

# Wavelengths and Energy Level Classifications for the Spectra of Sulfur (S I through S XVI)

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Wavelengths and their classifications have been compiled for the spectra of the atom and all positive ions of sulfur ( $Z = 16$ ). The selections of data are based on the compilations of energy levels by Martin, Zalubas, and Musgrove in 1990, with some updating from the more recent literature. Wavelengths (or wavenumbers) calculated from the differences of the energy levels are given along with the observed values for all classified lines; these calculated wavelengths should in general be more accurate than the observed values wherever the two values differ significantly. Calculated wavelengths are also given for a number of lines that have not yet been observed, including some important forbidden transitions. The most complete data are given in separate tables for the different spectra. No limitation has been imposed on the wavelength range of the classified lines, except for the omission of x-ray transitions in the neutral atom. Two finding lists are also included, one for S I through S III and the other for S IV through S XVI.

Key words: atomic energy levels; atomic ions; atomic spectra; atomic wavelengths; atomic wavenumbers; energy-level classifications; forbidden lines; infrared wavelengths; infrared wavenumbers; sulfur; ultraviolet wavelengths; wavelength tables; wavenumber tables.

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## 1. Introduction

The Atomic Energy Levels Data Center of the National Institute of Standards and Technology (NIST) publishes critical compilations of atomic energy levels, which have updated and extended the three volumes of *Atomic Energy Levels* by Charlotte Moore [1971]. Martin, Zalubas, and Hagan [1978] compiled energy-level data for spectra of the rare-earth elements lanthanum to lutetium ( $Z = 57-71$ ). New critical compilations of energy-level data have also been published for Na I-XI,

Mg I-XII, Al I-XIII, Si I-XIV [Martin and Zalubas, 1981, 1980, 1979, 1983, respectively], P I-XV, and S I-XVI [Martin, Zalubas, and Musgrove, 1985, 1990]. Compilations of the energy levels for all spectra of the iron-period elements potassium through nickel [Sugar and Corliss, 1985] and for copper, krypton, and molybdenum [Sugar and Musgrove, 1990, 1991, 1988, resp.] have also appeared.

These new compilations review the literature and provide a basis for assembling a complete list of classified spectral lines for each stage of ionization. Recently NIST, in collaboration with the Japan Atomic Energy Research Institute, has compiled wavelengths for high-ionization spectra of vanadium, chromium, iron, cobalt, nickel, copper, and molybdenum [Shirai *et al.*, 1992b, 1993, 1990, 1992a, 1987a, 1991, 1987b, resp.]. Wavelength compilations for *all* stages of ionization have been published

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for scandium [Kaufman and Sugar, 1988] and magnesium and aluminum [Kaufman and Martin, 1991a, 1991b].

We have used the sulfur energy-levels compilations by Martin, Zalubas, and Musgrove [1990], supplemented by some more recent publications, in compiling the lists of classified lines given here. The energy levels were used to predict wavenumbers and wavelengths for comparison with the directly measured values.

Wavelengths (or wavenumbers) calculated from the differences of the energy levels are normally given along with the observed values for all classified lines. *Unless otherwise noted, the calculated wavelengths should in general be more accurate than the observed values wherever the two values differ significantly.* The upper energy levels for some transitions were rounded off to fewer significant figures than were given for the observed wavelengths, in order to represent the uncertainties of the data more realistically; any differences between such observed wavelengths and values calculated from the rounded-off energy levels are in general insignificant. In a few cases, reevaluations of particular energy levels, although needed on the basis of more recent measurements, have not yet been carried out. Also, in some cases, we tabulate two or more experimentally resolved hyperfine-structure components belonging to a single calculated transition. The greater accuracy or resolution of the pertinent observed wavelengths is mentioned in such cases.

The most complete data are given in sixteen separate tables, one for each spectrum (ionization stage). No limitation has been imposed on the wavelength range of the classified lines, except for the omission of x-ray transitions in the neutral atom. In addition to electric-dipole transitions, we have tabulated "forbidden" lines from magnetic-dipole, electric-quadrupole, and magnetic-quadrupole transitions.

Some observed lines are classified as unresolved blends of two or more transitions. We list the calculated wavelength for each of the main components of such a blend or, in some cases, the calculated wavelength of the probable strongest component.

Calculated wavelengths are given for a substantial number of lines that have not yet been observed, including both allowed and important forbidden transitions. The calculated wavelengths for (helium-like) S XV and (hydrogen-like) S XVI were derived from theoretically calculated levels, since their estimated accuracy is greater than the accuracy of levels based on the available measurements. We have significantly extended the wavelength tables for both of these spectra by including calculated wavelengths for a relatively large number of as yet unobserved lines.

At the beginning of the table for each spectrum, we give the isoelectronic sequence, the ground state, and the ionization energy (the divisor  $8065.5410 \pm 0.0024 \text{ cm}^{-1}/\text{eV}$  has been used to convert wavenumber values to eV units [Cohen and Taylor, 1987]). A list of references is also given with each table.

*Our comments on the data and references are supplementary to the information given by Martin, Zalubas, and*

*Musgrove [1990]; this reference is hereafter abbreviated as "MZM90" and is omitted from the reference lists for the individual tables.*

The following explanation of the tables is organized according to column headings.

#### Mult. No.

The multiplet numbers are those assigned by Moore [1950, 1959].

#### Relative Intensity

The numbers are usually visual estimates related in some way to plate blackening. Some authors limit these estimates to a small range (e.g., 1 to 10) while others reach into the 100,000's. Such numbers are useful within a small wavelength range and are meaningful only for comparing lines of a particular spectrum as taken from a particular reference. More meaningful relative intensities obtained with photoelectric or solid-state detectors are given by some authors, especially for observations in the infrared region. We have in some cases adjusted the intensities in particular regions to reduce apparent discrepancies between different observers, etc. Kelly [1987] adjusted the various intensity scales of the original observers to a normalized scale having a maximum intensity of 1000. For some spectra, we give Kelly's adjusted intensities for some or all of the lines below 2000 Å. We use the following symbols to further characterize the lines:

- a* observed in absorption
- bl* blended with another line that may affect the wavelength and intensity
- B* line or feature having large width due to autoionization broadening
- g* transition involving a level of the ground term
- m* masked by another line (no wavelength measurement)
- M1, M2, E2, ...* magnetic-dipole, magnetic-quadrupole, electric-quadrupole, ... transition
- w* wide, diffuse, hazy, etc.

#### Wavelength and Wavenumber

The lines are tabulated in order of increasing wavelengths, the vacuum wavelength being included in the data for every line. Depending on the wavelength region, one of three different wavelength or wavenumber entities is given with both the observed and calculated values included in the table. The observed and calculated vacuum wavelengths are given for the region below 2000 Å. The vacuum wavelengths given for classi-

fied lines in the region above 2000 Å are normally the calculated values. Both the observed and calculated wavelengths in standard air are given for the region 2000–10 000 Å. Observed and calculated vacuum wavenumbers, instead of air wavelengths, are given in the region longer than 10 000 Å (10 000 Å = 1000 nm = 1 μm). A question mark following a calculated wavelength indicates that the energy-level classification of the line is questionable. We converted vacuum wavelengths or wavenumbers to wavelengths in air using the five-parameter formula of Peck and Reeder [1972] for the index of refraction of air.

### Levels

The numerical values of the two levels for the transition. The values of levels obtained from theoretical calculations are enclosed in brackets. A question mark following the upper level indicates that the classification is tentative.

### Configurations, Terms, and *J* Values

These data for the two levels are given in successive columns. The configuration and term notations are described fully by Martin *et al.* [1978]. Levels having incomplete theoretical designations are indicated by blank spaces in one or more of the columns. A blank *J* value may also indicate that the corresponding level value represents two or more unresolved levels. A fully interpreted level lacking an appropriate configuration and/or term designation because of a strongly mixed eigenvector composition is indicated by the symbol “ $\langle \psi \rangle$ ” in the corresponding column(s).

### Ref.

The letter-numerical symbols indicate references listed at the beginning of the table. The references in this column are for the *observed* wavelength values only. If two or more references are listed for a single observed wavelength, the value is usually a weighted average.

The tables for the individual spectra are followed by two finding lists. Section 3 contains the lines of S I through S III and Section 4 contains the lines of S IV through S XVI. This separation is intended to follow roughly the division of user interests. The two finding lists include only wavelengths, intensities, and spectrum symbol. The wavelengths in the finding lists are observed values unless otherwise indicated: wavelengths calculated from experimental energy levels are followed by the letter “c”, and calculated wavelengths involving theoretical or series-formula levels are given in brackets.

### 1.1. Acknowledgments

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## 2. Tables of Wavelengths and Energy Level Classifications

## S 1

Ground state  $1s^2 2s^2 2p^6 3s^2 3p^4 \ ^3P_2$ Ionization energy  $83\,559.1 \pm 1.0 \text{ cm}^{-1}$  ( $10.36001 \pm 0.00012 \text{ eV}$ )

In accordance with the energy level data and theoretical interpretation derived and compiled in MZM90, the selection of lines and the level classifications given here involve numerous differences from the data in several of the references. Such differences occur most frequently for some of the absorption data (wavelengths below 1200 Å) and for the older data. It is notable that almost all of the wavelengths for the entire region 4690–9600 Å are from two papers published nearly sixty years ago [F1, M1]. The lines given here for which no level classifications have been published previously include several lines from [F1] in the region 9445–9686 Å that are not listed in [J1]. Jakobsson [J1] used a lead-sulfide detector for his observations of the  $(^4S^\circ)4s \ ^3S^\circ - (^4S^\circ)4p \ ^3P$  multiplet (9212–9237 Å) and for the region longer than 10035 Å. His other measurements, in the range 9633 to 10035 Å, were made with photographic plates, with the result that the two sets of intensities are “not comparable”; we have adjusted Jakobsson’s and Frerichs’ photographic intensities for the 9400–9700 Å region to a scale hoped to be closer to that used for the  $4s \ ^3S^\circ - 4p \ ^3P$  multiplet.

The large inherent widths and consequent overlapping of a number of the autoionization-broadened features observed in absorption below 1200 Å should be noted. The  $3s^2 3p^4 \ ^3P - 3s^2 3p^3 (^2D^\circ) 3d \ ^3D^\circ$  feature begins at the ionization threshold (1196.76 Å) and extends from its maximum near 1195 Å to shorter wavelengths by perhaps some 20 Å or more [T1, G1]. The  $3s^2 3p^4 \ ^3P - 3s^2 3p^3 (^2D^\circ) 4d \ ^3D^\circ$  feature near 1106 Å also overlaps several much narrower features in the region ~1104–1096 Å. We have raised the  $(^2D^\circ) 3d \ ^3D^\circ$  and  $(^2D^\circ) 4d \ ^3D^\circ$  positions by  $200 \text{ cm}^{-1}$  from the values of MZM90 in accordance with an interpretation of the observed absorption maximum as representing the complete unresolved  $^3P - (^2D^\circ) nd \ ^3D^\circ$  multiplet position in each case [T1].

The observed vacuum-ultraviolet emission lines due to transitions from upper levels given to three decimal places extend down to 1381 Å. Jakobsson’s [J1] uncertainty for these levels corresponds to a relative wavelength uncertainty of a few units in the fourth decimal place in this region below 2000 Å, and the absolute uncertainty of these levels [K1] corresponds to uncertainties

of about 0.0015 to less than 0.0010 Å for the calculated wavelengths of these lines. Kaufman’s estimates of the errors of his measurements are in the range 0.0008 to 0.003 Å [K1].

