_3Sb_2		Fusion	41		
$Fe(CO)_5$		Fusion	42,43,44,45	42,44	
		Vaporization	45,46,47	45,46,47	
$Fe(CO)_4H_2$		Fusion	48		
		Vaporization	48	48	
$Fe(CO)_2(NO)_2$		Sublimation	49	49	
		Fusion	49	49	

Table 47 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$Fe(CO)_2(NO)_2$		Vaporization	49	49	
$FeCl_3 \cdot CH_3NH_3Cl$	methylammonium ferric chloride	Fusion			
$FeCl_3 \cdot (CH_3)_2NH_2Cl$	dimethylammionium ferric chloride	Fusion	50		
$FeCl_3 \cdot C_2H_5NH_3Cl$	ethylammonium ferric chloride	Fusion	50		
FeSi		Fusion	38,51		
$FeO \cdot SiO_2$	$FeSiO_3$	Fusion	52		
$2FeO \cdot SiO_2$	Fe_2SiO_4	Fusion	52		
$4FeO \cdot 3SiO_2$	$Fe_4Si_3O_{10}$	Fusion	52		
$Fe_2O_3 \cdot PbO$		Fusion	53		
$FeGa_2$		Fusion	54		
$FeCl_3 \cdot 2TlCl$		Fusion	55		
$Fe(SO_4)_2Tl \cdot 12H_2O$		Fusion	37		
$Fe_2O_3 \cdot ZnO$		Fusion	53		
$Fe_2O_3 \cdot CdO$		Fusion	53		
$Fe_2O_3 \cdot CuO$		Fusion	53		
$2FeCl_3 \cdot CuCl_2$		Fusion	56		
$Fe_2O_3 \cdot NiO_3$		Fusion	53		
$2FeS \cdot Ni_2S$		Fusion	57		
$Fe_2O_3 \cdot CoO$		Fusion	53		

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Table 48

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Mn		Transition	1,2,3,4,5,6	1,2,3	
		Fusion	1,2,3,7	1	
		Vaporization	1,8,9,10,11	1,10	
MnO		Fusion	12		
Mn_2O_3		Transition	13		
Mn_3O_4		Transition	14	14	
		Fusion	15,16,17		
MnF_2		Fusion	18		
$MnCl_2$		Fusion	19,20,21,22,23,24	19	
		Vaporization	25	25	
$MnBr_2$		Fusion	26,27		
MnI_2		Fusion	28		
MnS		Fusion	29		
$MnSO_4$		Fusion	30,31		
$Mn(NO_3)_2 \cdot 3H_2O$		Fusion	32,33	32	
$Mn(NO_3)_2 \cdot 4H_2O$		Fusion	34		
$Mn(NO_3)_2 \cdot 6H_2O$		Fusion	33,34,35,36	35	
Mn_5P_2		Fusion	37		
Mn_2Sb		Fusion	38		
Mn_3C		Transition	39	39	
$Mn(SCN)_2 \cdot C_2H_4(NH_3)_2(SCN)_2$	manganese ethylenediammonium thiocyanate	Fusion	40		
$MnSiO_3$		Transition	41		
		Fusion	41,42	42	
Mn_2SiO_4		Fusion	41,43		
MnAu		Fusion	44		
MnPd		Fusion	7		
$MnFe_2O_4$		Fusion	45		

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Table 49

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Cr		Fusion	1,2,3,4,5,10	1,10	
Cr_2O_3		Transition	6,7		
		Fusion	8,9		
$CrCl_2$		Sublimation	11,12	11,12	
		Fusion	11,12	11,12	
CrO_2Cl_2		Vaporization	13,14	13,14	
$Cr8r_2$		Fusion	15		
CrI_2		Fusion	16		
$NH_4Cr(SO_4)_2 \cdot 12H_2O$		Fusion	17		
CrSb		Fusion	18		
$Cr(CO)_6$		Sublimation	19,20	19,20	
CrSi		Fusion	21		
$CrSi_2$		Fusion	21		
$PbCrO_4$		Transition	22		
$PbCrO_4 \cdot PbO$		Fusion	22		
$TlCr(SO_4)_2 \cdot 12H_2O$		Fusion	17		
Pd_2Cr_3		Fusion	2		

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12. Doerner-1
13. Thorpe-1
14. Moles and Gomez-1
15. Fischer and Gewehr-1
16. Hein and Wintner-Hölder-1
17. Locke-1
18. Williams-3
19. von Hieber and Romberg-1
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21. Kurnakov-1
22. Jaeger and Germs-1

Table 50

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Mo		Fusion	1,2		
MoO_3		Sublimation	3	3	
		Fusion	3,4,5,6		
		Vaporization	3,7	3,7	
MoF_6		Sublimation	8,9,10	8,10	
		Fusion	8,9,10	8,10	
		Vaporization	8,9,10	8,10	
$MoOF_4$		Fusion	9		
$MoCl_5$		Fusion	9,11,12,13		
		Vaporization	9,11,12,13		
$Bi_2(MoO_4)_3$		Fusion	14		
MoC		Fusion	15,16		
Mo_2C		Fusion	15,16		
$Mo(CO)_6$		Sublimation	17	17	
$PbMoO_4$		Fusion	6		
$PbMoO_4 \cdot PbO$		Fusion	6		

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11. Hampe-3
12. Debray-1
13. Evans and Lister-1
14. Zambonini-2
15. Agte and Alterthum-1
16. Friederich and Sittig-2
17. Hieber and Romberg-1

Table 51

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
W		Fusion	1,2,3,4,5,6,7		
WO_3		Sublimation	8	8	
		Fusion	9		
WF_6		Transition	10,11	10,11	
		Fusion	10,11	10,11	
WOF_4		Fusion	12		
		Vaporization	12		
WCl_5		Fusion	13,14		
		Vaporization	13,14		
WCl_6		Transition	15	15	
		Sublimation	15	15	
		Fusion	15	15	
		Vaporization	15	15	
$WOCl_4$		Sublimation	12,14,16,17,18	16	
		Fusion	16	16	
		Vaporization	14,16	16	
WBr_5		Fusion	14		
		Vaporization	14		
$WOBr_4$		Fusion	14		
		Vaporization	14		
$WCl_6 \cdot 3WBr_6$		Fusion	19		
$Bi_2(WO_4)_3$		Fusion	20		
WC		Fusion	21,22		
W_2C		Fusion	22		
$W(CO)_6$		Sublimation	23	23	
$PbWO_4$		Transition	9,20		
		Fusion	9,20		
$PbWO_4 \cdot PbO$		Fusion	9		
W_2Re		Fusion	7		

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Table 51 (Continued)

SPECIFIC REFERENCES

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22. Agte and Alterthum-1

23. Hieber and Romberg-1

Table 52

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
V		Fusion	1,2,3,4		
V_2O_3		Fusion	5		
V_2O_4		Transition	6	6	6
		Fusion	5,6	6	6
V_2O_5		Fusion	6	6	6
VF_5		Sublimation	7		
VCl_4		Fusion	8,9		
		Vaporization	7,8,9,10,11	8	
$VOCl_3$		Fusion	12		
		Vaporization	10,12,13,14,15	12	
VN		Fusion	16,17		
$NH_4V(SO_4)_2 \cdot 12H_2O$		Fusion	18		
VC		Fusion	19		
VSi_2		Fusion	20		
$2PbO \cdot V_2O_5$		Fusion	21		
$3PbO \cdot V_2O_5$		Fusion	21		
$8PbO \cdot V_2O_5$		Fusion	21		
$3Pb_3(VO_4)_2 \cdot PbF_2$		Fusion	22		
$3Pb_3(VO_4)_2 \cdot PbCl_2$		Transition	23		
		Fusion	22,23		
$TlV(SO_4)_2 \cdot 12H_2O$		Fusion	18		

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Table 53

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Cb		Sublimation	1,2	2	
		Fusion	2		
Cb_2O_3		Fusion	3		
Cb_2O_5		Fusion	4,5		
CbF_5		Fusion	6,7		
		Vaporization	6,7	6	
$CbCl_5$		Sublimation	8,9,10,11	8,9	
		Fusion	8,9,10,11	8,9	
		Vaporization	8,9,10,12	8,9	
CbN		Fusion	13		
CbC		Fusion	14,15		
Cb_2Fe		Fusion	16		

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13. Friederich and Sittig-1
14. Agte and Alterthum-1
15. Friederich and Sittig-2
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Table 54

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ta		Sublimation	1,2,3,4	1	
		Fusion	1,2,3,4		
Ta_2O_5		Fusion	4,5		
TaF_5		Fusion	6		
		Vaporization	6	6	
$TaCl_5$		Sublimation	7,8,9,10	7,8	
		Fusion	7,8,9,10	7,8	
		Vaporization	7,8,9,11	7,8	
$TaBr_5$		Sublimation	12,13	12	
		Fusion	12,13	12	
		Vaporization	12,13	12	
TaI_5		Fusion	14		
TaN		Fusion	15,16	15	
TaC		Fusion	15,17,18		
TaFe		Fusion	19		

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18. Friederich and Sittig-2
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Table 55

