NSRDS—NBS 3, Section 10

U.S. DEPARTMENT OF COMMERCE/National Bureau of Standards

Selected Tables of Atomic Spectra

Atomic Energy Levels and Multiplet Table

O IV

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[2]Some divisions within the center are located at Boulder, CO 80303.

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Selected Tables of Atomic Spectra

A Atomic Energy Levels - Second Edition

B Multiplet Table

O IV

Data Derived from the Analyses of Optical Spectra

Charlotte E. Moore

Office of Standard Reference Data
National Bureau of Standards
Washington, DC 20234

U.S. Naval Research Laboratory
E. O. Hulburt Center for Space Research
Washington, DC 20375

U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, Secretary
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director

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Abstract

The present publication is the tenth section of a series being prepared in response to the need for a current revision of two sets of the author's tables containing data on atomic spectra as derived from analyses of optical spectra. As in the previous Sections, Part A contains the atomic energy levels and Part B the multiplet tables. Section 10 includes these data for O IV. The form of the presentation is described in detail in the text to Section I.

Key words: Atomic energy levels, O IV; atomic spectra, O IV; multiplet table, O IV; oxygen spectra, O IV; spectrum O IV; wavelengths, O IV.

Foreword

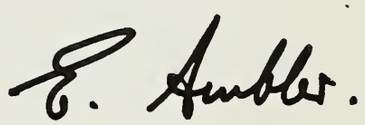
The National Standard Reference Data System provides access to the quantitative data of physical science, critically evaluated and compiled for convenience and readily accessible through a variety of distribution channels. The System was established in 1963 by action of the President's Office of Science and Technology and the Federal Council for Science and Technology, and responsibility to administer it was assigned to the National Bureau of Standards.

NSRDS receives advice and planning assistance from a Review Committee of the National Research Council of the National Academy of Sciences-National Academy of Engineering. A number of Advisory Panels, each concerned with a single technical area, meet regularly to examine major portions of the program, assign relative priorities, and identify specific key problems in need of further attention. For selected specific topics, the Advisory Panels sponsor subpanels which make detailed studies of users' needs, the present state of knowledge, and existing data resources as a basis for recommending one or more data compilation activities. This assembly of advisory services contributes greatly to the guidance of NSRDS activities.

The System now includes a complex of data centers and other activities in academic institutions and other laboratories. Components of the NSRDS produce compilations of critically evaluated data, reviews of the state of quantitative knowledge in specialized areas, and computations of useful functions derived from standard reference data. The centers and projects also establish criteria for evaluation and compilation of data and recommend improvements in experimental techniques. They are normally associated with research in the relevant field.

The technical scope of NSRDS is indicated by the categories of projects active or being planned: nuclear properties, atomic and molecular properties, solid state properties, thermodynamic and transport properties, chemical kinetics, and colloid and surface properties.

Reliable data on the properties of matter and materials are a major foundation of scientific and technical progress. Such important activities as basic scientific research, industrial quality control, development of new materials for building and other technologies, measuring and correcting environmental pollution depend on quality reference data. In NSRDS, the Bureau's responsibility to support American science, industry, and commerce is vitally fulfilled.



Ernest Ambler, *Director*

Preface

The present publication is the tenth section of a series that is being prepared in response to the increasing demand for a current revision of two sets of tables containing data on atomic spectra as derived from analyses of optical spectra.

The first set, Atomic Energy Levels, NBS Circular 467, consists of three volumes published, respectively, in 1949, 1952 and 1958. This Circular has been reprinted as NSRDS–NBS 35, Volumes I, II, and III.

The second set consists of two Multiplet Tables; one published in 1945 by the Princeton University Observatory, containing multiplets having wavelengths longer than 3000 Å; the other, An Ultraviolet Multiplet Table, NBS Circular 488, appearing in five Sections, the first in 1950, the second in 1952, and the others in 1962. The Princeton Multiplet Table was reprinted in 1972 as NSRDS–NBS 40.

The present series includes both sets of data, the energy levels and multiplet tables, as Parts A and B, respectively, for selected spectra contained in Volume I of "Atomic Energy Levels." The sections are being published at irregular intervals as revised analyses become available. A flexible paging permits the arrangement of the various sections by atomic number, regardless of the order in which the separate spectra are published. Section 1 includes three spectra of silicon, $Z=14$: Si II, Si III, Si IV. Section 2 contains similar data for Si I. Section 3 covers all spectra of carbon, $Z=6$: C I, C II, C III, C IV, C V, C VI. Section 4 includes the last four spectra of nitrogen, $Z=7$; N IV, N V, N VI, N VII. Section 5 completes the spectra of nitrogen, N I, N II, N III. Section 6 contains the spectra of hydrogen, $Z=1$: H I, D, T. Section 7 contains the first spectrum of oxygen, $Z=8$: O I, Section 8 the last three spectra of oxygen, $Z=8$: O VI, O VII, O VIII, Section 9, contains O V. The present Section, 10, contains O IV. The form of presentation of the data is described in detail in the text of Section 1. All sections are arranged identically, and the same conversion factor, cm^{-1} to eV, 0.000123981 is used throughout.

The manuscript has been prepared by Charlotte E. Moore, who published the earlier tables. She appreciates the cordial cooperation of numerous atomic spectroscopists. She is particularly indebted to B. Edlén in Lund, Sweden, W. C. Martin and R. Zalubas in the Spectroscopy Section of this Bureau, and to D. R. Lide and his staff for their cordial collaboration in publishing this material.

Washington, D.C., February, 1982

Contents

Part A-Atomic Energy Levels

Part B-Multiplet Table

Errata

NSRDS-NBS 3, Section 4

Selected Tables of Atomic Spectra
Atomic Energy Levels and Multiplet Tables

N IV, N V, N VI, N VII

N IV

Part A, p. A7 IV-1
Part B, p. B7 IV-1
In the second reference the authors should be listed as: D. J. Michels, S. G. Tilford, and J. W. Qwinn

Part A, p. A7 IV-2
Interchange the designations of the terms 487607.4 and 498045.5, i.e. $4s\ ^3S$ and $3p'\ ^3S$, respectively.
Corresponding corrections should be made in the designations of the following Multiplets in Part B:

UV 5.04	UV 11.02	UV 18.57	UV 18.76	7.01
UV 5.07	UV 11.05	UV 18.60	UV 18.78	12.02

(letter from D. G. Hummer to D. J. Michels).

Part B, p. B7 IV-1
Limit should read 624866. (W. C. Martin).

June 14, 1982

NSRDS-NBS 3, SECTION 10

OXYGEN $Z=8$

Part A OXYGEN

O IV ($Z=8$)

B I sequence: 5 electrons

Ground state $1s^2\ 2s^2\ 2p\ ^2P^{\circ}_{0\,1/2}$

$2p\ ^2P^{\circ}_{0\,1/2}$ ***624382.0*** cm^{-1}, 160.158 Å (Vac) 77.416 eV

The analysis is quoted from the 1969 paper by Bromander, who has revised and extended the earlier work. His observations made "with a theta-pinch discharge as a light source" cover the range 500 Å – 8000 Å. He includes 26 lines observed earlier by Palenius, who used a sliding vacuum spark as a source, where they appeared sharper but weaker. A separate table contains 39 classified lines between 202 Å and 379 Å used for the calculation of energy levels. These wavelengths are taken from Edlén's 1934 paper. The present revision includes a connection between doublet and quartet levels which determines a value of $x = 262.5\ cm^{-1}$, to be added to the quartet terms as listed in "Atomic Energy Levels."

The ionization limit quoted above has been determined "by applying the polarization formula to the hydrogen-like levels," according to Bromander.

In 1975 B. Edlén published a paper on "The Oxygen Spectrum below 200 Å and the High Limit Terms of O IV." This line list includes 71 lines of O IV and adds classifications for 26 lines between 200 Å and 327 Å. Twenty-five high-limit terms from the limits $2s\ 2p\ ^1P$ and $2p^2$ (^3P, ^1D, ^1S) have been added from this work.