We have added the  $(^4S^\circ)7d$  and  $8d \ ^5D_{3,2}$ ,  $(^4S^\circ)9d \ ^5D_2^\circ$ , and  $(^4S^\circ)12d \ ^3D_1^\circ$  levels to the data tabulated in MZM90. We have decreased the values given in [K1] and MZM90 for the  $(^4S^\circ)3d \ ^5D_1^\circ$ ,  $^5D_2^\circ$ ,  $^5D_3^\circ$ ,  $^3D_1^\circ$ ,  $^3D_2^\circ$ , and  $^3D_3^\circ$  levels by  $0.008 \text{ cm}^{-1}$  in accordance with a systematic correction applied by Kaufman to the other levels of Jakobsson; the slightly different correction applied to the above levels in [K1] was an oversight. Based on reexamination of the data, we have also adjusted by small amounts the values of the  $(^4S^\circ)5f$  and  $6f \ ^3F$  levels, the  $(^4S^\circ)7p$  and  $8p \ ^3P$  levels, the  $(^4S^\circ)8f \ ^5F$  level, and the  $(^2P^\circ)5s \ ^3P^\circ$  levels given in MZM90. The  $(^4S^\circ)nf$  levels may have been significantly Stark shifted in one or more of the emission sources; the measurements of the  $(^2D^\circ)4s \ ^3D^\circ - (^4S^\circ)5f \ ^3F$  lines by Frerichs [F1] and of the  $(^4S^\circ)3d \ ^3D^\circ - (^4S^\circ)5f \ ^3F$  lines by Jakobsson [J1], for example, together give values for the  $(^2D^\circ)4s \ ^3D^\circ - (^4S^\circ)3d \ ^3D^\circ$  level separations that are systematically different by about  $0.2 \text{ cm}^{-1}$  from the presumably accurate values of [J1].

The data here incorporate corrections of several misprints in K1, M1, and J1.

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S I

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	10g,a	928.98	928.98	0.000 -	107 645	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)16d	<sup>3</sup> P - <sup>3</sup> P° <sup>3</sup> D°	2 -	J2
	10g,a	929.51	929.51	0.000 -	107 584	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)15d	<sup>3</sup> P - <sup>3</sup> P° <sup>3</sup> D°	2 -	J2
	10g,a	930.12	930.12	0.000 -	107 513	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)14d	<sup>3</sup> P - <sup>3</sup> P° <sup>3</sup> D°	2 -	J2
	20g,a	931.09	931.09	0.000 -	107 401	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)13d	<sup>3</sup> P - <sup>3</sup> P° <sup>3</sup> D°	2 -	J2
	20g,a	932.08	932.08	0.000 -	107 287	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)12d	<sup>3</sup> P - <sup>3</sup> P° <sup>3</sup> D°	2 -	J2
	20g,a	933.53	933.53	0.000 -	107 120	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)11d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	25g,a	935.19	935.19	0.000 -	106 930	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)10d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	30g,a	937.96	937.96	0.000 -	106 614	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)9d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	g,a,B	940.1	940.1	0.000 -	106 370	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)10s	<sup>3</sup> P - <sup>3</sup> P°	2 -	G1
	g,a,B	940.6	940.6	0.000 -	106 310	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)8d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	30g,a	941.21	941.21	0.000 -	106 246	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)8d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	25g,a	944.85	944.5	0.000 -	105 880	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)9s	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	g,a,B	945.7	945.7	0.000 -	105 740	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)7d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	g,a,B	946.3	946.3	573.640 -	106 246	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)8d	<sup>3</sup> P - <sup>3</sup> P°	0-1	G1,T1
	30g,a	946.45	946.43	0.000 -	105 660	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)7d	<sup>3</sup> P - <sup>3</sup> P°	2-1	J2
	30g,a	952.48	952.4	0.000 -	105 000	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)8s	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	g,a,B	953.6	953.6	0.000 -	104 870	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)6d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	40g,a	954.74	954.75	0.000 -	104 740	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)6d	<sup>3</sup> P - <sup>3</sup> P°	2-2	J2
	30g,a	958.32	958.37	396.055 -	104 740	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)6d	<sup>3</sup> P - <sup>3</sup> P°	1 -	J2
	40g,a	965.32	965.25	0.000 -	103 600	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)7s	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	g,a,B	967.4	967.4	0.000 -	103 370	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	40g,a	969.13	969.09	0.000 -	103 190	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	40g,a	990.05	990.10	0.000 -	101 000	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)6s	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	30g,a	993.93	994.00	396.055 -	101 000	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)6s	<sup>3</sup> P - <sup>3</sup> P°	1 -	J2
	g,a,B	994.6	994.6	0.000 -	100 540	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	40g,a	996.98	997.01	0.000 -	100 300	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	20g,a,B	1000.4	1000.3	573.640 -	100 540	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4d	<sup>3</sup> P - <sup>3</sup> D°	0-1	J2
	10g,a	1018.80	1018.80	0.000 -	98 155	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)22s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	15g,a	1019.09	1019.10	0.000 -	98 126	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)21s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	15g,a	1019.44	1019.44	0.000 -	98 093	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)20s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	20g,a	1019.87	1019.87	0.000 -	98 052	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)19s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	20g,a	1020.41	1020.41	0.000 -	98 000	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)18s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	30g,a	1021.03	1021.03	0.000 -	97 940	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)17s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	30g,a	1021.76	1021.76	0.000 -	97 870	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)16s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	40g,a	1022.73	1022.72	0.000 -	97 778	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)15s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	50g,a	1023.91	1023.91	0.000 -	97 665	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)14s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	45g,a	1025.08	1025.09	573.640 -	98 126	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)21s	<sup>3</sup> P - <sup>3</sup> D°	0-1	J2
	40g,a	1025.45	1025.44	573.640 -	98 093	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)20s	<sup>3</sup> P - <sup>3</sup> D°	0-1	S1
	50g,a	1025.95	1025.92	396.055 -	97 870	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)16s	<sup>3</sup> P - <sup>3</sup> D°	1 -	S1
	25g,a	1027.46	1027.46	0.000 -	97 327	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)12s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	g,a,B	1028.	1028.	0.000 -	97 276	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)10d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	35g,a	1029.98	1029.98	0.000 -	97 089	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)11s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	50a	1030.18	1030.17	9 238.609 -	106 310	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)8d	<sup>1</sup> D - <sup>3</sup> D°	2 -	S1
	g,a,B	1030.8	1030.8	0.000 -	97 012	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)9d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	50g,a	1033.95	1033.96	0.000 -	96 716	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)10s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	20g,a	1034.10	1034.10	573.640 -	97 276	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)10d	<sup>3</sup> P - <sup>3</sup> D°	0-1	J2
	30g,a	1034.38	1034.37	0.000 -	96 677	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>3</sup> P - <sup>1</sup> D°	2-2	J2
	40g,a	1034.67	1034.67	0.000 -	96 649	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>3</sup> P - <sup>3</sup> S°	2-1	J2
	g,a,B	1035.0	1035.0	0.000 -	96 618	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>3</sup> P - <sup>3</sup> D°	2 -	G1
	35a	1037.22	1037.11	9 238.609 -	105 660	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)7d	<sup>1</sup> Π - <sup>3</sup> P°	2 -	J2
	30g,a	1038.29	1038.29	0.000 -	96 312	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7d	<sup>3</sup> P - <sup>3</sup> P°	2 -	J2
	25g,a	1038.59	1038.63	396.055 -	96 677	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>3</sup> P - <sup>1</sup> D°	1-2	J2
	40g,a	1038.92	1038.93	396.055 -	96 649	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>3</sup> P - <sup>3</sup> S°	1-1	J2
	50g,a	1039.46	1039.46	0.000 -	96 204	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)9s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2
	40g,a	1040.11	1040.12	573.640 -	96 716	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)10s	<sup>3</sup> P - <sup>3</sup> D°	0-1	J2

S 1 - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	50g,a	1040.59	1040.59	0.000	96 099	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7d	<sup>3</sup> P - <sup>3</sup> S°	2-1	J2
	g,a,B	1041.6	1041.6	0.000	96 006	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7d	<sup>3</sup> P - <sup>3</sup> D°	2-	G1
	35g,a	1043.75	1043.75	396.055	96 204	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)9s	<sup>3</sup> P - <sup>3</sup> D°	1-	J2
	45g,a	1044.88	1044.90	396.055	96 099	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7d	<sup>3</sup> P - <sup>3</sup> S°	1-1	J2
	35g,a	1045.75	1045.75	0.000	95 625	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6d	<sup>3</sup> P - <sup>3</sup> P°	2-	J2
	40g,a	1048.83	1048.77	0.000	95 350	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8s	<sup>3</sup> P - <sup>3</sup> D°	2-	S1
	g,a,w	1049.82	1049.80	0.000	95 256	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6d	<sup>3</sup> P - <sup>3</sup> S°	2-1	T1
	55g,a,w	1050.32	1050.35	0.000	95 206	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	2-2	J2,T1
	50g,a	1050.55	1050.54	0.000	95 189	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	2-1	J2
	g,a,B	1051.5	1051.5	0.000	95 100	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6d	<sup>3</sup> P - <sup>3</sup> D°	2-	G1
	g,a,w	1054.17	1054.19	396.055	95 256	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6d	<sup>3</sup> P - <sup>3</sup> S°	1-1	T1
	g,a	1054.81	1054.74	396.055	95 206	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	1-2	T1
	40g,a	1054.93	1054.93	396.055	95 189	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	1-1	J2
	40g,a	1055.03	1055.02?	396.055	95 181?	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	1-0	J2
	50g,a,w	1056.91	1056.91	573.640	95 189	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>3</sup> P - <sup>3</sup> P°	0-1	J2
	4g,a	1059.15	1059.16	0.000	94 414	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> P°	2-	J2
	6g,a	1059.53	1059.54	0.000	94 381	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)3d	<sup>3</sup> P - <sup>3</sup> P°	2-	J2
	g,a,B	1061.8	1061.8	0.000	94 180	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)3d	<sup>3</sup> P - <sup>3</sup> D°	2-	G1
	45g,a	1063.33	1063.43	0.000	94 035	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7s	<sup>3</sup> P - <sup>1</sup> D°	2-2	J2
	55g,a	1063.60	1063.63	396.055	94 414	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> P°	1-	J2
	35g,a	1064.01	{ 1064.00 1064.01	396.055	94 381	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-	J2
	20g,a	1065.60	1065.64	0.000	93 984	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7s	<sup>3</sup> P - <sup>3</sup> D°	2-	
	40g,a	1065.82	1065.83	573.640	94 414	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> P°	0-1	S1
	20g,a	1068.08	1067.93	0.000	93 824	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> S°	2-1	J2
	40g,a	1070.33	1070.34	396.055	93 824	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> S°	1-1	J2
	g,a,B	1070.5	1070.5	0.000	93 410	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>3</sup> P - <sup>3</sup> D°	2-	G1
	70g,a	1092.67	1092.67	0.000	91 519	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	2-2	J2,T1
	60g,a	1093.05	1093.06	0.000	91 486	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	2-1	J2,T1
	80g,a,B	1094.32	1094.33	0.000	91 380	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6s	<sup>3</sup> P - <sup>3</sup> D°	2-	J2
	20g,a	1095.58	1095.58	0.000	91 276	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>1</sup> D°	2-2	J2
	g,a,B	1096.6	1096.6	0.000	91 190	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> S°	2-1	G1,T1
	45g,a	1097.40	1097.42	396.055	91 519	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	1-2	J2,T1
	45g,a	1097.81	1097.82	396.055	91 486	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	1-1	J2,T1
	30g,a	1098.02	1098.02?	396.055	91 469?	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	1-0	J2,T1
	20g,a,B	1099.14	1099.10	396.055	91 380	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6s	<sup>3</sup> P - <sup>3</sup> D°	1-2	J2,T1
	40g,a	1099.96	1099.96	573.640	91 486	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> P°	0-1	J2,T1
	20g,a,B	1101.26	1101.24	573.640	91 380	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6s	<sup>3</sup> P - <sup>3</sup> D°	0-1	J2,T1
	g,a,B	1103.60	1103.55	573.640	91 190	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> S°	0-1	T1
	g,a,BB	1106.	1106.	196.	90 600	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>3</sup> P - <sup>3</sup> D°		G1,T1
	a,a	1135.37	1135.22	9 238.609	97 327	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)12s	<sup>1</sup> D - <sup>3</sup> D°	2-	T1
	a	1138.35	1138.30	9 238.609	97 089	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)11s	<sup>1</sup> D - <sup>3</sup> D°	2-	T1
	a	1143.07	1143.15	9 238.609	96 716	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)10s	<sup>1</sup> D - <sup>3</sup> D°	2-	T1
	a	1143.66	1143.66	9 238.609	96 677	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)8d	<sup>1</sup> D - <sup>1</sup> D°	2-2	T1
	a	1149.99	1149.88	9 238.609	96 204	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)9s	<sup>1</sup> D - <sup>3</sup> D°	2-	T1
	a	1150.82	1150.82	9 238.609	96 133	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7d	<sup>1</sup> D - <sup>1</sup> D°	2-2	T1
	a	1154.27	1154.269	9 238.609	95 873.5	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)3d	<sup>1</sup> D - <sup>1</sup> P°	2-1	T1
	85g,a	1156.00	1156.0265	0.000	86 503.21	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	2-2	J2,T1
	75g,a	1156.26	1156.2756	0.000	86 484.57	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	2-1	J2,T1
	10	1157.403	1157.4028	9 238.609	95 638.95	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>1</sup> D - <sup>1</sup> P°	2-1	K1
	90g,a	1161.34	{ 1161.3312 1161.3436	0.000	86 108.08	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>3</sup> P - <sup>1</sup> D°	2-2	J2,T1
	70g,a	1161.57	1161.5951	396.055	86 503.21	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-2	
	75g,a	1161.72	1161.7489	396.055	86 473.17	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-0	J2,T1
	a	1161.97	1161.97	9 238.609	95 299	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6d	<sup>1</sup> D - <sup>1</sup> D°	2-2	T1