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ti		Transition	1,2,3		
		Sublimation	4	4	
		Fusion	5,6,7,8		
TiO		Transition	9	9	
TiO_2		Transition	10,11,12,13	10,11	
		Fusion	14,15,16		
Ti_2O_3		Transition	9	9	
Ti_3O_5		Transition	9	9	
TiF_4		Vaporization	17		
$TiCl_4$		Fusion	18,19,20,21,22,23,24,	18,19,20	
		Vaporization	25,26,27,28,29	25,26	
$TiBr_4$		Transition	30		
		Fusion	18,22,30,31,32,33	18	
		Vaporization	22,27,30,33		
TiI_4		Fusion	22		
		Vaporization	34	34	
$TiCl_4 \cdot SCl_4$		Fusion	35		
TiN		Fusion	36,37		
$TiCl_4 \cdot POCl_3$		Fusion	38		
		Vaporization	38		
TiC		Fusion	37,39		
$TiFe_2$		Fusion	40		
$FeTiO_3$		Fusion	41	41	
Fe_2TiO_4		Fusion	42		
$MnTiO_3$		Fusion	43		

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Table 56

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Zr		Transition	1,2	1	
		Fusion	3		
ZrO		Transition	4		
ZrO_2		Transition	6,7		
		Fusion	3,5,8,9,10	5	
$ZrCl_4$		Sublimation	11,12	11,12	
		Fusion	12		
$ZrBr_4$		Sublimation	11,12	11,12	
		Fusion	12		
ZrI_4		Sublimation	11,12	11,12	
		Fusion	12		
ZrN		Fusion	13,14		
$Zr(NO_3)_2 \cdot 6H_2O$		Fusion	15		
$2ZrCl_4 \cdot PCl_5$		Fusion	3		
		Vaporization	3,17		
$2ZrCl_4 \cdot POCl_3$		Vaporization	3,17		
ZrC		Fusion	18,19		
$ZrSiO_4$		Fusion	20,21		
$ZrCu_3$		Fusion	22		
$ZrAu_3$		Fusion	22		
Zr_2Fe_3		Fusion	16		

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Table 57

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Hf		Transition	1		
		Fusion	1,2		
HfO_2		Fusion	3,4		
$HfCl_4$		Sublimation	5	5	
		Fusion	5		
$HfBr_4$		Sublimation	5	5	
		Fusion	5		
HfC		Fusion	6,7		

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Table 58
SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
B		Fusion	1		
B_2O_3		Fusion	2,3	2	
		Vaporization	4	4	
B_2H_6	diborane	Fusion	5,6	6	
		Vaporization	6	6	
B_4H_{10}	tetraborane	Fusion	5		
		Vaporization	7	7	
B_5H_9	pentaborane	Fusion	5		
		Vaporization	7	7	
B_5H_{11}		Fusion	8		
		Vaporization	8	8	
B_6H_{10}	hexaborane	Fusion	5		
$B_{10}H_{14}$	decaborane	Sublimation	7	7	
		Fusion	9,10	10	
		Vaporization	7	7	
HBO_2		Fusion	3		
BF_3		Sublimation	11,12,13,14	11,12,13,14	
		Fusion	15	15	
		Vaporization	11,12,13,14	11,12,13,14	
$BF_3 \cdot H_2O$		Fusion	16		
$8F_3 \cdot 2H_2O$		Fusion	17		
		Vaporization	17		
BCl_3		Fusion	18		
		Vaporization	7	7	
B_2H_5Cl		Fusion	19		
BBr_3		Fusion	1		
		Vaporization	7	7	
B_2H_5Br		Fusion	20		
		Vaporization	7	7	
BI_3		Fusion	21		
		Vaporization	21		
B_2S_3		Fusion	22		
8_2S_5		Fusion	23		
$8(HSO_4)_3$		Fusion	24		
$SCl_4 \cdot BCl_3$		Fusion	22		
$B_3N_3H_6$	hexahydro-s-triazatri-borine, borazole	Fusion	25		
		Vaporization	26,27	26,27	
$B(CH_3)_3$	trimethylborine	Fusion	28		
		Vaporization	28	28	
$(CH_3)_28_2H_4$	unsym. dimethyldiborane	Fusion	29		
		Vaporization	29	29	

Table 58 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$(CH_3)_3B_2H_3$	1,1,2-trimethyldiborane	Fusion	29		
		Vaporization	29	29	
$(CH_3)_4B_2H_2$	sym. tetramethyldiborane	Fusion	29		
		Vaporization	29	29	
$(C_2H_5)_2B_2H_4$	unsym. diethyldiborane	Vaporization	30	30	
$(C_2H_5)_4B_2H_2$	sym. tetraethyldiborane	Fusion	30		
$(CH_3O)_2BH$	dimethoxyborine	Fusion	31		
		Vaporization	31	31	
$B_3O_3(CH_3)_3$	trimethylboroxole	Fusion	32		
		Vaporization	32	32	
$B(CH_3)F_2$	methyldifluoroborine	Fusion	32		
		Vaporization	32	32	
$B(CH_3)_2F$	dimethylfluoroborine	Fusion	32		
		Vaporization	32	32	
$B(CH_3)Cl_2$	methyldichloroborine	Fusion	25		
		Vaporization	25	25	
$B(CH_3)_2Cl$	dimethylchloroborine	Vaporization	25	25	
$B(C_2H_5)_2Cl$	diethylchloroborine	Fusion	25		
		Vaporization	25	25	
$B(CH_3)Br_2$	methyldibromoborine	Fusion	25		
		Vaporization	25	25	
$B(CH_3)_2Br$	dimethylbromoborine	Fusion	25		
		Vaporization	25	25	
$B(C_2H_5)_2Br$	diethylbromoborine	Fusion	25		
		Vaporization	25	25	
$B(CH_3)_2I$	dimethyliodoborine	Fusion	25		
		Vaporization	25	25	
$BH_2N(CH_3)_2$	dimethylaminoborine	Fusion	25		
$B(CH_3)_2NH_2$	aminomethylborine	Fusion	25		
$B(CH_3)_2NH(CH_3)$	methylaminodimethylborine	Vaporization	33	33	
$BH_3 \cdot NH(CH_3)_2$	dimethylamine borine	Fusion	25		
$B(CH_3)_3 \cdot NH_2CH_3$	methylamine trimethyl-borine	Fusion	33		
$BH[N(CH_3)_2]_2$	bis(dimethylamino)borine	Fusion	25		
$B(CH_3)_3 \cdot NH(CH_3)_2$	dimethylamine trimethyl-borine	Fusion	25		
$B(CH_3)_2N(C_2H_5)_2$	diethylaminodimethylborine	Vaporization	25	25	
$B(C_2H_5)_2N(CH_3)_2$	dimethylaminodiethylborine	Vaporization	25	25	
$B[N(CH_3)_2]_3$	tris(dimethylamino)-borine	Fusion	34		
		Vaporization	34	34	
$[B(CH_3)_2NH(CH_3)]_2$	bis(methylaminodimethyl-borine)	Vaporization	33	33	
$[B(N(CH_3)_2)_3]_2$		Vaporization	25		

Table 58 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$(CH_3)B_3N_3H_5$	1-methylborazole (N-methylborazole)	Vaporization	30,35	30,35	
$(CH_3)B_3N_3H_5$	2-methylborazole (B-methylborazole)	Fusion	30		
		Vaporization	30,35	30,35	
$(CH_3)_2B_3N_3H_4$	1,3-dimethylborazole	Vaporization	35	35	
$(CH_3)_2B_3N_3H_4$	2,4-dimethylborazole	Fusion	30		
		Vaporization	30	30	
$(CH_3)_2B_3N_3H_4$	1,2-dimethylborazole	Vaporization	35	35	
$(CH_3)_3B_3N_3H_3$	1,3,5-trimethylborazole	Fusion	25		
		Vaporization	25,35	35	
$(CH_3)_3B_3N_3H_3$	2,4,6-trimethylborazole	Fusion	25		
		Vaporization	25,30	30	
$(CH_3)_3B_3N_3H_3$	1,2,4-Trimethylborazole	Vaporization	35	35	
$(CH_3)_4B_3N_3H_2$	1,2,4,6-tetramethylborazole	Vaporization	35	35	
$(CH_3)_6B_3N_3$	hexamethylborazole	Fusion	25		
		Vaporization	33	33	
$(CH_3)_3B_3O_3 \cdot NH_2(CH_3)$	trimethylborazol methylamine	Fusion	25		
$BCl_2N(CH_3)_2$	dimethylaminodichloroborine	Fusion	25		
		Vaporization	34	34	
$BCl[N(CH_3)_2]_2$	bis(dimethylamino)-chloroborine	Fusion	34		
		Vaporization	34	34	
$[BCl_2N(CH_3)_2]_2$	bis(dimethylaminodichloroborine)	Fusion	34		
$BBr_2N(CH_3)_2$	dimethylaminodibromoborine	Fusion	25		
$[BBr_2N(CH_3)_2]_2$	bis(dimethylaminodibromoborine)	Fusion	25		
$PbO \cdot B_2O_3$		Fusion	36		
$PbO \cdot 2B_2O_3$		Fusion	36		
$PbO \cdot 3B_2O_3$		Fusion	36		
$2PbO \cdot 5B_2O_3$		Fusion	36		
$3ZnO \cdot 2B_2O_3$		Fusion	37		
$2CdO \cdot 3B_2O_3$		Fusion	36		
Ni_2B		Fusion	38		
Ni_3B_2		Transition	38		
		Fusion	38		
Fe_2B		Fusion	39		
$MnO \cdot B_2O_3$		Fusion	36		
$MnO \cdot 2B_2O_3$		Fusion	36		
$MnO \cdot 3B_2O_3$		Fusion	36		
ZrB		Fusion	40		
$Zr(BH_4)_4$	zirconium borohydride	Sublimation	41	41	