In addition to investigations on the analysis of O IV, a few selected references on related topics are listed below. Hansen's paper deals with the relative transition probabilities of forbidden transitions in the B I isoelectronic sequence. Lewis et al. and Martinson et al. report on radiative lifetimes of excited levels in oxygen spectra. Church and Liu give two "Quantum-Beat g-Value Measurements on Transitions from Levels of Aligned Fast Ions" as follows:

$3d\ ^4F^{\circ}_{3\,1/2}$ 1.26 ± 0.035
$3p\ ^4D_{3\,1/2}$ 1.40 ± 0.035

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O IV

Config.	Desig.	J	Level	Interval
$2s^2(^1S)2p$	$2p\ ^2P^\circ$	$0^1/_2$	*0.0*	
		$1^1/_2$	*385.9*	385.9
$2s\ 2p^2$	$2p^2\ ^4P$	$0^1/_2$	71439.8	
		$1^1/_2$	71570.1	130.3
		$2^1/_2$	71755.5	185.4
$2s\ 2p^2$	$2p^2\ ^2D$	$2^1/_2$	126936.3	
		$1^1/_2$	126950.2	−13.9
$2s\ 2p^2$	$2p^2\ ^2S$	$0^1/_2$	164366.4	
$2s\ 2p^2$	$2p^2\ ^2P$	$0^1/_2$	180480.8	
		$1^1/_2$	180724.2	243.4
$2p^3$	$2p^3\ ^4S^\circ$	$1^1/_2$	*231537.5*	
$2p^3$	$2p^3\ ^2D^\circ$	$2^1/_2$	*255155.9*	
		$1^1/_2$	*255184.9*	−29.0
$2p^3$	$2p^3\ ^2P^\circ$	$0^1/_2$	*289015.4*	
		$1^1/_2$	*289023.5*	8.1
$2s^2(^1S)3s$	$3s\ ^2S$	$0^1/_2$	357614.3	
$2s^2(^1S)3p$	$3p\ ^2P^\circ$	$0^1/_2$	*390161.2*	
		$1^1/_2$	*390248.0*	86.8
$2s^2(^1S)3d$	$3d\ ^2D$	$1^1/_2$	419533.9	
		$2^1/_2$	419550.6	16.7
$2s\ 2p(^3P^\circ)3s$	$3s'\ ^4P^\circ$	$0^1/_2$	*438849.0*	
		$1^1/_2$	*438983.9*	134.9
		$2^1/_2$	*439230.9*	247.0
$2s\ 2p(^3P^\circ)3s$	$3s'\ ^2P^\circ$	$0^1/_2$	*452806.6*	
		$1^1/_2$	*453071.5*	264.9
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^2P$	$0^1/_2$	467229.3	
		$1^1/_2$	467344.9	115.6
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^4D$	$0^1/_2$	468337.4	
		$1^1/_2$	468414.9	77.5
		$2^1/_2$	468550.6	135.7
		$3^1/_2$	468760.0	209.4
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^4S$	$1^1/_2$	474478.1	
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^4P$	$0^1/_2$	478848.6	
		$1^1/_2$	478942.9	94.3
		$2^1/_2$	479072.0	129.1
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^2D$	$1^1/_2$	482666.1	
		$2^1/_2$	482921.6	255.5
$2s^2(^1S)4s$	$4s\ ^2S$	$0^1/_2$	485821.7	
$2s\ 2p(^3P^\circ)3p$	$3p'\ ^2S$	$0^1/_2$	492890.9	
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^4F^\circ$	$1^1/_2$	*495169*	
		$2^1/_2$	*495246.1*	77
		$3^1/_2$	*495359.6*	113.5
		$4^1/_2$	*495512.9*	153.3
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^4D^\circ$	$0^1/_2$	*499767.2*	
		$1^1/_2$	*499795.7*	28.5
		$2^1/_2$	*499842.6*	46.9
		$3^1/_2$	*499907.0*	64.4

O IV

Config.	Desig.	J	Level	Interval
$2s^2\ (^1S)4p$	$4p\ ^2P^\circ$	$0^1/_2$	*499994.9*	
		$1^1/_2$	*500037.8*	42.9
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^2D^\circ$	$1^1/_2$	*501509.2*	
		$2^1/_2$	*501564.4*	55.2
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^4P^\circ$	$2^1/_2$	*504095.7*	
		$1^1/_2$	*504208.9*	−113.2
		$0^1/_2$	*504282.3*	−73.4
$2s^2(^1S)4d$	$4d\ ^2D$	$1^1/_2$	510569.7	
		$2^1/_2$	510574.1	4.4
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^2F^\circ$	$2^1/_2$	*510744.9*	
		$3^1/_2$	*510977.2*	232.3
$2s^2(^1S)4f$	$4f\ ^2F^\circ$	$2^1/_2$	*513187.2*	
		$3^1/_2$	*513198.3*	11.1
$2s\ 2p(^3P^\circ)3d$	$3d'\ ^2P^\circ$	$1^1/_2$	*514220.4*	
		$0^1/_2$	*514371.3*	−150.9
$2s\ 2p(^1P^\circ)3s$	$3s''\ ^2P^\circ$	$0^1/_2$	*518699*	
		$1^1/_2$	*518709*	10
$2s^2(^1S)5s$	$5s\ ^2S$	$0^1/_2$	539368	
$2s^2(^1S)5p$	$5p\ ^2P^\circ$	$0^1/_2$	*546803.4*	
		$1^1/_2$	*546818.7*	15.3
$2s\ 2p(^1P^\circ)3p$	$3p''\ ^2D$	$1^1/_2$	547326	
		$2^1/_2$	547355	29
$2s\ 2p(^1P^\circ)3p$	$3p''\ ^2P$	$0^1/_2$	549792	
		$1^1/_2$	549855	63
$2s^2(^1S)5d$	$5d\ ^2D$	$1^1/_2$	552029.6	
		$2^1/_2$	552032.3	2.7
$2s^2(^1S)5f$	$5f\ ^2F^\circ$	$2^1/_2$	} *552495.1*	
		$3^1/_2$		
$2s^2(^1S)5g$	$5g\ ^2G$	$3^1/_2$	} 554001.6	
		$4^1/_2$		
$2s\ 2p(^1P^\circ)3p$	$3p''\ ^2S$	$0^1/_2$	554464	
$2s\ 2p(^3P^\circ)4s$	$4s'\ ^4P^\circ$	$0^1/_2$	*568901*	
		$1^1/_2$	*569036*	135
		$2^1/_2$	*569283*	247
$2s\ 2p(^1P^\circ)3d$	$3d''\ ^2F^\circ$	$2^1/_2$		
		$3^1/_2$	*570797*	
$2s\ 2p(^3P^\circ)4s$	$4s'\ ^2P^\circ$	$0^1/_2$	*573696*	
		$1^1/_2$	*573901*	211
$2s^2(^1S)6d$	$6d\ ^2D$	$1^1/_2$	} 574368.7	
		$2^1/_2$		
$2s^2(^1S)6f$	$6f\ ^2F^\circ$	$2^1/_2$	} *574807.7*	
		$3^1/_2$		
$2s\ 2p(^3P^\circ)4p$	$4p'\ ^2P$	$0^1/_2$	575202	
		$1^1/_2$	575375	173
$2s^2(^1S)6g$	$6g\ ^2G$	$3^1/_2$	} 575507.4	
		$4^1/_2$		