S 1 - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	60g,a	1163.98	1163.9962	573.640 -	86 484.57	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	0 - 1	J2,T1
	90g,a,B	1167.30	1167.13	0.000 -	85 680	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>3</sup> P - <sup>3</sup> D°	2 -	J2,T1
	60g,a	1168.03	1168.03	0.000 -	85 614	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d?	<sup>3</sup> P - <sup>1</sup> D°?	2 - 2	J2,T1
	90g,a,B	1170.56	1170.55	0.000 -	85 430	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> S°	2 - 1	J2
	60g,a,B	1172.51	1172.55	396.055 -	85 680	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	J2
	g,a,B	1175.1	1175.00	573.640 -	85 680	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	T1
	g,a,B	1176.0	1176.00	396.055 -	85 430	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> S°	1 - 1	T1
	a	1179.30	1179.30	9 238.609 -	94 035	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)7s	<sup>1</sup> D - <sup>1</sup> D°	2 - 2	T1
	a	1181.59	1181.59	9 238.609 -	93 870	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5d	<sup>1</sup> D - <sup>1</sup> D°	2 - 2	T1
	g,a,BB	1195.	1195.	196. -	83 900	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> D°		T1
	1g	1205.565	1205.564	0.000 -	82 948.7	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)14d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	3g	1207.015	1207.015	0.000 -	82 849.0	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)13d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	5g	1208.850	1208.851	0.000 -	82 723.2	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)12d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	10g	1211.212	1211.212	0.000 -	82 561.9	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	g,a	1211.38	1211.35	396.055 -	82 948.7	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)14d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	T1
	1g	1212.795	1212.794	396.055 -	82 850.3	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)13d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	g,a	1213.99	1213.96	573.640 -	82 948.7	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)14d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	T1
	1g	1214.295	1214.2944	0.000 -	82 352.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10d	<sup>3</sup> P - <sup>3</sup> D°	2 - 2	K1
	20g	1214.318	1214.3177	0.000 -	82 350.77	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	3g	1214.641	1214.640	396.055 -	82 725.0	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)12d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	a	1214.98	1214.97?	9 238.609 -	91 545?	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)6s	<sup>1</sup> D - <sup>1</sup> D°	2 - 2	T1
	a,bl	1215.45	1215.36	9 238.609 -	91 519	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>1</sup> D - <sup>3</sup> P°	2 - 2	T1
	5g	1216.425	1216.4241	0.000 -	82 208.17	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11s	<sup>3</sup> P - <sup>3</sup> S°	2 - 1	K1
	5g	1217.025	1217.026	396.055 -	82 563.6	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	g,a	1217.27	1217.27	573.640 -	82 724.6	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)12d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	T1
	g	1218.51	1218.5133	0.000 -	82 067.22	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	2 - 1	T1
	2g	1218.571	1218.5701	0.000 -	82 063.40	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	2 - 2	K1
	35g	1218.595	1218.5953	0.000 -	82 061.70	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	a	1218.95	1218.96	9 238.609 -	91 276	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4d	<sup>1</sup> D - <sup>1</sup> D°	2 - 2	T1
	1g	1219.649	1219.650	573.640 -	82 564.4	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	K1
	10g	1220.162	1220.1625	396.055 -	82 352.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	15g	1221.753	1221.7519	0.000 -	81 849.68	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10s	<sup>3</sup> P - <sup>3</sup> S°	2 - 1	K1
	2g	1222.312	1222.3128	396.055 -	82 208.17	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11s	<sup>3</sup> P - <sup>3</sup> S°	1 - 1	K1
	1g	1222.799	1222.7987	573.640 -	82 353.25	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	K1
	1g	1224.424	1224.4223	396.055 -	82 067.22	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	1 - 1	K1
	20g	1224.479	1224.4796	396.055 -	82 063.40	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	20g	1224.544	1224.5440	0.000 -	81 663.05	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	g,a	1224.99	1224.9718	573.640 -	82 208.17	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)11s	<sup>3</sup> P - <sup>3</sup> S°	0 - 1	T1
	6g	1227.089	1227.0906	573.640 -	82 067.22	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	K1
	10g	1227.692	1227.6925	396.055 -	81 849.68	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10s	<sup>3</sup> P - <sup>3</sup> S°	1 - 1	K1
	35g	1229.608	1229.6068	0.000 -	81 326.81	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9s	<sup>3</sup> P - <sup>3</sup> S°	2 - 1	K1
	2g	1230.374	1230.3749	573.640 -	81 849.68	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)10s	<sup>3</sup> P - <sup>3</sup> S°	0 - 1	K1
	6g	1230.473	1230.4731	396.055 -	81 665.61	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8d	<sup>3</sup> P - <sup>3</sup> D°	1 - 2	K1
	1g	1233.132	1233.1324	573.640 -	81 667.93	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	K1
	5g	1233.922	1233.9243	396.055 -	81 438.30	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>1</sup> P°	1 - 1	K1
	20g	1235.624	1235.6242	396.055 -	81 326.81	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9s	<sup>3</sup> P - <sup>3</sup> S°	1 - 1	K1
	7g	1236.632	1236.6342	573.640 -	81 438.30	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>1</sup> P°	0 - 1	K1
	10g	1238.340	1238.3415	573.640 -	81 326.81	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)9s	<sup>3</sup> P - <sup>3</sup> S°	0 - 1	K1
	g,a	1239.33	1239.3321	396.055 -	81 084.67	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7d	<sup>3</sup> P - <sup>3</sup> D°	1 - 1	T1
	200g	1241.905	1241.9050	0.000 -	80 521.46	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8s	<sup>3</sup> P - <sup>3</sup> S°	2 - 1	K1
	g,a	1242.03	1242.0658	573.640 -	81 084.67	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7d	<sup>3</sup> P - <sup>3</sup> D°	0 - 1	T1
	400g	1247.1600	1247.1602	0.000 -	80 182.16	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6d	<sup>3</sup> P - <sup>3</sup> D°	2 - 3	K1
	120g	1248.0451	1248.0436	396.055 -	80 521.46	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8s	<sup>3</sup> P - <sup>3</sup> S°	1 - 1	K1
	50g	1250.8138	1250.8158	573.640 -	80 521.46	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)8s	<sup>3</sup> P - <sup>3</sup> S°	0 - 1	K1
	40g	1253.297	1253.2970	396.055 -	80 185.60	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6d	<sup>3</sup> P - <sup>3</sup> D°	1 - 1	K1