Table 58 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$Zr(BH_4)_4$	zirconium borohydride	Fusion	41	41	
		Vaporization	41	41	
HfB		Fusion	40		
$Hf(BH_4)_4$		Sublimation	41	41	
		Fusion	41	41	
		Vaporization	41	41	

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Table 59

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Al		Fusion	1,2,3,4,5,6,7,8	1,2,3,4,6,8	
		Vaporization	9,10,11,12,13	9,10,11,12,13	
Al_2O_3		Fusion	3,14,15,16,17,18,19,20,21	3	
AlF_3		Sublimation	22,23,24	22,23,24	
Al_2Cl_6		Sublimation	25	25	
		Fusion	3,26,27	3,26	
Al_2Br_6		Fusion	26,27,28,29,30	26	
		Vaporization	25,31	25,31	
Al_2I_6		Fusion	26,27,32	26	
		Vaporization	25,33	25,33	
$AlBr_3 \cdot H_2S$		Fusion	34		
Al_3Se_4		Fusion	35		
Al_2Te_3		Fusion	36		
$AlCl_3 \cdot NH_3$		Fusion	32		
		Vaporization	37	37	
$AlBr_3 \cdot NH_3$		Fusion	32		
$NH_4Al(SO_4)_2 \cdot 12H_2O$		Transition	38	38	
		Fusion	39		
$AlCl_3 \cdot PH_3$		Fusion	32		
$AlCl_3 \cdot POCl_3$		Fusion	41		
$AlBr_3 \cdot PH_3$		Fusion	32		
$AlI_3 \cdot PH_3$		Fusion	32		
AlSb		Fusion	41		
$AlBr_3 \cdot SbBr_3$		Fusion	29,42		
$AlBr_3 \cdot BiBr_3$		Fusion	29,42		
$Al(CH_3)_3$	trimethylaluminum	Fusion	43		
		Vaporization	44,45	44,45	
$Al(C_2H_5)_3$	triethylaluminum	Vaporization	45	45	
$(CH_3)_2O \cdot Al(CH_3)_3$	trimethylaluminum dimethylether	Fusion	46		
		Vaporization	46	46	
$[(CH_3)_2AlO(CH_3)]_3$	tris(dimethylaluminum methoxide)	Fusion	46		
		Vaporization	46	46	
$[CH_3AlCl_2]_2$	bis(methylaluminum dichloride)	Fusion	47		
$[(CH_3)_2AlCl]_2$	bis(dimethylaluminum chloride)	Fusion	46		
		Vaporization	46	46	
$(CH_3)_2O \cdot Al(CH_3)_2Cl$	dimethylaluminum chloride dimethylether	Vaporization	46	46	
$(C_2H_5)_2O \cdot AlCl_3$	aluminum chloride diethylether	Fusion	34		
$[(CH_3)_2AlBr]_2$	bis(dimethylaluminum bromide)	Fusion	46		
		Vaporization	46	46	

Table 59 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$(C_2H_5)_2O \cdot AlBr_3$	aluminum bromide diethylether	Fusion	34		
$(CH_3)_2S \cdot Al(CH_3)_3$	trimethylaluminum dimethyl sulfide	Fusion	46		
		Vaporization	46	46	
$[(CH_3)_2AlSCH_3]_2$	bis(methylmercaptodimethyl aluminum)	Fusion	46		
		Vaporization	46	46	
$AlH_3 \cdot N(CH_3)_3$	aluminumhydride trimethylamine	Fusion	47		
$Al(CH_3)_3 \cdot NH(CH_3)_2$	trimethylaluminum dimethylamine	Fusion	46		
		Vaporization	46	46	
$Al(CH_3)_3 \cdot N(CH_3)_3$	trimethylaluminum trimethylamine	Sublimation	46,47	46	
		Vaporization	46,47	46	
$AlH_3 \cdot 2N(CH_3)_3$	aluminum hydride di(trimethylamine)	Fusion	47		
$[(CH_3)_2AlN(CH_3)_2]_2$	bis(dimethylaminodimethylaluminum)	Sublimation	46	46	
		Fusion	46		
$AlCl_3 \cdot C_2H_5NH_2$	aluminum chloride ethylamine	Fusion	34		
$Al(CH_3)_2Cl \cdot (CH_3)_3N$	dimethylaluminum chloride trimethylamine	Sublimation	46	46	
		Fusion	46		
$(CH_3)_2PH \cdot Al(CH_3)_3$	trimethylaluminum dimethyl phosphine	Vaporization	46		
$(CH_3)_3P \cdot Al(CH_3)_3$	trimethylaluminum trimethylphosphine	Sublimation	46	46	
		Vaporization		46	
$[(CH_3)_2AlP(CH_3)_2]_3$	tris(dimethylphosphinodimethylaluminum)	Sublimation	46	46	
$Al_2O_3 \cdot SiO_2$		Fusion	58		
$Al_2Cl_6 \cdot SnCl_2$		Fusion	42		
$Al_2Cl_6 \cdot 2SnCl_2$		Fusion	42		
$Al_2Br_6 \cdot SnBr_2$		Fusion	42		
$Al_2Br_6 \cdot 2SnBr_2$		Fusion	42		
$Al_2Br_6 \cdot PbBr_2$		Fusion	42		
AlGa		Fusion	49		
$AlGa_2$		Fusion	49		
Al_2Ga		Fusion	49		
$Al_2Cl_6 \cdot 2TlCl$		Fusion	42		
$Al_2Br_6 \cdot TlBr$		Fusion	42		
$Al_2Br_6 \cdot 2TlBr$		Fusion	42		
$AlTl(SO_4)_2 \cdot 12H_2O$		Fusion	39		
$Al_2O_3 \cdot ZnO$		Fusion	50		
$Al_2Br_6 \cdot ZnBr_2$		Fusion	42		
$Al_2Br_6 \cdot CdBr_2$		Fusion	42		
$Al_2Br_6 \cdot HgBr_2$		Fusion	42		
$Al_2Br_6 \cdot Hg_2Br_2$		Fusion	42		

Table 59 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
AlCu		Fusion	51		
$AlCu_3$		Fusion	51,52,53		
Al_2Cu		Fusion	51		
$Al_2Cl_6 \cdot Cu_2Cl_2$		Fusion	42		
$AlAg_2$		Fusion	51,54		
$AlAg_3$		Fusion	51,55		
$Al_2Br_6 \cdot 2HgBr$		Fusion	42		
$AlAu_2$		Fusion	56		
Al_2Au		Fusion	56		
NiAl		Fusion	52		
$Al_2O_3 \cdot NiO$		Fusion	57		
CoAl		Fusion	52		
$Al_2O_3 \cdot CoO$		Fusion	57		
$FeAl_3$		Fusion	58,59		
Al_3Ti		Fusion	60		
Al_4Ti		Fusion	61		
$Al_2O_3 \cdot TiO_2$		Fusion	62		
$Al_2O_3 \cdot 2TiO_2$		Fusion	57		
$Al(BH_4)_3$	aluminum borohydride	Fusion	63		
		Vaporization	63	63	
$Al(BH_4)_3 \cdot N(CH_3)_3$	aluminum borohydride trimethylamine	Fusion	63		

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4. Kelley-25
5. Roeser and Wensel-3
6. Bichowsky and Rossini-1
7. Vogel-4
8. Awbery-1
9. Baur and Brunner-1
10. Farkas-1
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12. Greenwood-2
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17. Kanolt-2
18. Ruff, Seiferheld and Suda-1
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20. Weigel and Kaysser-1
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22. Ruff and Boucher-1
23. Olbrich-1
24. Naryushkin-1
25. Kelley-19
26. Fischer-2
27. Biltz and Keunecke-1
28. Sugden-2

Table 59 (Continued)

SPECIFIC REFERENCES

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30. Puschin and Makuts-1
31. Zhuravlev-1
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33. Moles and Vian-1
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37. Klemm, Clausen, and Jacobi-1
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39. Locke-1
40. Casselman-1
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45. Bamford, Levi, and Newitt-1
46. Davidson and Brown-1
47. Klemm-1
48. Rankin and Wright-1
49. Puschin and Stojic-1
50. Bunting-4
51. Schübel-1
52. Gwyer-1
53. Carpenter and Edwards-1
54. Petrenko-1
55. Tischtschenko-1
56. Heycock and Neville-4
57. von Wartenberg and Reusch-1
58. Osawa-1
59. Biltz and Hasse-1
60. Manchot and Leber-1
61. Erckelens-1
62. Bunting-5
63. Schlesinger, Sanderson, and Burg-1