O IV—Continued

Config.	Desig.	J	Level	Interval
$2s^2(^1S)6h$	$6h\ ^2H^\circ$	$4^1/_2$	*575585.0*	
		$5^1/_2$		
$2s\ 2p(^1P^\circ)3d$	$3d''\ ^2D^\circ$	$1^1/_2$	*575819*	34
		$2^1/_2$	*575853*	
$2p^2(^3P)3s$	$3s'''\ ^4P$	$0^1/_2$	576853	144
		$1^1/_2$	576997	212
		$2^1/_2$	577209	
$2s\ 2p(^1P^\circ)3d$	$3d''\ ^2P^\circ$	$0^1/_2$	*581721*	22
		$1^1/_2$	*581743*	
$2s\ 2p(^3P^\circ)4p$	$4p'\ ^2D$	$1^1/_2$	584541	220
		$2^1/_2$	584761	
$2s^2(^1S)7h$	$7h\ ^2H^\circ$	$4^1/_2$	*588529.1*	
		$5^1/_2$		
$2s^2(^1S)7i$	$7i\ ^2I$	$5^1/_2$	588546.1	
		$6^1/_2$		
$2s\ 2p(^3P^\circ)4p$	$4p'\ ^2S$	$0^1/_2$	590069	
$2s\ 2p(^3P^\circ)4d$	$4d'\ ^4D^\circ$	$0^1/_2$	*591899*	
		$1^1/_2$		
		$2^1/_2$	*591962*	63
		$3^1/_2$	*592046*	84
$2s\ 2p(^3P^\circ)4d$	$4d'\ ^4P^\circ$	$2^1/_2$	*593273*	
		$1^1/_2$	*593406*	−133
		$0^1/_2$	*593473*	−67
$2s\ 2p(^3P^\circ)4d$	$4d'\ ^2D^\circ$	$1^1/_2$	*593627*	81
		$2^1/_2$	*593708*	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^4F$	$1^1/_2$	593948.7	13.2
		$2^1/_2$	593961.9	30.9
		$3^1/_2$	593992.8	52.1
		$4^1/_2$	594044.9	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^2F$	$2^1/_2$	594019	55
		$3^1/_2$	594074	
$2p^2(^3P)3s$	$3s'''\ ^2P$	$0^1/_2$	594340	198
		$1^1/_2$	594538	
$2s\ 2p(^3P^\circ)4d$	$4d'\ ^2F^\circ$	$2^1/_2$	*596295*	180
		$3^1/_2$	*596475*	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^4G$	$2^1/_2$	596330	72
		$3^1/_2$	596402	108
		$4^1/_2$	596510	145
		$5^1/_2$	596655	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^4D$	$3^1/_2$	596331	−113
		$2^1/_2$	596444	−68
		$1^1/_2$	596512.4	−53.8
		$0^1/_2$	596566.2	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^2G$	$3^1/_2$	596631.9	215.7
		$4^1/_2$	596847.6	
$2s\ 2p(^3P^\circ)4f$	$4f'\ ^2D$	$2^1/_2$	596658.3	−139.9
		$1^1/_2$	596798.2	

O IV—Continued

Config.	Desig.	J	Level	Interval
$2p^2(^3P)3p$	$3p'''\ ^2S^\circ$	$0^1/_2$	*597256*	
$2s\ 2p(^3P^\circ)4d$	$4d'\ ^2P^\circ$	$1^1/_2$	*597720*	−149
		$0^1/_2$	*597869*	
$2p^2(^1D)3s$	$3s^{IV}\ ^2D$	$1^1/_2$	600092	14
		$2^1/_2$	600106	
$2p^2(^3P)3p$	$3p'''\ ^4D^\circ$	$0^1/_2$		
		$1^1/_2$	*602962*	115
		$2^1/_2$	*603077*	150
		$3^1/_2$	*603227*	
$2p^2(^3P)3p$	$3p'''\ ^4P^\circ$	$0^1/_2$	*606530*	48
		$1^1/_2$	*606578*	116
		$2^1/_2$	*606694*	
$2p^2(^3P)3p$	$3p'''\ ^2D^\circ$	$2^1/_2$	*615431*	−29
		$1^1/_2$	*615460*	
$2p^2(^3P)3p$	$3p'''\ ^4S^\circ$	$1^1/_2$	*616881*	
O V $2s^2\ ^1S_0$	***Limit***	...	**624382.0**	
$2p^2(^1D)3p$	$3p^{IV}\ ^2F^\circ$	$2^1/_2$	*624876*	
		$3^1/_2$		
$2s\ 2p(^3P^\circ)5p$	$5p'\ ^2P$	$0^1/_2$		
		$1^1/_2$	628539	
$2s\ 2p(^3P^\circ)5p$	$5p'\ ^2D$	$1^1/_2$	630648	231
		$2^1/_2$	630879	
$2p^2(^1D)3p$	$3p^{IV}\ ^2D^\circ$	$1^1/_2$	*631913*	
		$2^1/_2$		
$2p^2(^3P)3d$	$3d'''\ ^2P$	$1^1/_2$	632426	−171
		$0^1/_2$	632597	
$2s\ 2p(^3P^\circ)5d$	$5d'\ ^4D^\circ$	$0^1/_2$		
		$1^1/_2$		
		$2^1/_2$		
		$3^1/_2$	*634182*	
$2s\ 2p(^3P^\circ)5d$	$5d'\ ^4P^\circ$	$2^1/_2$	*634523*	−99
		$1^1/_2$	*634622*	−31
		$0^1/_2$	*634653*	
$2s\ 2p(^3P^\circ)5d$	$5d'\ ^2F^\circ$	$2^1/_2$	*636058*	175
		$3^1/_2$	*636233*	
$2p^2(^3P)3d$	$3d'''\ ^4P$	$2^1/_2$	637113	−99
		$1^1/_2$	637212	−62
		$0^1/_2$	637274	
$2p^2(^1D)3d$	$3d^{IV}\ ^2G$	$3^1/_2$	643642	
		$4^1/_2$		
$2p^2(^3P)3d$	$3d'''\ ^2D$	$1^1/_2$	646859	
		$2^1/_2$		
$2p^2(^1D)3d$	$3d^{IV}\ ^2F$	$2^1/_2$	651098	19
		$3^1/_2$	651117	
$2p^2(^1D)3d$	$3d^{IV}\ ^2D$	$2^1/_2$	653328	−83
		$1^1/_2$	653411	

O IV—Continued

Config.	Desig.	J	Level	Interval
$2s\ 2p(^3P°)6d$	$6d'\ ^4D°$	$0^1/_2$		
		$1^1/_2$		
		$2^1/_2$		
		$3^1/_2$	*656591*	
$2s\ 2p(^1P°)4p$	$4p''\ ^2D$	$1^1/_2$	656745	42
		$2^1/_2$	656787	
$2s\ 2p(^3P°)6d$	$6d'\ ^4P°$	$2^1/_2$	*656769*	−120
		$1^1/_2$	*656889*	
		$0^1/_2$		
$2s\ 2p(^3P°)6d$	$6d'\ ^2F°$	$2^1/_2$	*657471*	236
		$3^1/_2$	*657707*	
$2p^2(^1D)3d$	$3d^{IV}\ ^2P$	$0^1/_2$	659998	
		$1^1/_2$		
$2s\ 2p(^1P°)4d$	$4d''\ ^2D°$	$2^1/_2$	*668553*	−4
		$1^1/_2$	*668557*	

O IV—Continued

Config.	Desig.	J	Level	Interval
O V $2s\ 2p\ ^3P°$	***Limit***	0	706321.2	136.1
		1	706457.3	306.7
		2	706764.0	
$2p^2(^1S)3d$	$3d^V\ ^2D$	$1^1/_2$	706333	
		$2^1/_2$		
$2p^2(^3P)4p$	$4p'''\ ^4D°$	$0^1/_2$		
		$1^1/_2$	*713033*	
		$2^1/_2$		
		$3^1/_2$		
O V $2s\ 2p\ ^1P°$	***Limit***	1	783180	
O V $2p^2\ ^3P$	***Limit***		838129	
O V $2p^2\ ^1D$	***Limit***	2	856103	
O V $2p^2\ ^1S$	***Limit***	0	912292	

February 1982.