S I - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	300g	1253.3250	1253.3248	396.055 -	80 183.83	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6d	3p - <sup>3</sup> D°	1 - 2	K1
	120g	1256.0930	1256.0927	573.640 -	80 185.60	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6d	3p - <sup>3</sup> D°	0 - 1	K1
	800g	1262.8596	1262.8599	0.000 -	79 185.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7s	3p - <sup>3</sup> S°	2 - 1	K1
	500g	1269.2086	1269.2080	396.055 -	79 185.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7s	3p - <sup>3</sup> S°	1 - 1	K1
	1500g	1270.7821	1270.7804	0.000 -	78 691.80	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	3p - <sup>3</sup> D°	2 - 3	K1
			1270.7874	0.000 -	78 691.37	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	3p - <sup>3</sup> D°	2 - 2	
	200g	1272.0749	1272.0751	573.640 -	79 185.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7s	3p - <sup>3</sup> S°	0 - 1	K1
	300g	1277.1985	1277.1967	396.055 -	78 692.53	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	3p - <sup>3</sup> D°	1 - 1	K1
	1200g	1277.2122	1277.2156	396.055 -	78 691.37	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	3p - <sup>3</sup> D°	1 - 2	K1
	500g	1280.0991	1280.1001	573.640 -	78 692.53	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	3p - <sup>3</sup> D°	0 - 1	K1
UV9	1600g	1295.6526	1295.6532	0.000 -	77 181.15	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> P°	2 - 2	K1
UV9	800g	1296.1738	1296.1740	0.000 -	77 150.14	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> P°	2 - 1	K1
	80	1300.9066	1300.9066	9 238.609 -	86 108.08	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>1</sup> D - <sup>1</sup> D°	2 - 2	K1
UV9	1500g	1302.3370	1302.3361	396.055 -	77 181.15	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> D°	1 - 2	K1
UV9	1000g	1302.8633	1302.8623	396.055 -	77 150.14	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> P°	1 - 1	K1
UV9	1000g	1303.1105	1303.1105	396.055 -	77 135.52	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> P°	1 - 0	K1
	1100g	1303.4295	1303.4301	0.000 -	76 720.65	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6s	3p - <sup>3</sup> S°	2 - 1	K1
UV9	1300g	1305.8834	1305.8837	573.640 -	77 150.14	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	3p - <sup>3</sup> P°	0 - 1	K1
	a,B	1308.2	1308.2	9 238.609 -	85 680	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)5s	<sup>1</sup> D - <sup>3</sup> D°	2 -	T1
	a,w	1309.3	1309.3	9 238.609 -	85 614	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d?	<sup>1</sup> D - <sup>1</sup> D°?	2 - 2	T1
	1400g	1310.1940	1310.1936	396.055 -	76 720.65	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6s	3p - <sup>3</sup> S°	1 - 1	K1
	600g	1313.2493	1313.2492	573.640 -	76 720.65	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6s	3p - <sup>3</sup> S°	0 - 1	K1
UV8	3000g	1316.5423	1316.5425	0.000 -	75 956.53	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	2 - 3	K1
UV8	1800g	1316.6183	1316.6150	0.000 -	75 952.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	2 - 2	K1
UV8			1316.6219	0.000 -	75 951.95	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	2 - 1	
UV8	3500g	1323.5153	1323.5165	396.055 -	75 952.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	1 - 2	K1
UV8	400g	1323.5220	1323.5234	396.055 -	75 951.95	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	1 - 1	K1
UV8	3000g	1326.6432	1326.6416	573.640 -	75 951.95	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>3</sup> D°	0 - 1	K1
	2g	1333.792	1333.7939	0.000 -	74 974.10	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>5</sup> D°	2 - 3	K1
	1g	1340.852	1340.8575	396.055 -	74 975.19	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	3p - <sup>5</sup> D°	1 - 2	K1
	a	1356.97	1356.971	22 179.954 -	95 873.5	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)3d	<sup>1</sup> S - <sup>1</sup> P°	0 - 1	T1
	30	1361.3040	1361.3037	22 179.954 -	95 638.95	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)5s	<sup>1</sup> S - <sup>1</sup> P°	0 - 1	K1
	60	1363.0330	1363.0328	9 238.609 -	82 604.41	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>1</sup> D - <sup>1</sup> P°	2 - 3	K1
UV7	25000g	1381.5521	1381.5527	0.000 -	72 382.328	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	2 - 1	K1
	1	1385.041	1385.0475	9 238.609 -	81 438.30	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>1</sup> D - <sup>1</sup> P°	2 - 1	K1
UV7	20000g	1385.5100	1385.5103	396.055 -	72 571.63	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	1 - 0	K1
UV7	45000g	1388.4347	1388.4358	0.000 -	72 023.495	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	2 - 2	K1
UV7	15000g	1389.1538	1389.1537	396.055 -	72 382.328	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	1 - 1	K1
UV7	25000g	1392.5878	1392.5892	573.640 -	72 382.328	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	0 - 1	K1
UV7	50000g	1396.1122	1396.1130	396.055 -	72 023.495	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	3p - <sup>3</sup> P°	1 - 2	K1
UV6	1500g	1401.5136	1401.5142	0.000 -	71 351.399	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s	3p - <sup>3</sup> S°	2 - 1	K1
UV6	2000g	1409.3369	1409.3372	396.055 -	71 351.399	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s	3p - <sup>3</sup> S°	1 - 1	K1
UV6	1500g	1412.8726	1412.8732	573.640 -	71 351.399	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s	3p - <sup>3</sup> S°	0 - 1	K1
	1g	1414.368	1414.3713	0.000 -	70 702.790	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s	3p - <sup>5</sup> S°	2 - 2	K1
UV5	8000g	1425.0301	1425.0300	0.000 -	70 173.96	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> D°	2 - 3	K1
UV5	1200g	1425.1882	1425.1879	0.000 -	70 166.187	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> D°	2 - 2	K1
UV5	700g	1425.2190	1425.2191	0.000 -	70 164.650	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> D°	2 - 1	K1
UV5	5000g	1433.2800	1433.2781	396.055 -	70 166.187	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> D°	1 - 2	K1
UV5	1500g	1433.3105	1433.3096	396.055 -	70 164.650	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> P°	1 - 1	K1
UV5	2000g	1436.9675	1436.9672	573.640 -	70 164.650	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	3p - <sup>3</sup> D°	0 - 1	K1
	1	1439.8165	1439.8187	9 238.609 -	78 691.80	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5d	<sup>1</sup> D - <sup>3</sup> D°	2 - 3	K1



S 1 - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
UV12	200g	1444.2967	1444.2960	0.000 -	69 237.886	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>1</sup> D°	2-2	K1
	2000	1448.2290	1448.2295	9 238.609 -	78 288.44	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	<sup>1</sup> D - <sup>1</sup> P°	2-1	K1
	150	1471.8320	1471.8319	9 238.609 -	77 181.15	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> F°)4s	<sup>1</sup> D - <sup>3</sup> P°	2-2	K1
	8	1472.5030	1472.5040	9 238.609 -	77 150.14	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	<sup>1</sup> D - <sup>3</sup> P°	2-1	K1
UV4	5000g	1472.9720	1472.9708	0.000 -	67 890.008	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P - <sup>5</sup> D°	2-3	K1
UV4	1800g	1473.0185	1473.0188	0.000 -	67 887.797	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P - <sup>5</sup> D°	2-2	K1
UV3	10000g	1473.9948	1473.9943	0.000 -	67 842.867	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	2-3	K1
UV3	2000g	1474.3800	1474.3785	0.000 -	67 825.188	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	2-2	K1
UV3	600g	1474.5715	1474.5707	0.000 -	67 816.351	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	2-1	K1
UV4	3000g	1481.6650	1481.6627	396.055 -	67 887.797	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P - <sup>5</sup> D°	1-2	K1
UV4	1500g	1481.7125	1481.7126	396.055 -	67 885.527	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P - <sup>5</sup> D°	1-1	K1
UV3	7000g	1483.0390	1483.0385	396.055 -	67 825.188	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	1-2	K1
UV3	2000g	1483.2330	1483.2329	396.055 -	67 816.351	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	1-1	K1
UV4	2500g	1485.6224	1485.6217	573.640 -	67 885.527	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P - <sup>5</sup> D°	0-1	K1
UV3	4000g	1487.1500	1487.1500	573.640 -	67 816.351	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>3</sup> P - <sup>3</sup> D°	0-1	K1
UV11	8	1498.850	1498.8477	9 238.609 -	75 956.53	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	<sup>1</sup> D - <sup>3</sup> D°	2-3	K1
	2	1498.942	1498.9416	9 238.609 -	75 952.35	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4d	<sup>1</sup> D - <sup>3</sup> D°	2-2	K1
	1	1583.683	1583.6888	9 238.609 -	72 382.328	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>1</sup> D - <sup>3</sup> P°	2-1	K1
	4	1592.736	1592.7400	9 238.609 -	72 023.495	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>1</sup> D - <sup>3</sup> P°	2-2	K1
	15	1641.085	1641.0835	9 238.609 -	70 173.96	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>1</sup> D - <sup>3</sup> D°	2-3	K1
	40	1641.296	1641.2928	9 238.609 -	70 166.187	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>1</sup> D - <sup>3</sup> D°	2-2	K1
	17500	1666.6875	1666.6868	9 238.609 -	69 237.886	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>1</sup> D - <sup>1</sup> D°	2-2	K1
	15000	1687.5305	1687.5260	22 179.954 -	81 438.30	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>1</sup> S - <sup>1</sup> P°	0-1	K1
	10	1704.986	1704.9891	9 238.609 -	67 890.008	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>1</sup> D - <sup>5</sup> D°	2-3	K1
	2	1705.115	1705.1194	9 238.609 -	67 885.527	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>1</sup> D - <sup>5</sup> D°	2-1	K1
UV10	40	1706.360	1706.3606	9 238.609 -	67 842.867	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>1</sup> D - <sup>3</sup> D°	2-3	K1
UV10	25	1707.132	1707.1331	9 238.609 -	67 816.351	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s	<sup>1</sup> D - <sup>3</sup> D°	2-1	K1
UV13	500	1782.2626	1782.2616	22 179.954 -	78 288.44	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> P°)4s	<sup>1</sup> S - <sup>1</sup> P°	0-1	K1
UV2	20000g	1807.3108	1807.3113	0.000 -	55 330.811	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>3</sup> P - <sup>3</sup> S°	2-1	K1
UV2	17500g	1820.3426	1820.3412	396.055 -	55 330.811	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>3</sup> P - <sup>3</sup> S°	1-1	K1
UV2	15000g	1826.2451	1826.2448	573.640 -	55 330.811	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>3</sup> P - <sup>3</sup> S°	0-1	K1
UV1	20000g	1900.2863	1900.2866	0.000 -	52 623.640	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>3</sup> P - <sup>5</sup> S°	2-2	K1
UV1	10000g	1914.6982	1914.6970	396.055 -	52 623.640	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>3</sup> P - <sup>5</sup> S°	1-2	K1
UV1	25	1991.9369	1991.9377	22 179.954 -	72 382.328	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>1</sup> S - <sup>3</sup> P°	0-1	K1

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	10	2168.8851	2168.8840	2169.5644	9 238.609 -	55 330.811	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s	<sup>1</sup> D - <sup>3</sup> S°	2-1	K1
	1	3962.00	3961.974	3963.095	52 623.640 -	77 856.446	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> S° - <sup>5</sup> P	2-3	M1
	1	3962.49	3962.478	3963.599	52 623.640 -	77 853.234	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> S° - <sup>5</sup> P	2-2	M1
	2	4034.01	4034.06	4035.20	55 330.811 -	80 112.73	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)7p	<sup>3</sup> S° - <sup>3</sup> P	1-2	M1
	1	4150.37	4150.41	4151.58	55 330.811 -	79 418.01	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> S° - <sup>3</sup> P	1-0	F1
	50	4152.604	4152.604	4153.775	55 330.811 -	79 405.30	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> S° - <sup>3</sup> P	1-1	K1
	25	4157.699	4157.698	4158.871	55 330.811 -	79 375.80	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> S° - <sup>3</sup> P	1-2	K1
	10M1	4589.2606	4589.2605	4590.5464	396.055 -	22 179.954	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>3</sup> P - <sup>1</sup> S	1-0	E1
		4625.28	4625.28	4626.58	64 888.964 -	86 503.21	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-2	A1
		4626.06	4626.06	4627.35	64 892.582 -	86 503.21	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	2-2	A1
		4629.27	4629.28	4630.57	64 888.964 -	86 484.57	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-1	A1
		4629.80	4629.79	4631.09	64 891.386 -	86 484.57	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	0-1	A1
		4630.05	4630.05	4631.35	64 892.582 -	86 484.57	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	2-1	A1
		4631.72	4631.72	4633.02	64 888.964 -	86 473.17	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)3d	<sup>3</sup> P - <sup>3</sup> P°	1-0	A1
	2	10	4694.13	4694.113	4695.426	52 623.640 -	73 920.961	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>5</sup> S° - <sup>5</sup> P	2-3