Table 60

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Sc		Fusion	1		
		Vaporization	2		
$ScCl_3$		Sublimation	3,4,5	3	
		Fusion	3,4,5		
$ScBr_3$		Sublimation	3	3	
		Fusion	3		
ScI_3		Sublimation	3	3	
		Fusion	3		
ScN		Fusion	6		

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1. Fischer, Brünger and Grieneisen-1
2. Richardson-6
3. Fischer, Gewehr and Wingchen-1
4. Biltz and Klemm-1
5. Voigt and Biltz-1
6. Friederich and Sittig-1

Table 61

Y		Fusion	1		
		Vaporization	2		
Y_2O_3		Vaporization	3		
YCl_3		Fusion	4,5,6,7		
YBr_3		Fusion	4,7		
YI_3		Fusion	4,7		
Y_2C_3		Vaporization	3		
$Y_2(MoO_4)_3$		Fusion	8		

REFERENCES

1. Thompson, Holton, and Kremers-1
2. Richardson-6
3. Mott-1
4. Jantsch, Jawurek, Skalla, and Gawalowski-1
5. Klemm and Biltz-1
6. Kleinheksel and Kremers-1
7. Jantsch and Wein-1
8. Zambonini-1

Table 62

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$LuCl_3$		Fusion	1,2		
LuI_3		Fusion	1,2		

REFERENCES

1. Jantsch, Skalla, and Grubitsch-1
2. Jantsch and Wein-1

Table 63

$YbCl_3$		Fusion	1,2		
$YbBr_3$		Fusion	2		

REFERENCES

1. Jantsch, Skalla and Jawurek-1
2. Jantsch and Wein-1

Table 64

Tm		Vaporization	1		
$TmCl_3$		Fusion	2,3,4		
TmI_3		Fusion	4		

REFERENCES

1. Richardson-1
2. Kleinheksel and Kremers-1
3. Jantsch, Skalla, and Grubitsch-1
4. Jantsch and Wein-1

Table 65

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$ErCl_3$		Fusion	1,2		
$ErBr_3$		Fusion	1,2		
ErI_3		Fusion	1,2		

REFERENCES

1. Jantsch and Wein-1
2. Jantsch, Jawurek, Skalla, and Gawalowski-1

Table 66

$HoCl_3$		Fusion	1,2,3		
$HoBr_3$		Fusion	1,3		
HoI_3		Fusion	1,3		

REFERENCES

1. Jantsch, Jawurek, and Skalla-1
2. Kleinheksel and Kremers-1
3. Jantsch and Wein-1

Table 67

$DyBr_3$		Fusion	1,2		
DyI_3		Fusion	1,2		

REFERENCES

1. Jantsch, Jawurek, Skalla and Gawalowski-1
2. Jantsch and Wein-1

Table 68

$TbCl_3$		Fusion	1		

REFERENCES

1. Bourion-2

Table 69

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$GdCl_3$		Fusion	1,2,3		
$GdBr_3$		Fusion	1,2		
GdI_3		Fusion	1,2		

REFERENCES

1. Jantsch, Jawurek, Skàlla, and Gawalowski-1
2. Jantsch and Wein-1
3. Bourion-2

Table 70

$EuCl_3$		Fusion	1,2		

REFERENCES

1. Jantsch, Grubitsch, Hoffman and Alber-1
2. Jantsch and Wein-1

Table 71

Sm		Fusion	1		
$SmCl_2$		Fusion	2		
$SmCl_3$		Fusion	3,4,5,6,7,8		
$SmBr_3$		Fusion	5,6		
SmI_3		Fusion	4,6		
$Sm_2(MoO_4)_3$		Fusion	9		

REFERENCES

1. Henesy-3
2. Jantsch, Ruping and Kunze-1
3. Kleinheksel and Kremer-1
4. Jantsch, Grubitsch, Hoffmann and Alber-1
5. Klemm and Rockstroh-1
6. Jantsch and Wein-1
7. Bourion-2
8. Matignon-21
9. Carobbi-1

Table 73

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Nd		Transition	1,2		
		Fusion	3		
NdF_3		Fusion	4		
$NdCl_3$		Fusion	5,6,7,8,9		
$NdCl_3 \cdot 6H_2O$		Fusion	10		
$NdBr_3$		Fusion	9		
NdI_3		Fusion	5,9		
$Nd(MoO_4)_3$		Fusion	11		

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2. Trombe-2
3. Muthmann and Weiss-1
4. von Wartenberg-2
5. Jantsch, Grubitsch, Hoffmann, and Alber-1
6. Kleinheksel and Kremers-1
7. Matignon-6,21
8. Bourion-2
9. Jantsch and Wein-1
10. Matignon-5
11. Zambonini-1

Table 74

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Pr		Fusion	1,2	1	
PrF_3		Fusion	3		
$PrCl_3$		Fusion	4,5,6		
$PrCl_3 \cdot 7H_2O$		Fusion	6		
$PrBr_3$		Fusion	7		
PrI_3		Fusion	7,8		
$PrSn_3$		Fusion	9		
Pr_2Sn		Fusion	9		
Pr_2Sn_3		Fusion	9		
PrPb		Fusion	9		
$PrPb_3$		Fusion	9		
Pr_2Pb		Fusion	9		
$PrGa_2$		Fusion	10		
PrTl		Fusion	9		
$PrTl_3$		Fusion	9		
$PrCu_2$		Fusion	9		
$PrCu_6$		Fusion	9		
PrAg		Fusion	9		
$PrAg_3$		Fusion	9		
PrAu		Fusion	9		
$PrAu_2$		Fusion	9,11		
$PrAu_3$		Fusion	9		
$PrAu_4$		Fusion	11		
PrNi		Fusion	12		
$PrNi_5$		Fusion	12		
Pr_3Ni		Fusion	12		
$Pr_2(MoO_4)_3$		Fusion	13		
$PrAl_2$		Fusion	9		

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2. Canneri and Rossi-3
3. von Wartenberg-2
4. Kleinheksel and Kremers-1
5. Matignon-21
6. Matignon-6
7. Jantsch and Wein-1
8. Jantsch, Grubitsch, Hoffmann, and Alber-1
9. Rolla, Jandelli, Canneri, and Vogel-1
10. Iandelli-1
11. Rossi-1
12. Vogel and Fülling-1
13. Zambonini-4

Table 75
SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ce		Transition	1,2		
		Fusion	3,4,5,6	3	
Ce_2O_3		Fusion	7		
CeF_3		Fusion	8		
$CeCl_3$		Fusion	9,10	10	
$CeBr_3$		Fusion	11		
CeI_3		Fusion	11,12		
CeBi		Fusion	13		
Ce_4Bi_3		Fusion	14		
$CeSn_2$		Fusion	15		
$CeSn_3$		Fusion	4		
Ce_2Sn		Fusion	4,15		
Ce_2Sn_3		Fusion	4,15		
$CePb_3$		Fusion	4,13		
Ce_2Pb		Fusion	4		
CeTl		Fusion	4		
$CeTl_3$		Fusion	4		
$CeZn_9$		Fusion	16		
$CeCu_2$		Fusion	4		
$CeCu_6$		Fusion	4		
CeAg		Fusion	4		
$CeAg_3$		Fusion	4		
CeAu		Fusion	4		
$CeAu_2$		Fusion	4		
$CeAu_3$		Fusion	4		
CeNi		Fusion	17		
$CeNi_5$		Fusion	17		
Ce_3Ni		Fusion	17		
Ce_3Co		Fusion	17		
$Ce_2O_3 \cdot Cr_2O_3$		Fusion	18		
$Ce_2(MoO_4)_3$		Fusion	19		
$Ce_2(WO_4)_3$		Fusion	19		
$CeAl_2$		Fusion	4,20		
$CeAl_4$		Transition	21		
Ce_3Al		Fusion	21		

Table 75 (Continued)

SPECIFIC REFERENCES

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7. Friederich and Sittig-3
8. von Wartenberg-11
9. Kleinheksel and Kremers-1
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11. Jantsch and Wein-1
12. Jantsch, Grubitsch, Hoffmann, and Alber-1
13. Iandelli-1
14. Vogel-6
15. Vogel-3
16. Schramm-1
17. Vogel and Fülling-1
18. von Wartenberg and Eckhardt-1
19. Zambonini-4
20. Vogel-4
21. Notwotny-1

Table 76

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
La		Transition	1,2		
		Fusion	3,4,5		
La_2O_3		Fusion	6		
$LaCl_3$		Fusion	7,8,9,10		
$LaBr_3$		Fusion	8		
LaI_3		Fusion	8,10		
$La(NO_3)_3 \cdot 6H_2O$		Transition	11		
		Fusion	12		
$LaSn_3$		Fusion	5		
La_2Sn		Fusion	5,13		
La_2Sn_3		Fusion	5,13		
LaPb		Fusion	5,13		
$LaPb_3$		Fusion	5		
La_2Pb		Fusion	5,13		
LaTl		Fusion	5,13,14		
$LaTl_3$		Fusion	5,13		
$LaCu_2$		Fusion	5,13		
$LaCu_6$		Fusion	5		
$LaZn_9$		Fusion	15		
LaAg		Fusion	5,13		
$LaAg_3$		Fusion	5,13		
LaAu		Fusion	5,13		
$LaAu_2$		Fusion	5,13		
$LaAu_3$		Fusion	5,13		
LaNi		Fusion	16		
$LaNi_5$		Fusion	16		
La_3Ni		Fusion	16		
$La(MoO_4)_3$		Fusion	17		
$LaAl_2$		Fusion	5,18		
$LaAl_4$		Transition	19		