O IV Observed Terms

Config. $1s^2+$	Observed Terms		
$2s\ 2p^2$	$2p^2\ ^4P$		
	$2p^2\ ^2S$	$2p^2\ ^2P$	$2p^2\ ^2D$
$2p^3$	$2p^3\ ^4S°$		
	$2p^3\ ^2P°$	$2p^3\ ^2D°$	

	$ns(n\geq3)$	$np(n\geq2)$	$nd(n\geq3)$
$2s^2(^1S)nl$	$3–5s\ ^2S$	$2–5p\ ^2P°$	$3–6d\ ^2D$
$2s\ 2p(^3P°)nl'$	$3,4s'\ ^4P°$	$3p'\ ^4S$ $3p'\ ^4P$ $3p'\ ^4D$	$3–6d'\ ^4P°$ $3–6d'\ ^4D°$ $3d'\ ^4F°$
	$3,4s'\ ^2P°$	$3,4p'\ ^2S$ $3–5p'\ ^2P$ $3–5p'\ ^2D$	$3,4d'\ ^2P°$ $3,4d'\ ^2D°$ $3–6d'\ ^2F°$
$2s\ 2p(^1P°)nl''$	$3s''\ ^2P°$	$3p''\ ^2S$ $3p''\ ^2P$ $3,4p''\ ^2D$	$3d''\ ^2P°$ $3,4d''\ ^2D°$ $3d''\ ^2F°$
$2p^2(^3P)nl'''$	$3s'''\ ^4P$	$3p'''\ ^4S°$ $3p'''\ ^4P°$ $3,4p'''\ ^4D°$	$3d'''\ ^4P$
	$3s'''\ ^2P$	$3p'''\ ^2S°$ $3p'''\ ^2D°$	$3d'''\ ^2P$ $3d'''\ ^2D$
$2p^2(^1D)nl^{IV}$	$3s^{IV}\ ^2D$	$3p^{IV}\ ^2D°$ $3p^{IV}\ ^2F°$	$3d^{IV}\ ^2P$ $3d^{IV}\ ^2D$ $3d^{IV}\ ^2F$ $3d^{IV}\ ^2G$
$2p^2(^1S)nl^V$			$3d^V\ ^2D$

	$nf(n\geq4)$	$ng(n\geq5)$	$nh(n\geq6)$	$ni(n\geq7)$
$2s^2(^1S)nl$	$4–6f\ ^2F°$	$5,6g\ ^2G$	$6,7h\ ^2H°$	$7i\ ^2I$
$2s\ 2p(^3P°)nl'$	$4f'\ ^4D$ $4f'\ ^4F$ $4f'\ ^4G$			
	$4f'\ ^2D$ $4f'\ ^2F$ $4f'\ ^2G$			

Part B OXYGEN

O IV ($Z=8$)

I P 77.4165 ev Limit 624382.0 cm^{-1} 160.158 Å (VAC)

Anal A List A February 1982

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P Predicted Lines

New Multiplet Numbers not inserted between older ones start with UV 10 and 16; (13 and 15 rejected).

m Masked

‡ Raie Ultime

* Blend

* and § Blend of O IV and 0 III

* and † Blend of O IV and O II

* and §§ Blend of O IV and Si III

O IV

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
1401.156	A	7	0.05	8.90	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–2p^2\ ^4P$
1397.20	A	3*	0.00	8.87	$0^1/_2$–$1^1/_2$	UV 0.01
1404.812	A	4	0.05	8.87	$1^1/_2$–$1^1/_2$	
1399.774	A	5	0.00	8.86	$0^1/_2$–$0^1/_2$	
1407.386	A	5	0.05	8.86	$1^1/_2$–$0^1/_2$	
790.199	B	21	0.05	15.74	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–2p^2\ ^2D$
787.711	B	20	0.00	15.74	$0^1/_2$–$1^1/_2$	UV 1
790.109	B	18	0.05	15.74	$1^1/_2$–$1^1/_2$	
609.829	B	20	0.05	20.38	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–2p^2\ ^2S$
608.398	B	19	0.00	20.38	$0^1/_2$–$0^1/_2$	UV 2
554.514‡	B	23	0.05	22.41	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–2p^2\ ^2P$
554.075	B	22	0.00	22.38	$0^1/_2$–$0^1/_2$	UV 3
555.261	B	21	0.05	22.38	$1^1/_2$–$0^1/_2$	
553.330	B	21	0.00	22.41	$0^1/_2$–$1^1/_2$	
279.937	D	(11)	0.05	44.34	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–3s\ ^2S$
279.633	D	(10)	0.00	44.34	$0^1/_2$–$0^1/_2$	UV 4
238.573	D	(15)	0.05	52.02	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3d\ ^2D$
238.361	D	(14)	0.00	52.01	$0^1/_2$–$1^1/_2$	UV 5
214.155	D	(6)	0.05	57.94	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–3p'\ ^2P$
214.032	D	(5)	0.00	57.93	$0^1/_2$–$0^1/_2$	UV 5.01
214.209	D	(4)	0.05	57.93	$1^1/_2$–$0^1/_2$	
213.978	D	(4)	0.00	57.94	$0^1/_2$–$1^1/_2$	
213.600	P		0.05	58.09	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3p'\ ^4D$
213.486	P		0.00	58.07	$0^1/_2$–$1^1/_2$	UV 5.02
217.254	P		0.05	58.07	$1^1/_2$–$1^1/_2$	
213.521	P		0.00	58.06	$0^1/_2$–$0^1/_2$	
213.697	P		0.05	58.06	$1^1/_2$–$0^1/_2$	
210.929	P		0.05	58.83	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–3p'\ ^4S$
210.758	P		0.00	58.83	$0^1/_2$–$1^1/_2$	UV 5.03
208.905	P		0.05	59.40	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3p'\ ^4P$
208.793	P		0.00	59.38	$0^1/_2$–$1^1/_2$	UV 5.04
208.957	P		0.05	59.38	$1^1/_2$–$1^1/_2$	
208.834	P		0.00	59.37	$0^1/_2$–$0^1/_2$	
209.003	P		0.05	59.37	$1^1/_2$–$0^1/_2$	
207.239	D	(7)	0.05	59.87	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3p'\ ^2D$
207.183	D	(6)	0.00	59.84	$0^1/_2$–$1^1/_2$	UV 5.05
207.348	D	(4)	0.05	59.84	$1^1/_2$–$1^1/_2$	
206.002	D	(1)	0.05	60.23	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–4s\ ^2S$
205.842	D	(0)	0.00	60.23	$0^1/_2$–$0^1/_2$	UV 5.06
203.048	D	(5)	0.05	61.11	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–3p'\ ^2S$
202.891	D	(4)	0.00	61.11	$0^1/_2$–$0^1/_2$	UV 5.07
*196.009	C	9	0.05	63.30	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–4d\ ^2D$
195.863	C	8	0.00	63.30	$0^1/_2$–$1^1/_2$	UV 5.08
*196.009	C	9	0.05	63.30	$1^1/_2$–$1^1/_2$	
185.535	C	2	0.05	66.87	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–5s\ ^2S$
185.402	C	1	0.00	66.87	$0^1/_2$–$0^1/_2$	UV 5.09