S I - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.	
		Observed	Calculated		Lower	Upper					
3	5	9958.859	9958.863	9961.593	67 816.351	77 854.906	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> D° - <sup>1</sup> P	1 - 1	J1	
	3	9962.989	9962.997	9965.729	67 816.351	77 850.740	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>3</sup> D° - <sup>5</sup> F	1 - 1	J1	
	2	9971.591	9971.586	9974.320	67 887.797	77 913.543	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>3</sup> P	2 - 1	J1	
	1	9971.71	9971.779	9974.513	67 825.188	77 850.740	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>3</sup> D° - <sup>5</sup> P	2 - 1	F1	
	1	9980.54	9980.611	9983.347	67 885.527	77 902.208	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>3</sup> P	1 - 0	J1	
	2	9996.736	9996.735	9999.476	67 890.008	77 890.532	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>3</sup> P	3 - 2	J1	
			Wavenumber (cm <sup>-1</sup> )		Vacuum Wavelength (Å)						
			Observed	Calculated							
		4	9978.816	9978.811	10021.234	67 877.635	77 856.446	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>5</sup> P	4 - 3	J1
		1	9967.098	9967.109	10033.000	67 887.797	77 854.906	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>5</sup> D° - <sup>1</sup> P	2 - 1	J1
		1	9966.433	9966.438	10033.675	67 890.008	77 856.446	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>3</sup> P	3 - 3	J1
		2	9965.429	9965.437	10034.683	67 887.797	77 853.234	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>5</sup> P	2 - 2	J1
		2	9965.210	9965.213	10034.908	67 885.527	77 850.740	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>5</sup> P	1 - 1	J1
		2	9963.234	9963.226	10036.910	67 890.008	77 853.234	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>5</sup> P	3 - 2	J1
		1	9962.940	9962.943	10037.195	67 887.797	77 850.740	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>5</sup> D° - <sup>5</sup> P	2 - 1	J1
		1850	9561.769	9561.771	10458.314	55 330.811	64 892.582	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p	<sup>3</sup> S° - <sup>3</sup> P	1 - 2	J1
		310	9560.575	9560.575	10459.622	55 330.811	64 891.386	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p	<sup>3</sup> S° - <sup>3</sup> P	1 - 0	J1
		1300	9558.153	9558.153	10462.272	55 330.811	64 888.964	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p	<sup>3</sup> S° - <sup>3</sup> P	1 - 1	J1
		210	9402.037	9402.037	10635.993	69 237.886	78 639.923	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>1</sup> D° - <sup>1</sup> F	2 - 3	J1
		100M1	9238.608	9238.609	10824.140	0.000	9 238.609	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	<sup>3</sup> P - <sup>1</sup> D	2 - 2	E1
	9	9125.54	9125.565	10958.226	63 446.065	72 571.63	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	1 - 0	J1	
	136l	8979.51	8979.40	11136.60	70 164.650	79 144.05	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5f	<sup>3</sup> D° - <sup>3</sup> F	1 - 2	J1	
	18	8977.932	8977.86	11138.51	70 166.187	79 144.05	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5f	<sup>3</sup> D° - <sup>3</sup> F	2 - 3	J1	
	25	8970.146	8970.09	11148.16	70 173.96	79 144.05	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5f	<sup>3</sup> D° - <sup>3</sup> F	3 - 4	J1	
	16	8936.263	8936.263	11190.360	63 446.065	72 382.328	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	1 - 1	J1	
	5	8925.184	8925.186	11204.248	63 457.142	72 382.328	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	2 - 1	J1	
	28	8914.438	8914.450	11217.742	69 237.886	78 152.336	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>1</sup> D° - <sup>3</sup> D	2 - 1	J1	
	M1		8842.554	11308.950	396.055	9 238.609	3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	<sup>3</sup> P - <sup>1</sup> D	1 - 2		
	1	8839.94	8840.007	11312.208	67 816.351	76 656.358	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>3</sup> D° - <sup>3</sup> F	1 - 2	J1	
	1	8838.50	8838.496	11314.142	67 816.351	76 654.847	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>3</sup> D° - <sup>5</sup> F	1 - 1	J1	
	2	8813.45	{ 8813.463 8813.457	{ 11346.278 11346.286	67 842.867	76 656.330 76 656.324	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>3</sup> D° - <sup>3</sup> F <sup>3</sup> D° - <sup>3</sup> F	3 - 3 3 - 4	J1	
	24	8811.907	{ 8811.927 8811.900	{ 11348.256 11348.290	67 842.867	76 654.794 76 654.767	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>3</sup> D° - <sup>5</sup> F <sup>3</sup> D° - <sup>5</sup> F	3 - 3 3 - 4	J1	
	19	265	8777.134	{ 8777.134 8777.132	{ 11393.241 11393.243	67 877.635	76 654.769 76 654.767	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>5</sup> D° - <sup>5</sup> F <sup>5</sup> D° - <sup>5</sup> F	4 - 5 4 - 4	J1
	19	30	8770.689	8770.689	11401.613	67 884.158	76 654.847	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>5</sup> D° - <sup>5</sup> F	0 - 1	J1
	19	85	8769.296	{ 8769.320 8769.284	{ 11403.393 11403.440	67 885.527	76 654.847 76 654.811	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>5</sup> D° - <sup>5</sup> F <sup>5</sup> D° - <sup>5</sup> F	1 - 1 1 - 2	J1
	19	150	8767.004	{ 8767.014 8766.997	{ 11406.392 11406.414	67 887.797	76 654.811 76 654.794	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>5</sup> D° - <sup>5</sup> F <sup>5</sup> D° - <sup>5</sup> F	2 - 2 2 - 3	J1
	19	165	8764.766	{ 8764.786 8764.759	{ 11409.292 11409.327	67 890.008	76 654.794 76 654.767	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4f	<sup>5</sup> D° - <sup>5</sup> F <sup>5</sup> D° - <sup>5</sup> F	3 - 3 3 - 4	J1
	19	4	8737.50		11444.92					J1	
	6	8675.657	8675.657	11526.505	69 237.886	77 913.543	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>1</sup> D° - <sup>3</sup> P	2 - 1	J1	
	13	8617.017	8617.020	11604.940	69 237.886	77 854.906	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>1</sup> D° - <sup>1</sup> P	2 - 1	J1	
	4	8612.854	8612.854	11610.553	69 237.886	77 850.740	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)6p	<sup>1</sup> D° - <sup>5</sup> P	2 - 1	J1	
	10	8577.431	8577.430	11658.504	63 446.065	72 023.495	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	1 - 2	J1	
	10	8566.355	8566.353	11673.579	63 457.142	72 023.495	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	2 - 2	J1	
	2	8548.46	8548.444	11698.035	63 475.051	72 023.495	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)4p - 3s <sup>2</sup> 3p <sup>5</sup>	<sup>5</sup> P - <sup>3</sup> P°	3 - 2	J1	
	10	8029.234	8029.220	12454.510	70 173.96	78 203.180	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> D° - <sup>3</sup> D	3 - 3	J1	
	4	7987.659	7987.686	12519.270	70 164.650	78 152.336	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> D° - <sup>3</sup> D	1 - 1	J1	
	6	7985.938	{ 7986.149 7985.884	{ 12521.680 12522.095	{ 70 166.187 70 166.187	{ 78 152.336 78 152.071	3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)3d - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>2</sup> D°)4p	<sup>3</sup> D° - <sup>3</sup> D <sup>3</sup> D° - <sup>3</sup> D	2 - 1 2 - 2	J1	

## Si - Continued

Mult. No.	Rel. Int.	Wavenumber ( $\text{cm}^{-1}$ )		Vacuum Wave- length ( $\text{\AA}$ )	Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	5	7682.69	7682.67	13016.31	64 888.964 - 72 571.63		$3s^2 3p^3(4S)4p - 3s 3p^5$	$3P - 3P^o$	1-0	J1
	8	7493.367	7493.364	13345.141	64 888.964 - 72 382.328		$3s^2 3p^3(4S)4p - 3s 3p^5$	$3P - 3P^o$	1-1	J1
	6	7489.747	7489.746	13351.588	64 892.582 - 72 382.328		$3s^2 3p^3(4S)4p - 3s 3p^5$	$3P - 3P^o$	2-1	J1
	12	7256.724	7256.725	13780.321	63 446.065 - 70 702.790		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$5P - 5S^o$	1-2	J1
	160	7245.648	7245.648	13801.388	63 457.142 - 70 702.790		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$5P - 5S^o$	2-2	J1
	240	7227.740	7227.739	13835.585	63 475.051 - 70 702.790		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$5P - 5S^o$	3-2	J1
	1	7134.532	7134.531	14016.338	64 888.964 - 72 023.495		$3s^2 3p^3(4S)4p - 3s 3p^5$	$3P - 3P^o$	1-2	J1
	30	7130.911	7130.913	14023.450	64 892.582 - 72 023.495		$3s^2 3p^3(4S)4p - 3s 3p^5$	$3P - 3P^o$	2-2	J1
	75	6491.708	6491.708	15404.27	70 164.650 - 76 656.358		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)4f$	$3D^o - 3F$	1-2	J1
	130	6490.147	6490.171	15407.92	70 166.187 - 76 656.358		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)4f$	$3D^o - 3F$	2-2	J1
			6490.143	15407.98	70 166.187 - 76 656.330		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)4f$	$3D^o - 3F$	2-3	
	210	6482.965	6482.370	15426.46	70 173.96 - 76 656.330		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)4f$	$3D^o - 3F$	3-3	J1
			6482.364	15426.47	70 173.96 - 76 656.324		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)4f$	$3D^o - 3F$	3-4	
	95	6462.436	6462.435	15474.04	64 888.964 - 71 351.399		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$3P - 3S^o$	1-1	J1
	35	6460.014	6460.013	15479.84	64 891.386 - 71 351.399		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$3P - 3S^o$	0-1	J1
	145	6458.816	6458.817	15482.71	64 892.582 - 71 351.399		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)5s$	$3P - 3S^o$	2-1	J1
	25	6043.325	6043.326	16547.18	67 877.635 - 73 920.961		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	4-3	J1
	4	6030.943	6030.953	16581.13	67 890.008 - 73 920.961		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	3-3	J1
	6	6027.128	6027.131	16591.64	67 887.797 - 73 914.928		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	2-2	J1
	4	6025.734	6025.732	16595.49	67 885.527 - 73 911.259		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	1-1	J1
	6	6024.922	6024.920	16597.73	67 890.008 - 73 914.928		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	3-2	J1
	3	6023.453	6023.462	16601.75	67 887.797 - 73 911.259		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$5D^o - 5P$	2-1	J1
					64 892.582 - 70 173.96		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	2-3	J1
	635	5281.378	5281.378	18934.45	64 892.582 - 70 173.96		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	2-3	J1
	335	5277.223	5277.223	18949.36	64 888.964 - 70 166.187		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	1-2	J1
	55	5275.685	5275.686	18954.88	64 888.964 - 70 164.650		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	1-1	J1
	80bl	5273.58	5273.605	18962.36	64 892.582 - 70 166.187		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	2-2	J1
		5273.23	5273.264	18963.59	64 891.386 - 70 164.650		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	0-1	J1
	5	5272.070	5272.068	18967.89	64 892.582 - 70 164.650		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$3P - 3D^o$	2-1	J1
					$\mu\text{m}$					
	115	4441.733	4441.732	2.251374	63 446.065 - 67 887.797		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	1-2	J1
	185	4439.462	4439.462	2.252525	63 446.065 - 67 885.527		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	1-1	J1
	116	4438.093	4438.093	2.253220	63 446.065 - 67 884.158		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	1-0	J1
	280	4432.866	4432.866	2.255877	63 457.142 - 67 890.008		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	2-3	J1
	225	4430.655	4430.655	2.257003	63 457.142 - 67 887.797		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	2-2	J1
	75	4428.386	4428.385	2.258160	63 457.142 - 67 885.527		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	2-1	J1
	135	4414.958	4414.957	2.265028	63 475.051 - 67 890.008		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	3-3	J1
	25	4412.746	4412.746	2.266163	63 475.051 - 67 887.797		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	3-2	J1
	1250	4402.584	4402.584	2.271393	63 475.051 - 67 877.635		$3s^2 3p^3(4S)4p - 3s^2 3p^3(4S)3d$	$5P - 5D^o$	3-4	J1
	70	4385.725	4385.725	2.280125	63 457.142 - 67 842.867		$3s^2 3p^3(4S)4p - 3s^2 3p^3(2D)4s$	$5P - 3D^o$	2-3	J1
	5	4379.122	4379.123	2.283562	63 446.065 - 67 825.188		$3s^2 3p^3(4S)4p - 3s^2 3p^3(2D)4s$	$5P - 3D^o$	1-2	J1
	1	4370.271	4370.286	2.288180	63 446.065 - 67 816.351		$3s^2 3p^3(4S)4p - 3s^2 3p^3(2D)4s$	$5P - 3D^o$	1-1	J1
	26bl	4368.06	4368.046	2.289553	63 457.142 - 67 825.188		$3s^2 3p^3(4S)4p - 3s^2 3p^3(2D)4s$	$5P - 3D^o$	2-2	J1
		4367.817	4367.816	2.289474	63 475.051 - 67 842.867		$3s^2 3p^3(4S)4p - 3s^2 3p^3(2D)4s$	$5P - 3D^o$	3-3	J1
	2	4359.61	4359.73	2.293720	73 911.259 - 78 270.99		$3s^2 3p^3(4S)5p - 3s^2 3p^3(4S)5d$	$5P - 5D^o$	1-2	J1
	2	4355.60	4355.59	2.295900	73 914.928 - 78 270.52		$3s^2 3p^3(4S)5p - 3s^2 3p^3(4S)5d$	$5P - 5D^o$	2-3	J1
	5bl	4349.43	4349.56	2.299083	73 920.961 - 78 270.52		$3s^2 3p^3(4S)5p - 3s^2 3p^3(4S)5d$	$5P - 5D^o$	3-3	J1
					73 920.961 - 78 270.10		$3s^2 3p^3(4S)5p - 3s^2 3p^3(4S)5d$	$5P - 5D^o$	3-4	J1
	4	4107.002	4107.001	2.434867	70 164.650 - 74 271.651		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$3D^o - 3P$	1-0	J1
	3	4104.959	4104.950	2.436083	70 164.650 - 74 269.600		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$3D^o - 3P$	1-1	J1
	11	4103.413	4103.413	2.436996	70 166.187 - 74 269.600		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$3D^o - 3P$	2-1	J1
	4	4102.360	4102.360	2.437621	70 166.187 - 74 268.547		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$3D^o - 3P$	2-2	J1
	21	4094.589	4094.587	2.442249	70 173.96 - 74 268.547		$3s^2 3p^3(4S)3d - 3s^2 3p^3(4S)5p$	$3D^o - 3P$	3-2	J1
	7	4077.843		2.452277						J1
	3	4032.621		2.479777						J1