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4. Rolla and Jandelli-1
5. Rolla, Jandelli, Canneri, and Vogel-1
6. von Wartenberg and Reusch-1
7. Kleinheksel and Kremers-1
8. Jantsch and Wein-1
9. Voigt and Biltz-1
10. Jantsch, Grubitsch, Hoffman, and Alber-1
11. Friend-1
12. Quill and Robey-1
13. Canneri-2
14. Iandelli-1
15. Schramm-1
16. Vogel and Fülling-1
17. Zambonini-4
18. Canneri-3
19. Notwotny-1

Table 79

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
PuF_3		Sublimation	1,2	1,2	
		Vaporization	1,2	1,2	
$PuCl_3$		Sublimation	1,2,3	1,2,3	
		Vaporization	1,2,3	1,2,3	
$PuBr_3$		Sublimation	1,2	1,2	
		Vaporization	1,2	1,2	

REFERENCES

1. Brewer et al-1
2. Seaborg, Katz, and Manning-1
3. Weinstock-1

Table 80

NpF_6		Fusion	1		
$NpCl_3$		Fusion	1		
$NpCl_4$		Fusion	1		
$NpBr_4$		Fusion	1		
NpI_3		Fusion	1		

REFERENCES

1. Brewer et al-1

Table 81

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH_f°	ΔC_p°
Formula	Description				
U		Transition	1,2	1,2	
		Fusion	1		
UF_4		Sublimation	1	1	
		Vaporization	1	1	
UF_6		Sublimation	1,3,4	1,3	
		Fusion	4	4	
		Vaporization	1,4	1,4	
UCl_3		Sublimation	1	1	
		Vaporization	1	1	
UCl_4		Sublimation	1	1	
		Vaporization	1	1	
UBr_3		Sublimation	1	1	
		Fusion	1	1	
		Vaporization	1	1	
UBr_4		Sublimation	1	1	
		Vaporization	1	1	
UC_2		Fusion	1	1	
U_2C_3		Fusion	1	1	
$(UO_2)Cl_4(CH_2NH_3)_2$	ethylene diammonium uranyl chloride	Fusion	5		
$UO_2(NO_3)_4(CH_2NH_3)_2$	diethylene diammonium uranyl nitrate	Fusion	5		
$U(BH_4)_4$	uranium borohydride	Vaporization	6	6	
$U(BH_4)_3(BH_3CH_3)$		Vaporization	6	6	
$U(BH_3CH_3)_4$		Vaporization	6	6	

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2. Moore and Kelley-2
3. Weinstock and Crist-1
4. Brickwedde, Hoge and Scott-1
5. Grossmann and Schück-1
6. Schlesinger and Brown-1

Table 82

$PaCl_5$		Fusion	1		

REFERENCES

1. Grosse-1

Table 83

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Th		Transition	1		
		Fusion	2,3		
ThO_2		Fusion	4		
$ThCl_4$		Sublimation	5	5	
		Vaporization	5	5	
$ThBr_4$		Sublimation	5	5	
		Vaporization	5	5	
ThI_4		Fusion	5		
		Vaporization	5	5	
$Th(BH_4)_4$		Sublimation	6	6	

REFERENCES

1. Schultze-1
2. Thompson-1
3. Marden and Rentschler-1
4. Ruff, Ebert, and Woitinek-1
5. Fischer, Gewehr, and Wingchen-1
6. Hoekstra and Katz-1

Table 85

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Be		Sublimation	1,2,3,4	1,2,3,4	
		Fusion	1,2,3,4	1,2,3,4	
BeO		Sublimation	5	5	
		Fusion	6		
$BeCl_2$		Sublimation	7,8,9	7,8,9	
		Vaporization	7,8,9	7,8,9	
$BeBr_2$		Sublimation	7,8	7,8	
		Fusion	7,10		
BeI_2		Sublimation	7,8	7,8	
		Fusion	7		
$Be_4O(CH_3CO_2)_6$		Sublimation	11	11	
		Transition	11	11	
		Fusion	11	11	
$BeCl_2 \cdot 2(C_2H_5)_2O$		Fusion	12		
$BeBr_2 \cdot 2(C_2H_5)_2O$		Fusion	12		
BeB_2H_8		Sublimation	13	13	
$BeB_2H_8 \cdot N(CH_3)_3$		Vaporization	13	13	
		Fusion	13		
$3BeO \cdot 2ZrO_2$		Fusion	14		
$BeO \cdot Al_2O_3$		Fusion	15		

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Table 86

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Mg		Fusion	1,2	3	
		Vaporization	4,5,6,7,8	8	
MgO		Fusion	9	3	
MgF_2		Fusion	10,11	10	
		Vaporization	8,12	8,12	
$MgCl_2$		Fusion	13,14,15,16,17	13,18	
		Vaporization	19,20,21	19,20	
$MgCl_2 \cdot 6H_2O$		Fusion	23,24	23,25,22	
$MgBr_2$		Fusion	26,27	3	
$MgBr_2 \cdot 6H_2O$		Fusion	28		
$MgSO_4$		Fusion	3		
Mg_3N_2		Transition	29		
$Mg(NO_3)_2 \cdot 2H_2O$		Fusion	30,31,32		
$Mg(NO_3)_2 \cdot 6H_2O$		Fusion	69,30,31,32,34	69	
$Mg_2P_2O_7$		Transition	35		
		Fusion	36		
$Mg_3(PO_4)_2$		Fusion	3		
Mg_3As_2		Fusion	37		
Mg_3Sb_2		Transition	38		
$3Mg(NO_3)_2 \cdot 2Bi \cdot 24H_2O$		Fusion	39		
$Mg(CH_3COO)_2 \cdot 4H_2O$		Fusion	40		
$MgBr_2 \cdot 6HCOOH$		Fusion	41,42		
$MgBr_2 \cdot 6CH_3OH$		Fusion	41		
$MgBr_2 \cdot 6CH_3COOH$		Fusion	41,42		
$MgBr_2 \cdot 6C_2H_5OH$		Fusion	41,42		
$MgI_2 \cdot 6CH_3OH$		Fusion	41		
$MgI_2 \cdot 6CH_3COOH$		Fusion	41		
$MgI_2 \cdot 6C_2H_5OH$		Fusion	41		
$MgBr_2 \cdot 3CH_3CN$		Fusion	43		
$MgBr_2 \cdot 6CH_3CONH_2$		Fusion	43		
$MgI_2 \cdot 6CH_3CONH_2$		Fusion	43		
Mg_2Si		Fusion	44		
$MgSiO_3$		Fusion	45,46	3	
Mg_2SiO_4		Fusion	47		
Mg_2Ge		Fusion	48		
Mg_5Tl		Fusion	49		
$MgZn_2$		Fusion	3,50,51	3	
$MgCu_2$		Fusion	1,51		
Mg_2Cu		Fusion	1		
MgCuSb		Fusion	52		
MgAg		Fusion	51		

Table 86 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$MgNi_2$		Fusion	51		
$MgO \cdot Fe_2O_3$		Fusion	53,54		
$MgO \cdot 2TiO_2$		Fusion	55		
$2MgO.TiO_2$		Fusion	55		
$MgO \cdot ZrO_2$		Fusion	56		
$MgO \cdot B_2O_3$		Fusion	57		
$2MgO \cdot B_2O_3$		Fusion	57		
$3MgO \cdot B_2O_3$		Fusion	57		
$MgCl_2 \cdot 5MgO \cdot 7B_2O_3$	boracite	Transition	58		
Mg_2Al_3		Fusion	59		
Mg_4Al_3		Fusion	60		
$MgO \cdot Al_2O_3$		Fusion	61,62,63		
MgPr		Fusion	64		
Mg_3Pr		Fusion	64		
MgCe		Fusion	65		
Mg_3Ce		Fusion	64,65,66		
Mg_4Ce		Fusion	64,65		
MgLa		Fusion	67		
Mg_3La		Fusion	64,65		
$MgO \cdot La_2O_3$		Fusion	68		