O IV

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
*182.827	C	5	0.05	67.86	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3p''\ ^2D$
182.706	C	4	0.00	67.86	$0^1/_2$–$1^1/_2$	UV 5.10
*182.827	C	5	0.05	67.86	$1^1/_2$–$1^1/_2$	
181.994	C	4	0.05	68.17	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–3p''\ ^2P$
181.887	C	3	0.00	68.16	$0^1/_2$–$0^1/_2$	UV 5.11
182.015	C	2	0.05	68.16	$1^1/_2$–$0^1/_2$	
181.866	C	2	0.00	68.17	$0^1/_2$–$1^1/_2$	
*181.277	C	6	0.05	68.44	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–5d\ ^2D$
181.150	C	5	0.00	68.44	$0^1/_2$–$1^1/_2$	UV 5.12
*181.277	C	6	0.05	68.44	$1^1/_2$–$1^1/_2$	
180.480	C	3	0.05	68.74	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–3p''\ ^2S$
180.354	C	2	0.00	68.74	$0^1/_2$–$0^1/_2$	UV 5.13
*174.221	C	$3d$	0.05	71.21	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–6d\ ^2D$
174.105	C	$2d$	0.00	71.21	$0^1/_2$–$1^1/_2$	UV 5.14
*174.221	C	$3d$	0.05	71.21	$1^1/_2$–$1^1/_2$	
173.916	C	3	0.05	71.34	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–4p'\ ^2P$
173.852	C	2	0.00	71.31	$0^1/_2$–$0^1/_2$	UV 5.15
173.969	C	1	0.05	71.31	$1^1/_2$–$0^1/_2$	
173.799	C	1	0.00	71.34	$0^1/_2$–$1^1/_2$	
173.363	P		0.05	71.56	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3s'''\ ^4P$
173.311	P		0.00	71.54	$0^1/_2$–$1^1/_2$	UV 5.16
173.427	P		0.05	71.54	$1^1/_2$–$1^1/_2$	
173.354	P		0.00	71.52	$0^1/_2$–$0^1/_2$	
173.470	P		0.05	71.52	$1^1/_2$–$0^1/_2$	
171.123	C	4	0.05	72.50	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–4p'\ ^2D$
171.074	C	3	0.00	72.47	$0^1/_2$–$1^1/_2$	UV 5.17
171.188	C	1	0.05	72.47	$1^1/_2$–$1^1/_2$	
169.582	C	1	0.05	73.16	$1^1/_2$–$0^1/_2$	$2p$ $^2P°–4p'\ ^2S$
169.474	C	0	0.00	73.16	$0^1/_2$–$0^1/_2$	UV 5.18
168.306	C	1	0.05	73.71	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–3s'''\ ^2P$
168.254	P		0.00	73.69	$0^1/_2$–$0^1/_2$	UV 5.19
166.741	C	0	0.05	74.40	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3s^{IV}\ ^2D$
166.641	P		0.00	74.40	$0^1/_2$–$1^1/_2$	UV 5.20
166.776	P		0.05	74.40	$1^1/_2$–$1^1/_2$	
159.197	C	0	0.05	77.93	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–5p'\ ^2P$ UV 5.21
158.606	C	2	0.05	78.22	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–5p'\ ^2D$
158.567	C	1	0.00	78.19	$0^1/_2$–$1^1/_2$	UV 5.22
158.218	P		0.05	78.41	$1^1/_2$–$1^1/_2$	$2p$ $^2P°–3d'''\ ^2P$
158.079	P		0.00	78.43	$0^1/_2$–$0^1/_2$	UV 5.23
154.681	C	1	0.05	80.20	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3d'''\ ^2D$
154.590	C	0	0.00	80.20	$0^1/_2$–$1^1/_2$	UV 5.24
153.151	C	$2d$	0.05	81.00	$1^1/_2$–$2^1/_2$	$2p$ $^2P°–3d^{IV}{}^2D?$
153.043	P		0.00	81.01	$0^1/_2$–$1^1/_2$	UV 5.25

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
152.346	G	2	0.05	81.43	1½–2½	2p ²P°–4p″ ²D
152.266	C	1	0.00	81.42	½–1½	UV 5.26
151.604	P		0.05	81.83	1½–	2p ²P°–3d[IV] ²P
151.516	P		0.00	81.83	½–	UV 5.27
141.654	P		0.05	87.57	1½–	2p ²P°–3d[V] ²D?
141.576	P		0.00	87.57	½–	UV 5.28
625.852	B	20	8.90	28.71	2½–1½	2p² ⁴P –2p³ ⁴S°
625.130	B	19	8.87	28.71	1½–1½	UV 6
624.617	B	18	8.86	28.71	½–1½	
272.125	A	7	8.90	54.46	2½–2½	2p² ⁴P –3s′ ⁴P°
*272.174	D	(5)	8.87	54.43	1½–1½	UV 6.01
*272.174	D	(5)	8.86	54.41	½–½	
272.311	A	6	8.90	54.43	2½–1½	
272.270	A	6	8.87	54.41	1½–½	
271.989	A	6	8.87	54.46	1½–2½	
272.076	A	6	8.86	54.43	½–1½	
233.561	D	(8)	8.90	61.98	2½–3½	2p² ⁴P –3d′ ⁴D°
233.495	D	(7)	8.87	61.97	1½–2½	UV 7
*233.457	D	(7–)	8.86	61.97	½–1½	
233.596	D	(6)	8.90	61.97	2½–2½	
233.521	D	(6)	8.87	61.97	1½–1½	
*233.457	D	(7–)	8.86	61.96	½–½	
m233.623	P	O IV	8.90	61.97	2½–1½	
m233.537	P	O IV	8.87	61.96	1½–½	
231.302	A	7	8.90	62.50	2½–2½	2p² ⁴P –3d′ ⁴P°
231.144	A	4	8.87	62.51	1½–1½	UV 7.01
231.031	A	3	8.86	62.52	½–½	
231.240	A	6	8.90	62.51	2½–1½	
231.101	A	6	8.87	62.52	1½–½	
231.200	A	6	8.87	62.50	1½–2½	
231.070	D	(7)	8.86	62.51	½–1½	
200.995	D	(2)	8.90	70.58	2½–2½	2p² ⁴P –4s′ ⁴P°
*201.022	D	(0)	8.87	70.55	1½–1½	UV 7.02
*201.022	D	(0)	8.86	70.53	½–½	
201.098	D	(1)	8.90	70.55	2½–1½	
201.073	D	(1–)	8.87	70.53	1½–½	
200.915	D	(1)	8.87	70.58	1½–2½	
200.966	D	(1–)	8.86	70.55	½–1½	
192.200	C	6	8.90	73.40	2½–3½	2p² ⁴P –4d′ ⁴D°
192.163	C	5	8.87	73.39	1½–2½	UV 7.03
*192.138	C	4	8.86	73.38	½–1½	
192.231	C	3	8.90	73.39	2½–2½	
*192.186	P		8.87	73.38	1½–1½	
*192.138	C	4	8.86	73.38	½–½	
192.256	P		8.90	73.38	2½–1½	
*192.186	P		8.87	73.38	1½–½	

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
191.748	C	4	8.90	73.55	2½–2½	2p² ⁴P –4d′ ⁴P°
191.631	C	2	8.87	73.57	1½–1½	UV 7.04
m191.559	P	O V	8.86	73.58	½–½	
191.699	C	3	8.90	73.57	2½–1½	
191.607	C	3	8.87	73.58	1½–½	
191.680	C	2	8.87	73.55	1½–2½	
191.583	C	2	8.86	73.57	½–1½	
*188.151	C	3	8.90	74.79	2½–3½	2p² ⁴P –3p‴ ⁴D°
*188.151	C	3	8.87	74.77	1½–2½	UV 7.05
*188.151	C	3	8.86	74.76	½–1½	
188.210	C	0	8.90	74.77	2½–2½	
188.185	C	0	8.87	74.76	1½–1½	
*186.935	C	3	8.90	75.22	2½–2½	2p² ⁴P –3p‴ ⁴P°
*186.870	C	2	8.87	75.20	1½–1½	UV 7.06
186.884	P		8.86	75.20	½–½	
186.978	C	1	8.90	75.20	2½–1½	
*186.935	C	3	8.87	75.20	1½–½	
*186.870	C	2	8.87	75.22	1½–2½	
*186.870	C	2	8.86	75.20	½–1½	
183.444	C	2	8.90	76.48	2½–1½	2p² ⁴P –3p‴ ⁴S°
183.382	C	2	8.87	76.48	1½–1½	UV 7.07
183.338	C	1	8.86	76.48	½–1½	
*177.801	C	3d	8.90	78.63	2½–3½	2p² ⁴P –5d′ ⁴D°
177.762	C	2	8.87	78.63		UV 7.08
177.693	C	2	8.90	78.67	2½–2½	2p² ⁴P –5d′ ⁴P°
177.603	P		8.87	78.68	1½–1½	UV 7.09
177.553	P		8.86	78.68	½–½	
177.662	C	1	8.90	78.68	2½–1½	
177.594	C	1	8.87	78.68	1½–½	
177.635	P		8.87	78.67	1½–2½	
177.562	C	1	8.86	78.68	½–1½	
*170.988	C	2d	8.90	81.40	2½–3½	2p² ⁴P –6d′ ⁴D°
						UV 7.10
*170.935	C	1d	8.90	81.43	2½–2½	2p² ⁴P –6d′ ⁴P°
*170.847	C	0	8.87	81.44		UV 7.11
155.911	C	1d	8.90	88.40		2p² ⁴P –4p‴ ⁴D°
						UV 7.12
779.912	B	15	15.74	31.63	2½–2½	2p² ²D –2p³ ²D°
779.821	B	14	15.74	31.64	1½–1½	UV 8
779.734	B	11	15.74	31.64	2½–1½	
779.997	B	11	15.74	31.63	1½–2½	
616.952	B	13	15.74	35.83	2½–1½	2p² ²D –2p³ ²P°
m617.036	P	O II	15.74	35.83	1½–½	UV 8.01
m617.005	P	O II	15.74	35.83	1½–1½	
*379.775	D	(4)	15.74	48.38	2½–1½	2p² ²D –3p ²P°
379.919	D	(3)	15.74	48.37	1½–½	UV 8.02
*379.775	D	(4)	15.74	48.38	1½–1½	