S I - Continued

Mult. No.	Rel. Int.	Wavenumber (cm <sup>-1</sup> )		Vacuum Wavelength (μm)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	2	3973.992		2.516361						J1
	5	3817.928		2.619222						J1
	6	3772.687		2.650631						J1
	9	3771.945		2.651152						J1
	13	3770.689		2.652035						J1
	23	3218.174	3218.171	3.107355	70 702.790 - 73 920.961		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>5</sup> S° - <sup>5</sup> P	2-3	J1
	18	3212.137	3212.138	3.113191	70 702.790 - 73 914.928		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>5</sup> S° - <sup>5</sup> P	2-2	J1
	11	3208.470	3208.469	3.116751	70 702.790 - 73 911.259		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>5</sup> S° - <sup>5</sup> P	2-1	J1
	2	2920.251	2920.252	3.424362	71 351.399 - 74 271.651		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>3</sup> S° - <sup>3</sup> P	1-0	J1
	6	2918.192	2918.201	3.426769	71 351.399 - 74 269.600		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>3</sup> S° - <sup>3</sup> P	1-1	J1
	12	2917.143	2917.148	3.428006	71 351.399 - 74 268.547		3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5s - 3s <sup>2</sup> 3p <sup>3</sup> ( <sup>4</sup> S°)5p	<sup>3</sup> S° - <sup>3</sup> P	1-2	J1
	M1	396.12	396.055	25.2490	0.000 - 396.055		3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	<sup>3</sup> P - <sup>3</sup> P	2-1	H2
	M1		177.585	56.311	396.055 - 573.640		3s <sup>2</sup> 3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	<sup>3</sup> P - <sup>3</sup> P	1-0	

## S II

## P I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 3s^2 3p^3 \ ^4S_{3/2}$ Ionization energy  $188\,232.7 \pm 2.0 \text{ cm}^{-1}$  ( $23.337\,89 \pm 0.000\,25 \text{ eV}$ )

The estimated errors of Petterson's wavelength determinations are "less than 0.03 Å for undisturbed lines above 4500 Å, less than 0.02 Å between 4500 Å and 2000 Å and less than 0.01 Å below 2000 Å" [P2]. We have included a few lines from earlier investigations [H1, B4, B5]; the calculated wavelengths for these lines should in general be significantly more accurate than the observed values. The wavelengths of the  $3s^2 3p^3 \ ^4S^\circ - ^2D^\circ$  forbidden lines given here (6716.440 and 6730.815 Å) are probably accurate to about 0.02 Å.

## References

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 B4 Bartelt, O. and Eckstein, L. [1933], *Z. Phys.* **86**, 77–81.  
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 H1 Hunter, A. [1934], *Phil. Trans. R. Soc. London, Ser. A*, **233**, 303–326.  
 P2 Petterson, J. E. [1983], *Phys. Scr.* **28**, 421–434.  
 T3 Trauger, J. T., Münch, G., and Roesler, F. L. [1980], *Astrophys. J.* **236**, 1035–1042.

## S II

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	2g	558.755	558.755	0.00	178 969.32	$3s^2 3p^3 - 3s^2 3p^2(^3P)7d$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	2g	558.924	558.924	0.00	178 915.20	$3s^2 3p^3 - 3s^2 3p^2(^3P)7d$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	2g	559.131	559.131	0.00	178 848.96	$3s^2 3p^3 - 3s^2 3p^2(^3P)7d$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	2g	560.713	560.713	0.00	178 344.36	$3s^2 3p^3 - 3s^2 3p^2(^3P)7d$	$4S^\circ - ^4D$	$3/2 - 5/2$	P2
	3g	571.156	571.156	0.00	175 083.51	$3s^2 3p^3 - 3s^2 3p^2(^3P)6d$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	4g	571.364	571.364	0.00	175 019.78	$3s^2 3p^3 - 3s^2 3p^2(^3P)6d$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	5g	571.779	571.779	0.00	174 892.75	$3s^2 3p^3 - 3s^2 3p^2(^3P)6d$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	4g	573.523	573.523	0.00	174 360.92	$3s^2 3p^3 - 3s^2 3p^2(^3P)6d$	$4S^\circ - ^4D$	$3/2 - 5/2$	P2
	1g	573.627	573.627	0.00	174 329.31	$3s^2 3p^3 - 3s^2 3p^2(^3P)6d$	$4S^\circ - ^4D$	$3/2 - 3/2$	P2
	1g	573.813	573.807	0.00	174 274.52	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$4S^\circ - ^2P$	$3/2 - 3/2$	P2
	2g	574.397	574.389	0.00	174 098.10	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	1g	576.057	576.051	0.00	173 595.77	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	1g	576.978	576.978	0.00	173 316.83	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	1	588.958	588.963	14 852.94	184 642.76	$3s^2 3p^3 - 3s^2 3p^2(^1D)7s$	$2D^\circ - ^2D$	$3/2 -$	P2
	1	589.079	589.074	14 884.73	184 642.76	$3s^2 3p^3 - 3s^2 3p^2(^1D)7s$	$2D^\circ - ^2D$	$5/2 -$	P2
	8g	593.507	593.506	0.00	168 490.43	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	10g	593.835	593.832	0.00	168 397.89	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	11g	594.475	594.470	0.00	168 217.10	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	5g	597.494	597.497	0.00	167 364.98	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4D$	$3/2 - 5/2$	P2
	1g	597.760	597.758	0.00	167 291.84	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4D$	$3/2 - 3/2$	P2
	1g	599.834	599.847	0.00	166 709.27	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$4S^\circ - ^4F$	$3/2 - 5/2$	P2
	6bl	600.661	600.673	0.00	166 470.82	$3s^2 3p^3 - 3s^2 3p^2(^3P)6s$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	5g	602.446	602.441	0.00	165 991.35	$3s^2 3p^3 - 3s^2 3p^2(^3P)6s$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	4g	603.430	603.430	0.00	165 719.23	$3s^2 3p^3 - 3s^2 3p^2(^3P)6s$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	1	616.437	616.431	14 852.94	177 077.02	$3s^2 3p^3 - 3s^2 3p^2(^1D)6s$	$2D^\circ - ^2D$	$3/2 - 3/2$	P2
	2	616.560	616.555	14 884.73	177 076.28	$3s^2 3p^3 - 3s^2 3p^2(^1D)6s$	$2D^\circ - ^2D$	$5/2 - 5/2$	P2
	1	627.390	627.393	14 884.73	174 274.52	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$2D^\circ - ^2P$	$5/2 - 3/2$	P2
	1	629.340	629.342	14 852.94	173 749.01	$3s^2 3p^3 - 3s^2 3p^2(^3P)7s$	$2D^\circ - ^2P$	$3/2 - 1/2$	P2
	12g	640.412	640.416	0.00	156 148.48	$3s^2 3p^3 - 3s^2 3p^2(^3P)4d$	$4S^\circ - ^4P$	$3/2 - 1/2$	P2
	13g	640.902	640.904	0.00	156 029.54	$3s^2 3p^3 - 3s^2 3p^2(^3P)4d$	$4S^\circ - ^4P$	$3/2 - 3/2$	P2
	15g	641.767	641.771	0.00	155 818.71	$3s^2 3p^3 - 3s^2 3p^2(^3P)4d$	$4S^\circ - ^4P$	$3/2 - 5/2$	P2
	1	644.488	644.486	14 852.94	170 015.23	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$2D^\circ - ^2D$	$3/2 - 5/2$	P2
	1	644.623	644.619	14 884.73	170 015.23	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$2D^\circ - ^2D$	$5/2 - 5/2$	P2
	1	645.012	645.005	14 884.73	169 922.27	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$2D^\circ - ^2D$	$5/2 - 3/2$	P2
	10	645.920	645.921	14 884.73	169 702.32	$3s^2 3p^3 - 3s^2 3p^2(^3P)5d$	$2D^\circ - ^2F$	$5/2 - 7/2$	P2