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Table 87

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ca		Transition	1,2,3	12	2
		Sublimation	3,4,5	3,4,5	
		Fusion	1,6,7,8	8	
CaO		Fusion	9,10,11	9,10,11	
CaF_2		Transition	2,12	2,12	2
		Fusion	2,12,13	2,12	2
		Vaporization	12	12	
$CaCl_2$		Fusion	2,15,16,17,18,19	2,15	2
		Sublimation	20	20	
$CaCl_2 \cdot 6H_2O$		Fusion	59		
$4CaCl_2 \cdot CaO$		Fusion	17		
$CaBr_2 \cdot 6H_2O$		Fusion	60		
$CaSO_4$		Transition	21		
		Fusion	8,21	8	
Ca_3N_2		Fusion	7		
$Ca(NO_3)_2$		Fusion	8,22	8	
$Ca(NO_3)_2 \cdot NH_2O$		Fusion	23		
$CaO \cdot P_2O_5$		Fusion	24,25		
$2CaO \cdot P_2O_5$		Fusion	24		
$3CaO \cdot P_2O_5$		Transition	2	2	2
		Fusion	24		
$4CaO \cdot P_2O_5$		Fusion	25		
$Ca_3(AsO_4)_2$		Fusion	26		
Ca_3Bi_2		Fusion	27		
CaC_2		Transition	2,28	2,28	2
$CaC_2 \cdot CaO$		Fusion	29		
$CaCl_2 \cdot 3CH_3OH$		Fusion	30		
$CaCl_2 \cdot 3C_2H_5OH$		Fusion	30		
$CaSi_2$		Fusion	31		
$CaSiO_3$		Transition	32		
		Fusion	32,33,34,35,36,37		
Ca_2SiO_4		Transition	2,32,36,38,39	2	2
		Fusion	32,37		
$CaSn_3$		Fusion	40		
$CaPb_3$		Fusion	27,40,41		
Ca_2Pb		Fusion	41		
CaTl		Fusion	27,41		
$CaCl_2 \cdot TlCl$		Fusion	16		
$CaZn_{10}$		Fusion	40,42		
Ca_2Zn_3		Fusion	40,42		
$CaCd_3$		Fusion	42		

Table 87 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$CaCu_4$		Fusion			
CaAg		Fusion	41,43		
$CaAg_2$		Fusion	43		
$CaAg_3$		Fusion	41,43		
$CaAg_4$		Fusion	43		
$CaAu_2$		Fusion	44		
$CaAu_4$		Fusion	44		
$2CaO \cdot 3Fe_2O_3$		Fusion	45		
$CaO \cdot 9FeO$		Fusion	46		
$CaO \cdot FeO \cdot SiO_2$		Fusion	47		
$CaCrO_4$		Fusion	48		
$CaTiO_3$		Transition	2,49	2,49	2
$CaO \cdot TiO_2 \cdot SiO_2$		Fusion	50		
$CaO \cdot ZrO_2$		Fusion	51		
$CaO \cdot B_2O_3$		Fusion	52,53	52	52
$CaO \cdot 2B_2O_3$		Fusion	2,52,53	2,52	2
$2CaO \cdot B_2O_3$		Transition	2,52	2,52	2
		Fusion	52,53	52	2
$3CaO \cdot B_2O_3$		Fusion	52,53	52	2
$5CaO \cdot B_2O_3 \cdot SiO_2$		Fusion	54		
$CaAl_2$		Fusion	55		
$CaAl_3$		Fusion	56		
$CaO \cdot Al_2O_3$		Fusion	32,36,37		
$12CaO \cdot 7Al_2O_3$		Fusion	36,37		
$CaBr_2 \cdot AlBr_3$		Fusion	57		
$CaO \cdot Al_2O_3 \cdot 2SiO_2$		Fusion	36,37	8	8
$2CaO \cdot Al_2O_3 \cdot SiO_2$		Fusion	36,37		
$CaMg_2$		Fusion	41		
$CaMg(SiO_3)_2$		Fusion	58		

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Table 88

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Sr		Fusion	2,3,4,5	1	
		Vaporization	6	6	
SrO		Fusion	7		
SrF_2		Fusion	1	1	
$SrCl_2$		Fusion	8,9,10,11,12	1	
$4SrCl_2 \cdot SrO$		Fusion	8		
$SrCl_2 \cdot SrF_2$		Fusion	13		
$SrBr_2$		Fusion	14	1	
SrI_2		Fusion	15		
$SrSO_4$		Transition	16		
$SrSO_4$		Fusion	16,17		
$Sr(NO_2)_2$		Transition	18		
$Sr(NO_3)_2$		Fusion	15		
$Sr_3(AsO_4)_2$		Fusion	19		
$Sr_3(PO_4)_2$		Fusion	1	1	
$SrCO_3$		Transition	20		
		Fusion	21		
$SrO \cdot SiO_2$		Fusion	22,23		
$2SrO \cdot SiO_2$		Fusion	24		
$SrPb_3$		Fusion	25		
SrAg		Fusion	2		
$SrAg_4$		Fusion	2		
Sr_3Ag_2		Fusion	2		
Sr_3Ag_5		Fusion	2		
$SrO \cdot B_2O_3$		Fusion	26		
$SrO \cdot 2B_2O_3$		Fusion	26		
$2SrO \cdot B_2O_3$		Fusion	26		
$SrO \cdot Al_2O_3$		Fusion	27		
$SrMg_2$		Fusion	28		
$SrMg_9$		Fusion	28		

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Table 89

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ba		Transition	1		
		Sublimation	2,3	2	
		Fusion	1,3,4,5		
		Vaporization	6	6	
BaO		Sublimation	6,7	6,7	
		Fusion	8		
$Ba(OH)_2$		Fusion	9	9	
BaF_2		Fusion	10,11,12,12	10	
		Vaporization	14	14	
$BaCl_2$		Transition	16,17		
		Fusion	10,13,16,17,18,19	10,19	
		Vaporization	15	15	
$Ba(ClO_4)_2$		Transition	20		
$BaBr_2$		Fusion	10,13,21,22	10	
BaI_2		Fusion	13		
$BaSO_4$		Fusion	10,23	10	
		Transition	24		
$Ba(NO_3)_2$		Fusion	10,22,25	10	
$Ba_3(PO_4)_2$		Fusion	10	10	
$Ba_3(AsO_4)_2$		Fusion	26		
$BaCO_3$		Transition	27,28	27	
$BaSiO_3$		Fusion	29,30		
$BaO \cdot 2SiO_2$		Fusion	29,31		
$BaAg_4$		Fusion	4		
Ba_2Ag_3		Fusion	4		
$BaO \cdot Fe_2O_3$		Fusion	32		
$Ba(MoO_4)$		Fusion	33		
$Ba_2V_2O_7$		Fusion	22		
$BaTiO_3$		Transition	34		
$BaO \cdot ZrO_2$		Fusion	35		
$BaO \cdot B_2O_3$		Fusion	36		
$BaO \cdot 2B_2O_3$		Fusion	37		
$BaO \cdot 3B_2O_3$		Fusion	37		
$BaO \cdot 4B_2O_3$		Fusion	37		
$2BaO \cdot B_2O_3$		Fusion	36		
$3BaO \cdot B_2O_3$		Fusion	36		
$BaO \cdot Al_2O_3$		Fusion	38		
$BaMg_2$		Fusion	39		
$BaMg_9$		Fusion	39		
$BaBeF_4$		Fusion	40		
$BaBe_2F_6$		Fusion	40		

Table 89 (Continued)

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Table 90

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Ra		Fusion	1		
$RaCl_3$		Fusion	2		

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Table 91

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Li		Transition	1		
		Fusion	2,3,4,5,6	2,3	
		Vaporization	7		
LiOH		Fusion	8		
LiF		Fusion	2,8,9,10,11,12	2	
		Vaporization	13	13	
LiCl		Sublimation	14	14	
		Fusion	2,8,9,11,15,16,17,18,19	2	
		Vaporization	13	13	
$LiClO_3$		Transition	20		
		Fusion	20,21		
$LiClO_3 \cdot 3H_2O$		Fusion	20		
$LiClO_4$		Fusion	22		
LiBr		Fusion	2,9,16,23,24	2	
		Vaporization	13	13	
LiI		Fusion	8,9,16,23		
		Vaporization	13	13	
Li_2SO_4		Transition	18,25,26,27,28,29	25	
		Fusion	2,18,26,28,29,30	2	
$LiNO_3$		Fusion	11,31,32,33,34,35,36,37	31	32
$LiNO_3 \cdot 3H_2O$		Fusion	38,39	38	
Li_3PO_4		Fusion	40		
Li_3Bi		Fusion	41		
Li_2CO_3		Fusion	11,18,28,42		
$LiC_2H_3O_2$		Fusion	43,44		
$LiC_2H_3O_2 \cdot 2H_2O$		Fusion	44		
Li_2SiO_3		Fusion	2,45	2	
Li_4SiO_4		Fusion	2,45,46	2	
Li_2GeO_3		Fusion	47		
Li_4GeO_4		Fusion	47		
$LiReO_4$		Fusion	48		
$LiCl \cdot CoCl_2$		Fusion	49		
Li_2MoO_4		Fusion	2,50	2	
Li_2WO_4		Fusion	2,50,51	2	
$Li_2W_2O_7$		Transition	51		
		Fusion	50,51		
$LiVO_3$		Fusion	9		
$2LiSiO_4 \cdot 3ZrSiO_4$		Fusion	52		
$LiBO_2$		Fusion	2,11,45	2	

Table 91 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$Li_2O \cdot B_2O_3$		Fusion	53		
$Li_2O \cdot 2B_2O_3$		Fusion	53		
$Li_2O \cdot 3B_2O_3$		Fusion	53		
$Li_2O \cdot 4B_2O_3$		Fusion	53		
$Li_2O \cdot 5B_2O_3$		Fusion	53		
$3LiF \cdot AlF_3$		Fusion	54,55		
$LiCl \cdot AlCl_3$		Fusion	24		
$LiBr \cdot AlBr_3$		Fusion	24		
$LiBr \cdot 7AlBr_3$		Fusion	24		
Li_2BeF_4		Fusion	56,57		