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
*306.621	D	(8)	15.74	56.17	2½–1½	$2p^2\ {}^2D - 3s'\ {}^2P^\circ$
306.882	D	(7)	15.74	56.14	1½–0½	UV 8.03
*306.621	D	(8)	15.74	56.17	1½–1½	
*266.932	D	(6)	15.74	62.18	2½–2½	$2p^2\ {}^2D - 3d'\ {}^2D^\circ$
*266.967	D	(5)	15.74	62.18	1½–1½	UV 8.04
*266.967	D	(5)	15.74	62.18	2½–1½	
*266.932	D	(6)	15.74	62.18	1½–2½	
260.389	D	(10)	15.74	63.35	2½–3½	$2p^2\ {}^2D - 3d'\ {}^2F^\circ$
*260.556	D	(9)	15.74	63.32	1½–2½	UV 9
*260.556	D	(9)	15.74	63.32	2½–2½	
*258.207	D	(3)	15.74	63.75	2½–1½	$2p^2\ {}^2D - 3d'\ {}^2P^\circ$
258.116	D	(2)	15.74	63.77	1½–0½	UV 9.01
*258.207	D	(3)	15.74	63.75	1½–1½	
255.252	D	(5)	15.74	64.31		$2p^2\ {}^2D - 3s''\ {}^2P^\circ$
						UV 9.02
234.988	D	(3)	15.74	68.50		$2p^2\ {}^2D - 5f\ {}^2F^\circ$
						UV 9.03
225.299	D	(5)	15.74	70.77	2½–3½	$2p^2\ {}^2D - 3d''\ {}^2F^\circ$
						UV 9.04
223.728	D	(0)	15.74	71.15	2½–1½	$2p^2\ {}^2D - 4s'\ {}^2P^\circ$
223.841	D	(0–)	15.74	71.13	1½–0½	UV 9.05
222.763	D	(5)	15.74	71.39	2½–2½	$2p^2\ {}^2D - 3d''\ {}^2D^\circ$
222.777	D	(4)	15.74	71.39	1½–1½	UV 9.06
214.249	D	(1)	15.74	73.61	2½–2½	$2p^2\ {}^2D - 4d'\ {}^2D^\circ$
214.290	D	(1–)	15.74	73.60	1½–1½	UV 9.07
212.974	D	(3)	15.74	73.95	2½–3½	$2p^2\ {}^2D - 4d'\ {}^2F^\circ$
213.061	D	(2–)*d*	15.74	73.93	1½–2½	UV 9.08
204.708	D	(0)*d*	15.74	76.30		$2p^2\ {}^2D - 3p'''\ {}^2D^\circ$
						UV 9.09
200.830	G	(2)*bd*	15.74	77.47		$2p^2\ {}^2D - 3p^{IV}\ {}^2F^\circ$
						UV 9.10
198.031	C	4	15.74	78.35		$2p^2\ {}^2D - 3p^{IV}\ {}^2D^\circ$
						UV 9.11
196.349	C	2*d*	15.74	78.88	2½–3½	$2p^2\ {}^2D - 5d'\ {}^2F^\circ$
196.432	C	1*d*	15.74	78.86	1½–2½	UV 9.12
188.405	C	1*d*	15.74	81.51	2½–3½	$2p^2\ {}^2D - 6d'\ {}^2F^\circ$
188.494	C	0*d*	15.74	81.54	1½–2½	UV 9.13
802.200	B	11	20.38	35.83	0½–1½	$2p^2\ {}^2S - 2p^3\ {}^2P^\circ$
802.255	B	10	20.38	35.83	0½–0½	UV 10
442.705	D	(1)	20.38	48.38	0½–1½	$2p^2\ {}^2S - 3p\ {}^2P^\circ$
442.873	D	(0)	20.38	48.37	0½–0½	UV 11
346.372	D	(4)	20.38	56.17	0½–1½	$2p^2\ {}^2S - 3s'\ {}^2P^\circ$
346.688	D	(3)	20.38	56.14	0½–0½	UV 12

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
285.838	D	(7)	20.38	63.75	0½–1½	$2p^2\ {}^2S - 3d'\ {}^2P^\circ$
285.714	D	(6)	20.38	63.77	0½–0½	UV 13
282.213	D	(1)	20.38	64.31	0½–1½	$2p^2\ {}^2S - 3s''\ {}^2P^\circ$
						UV 14
239.592	D	(3)	20.38	72.13	0½–1½	$2p^2\ {}^2S - 3d''\ {}^2P^\circ$
						UV 15
230.755	D	(2)	20.38	74.11	0½–1½	$2p^2\ {}^2S - 4d'\ {}^2P^\circ$
230.682	D	(1)	20.38	74.12	0½–0½	UV 16
1343.512	B	12	22.41	31.63	1½–2½	$2p^2\ {}^2P - 2p^3\ {}^2D^\circ$
1338.612	B	11	22.38	31.64	0½–1½	UV 17
1342.992	B	9	22.41	31.64	1½–1½	
923.367	B	11	22.41	35.83	1½–1½	$2p^2\ {}^2P - 2p^3\ {}^2P^\circ$
921.366	B	10	22.38	35.83	0½–0½	UV 18
923.433	B	9	22.41	35.83	1½–0½	
921.296	B	9	22.38	35.83	0½–1½	
367.192	D	(2)	22.41	56.17		$2p^2\ {}^2P - 3s'\ {}^2P^\circ$
						UV 19
311.679	D	(6)	22.41	62.18	1½–2½	$2p^2\ {}^2P - 3d'\ {}^2D^\circ$
311.490	D	(5)	22.38	62.18	0½–1½	UV 20
311.726	D	(3)	22.41	62.18	1½–1½	
299.850	D	(4)	22.41	63.75	1½–1½	$2p^2\ {}^2P - 3d'\ {}^2P^\circ$
299.495	D	(3)	22.38	63.77	0½–0½	UV 21
299.710	D	(2)	22.41	63.77	1½–0½	
299.620	D	(2)	22.38	63.75	0½–1½	
295.874	D	(2)	22.41	64.31	1½–1½	$2p^2\ {}^2P - 3s''\ {}^2P^\circ$
						UV 22
253.082	D	(7)	22.41	71.39	1½–2½	$2p^2\ {}^2P - 3d''\ {}^2D^\circ$
252.948	D	(6)	22.38	71.39	0½–1½	UV 23
249.365	D	(4)	22.41	72.13	1½–1½	$2p^2\ {}^2P - 3d''\ {}^2P^\circ$
249.223	D	(3)	22.38	72.12	0½–0½	UV 24
242.140	D	(3)	22.41	73.61	1½–2½	$2p^2\ {}^2P - 4d'\ {}^2D^\circ$
242.045	D	(2)	22.38	73.60	0½–1½	UV 25
242.183	D	(0)	22.41	73.60	1½–1½	
240.079	D	(1)	22.41	74.05	1½–0½	$2p^2\ {}^2P - 3p'''\ {}^2S^\circ$
239.935	D	(0)	22.38	74.05	0½–0½	UV 26
230.040	D	(0)	22.41	76.30	1½–2½	$2p^2\ {}^2P - 3p'''\ {}^2D^\circ$
229.896	D	(0)	22.38	76.31	0½–1½	UV 27
204.996	D	(0)	22.41	82.89	1½–2½	$2p^2\ {}^2P - 4d''\ {}^2D^\circ$
204.905	D	(0–)	22.38	82.89	0½–1½	UV 28
289.292	D	(3)	28.71	71.56	1½–2½	$2p^3\ {}^4S^\circ - 3s'''\ {}^4P$
289.469	D	(2)	28.71	71.54	1½–1½	UV 29
289.590	D	(1)	28.71	71.52	1½–0½	