S II - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
1		647.299	647.302	14 852.94	- 169 340.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2D° - 2P	3/2 - 3/2	P2
1		647.443	647.435	14 884.73	- 169 340.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2D° - 2P	5/2 - 3/2	P2
8		647.542	647.540	14 852.94	- 169 283.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2D° - 2F	3/2 - 5/2	P2
8bl		647.657	647.673	14 884.73	- 169 283.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2D° - 2F	5/2 - 5/2	P2
5g		652.391	652.388	0.00	- 153 283.07	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	4S° - 4D	3/2 - 5/2	P2
2g		652.741	652.733	0.00	- 153 201.95	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	4S° - 4D	3/2 - 3/2	P2
6		655.084	655.079	14 852.94	- 167 506.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2D	3/2 - 5/2	P2
11		655.220	655.215	14 884.73	- 167 506.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2D	5/2 - 5/2	P2
			655.224	14 852.94	- 167 472.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2D	3/2 - 3/2	
5		655.360	655.361	14 884.73	- 167 472.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2D	5/2 - 3/2	P2
4		657.998	657.990	14 884.73	- 166 862.71	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)6s	2D° - 2P	5/2 - 3/2	P2
4		660.160	660.161	14 852.94	- 166 331.19	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)6s	2D° - 2P	3/2 - 1/2	P2
2bl		660.809	660.796	14 852.94	- 166 185.47	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2P	3/2 - 3/2	P2
8		660.931	660.935	14 884.73	- 166 185.47	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2P	5/2 - 3/2	P2
			660.944	14 852.94	- 166 151.61	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2P	3/2 - 1/2	
10g		662.267	662.267	0.00	- 150 996.41	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 3/2	P2
9g		664.315	664.314	0.00	- 150 531.31	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 3/2	P2
8g		665.519	665.520	0.00	- 150 258.51	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 1/2	P2
8		669.105	669.107	14 884.73	- 164 337.61	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2F	5/2 - 7/2	P2
7		669.435	669.436	14 852.94	- 164 232.36	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2F	3/2 - 5/2	P2
5		669.580	669.579	14 884.73	- 164 232.36	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2F	5/2 - 5/2	P2
8		669.808	669.808	14 884.73	- 164 181.17	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2D° - 2G	5/2 - 7/2	P2
7		687.551	687.551	24 571.54	- 170 015.23	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2D	3/2 - 5/2	P2
5		687.776	687.770	24 524.83	- 169 922.27	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2D	1/2 - 3/2	P2
4		687.992	687.991	24 571.54	- 169 922.27	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2D	3/2 - 3/2	P2
4		688.884	688.882	24 524.83	- 169 687.52	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2P	1/2 - 1/2	P2
3		689.110	689.104	24 571.54	- 169 687.52	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2P	3/2 - 1/2	P2
5		690.535	690.534	24 524.83	- 169 340.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2P	1/2 - 3/2	P2
6		690.760	690.756	24 571.54	- 169 340.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2P	3/2 - 3/2	P2
1		691.029	691.028	24 571.54	- 169 283.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5d	2P° - 2F	3/2 - 5/2	P2
4		691.366	691.357	14 852.94	- 159 495.94	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2D	3/2 - 3/2	P2
			691.372	14 852.94	- 159 492.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2D	3/2 - 5/2	
7		691.514	691.509	14 884.73	- 159 495.94	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2D	5/2 - 3/2	P2
			691.524	14 884.73	- 159 492.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2D	5/2 - 5/2	
5		691.639	691.636	24 524.83	- 169 109.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2S	1/2 - 1/2	P2
7		691.859	691.860	24 571.54	- 169 109.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2S	3/2 - 1/2	P2
7		692.370	692.373	14 852.94	- 159 283.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2P	3/2 - 1/2	P2
6		694.564	694.563	14 852.94	- 158 828.31	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2P	3/2 - 3/2	P2
7		694.714	694.717	14 884.73	- 158 828.31	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2P	5/2 - 3/2	P2
3		699.557	699.557	24 524.83	- 167 472.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2D	1/2 - 3/2	P2
5		699.609	699.619	24 571.54	- 167 506.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2D	3/2 - 5/2	P2
1		699.782	699.786	24 571.54	- 167 472.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2D	3/2 - 3/2	P2
1		700.664	700.671	24 571.54	- 167 291.84	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> F)5d	2P° - 4D	3/2 - 3/2	P2
1		705.187	705.187	24 524.83	- 166 331.19	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)6s	2P° - 2P	1/2 - 1/2	P2
9		705.617	705.619	14 884.73	- 156 604.17	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2F	5/2 - 7/2	P2
1		706.144	706.145	24 571.54	- 166 185.47	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)4d	2P° - 2P	3/2 - 3/2	P2
8		707.869	707.871	14 852.94	- 156 121.70	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2F	3/2 - 5/2	P2
5		708.024	708.030	14 884.73	- 156 121.70	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2F	5/2 - 5/2	P2
1g		714.199	714.200	0.00	- 140 016.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)3d	4S° - 2P	3/2 - 3/2	P2
1		727.689	727.695	14 884.73	- 152 305.00	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 4F	5/2 - 7/2	P2
3		728.805	728.793	24 524.83	- 161 737.99	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)5s	2P° - 2D	1/2 - 3/2	P2
			728.810	14 884.73	- 152 094.64	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 4F	5/2 - 5/2	
3		729.059	729.067	24 571.54	- 161 733.10	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> (1D)5s	2P° - 2D	3/2 - 5/2	P2
7		729.783	729.788	14 884.73	- 151 910.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2D° - 2P	5/2 - 3/2	P2
5		732.448	732.435	14 852.94	- 151 383.81	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2D° - 2P	3/2 - 1/2	P2

S II - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	8	740.898	740.899	24 524.83	- 159 495.94	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2D	1/2 - 3/2	P2
	10	741.165	741.156	24 571.54	- 159 495.94	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2D	3/2 - 3/2	P2
			741.173	24 571.54	- 159 492.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2D	3/2 - 5/2	
	7	742.063	742.066	24 524.83	- 159 283.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2P	1/2 - 1/2	P2
	7	742.318	742.324	24 571.54	- 159 283.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2P	3/2 - 1/2	P2
	7	744.580	744.582	24 524.83	- 158 828.31	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2P	1/2 - 3/2	P2
	9	744.838	744.841	24 571.54	- 158 828.31	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2P° - 2P	3/2 - 3/2	P2
	5	745.996	746.002	14 852.94	- 148 900.91	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	3/2 - 3/2	P2
	2	746.072	746.081	14 852.94	- 148 886.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	3/2 - 5/2	P2
	1	746.176	746.179	14 884.73	- 148 900.91	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	5/2 - 3/2	P2
	6	746.256	746.258	14 884.73	- 148 886.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	5/2 - 5/2	P2
	7	763.214	763.215	14 852.94	- 145 877.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2D° - 2P	3/2 - 1/2	P2
	10g	763.657	763.656	0.00	- 130 948.94	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	4S° - 4P	3/2 - 1/2	P2
	11g	764.420	764.416	0.00	- 130 818.85	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	4S° - 4P	3/2 - 3/2	P2
	4	765.391	765.387	14 852.94	- 145 505.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2D° - 2P	3/2 - 3/2	P2
	8	765.572	765.574	14 884.73	- 145 505.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2D° - 2P	5/2 - 3/2	P2
	12g	765.693	765.684	0.00	- 130 602.21	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	4S° - 4P	3/2 - 5/2	P2
	8	773.459	773.460	14 852.94	- 144 142.16	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2D	3/2 - 3/2	P2
	4	773.643	773.650	14 884.73	- 144 142.16	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2D	5/2 - 3/2	P2
	5	774.255	774.255	14 852.94	- 144 009.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2D	3/2 - 5/2	P2
	10	774.445	774.445	14 884.73	- 144 009.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2D	5/2 - 5/2	P2
	2	785.023	785.016	24 524.83	- 151 910.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	1/2 - 3/2	P2
	5	785.302	785.304	24 571.54	- 151 910.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	3/2 - 3/2	P2
	7	786.615	786.616	24 524.83	- 151 651.72	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2S	1/2 - 1/2	P2
	8	786.906	786.905	24 571.54	- 151 651.72	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2S	3/2 - 1/2	P2
	4	788.279	788.277	24 524.83	- 151 383.81	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	1/2 - 1/2	P2
	1	788.564	788.567	24 571.54	- 151 383.81	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	3/2 - 1/2	P2
	5	798.953	798.953	14 852.94	- 140 016.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2P	3/2 - 3/2	P2
	8	799.155	799.156	14 884.73	- 140 016.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2P	5/2 - 3/2	P2
	5bl	800.037	800.051	14 852.94	- 139 844.99	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2P	3/2 - 1/2	P2
	10	804.005	804.013	24 524.83	- 148 900.91	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2P° - 2D	1/2 - 3/2	P2
	3	804.313	804.315	24 571.54	- 148 900.91	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2P° - 2D	3/2 - 3/2	P2
	8	804.411	804.408	24 571.54	- 148 886.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2P° - 2D	3/2 - 5/2	P2
	6	808.692	808.694	14 852.94	- 138 509.17	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2F	3/2 - 5/2	P2
	7	808.776	808.778	14 884.73	- 138 527.98	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2F	5/2 - 7/2	P2
	4	808.896	808.902	14 884.73	- 138 509.17	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2D° - 2F	5/2 - 5/2	P2
	2g	822.854	822.842	0.00	- 121 530.02	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	4S° - 2D	3/2 - 5/2	P2
			822.851	0.00	- 121 528.72	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	4S° - 2D	3/2 - 3/2	
	7	824.048	824.043	24 524.83	- 145 877.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2P° - 2P	1/2 - 1/2	P2
	6	824.370	824.361	24 571.54	- 145 877.66	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2P° - 2P	3/2 - 1/2	P2
	6	826.586	826.577	24 524.83	- 145 505.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2P° - 2P	1/2 - 3/2	P2
	9	826.903	826.896	24 571.54	- 145 505.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>4</sup>	2P° - 2P	3/2 - 3/2	P2
	2	836.002	835.999	24 524.83	- 144 142.16	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2D	1/2 - 3/2	P2
	2	836.328	836.326	24 571.54	- 144 142.16	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2D	3/2 - 3/2	P2
	4	837.255	837.255	24 571.54	- 144 009.42	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2D	3/2 - 5/2	P2
	7	840.614	840.605	14 852.94	- 133 814.84	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2D	3/2 - 5/2	P2
	9	840.831	840.830	14 884.73	- 133 814.84	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2D	5/2 - 5/2	P2
	8	843.830	843.825	14 852.94	- 133 360.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2D	3/2 - 3/2	P2
	5	844.048	844.052	14 884.73	- 133 360.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2D	5/2 - 3/2	P2
	4	865.864	865.861	24 524.83	- 140 016.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2P	1/2 - 3/2	P2
	7	866.210	866.212	24 571.54	- 140 016.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2P	3/2 - 3/2	P2
	6	867.152	867.151	24 524.83	- 139 844.99	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2P	1/2 - 1/2	P2
	4	867.503	867.502	24 571.54	- 139 844.99	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2P	3/2 - 1/2	P2
	2g	875.415	875.419	0.00	- 114 231.04	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	4S° - 4D	3/2 - 5/2	P2
	1g	875.650	875.653	0.00	- 114 200.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	4S° - 4D	3/2 - 3/2	P2