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Table 92

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Na		Fusion	1,2,3,4,5,6,7	1	1
		Vaporization	8,9		
Na_2O_2		Fusion	10		
NaOH		Transition	11,12,13	11	
		Fusion	11,12,14	11,12,14	
$NaOH \cdot H_2O$		Fusion	15		
$NaOH \cdot 3\ 1/2H_2O$		Fusion	15		
NaF		Sublimation	16,17,18,19,20, 21,22,23,24,25	16	
		Fusion	1,14,16,17,18,19, 20,21,22,23,24,25	1,14	
		Vaporization	19	19	
NaCl		Sublimation	27,28	27,28	
		Fusion	1,21,23,29,30,31, 32,33,34,35,36	1	1
		Vaporization	26	26	
$NaClO_3$		Fusion	1,37	1,37	1
$NaClO_4$		Transition	38,39		
NaBr		Sublimation	16,28	16,28	
		Fusion	14,21,22,23,33, 34,40,41,42	14	1
		Vaporization	26	26	
NaI		Fusion	14,22,23,34,40, 41,43,44	14	
		Vaporization	26	26	
Na_2S		Fusion	45,46,47	46,47	
Na_2S_2		Fusion	47,48		
Na_2S_3		Fusion	47		
Na_2S_4		Fusion	45,47,49		
Na_2S_5		Fusion	47,48		
Na_4S_3		Fusion	47		
Na_4S_5		Fusion	47		
Na_4S_7		Fusion	47		
Na_4S_9		Fusion	47		
Na_2SO_4		Transition	49,50,51,52,53,54		
		Fusion	23,34,49,52,53,54, 55		
$Na_2S_2O_3 \cdot 5H_2O$		Fusion	56,57,58	56,57	
NaSH		Transition	50	50	
$NaHSO_4$		Fusion	59		
NaSeH		Transition	50		
Na_2Te		Transition	60		
$NaNO_2$		Transition	61		

Table 92 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$NaNO_3$		Transition	62		
		Fusion	1,42,37,63,64,65,66	1	1
$NaNH_2$		Fusion	67,68,69		
$NaPO_3$		Fusion	23,70		
$Na_4P_2O_7$		Fusion	14,17	14	
NaH_2PO_3		Fusion	71		
NaBi		Fusion	72		
Na_3Bi		Fusion	72,73		
Na_2CO_3		Transition	74		
		Fusion	14,74,75,76	14	
NaO_2CH	sodium formate	Fusion	77,78		
$NaC_2H_3O_2$	sodium acetate	Transition	79		
NaCN		Transition	80		
		Fusion	14	14	
		Vaporization	26	26	
NaCNS		Fusion	14	14	
Na_2SiO_3		Fusion	1,81,82	1	1
Na_2SiO_5		Fusion	14,81,82	14	
Na_2GeO_3		Fusion	83,84		
$Na_2Ge_2O_5$		Fusion	84		
$Na_2Ge_4O_9$		Fusion	84		
NaSn		Transition	72		
		Fusion	72		
Na_2Sn		Fusion	72		
NaPb		Fusion	72,85,86		
Na_2Pb		Fusion	72,86		
Na_2Pb_5		Fusion	72,86		
Na_4Pb		Fusion	72,86,87		
Na_5Pb_2		Fusion	85		
$NaCd_2$		Fusion	86		
$NaCd_5$		Fusion	86		
$NaReO_4$		Fusion	87		
$Na_2O{\cdot}Fe_2O_3$		Fusion	88		
Na_2CrO_4		Transition	89		
		Fusion	89		
$Na_2CrO_4 \cdot 10H_2O$		Fusion	90		
$Na_2Cr_2O_7$		Fusion	91		
Na_2MoO_4		Transition	30	30	
		Fusion	14,23	14	
Na_2WO_4		Transition	92	92	
		Fusion	14,23,92	14,92	

Table 92 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Na_2TiO_3		Transition	1		
		Fusion	1,93	1	1
$Na_2Ti_2O_5$		Fusion	93		
$Na_2Ti_3O_7$		Fusion	93		
$NaBO_2$		Fusion	23		
$Na_2O \cdot B_2O_3$		Fusion	94		
$Na_2O \cdot B_2O_3 \cdot 8H_2O$		Fusion	94		
$Na_2O \cdot 2B_2O_3$		Fusion	95,96		
$Na_2O \cdot 4B_2O_3$		Fusion	95,96		
$2NaO \cdot B_2O_3$		Fusion	95		
Na_3AlF_6		Transition	1	1	1
		Fusion	1	1	1
$NaAlSiO_4$		Transition	97		
		Fusion	97		
$Na_2SO_4 \cdot MgSO_4$		Transition	98		
		Fusion	99		

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96. Ponomareff-1
97. Bowen-10
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99. Druzhinin-1

Table 93

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
K		Fusion	1,2,3,4,5,6,7	1,2	
		Vaporization	8		
KO_2		Transition	9		
K_2O_2		Fusion	10		
K_2O_3		Fusion	10		
KOH		Transition	11,12,13	11	
		Fusion	11,13,14	11,13,14	
		Vaporization	19	19	
$KOH \cdot H_2O$		Fusion	16		
KF		Fusion	2,17,18,19,20,21	2	2
		Vaporization	15	15	
$KF \cdot 4H_2O$		Fusion	22		
KHF_2		Transition	23	23	
		Fusion	23,24	23	
$KF \cdot 2HF$		Fusion	24		
$KF \cdot 3HF$		Fusion	24		
$KF \cdot 4HF$		Fusion	24		
$2KF \cdot 5HF$		Fusion	24		
KCl		Sublimation	25,26	25,26	
		Fusion	2,20,21,27,28,29,30,31,32,33,34,35,36,37	2,27	2
		Vaporization	15,38,39	15,38	
$KClO_4$		Transition	40,41,42	40	
KBr		Sublimation	25,26,43,44	25,26,43,44	
		Fusion	15,20,25,26,30,32,33,35,36,37,43,44,45,46,47	15,25,26,43,44	
		Vaporization	15	15	
KI		Sublimation	26,43,44	26,43,44	
		Fusion	21,30,32,33,35,36,37,48,49,50		
		Vaporization	15	15	
KI_3		Fusion	51		
KIO_3		Fusion	37		
$KIBr_2$		Fusion	52		
K_2S		Transition	53	53	
K_2S_5		Fusion	54		
K_2SO_4		Transition	27,28,35,55,56,57,58,59,60,61	27,56,57	55
		Fusion	21,28,56,57,62,63	56,57	55
$K_2SO_4 \cdot 3K_2S$		Fusion	62		
KSH		Transition	64	64	

Table 93 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$KHSO_4$		Transition	65	65	
		Fusion	66		
$K_2SO_4 \cdot 3H_2SO_4$		Fusion	66		
KSeH		Transition	64	64	
KN_3		Fusion	67		
KNO_2		Fusion	68,69		
KNO_3		Transition	2,70,71,72,73	2,70,71	2
		Fusion	14,21,72,73,74, 75,76	14,74	2
KNH_2		Fusion	77,78		
$KNO_3 \cdot 2HNO_3$		Fusion	79		
KPO_3		Transition	28		
		Fusion	14,21,80	14	
K_3PO_4		Fusion	81	81	
$K_4P_2O_7$		Transition	81		
		Fusion	14,28,81	14	
KH_2PO_4		Transition	82	82	
$K_2HPO_4 \cdot 6H_2O$		Fusion	83		
$KPO_3 \cdot KF$		Transition	81		
		Fusion	81		
KH_2AsO_4		Transition	84	84	
KSb		Fusion	85		
K_3Sb		Fusion	85		
KBi_2		Fusion	86		
K_2Bi		Fusion	87		
K_3Bi		Fusion	87,88		
K_3Bi_2		Fusion	87		
K_2CO_3		Transition	35,89		
		Fusion	2,35,37,89,90,91	2	
$KCHO_2$	potassium formate	Fusion	92		
$KC_2H_3O_2$	potassium acetate	Fusion	93,94		
$KCHO_2 \cdot HCO_2H$		Fusion	92		
$HC_2H_3O_2 \cdot HC_2H_3O_2$		Fusion	93		
KCN		Transition	95	95	
		Fusion	14,49	14	
KCNS		Transition	96,97	96	
		Fusion	14,96,97,98,99, 100	14,96,98	
K_2SiO_3		Fusion	101		
$K_2O \cdot 2SiO_2$		Fusion	101		
$K_2O \cdot 4SiO_2$		Transition	102	102	
		Fusion	101,102,103	102	