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
246.563	D	(4)	28.71	78.99	1½–2½	$2p^3\ {}^4S°–3d'''\ {}^4P$
246.503	D	(3)	28.71	79.00	1½–1½	UV 30
246.465	D	(2)	28.71	79.01	1½–0½	
471.273	D	(1)	31.63	57.94	2½–1½	$2p^3\ {}^2D°–3p'\ {}^2P$
471.603	D	(0)	31.64	57.93	1½–0½	UV 31
339.330	D	(1)	31.63	68.17	2½–1½	$2p^3\ {}^2D°–3p''\ {}^2P$
339.436	D	(0)	31.64	68.16	1½–0½	UV 32
295.051	D	(1)	31.63	73.65	2½–3½	$2p^3\ {}^2D°–4f'\ {}^2F$
295.140	D	(1–)	31.64	73.65	1½–2½	UV 33
294.650	D	(1+)	31.63	73.71	2½–1½	$2p^3\ {}^2D°–3s'''\ {}^2P$
294.853	D	(1+)	31.64	73.69	1½–0½	UV 34
289.898	D	(2)	31.63	74.40	2½–2½	$2p^3\ {}^2D°–3s^{IV}\ {}^2D$
289.933	D	(1)	31.64	74.40	1½–1½	UV 35
265.062	D	(0)	31.63	78.41		$2p^3\ {}^2D°–3d'''\ {}^2P$ UV 36
255.302	E	(0)	31.63	80.20		$2p^3\ {}^2D°–3d'''\ {}^2D$ UV 37
252.550	E	(6)*d	31.63	80.73	2½–3½	$2p^3\ {}^2D°–3d^{IV}\ {}^2F$
252.581	E	(6)*d	31.64	80.72	1½–2½	UV 38
251.148	E	(1+)	31.63	81.00	2½–2½	$2p^3\ {}^2D°–3d^{IV}\ {}^2D$
251.114	E	(1)	31.64	81.01	1½–1½	UV 39
327.320	D	(1)	35.83	73.71	1½–1½	$2p^3\ {}^2P°–3s'''\ {}^2P$
327.519	D	(0)	35.83	73.69	0½–0½	UV 40
321.457	D	(1)	35.83	74.40		$2p^3\ {}^2P°–3s^{IV}\ {}^2D$ UV 41
291.203	D	(1+)	35.83	78.41	1½–1½	$2p^3\ {}^2P°–3d'''\ {}^2P$
291.054	D	(1)	35.83	78.43	0½–0½	UV 42
279.456	E	(2)	35.83	80.20		$2p^3\ {}^2P°–3d'''\ {}^2D$ UV 43
269.559	D	(1)d	35.83	81.83		$2p^3\ {}^2P°–3d^{IV}\ {}^2P$ UV 44
Air						
3063.42	A	17	44.34	48.38	0½–1½	$3s\ {}^2S–3p\ {}^2P°$
3071.61	A	16	44.34	48.37	0½–0½	1
3411.69	A	16	48.38	52.02	1½–2½	$3p\ {}^2P°–3d\ {}^2D$
3403.52	A	15	48.37	52.01	0½–1½	2
3413.64	A	12	48.38	52.01	1½–1½	
Vac						
1046.316	A	5	48.38	60.23	1½–0½	$3p\ {}^2P°–4s\ {}^2S$
1045.384	A	4	48.37	60.23	0½–0½	UV 45
831.070	A	4	48.38	63.30	1½–2½	$3p\ {}^2P°–4d\ {}^2D$
830.506	A	3	48.37	63.30	0½–1½	UV 46

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
618.107	A	4	48.38	68.44	1½–2½	$3p\ {}^2P°–5d\ {}^2D$
617.786	A	3	48.37	68.44	0½–1½	UV 47
543.118	A	2	48.38	71.21	1½–	$3p\ {}^2P°–6d\ {}^2D$
542.859	A	1	48.37	71.21	0½–1½	UV 48
*1067.810	A	9	52.02	63.63	2½–3½	$3d\ {}^2D–4f\ {}^2F°$
*1067.810	A	9	52.01	63.63	1½–2½	UV 49
752.150	A	2h	52.02	68.50		$3d\ {}^2D–5f\ {}^2F°$ UV 50
Air						
3385.52	A	15	54.46	58.12	2½–3½	$3s'\ {}^4P°–3p'\ {}^4D$
*3381.20	A	15	54.43	58.09	1½–2½	3
*3381.20	A	15	54.41	58.07	0½–1½	
*3409.66§	A	12	54.46	58.09	2½–2½	
3396.79	A	13	54.43	58.07	1½–1½	
m3390.19	P	O II	54.41	58.06	0½–0½	
3425.57	A	9	54.46	58.07	2½–1½	
m3405.78	P	O III	54.43	58.06	1½–0½	
2836.26	A	10	54.46	58.83	2½–1½	$3s'\ {}^4P°–3p'\ {}^4S$
2816.56	A	9	54.43	58.83	1½–1½	UV 51
2805.84	A	8	54.41	58.83	0½–1½	
2509.19	A	12	54.46	59.40	2½–2½	$3s'\ {}^4P°–3p'\ {}^4P$
2501.81	A	7	54.43	59.38	1½–1½	UV 52
2499.28	A	7	54.41	59.37	0½–0½	
*2517.2†	A	11	54.46	59.38	2½–1½	
2507.73	A	11	54.43	59.37	1½–0½	
2493.77	A	11	54.43	59.40	1½–2½	
2493.44	A	11	54.41	59.38	0½–1½	
7004.14	A	4h	56.17	57.94	1½–1½	$3s'\ {}^2P°–3p'\ {}^2P$
6931.55	A	2h	56.14	57.93	0½–0½	3.01
7061.16	A	1h	56.17	57.93	1½–0½	
6876.43	A	1h	56.14	57.94	0½–1½	
3349.11	A	13	56.17	59.87	1½–2½	$3s'\ {}^2P°–3p'\ {}^2D$
3348.08	A	12	56.14	59.84	0½–1½	4
3378.06	A	9	56.17	59.84	1½–1½	
3052.53	A	8	56.17	60.23	1½–0½	$3s'\ {}^2P°–4s\ {}^2S$
3028.04	A	7	56.14	60.23	0½–0½	5
2510.6	A	3*	56.17	61.11	1½–0½	$3s'\ {}^2P°–3p'\ {}^2S$
m2494.00	P	O IV	56.14	61.11	0½–0½	UV 53
2921.45	A	10	57.94	62.18	1½–2½	$3p'\ {}^2P–3d'\ {}^2D°$
2916.30	A	9	57.93	62.18	0½–1½	UV 54
2926.17	A	6	57.94	62.18	1½–1½	
2132.64	A	2	57.94	63.75	1½–1½	$3p'\ {}^2P–3d'\ {}^2P°$
2120.58	A	1	57.93	63.77	0½–0½	UV 55