Table 93 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$K_2O \cdot GeO_2$		Fusion	104		
$K_2O \cdot 4GeO_2$		Fusion	104		
$2KF \cdot GeF_4$		Fusion	105		
$KPbI_3$		Fusion	48		
$K_2SO_4 \cdot 2PbSO_4$		Transition	106		
		Fusion	106		
KTl		Fusion	107		
KCd		Fusion	7		
$KReO_4$		Sublimation	108,109,110	109	
		Fusion	108,109,110	109	
$K_2SO_4 \cdot 2CoSO_4$		Fusion	111		
$KFe(SO_4)_2 \cdot 12H_2O$		Fusion	112		
$KCl \cdot MnCl_2$		Fusion	113		
$K_2SO_4 \cdot 2MnSO_4$		Fusion	114		
K_2CrO_4		Transition	27,61,115,116,117	27	
		Fusion	14,61,115,116,117	14	
$K_2Cr_2O_7$		Transition	118		
		Fusion	2,21,57,61,115, 116,117,118,119, 120	2,119	2
K_2MoO_4		Transition	59,121,61,117,122		
		Fusion	14,21,35,59,61, 117,121,122	14	
$K_2Mo_2O_7$		Fusion	61,117		
$K_2O \cdot 3MoO_3$		Fusion	121		
K_2WO_4		Transition	59,117,121,122, 123		
		Fusion	14,21,35,59,121, 123	14	
$K_2W_2O_7$		Fusion	61,117		
KVO_3		Fusion	20,124		
KBO_2		Fusion	21,80	15	
$K_2O \cdot B_2O_3$		Fusion	125,126		
$K_2O \cdot 2B_2O_3$		Fusion	125		
$K_2O \cdot 4B_2O_3$		Fusion	125		
KBF_4		Transition	127		
		Fusion	128		
$KBO_2 \cdot KPO_3$		Fusion	80		
$3KF \cdot AlF_3$		Fusion	17		
$KBr \cdot AlBr_3$		Fusion	129		
$KBr \cdot 2AlBr_3$		Fusion	129		
$KAl(SO_4)_2 \cdot 12H_2O$		Transition	130	130	
		Fusion	112,131,132	132	

Table 93 (Continued)

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
$KAlSi_2O_6$	lincite	Transition	133		
		Fusion	134		
$K_2SO_4 \cdot BeSO_4$		Fusion	106		
$KF \cdot MgF_2$		Fusion	135		
$KCl \cdot MgCl_2$		Fusion	2,136,137	2	
$2KCl \cdot MgCl_2$		Fusion	137		
$K_2SO_4 \cdot 2MgSO_4$		Fusion	106,138		
$KCl \cdot CaCl_2$		Fusion	136		
$K_2SO_4 \cdot 2CaSO_4$		Transition	136		
		Fusion	136		
$KCaPO_4$		Transition	139		
$K_2O \cdot CaO \cdot SiO_2$		Fusion	140		
$K_2O \cdot 3CaO \cdot 6SiO_2$		Fusion	140		
$2K_2O \cdot CaO \cdot 3SiO_2$		Fusion	140		
$2K_2O \cdot CaO \cdot 6SiO_2$		Fusion	140		
$4K_2O \cdot CaO \cdot 10SiO_2$		Fusion	140		
$KBr \cdot 2SrBr_2$		Fusion	141		
$2KBr \cdot SrBr_2$		Fusion	141		
$K_2SO_4 \cdot 2SrSO_4$		Transition	106		
$2KBr \cdot BaBr_2$		Fusion	141		
$K_2SO_4 \cdot Li_2SO_4$		Fusion	138		
$K_2MoO_4 \cdot Li_2MoO_4$		Transition	121		
		Fusion	121		
$K_2WO_4 \cdot Li_2WO_4$		Fusion	123		

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Table 94

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Rb		Transition	1		
		Sublimation	2	2	
		Fusion	1,3,4,5,6	3	
		Vaporization	2	2	
RbOH		Transition	7	7	
		Fusion	7,8	7,8	
RbF		Fusion	3,9	3,9	
		Vaporization	2	2	
RbF·HF		Fusion	10		
RbF·2HF		Fusion	10		
RbCl		Fusion	3,11,12,13		
		Vaporization	2,14	2,14	
RbBr		Fusion	3,14,15	3,14	
		Vaporization	2	2	
RbI		Fusion	3,15	3	
		Vaporization	2	2	
Rb_2S_2		Fusion	16		
Rb_2S_3		Fusion	16		
Rb_2S_5		Fusion	16		
Rb_2S_6		Fusion	16		
Rb_2SO_4		Transition	17,18		
		Fusion	15		
RbSH		Transition	19	19	
RbSeH		Transition	19		
RbN_3		Fusion	20		
$RbNO_3$		Transition	21,22		
		Fusion	3,15,21,22	3	
$RbNO_3 \cdot HNO_3$		Fusion	23		
Rb_2CO_3		Fusion	24		
$RbCHO_2$	rubidium formate	Fusion	25		
$RbC_2H_3O_2$	rubidium acetate	Fusion	25		
RbCNS		Fusion	26		
$RbBF_4$		Fusion	27		
$3Rb \cdot AlF_3$		Fusion	28		
$RbNO_3 \cdot LiNO_3$		Fusion	22		
RbOH·2NaOH		Fusion	7		
2RbOH·KOH		Fusion	7		

Table 94 (Continued)

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12. Biltz and Klemm-2
13. Richards and Meldrum-1
14. Mayer and Wintner-1
15. Jaeger-3
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18. Hüttner and Tammann-1
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20. Suhrmann and Clusius-1
21. Rostkovskii-1
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25. Sidgwick and Gentle-1
26. Vrzhesnevskii-1
27. de Boer and von Liempt-1
28. Puschin and Baskow-1

Table 95

SPECIFIC REFERENCES

Substance		Type of Process	Temperature	ΔH	ΔC_p
Formula	Description				
Cs		Sublimation	1	1	
		Fusion	2,3,4,5,6	2,3	
		Vaporization	1	1	
Cs_2O		Fusion	7		
Cs_7O		Fusion	7		
CsOH		Transition	8		
		Fusion	8	8	
CsF		Fusion	2,9,10	2,9	
CsF·HF		Fusion	11		
CsF·2HF		Fusion	11		
CsF·3HF		Fusion	11		
CsF·6HF		Fusion	11		
CsCl		Transition	12	12	
		Fusion	2,10,13,14	2	
		Vaporization	1	1	
CsBr		Fusion	1,10,15	1,15	
		Vaporization	1	1	
$CsBrO_3$		Fusion	16		
CsI		Fusion	10		
		Vaporization	1	1	
Cs_2S_2		Fusion	17		
Cs_2S_3		Fusion	17		
Cs_2S_5		Fusion	17		
Cs_2S_6		Fusion	17		
Cs_2SO_4		Transition	18		
		Fusion	10		
CsN_3		Fusion	19		
$CsNH_2$		Fusion	20,21		
$CsNO_3$		Transition	22,23		
		Fusion	1,10,22	1	
$CsNO_3·4H_2O$		Fusion	24		
$CsNO_3·HNO_3$		Fusion	25		
$CsHCO_2$	cesium formate	Fusion	26		
$CsHCO_2·H_2O$		Transition	26		
		Fusion	26		
$CsC_2H_3O_2$	cesium acetate	Fusion	26		
CsCl·2CuCl		Fusion	27		
Cs_2TiF_6		Fusion	28		
$CsBF_4$		Fusion	29		
$3CsF·AlF_3$		Fusion	30		

Table 95 (Continued)

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3. See van Arkel–2.

VII. INDEX

As indicated in the Introduction, the formula of the given substance, written according to the standard arrangement, determines, first, the element under which the compound will be listed and, second, the position the given compound will occupy in that section.

The tables of values and of specific references for compounds occurring under given elements may be located from the following numbers referring to pages in this book.

Element	Tables of values		Specific references	
	Series I page	Series II page	Series I page	Series II page
Actinium				
Aluminum	318	731	941	1, 127
Americium				
Antimony	90	582	852	1, 051
Argon	15	544	827	1, 028
Arsenic	85	579	850	1, 049
Astatine				
Barium	413	787	984	1, 152
Beryllium	368	770	968	1, 143
Bismuth	95	584	854	1, 053
Boron	313	721	939	1, 123
Bromine	27	550	832	1, 032
Cadmium	190	670	885	1, 091
Calcium	386	778	974	1, 147
Carbon	98	585	855	1, 054
Cerium	348	756	959	1, 137
Cesium	528	819	1, 021	1, 169
Chlorine	21	549	830	1, 031
Chromium	284	705	925	1, 112
Cobalt	252	692	913	1, 106
Columbium (Niobium)	302	714	932	1, 117
Copper	207	674	891	1, 094
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Erbium	335	745	949	1, 133
Europium	340	750	954	1, 134
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Germanium	151	645	871	1, 078
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Helium	13	542	827	1, 028
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Promethium	343		956	
Protactinium		768		1, 141
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Radon	18	547	828	1, 029
Rhenium	239	685	906	1, 101
Rhodium	242	688	908	1, 102
Rubidium	520	815	1, 018	1, 167
Ruthenium	243	689	909	1, 103
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Scandium	328	740	944	1, 131
Selenium	46	557	839	1, 038
Silicon	147	629	869	1, 072
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Yttrium	330	741	945	1, 131
Zinc	177	667	881	1, 089
Zirconium	308	718	936	1, 121

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