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
*3736.85	A	16	58.12	61.43	3½–4½	3p' ^{4}D –3d' ^{4}F°
3729.03	A	15	58.09	61.42	2½–3½	6
*3725.93	A	14w	58.07	61.40	1½–2½	
*3725.93	A	14w	58.06	61.39	0½–1½	
*3758.39§	P		58.12	61.42	3½–3½	
3744.89	A	12	58.09	61.40	2½–2½	
*3736.85	A	16	58.07	61.39	1½–1½	
3209.66	A	10	58.12	61.98	3½–3½	3p' ^{4}D –3d' ^{4}D°
3194.79	A	9	58.09	61.97	2½–2½	7
*3185.86§§	A	7	58.07	61.97	1½–1½	
*3180.87	A	8	58.06	61.96	0½–0½	
m3216.30	P	O III	58.12	61.97	3½–2½	
3199.55	A	7	58.09	61.97	2½–1½	
3188.66	A	6	58.07	61.96	1½–0½	
3188.25	A	6	58.09	61.98	2½–3½	
*3180.87	A	8	58.07	61.97	1½–2½	
3177.89	A	6	58.06	61.97	0½–1½	
2829.16	A	4	58.12	62.50	3½–2½	3p' ^{4}D –3d' ^{4}P°
2803.59	A	3	58.09	62.51	2½–1½	UV 56
m2827.23	P	O V	58.07	62.52	1½–0½	
2812.41	A	2	58.09	62.50	2½–2½	
2772.90	A	2	58.07	62.51	1½–1½	
m2781.21	P	O V	58.06	62.52	0½–0½	
3375.40	A	11	58.83	62.50	1½–2½	3p' ^{4}S –3d' ^{4}P°
m3362.56	P	O III	58.83	62.51	1½–1½	8
3354.27	A	10	58.83	62.52	1½–0½	
4798.24	A	7	59.40	61.98	2½–3½	3p' ^{4}P –3d' ^{4}D°
4783.42	A	6	59.38	61.97	1½–2½	9
4772.56	A	5	59.37	61.97	0½–1½	
*4813.15§§	A	5	59.40	61.97	2½–2½	
4794.26	A	5	59.38	61.97	1½–1½	
4779.07	A	5	59.37	61.96	0½–0½	
3995.08	A	7	59.40	62.50	2½–2½	3p' ^{4}P –3d' ^{4}P°
3956.74	A	4	59.38	62.51	1½–1½	10
3930.68	P		59.37	62.52	0½–0½	
3977.09	A	6	59.40	62.51	2½–1½	
m3945.30	P	O II	59.38	62.52	1½–0½	
m3974.58	P	O II	59.38	62.50	1½–2½	
3942.10	A	5	59.37	62.51	0½–1½	
5362.55	A	3	59.87	62.18	2½–2½	3p' ^{2}D –3d' ^{2}D°
5305.58	A	2	59.84	62.18	1½–1½	11
3563.33	A	13	59.87	63.35	2½–3½	3p' ^{2}D –3d' ^{2}F°
3560.39	A	12	59.84	63.32	1½–2½	12
3593.08	A	7	59.87	63.32	2½–2½	
7032.36	A	8w	60.23	62.00	0½–1½	4s ^{2}S –4p ^{2}P°
7053.62	A	7w	60.23	61.99	0½–0½	12.01

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
1639.430	A	4	60.23	67.80	0½–1½	4s ^{2}S –5p ^{2}P°
1639.842	A	3	60.23	67.79	0½–0½	UV 57
Air						
4687.03	A	6	61.11	63.75	0½–1½	3p' ^{2}S –3d' ^{2}P°
						12.02
Vac						
988.713	A	6	61.43	73.97	4½–5½	3d' ^{4}F –4f' ^{4}G
988.628	A	6	61.42	73.96	3½–4½	UV 58
988.571	A	6	61.40	73.94	2½–3½	
988.523	A	5	61.39	73.93	1½–2½	
1062.271	A	6	61.98	73.65	3½–4½	3d' ^{4}D°–4f' ^{4}F
1062.133	A	6	61.97	73.64	2½–3½	UV 59
1061.952	A	5	61.97	73.64	1½–2½	
1061.780	A	5	61.96	73.64	0½–1½	
1062.840	A	3	61.98	73.64	3½–3½	
1062.434	A	3	61.97	73.64	2½–2½	
*1080.965	A	7	62.18	73.65	2½–3½	3d' ^{2}D°–4f' ^{2}F
*1080.965	A	7	62.18	73.65	1½–2½	UV 60
1081.645	A	3	62.18	73.65	2½–2½	
*1084.189	A	6	62.50	73.93	2½–3½	3d' ^{4}P°–4f' ^{4}D
*1084.189	A	6	62.51	73.95	1½–2½	UV 61
*1084.189	A	6	62.52	73.96	0½–1½	
1083.382	A	3	62.51	73.96	1½–1½	
1083.613	A	3	62.52	73.96	0½–0½	
Air						
2758.16	A	7	63.30	67.80	2½–1½	4d ^{2}D –5p ^{2}P°
2759.05	A	6	63.30	67.79	1½–0½	UV 62
*2384.61	A	7h	63.30	68.50	2½–	4d ^{2}D –5f ^{2}F°
*2384.61	A	7h	63.30	68.50	1½–2½	UV 63
Vac						
1169.160	A	1	63.35	73.96	3½–4½?	3d' ^{2}F°–4f' ^{4}G
1167.532	A	3	63.32	73.94	2½–3½?	UV 64
1164.545	A	6	63.35	74.00	3½–4½	3d' ^{2}F°–4f' ^{2}G
1164.320	A	5	63.32	73.97	2½–3½	UV 65
Air						
2450.040	A	11	63.63	68.69	3½–	4f ^{2}F°–5g ^{2}G
2449.372	A	11	63.63	68.69	2½–3½	UV 66
Vac						
1604.901	A	3	63.63	71.35	3½–	4f ^{2}F°–6g ^{2}G
1604.620	A	2	63.63	71.35	2½–3½	UV 67

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
1213.035	A	7	63.75	73.97	$1^1/_2$–$2^1/_2$	$3d'$ $^2P°$–$4f''$ ^2D
1213.196	A	6	63.77	73.99	$0^1/_2$–$1^1/_3$	UV 68
1211.043	A	2	63.75	73.99	$1^1/_2$–$1^1/_2$?	
Air						
3489.83	A	11	64.31	67.86	$1^1/_2$–$2^1/_2$	$3s''$ $^2P°$–$3p''$ ^2D
3492.24	A	10	64.31	67.86	$0^1/_2$–$1^1/_2$	14
3493.41	A	3	64.31	67.86	$1^1/_2$–$1^1/_2$?	
3628.74	A	7*h*	67.80	71.21	$1^1/_2$–	$5p$ $^2P°$–$6d$ ^2D
3626.72	A	6*h*	67.79	71.21	$0^1/_2$–$1^1/_2$	16
4389.50	A	6*h**	68.44	71.27	$2^1/_2$–	$5d$ ^2D —$6f$ $^2F°$
4388.94	A	6*h**	68.44	71.27	$1^1/_2$–$2^1/_2$	17

O IV—Continued

I A	Ref.	Int.	E P Low	E P High	J	Multiplet No.
Vac						
*4344.31†	A	6	68.50	71.35		$5f$ $^2F°$–$6g$ ^2G 18
4631.89	A	7*h*	68.69	71.36		$5g$ ^2G –$6h$ $^2H°$ 19
7677.4	A	4*w*	71.35	72.97		$6g$ ^2G –$7h$ $^2H°$ 20
7713.3	A	6*w*	71.36	72.97		$6h$ $^2H°$–$7i$ ^2I 21
5327.21	A	7*wh*	77.47	79.80		$3p^{IV}$ $^2F°$–$3d^{IV}$ ^2G 22

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The present publication is the tenth section of a series being prepared in response to the need for a current revision of two sets of the author's tables containing data on atomic spectra as derived from analyses of optical spectra. As in the previous Sections, Part A contains the atomic energy levels and Part B the multiplet tables. Section 10 includes these data for O IV. The form of the presentation is described in detail in the text to Section I.

12. KEY WORDS *(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)*

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