S II - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.	
		Observed	Calculated	Lower	Upper					
UV2	3	877.675	877.673	24 571.54	- 138 509.17	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2P° - 2F	3/2 - 5/2	P2	
	1g	881.359	881.356	0.00	- 113 461.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	4S° - 2P	3/2 - 3/2	P2	
	6	894.426	894.423	24 524.83	- 136 328.79	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4s	2P° - 2S	1/2 - 1/2	P2	
	7	894.799	894.797	24 571.54	- 136 328.79	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4s	2P° - 2S	3/2 - 1/2	P2	
	12g	906.885	906.876	0.00	- 110 268.60	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	4S° - 4P	3/2 - 5/2	P2	
UV2	11g	910.484	910.485	0.00	- 109 831.59	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	4S° - 4P	3/2 - 3/2	P2	
UV2	10g	912.735	912.736	0.00	- 109 560.69	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	4S° - 4P	3/2 - 1/2	P2	
	9	915.390	915.388	24 571.54	- 133 814.84	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2D	3/2 - 5/2	P2	
	8	918.809	918.813	24 524.83	- 133 360.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2D	1/2 - 3/2	P2	
	6	919.205	919.208	24 571.54	- 133 360.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2D	3/2 - 3/2	P2	
UV6	9	937.421	937.420	14 852.94	- 121 528.72	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	2D° - 2D	3/2 - 3/2	P2	
UV6	10	937.684	937.688	14 884.73	- 121 530.02	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	2D° - 2D	5/2 - 5/2	P2	
UV5	8	996.007	996.007	14 884.73	- 115 285.61	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2F	3/2 - 7/2	P2	
UV5	7	1000.485	1000.486	14 852.94	- 114 804.37	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2F	3/2 - 5/2	P2	
UV5	4	1000.804	1000.804	14 884.73	- 114 804.37	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2F	5/2 - 5/2	P2	
UV4	2	1006.093	1006.091	14 884.73	- 114 279.33	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 4D	5/2 - 7/2	P2	
	2	1006.261	1006.258	14 852.94	- 114 231.04	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 4D	3/2 - 5/2	P2	
	6	1014.119	1014.110	14 852.94	- 113 461.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2D° - 2P	3/2 - 3/2	P2	
	UV4	10	1014.449	1014.437	14 884.73	- 113 461.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2D° - 2P	5/2 - 3/2	P2
	UV4	9	1019.537	1019.528	14 852.94	- 112 937.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2D° - 2P	3/2 - 1/2	P2
		g		1021.254	0.00	- 97 918.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	4S° - 2D	3/2 - 5/2	
UV9	1g	1021.539	1021.547	0.00	- 97 890.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	4S° - 2D	3/2 - 3/2	P2	
	5	1030.890	1030.886	24 524.83	- 121 528.72	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	2P° - 2D	1/2 - 3/2	P2	
UV9	6	1031.375	1031.369	24 571.54	- 121 530.02	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s	2P° - 2D	3/2 - 5/2	P2	
	5	1049.773	1049.770	24 524.83	- 119 783.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2P° - 2S	1/2 - 1/2	P2	
UV3	6	1050.283	1050.285	24 571.54	- 119 783.77	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2P° - 2S	3/2 - 1/2	P2	
	2	1053.222	1053.221	14 884.73	- 109 831.59	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2D° - 4P	5/2 - 3/2	P2	
	1	1055.891	1055.880	14 852.94	- 109 560.69	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2D° - 4P	3/2 - 1/2	P2	
	6	1096.602	1096.596	14 852.94	- 106 044.24	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2P	3/2 - 1/2	P2	
UV3	4	1101.975	1101.975	14 852.94	- 105 599.06	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2D° - 2P	3/2 - 3/2	P2	
UV3	7	1102.360	1102.362	14 884.73	- 105 599.06	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2P	5/2 - 3/2	P2	
UV8	5	1124.396	1124.395	24 524.83	- 113 461.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2P° - 2P	1/2 - 3/2	P2	
UV8	8	1124.978	1124.986	24 571.54	- 113 461.54	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2P° - 2P	3/2 - 3/2	P2	
UV8	7	1131.052	1131.059	24 524.83	- 112 937.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2P° - 2P	1/2 - 1/2	P2	
UV8	5	1131.658	1131.657	24 571.54	- 112 937.57	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2P° - 2P	3/2 - 1/2	P2	
UV7	1	1172.877	1172.882	24 571.54	- 109 831.59	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s	2P° - 4P	3/2 - 3/2	P2	
	4	1203.861	1203.863	14 852.94	- 97 918.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 2D	3/2 - 5/2	P2	
	126l	1204.290	1204.271	14 852.94	- 97 890.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 2D	3/2 - 3/2	P2	
	126l	1204.335	1204.324	14 884.73	- 97 918.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 2D	5/2 - 5/2	P2	
	4	1204.735	1204.732	14 884.73	- 97 890.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 2D	5/2 - 3/2	P2	
UV7	4	1226.706	1226.702	24 524.83	- 106 044.24	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2P	1/2 - 1/2	P2	
UV7	3	1227.408	1227.405	24 571.54	- 106 044.24	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2P	3/2 - 1/2	P2	
UV7	4	1233.440	1233.438	24 524.83	- 105 599.06	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2P	1/2 - 3/2	P2	
UV7	6	1234.157	1234.149	24 571.54	- 105 599.06	3s <sup>2</sup> 3p <sup>3</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d	2P° - 2P	3/2 - 3/2	P2	
	2	1236.261	1236.264	79 395.39	- 160 284.24	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P) <sub>1</sub> 4f	4P - 2[3]°	3/2 - 7/2	P2	
UV1	1	1238.056	1238.067	79 962.61	- 160 733.68	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P) <sub>2</sub> 4f	4P - 2[1]°	1/2 -	P2	
	2	1238.648	1238.643	79 395.39	- 160 128.90	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P) <sub>0</sub> 4f	4P - 2[3]°	5/2 - 7/2	P2	
	1	1238.900	1238.903	79 756.83	- 160 467.51	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P) <sub>1</sub> 4f	4P - 2[2]°	3/2 - 5/2	P2	
	13g	1250.578	1250.584	0.00	- 79 962.61	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	4S° - 4P	3/2 - 1/2	P2	
UV1	15g	1253.805	1253.811	0.00	- 79 756.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	4S° - 4P	3/2 - 3/2	P2	
UV1	16g	1259.518	1259.519	0.00	- 79 395.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	4S° - 4P	3/2 - 5/2	P2	
	2	1270.270	1270.271	79 395.39	- 158 118.75	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4S°	5/2 - 3/2	P2	
	1	1271.555	1271.566	79 395.39	- 158 038.60	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	5/2 - 5/2	P2	
	3	1276.132	1276.130	79 756.83	- 158 118.75	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4S°	3/2 - 3/2	P2	
	1	1277.450	1277.437	79 756.83	- 158 038.60	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	3/2 - 5/2	P2	

S II - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
4		1279.028	1279.029	79 395.39	157 579.68	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	5/2 - 3/2	P2
2		1279.489	1279.490	79 962.61	158 118.75	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4S°	1/2 - 3/2	P2
1		1283.350	1283.359	79 756.83	157 677.32	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	3/2 - 1/2	P2
1		1284.962	1284.970	79 756.83	157 579.68	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	3/2 - 3/2	P2
1		1288.387	1288.376	79 962.61	157 579.68	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	4P - 4P°	1/2 - 3/2	P2
3bl		1363.011	1363.031	24 524.83	97 890.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2P° - 2D	1/2 - 3/2	P2
6		1363.384	1363.376	24 571.54	97 918.86	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2P° - 2D	3/2 - 5/2	P2
2		1363.902	1363.899	24 571.54	97 890.74	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2P° - 2D	3/2 - 3/2	P2
1		1446.481	1446.481	110 766.56	179 899.86	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )7f	4F - 2[5]°	9/2 - 11/2	P2
1		1511.037	1511.036	105 599.06	171 778.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	2P - 2[2]°	3/2 -	P2
1		1511.216	1511.206	115 285.61	181 457.92	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )5f	2F - 2[3]°	7/2 -	P2
1		1513.892	1513.892	115 285.61	181 340.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )5f	2F - 2[4]°	7/2 -	P2
3		1519.912	1519.912	110 766.56	176 559.84	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )6f	4F - 2[5]°	9/2 - 11/2	P2
1		1535.188	1535.192	106 044.24	171 182.67	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	2P - 2[2]°	1/2 - 3/2	P2
1		1536.939	1536.947	105 599.06	170 663.13	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	2P - 2[2]°	3/2 - 5/2	P2
1		1539.499	1539.505	106 044.24	171 000.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	2P - 2[1]°	1/2 -	P2
1		1540.749	1540.740	14 852.94	79 756.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 4P	3/2 - 3/2	P2
2		1540.891	1540.880	105 599.06	170 497.03	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	2P - 2[3]°	3/2 - 5/2	P2
1		1541.504	1541.495	14 884.73	79 756.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 4P	5/2 - 3/2	P2
1		1546.662	1546.653	105 599.06	170 254.81	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )5f	2P - 2[3]°	3/2 - 5/2	P2
1		1547.906	1547.899	106 044.24	170 647.95	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	2P - 2[2]°	1/2 - 3/2	P2
2		1550.140	1550.131	14 884.73	79 395.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	2D° - 4P	5/2 - 5/2	P2
1		1600.766	1600.766	114 231.04	176 701.13	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )6f	4D - 2[4]°	5/2 - 7/2	P2
1		1645.939	1645.951	110 508.71	171 263.87	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4F - 2[4]°	7/2 - 7/2	P2
1		1652.483	1652.490	110 766.56	171 281.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4F - 2[4]°	9/2 - 9/2	P2
1w		1657.828	1657.825	110 177.02	170 497.03	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4F - 2[3]°	3/2 - 5/2	P2
1bl		1658.183	1658.193	110 313.40	170 620.00	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4F - 2[4]°	5/2 - 7/2	P2
5		1659.777	1659.776	110 766.56	171 015.64	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4F - 2[5]°	9/2 - 11/2	P2
1		1661.361	1661.364	110 313.40	170 504.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4F - 2[3]°	3/2 - 7/2	P2
4		1664.488	1664.488	110 508.71	170 587.24	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4F - 2[4]°	7/2 - 9/2	P2
		1664.488?		127 127.10	187 205.63?	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S <sub>0</sub> )4f	2G - 2[3]°	7/2 - 9/2	
3		1667.089	1667.090	110 313.40	170 298.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )5f	4F - 2[3]°	7/2 - 7/2	P2
1		1712.736	1712.737	97 890.74	156 276.83	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2D - 2P°	3/2 - 3/2	P2
3		1713.552	1713.562	97 918.86	156 276.83	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2D - 2P°	5/2 - 3/2	P2
1		1715.958	1715.963	97 890.74	156 167.04	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2D - 2P°	3/2 - 1/2	P2
1		1751.188	1751.179	114 200.54	171 304.92	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[3]°	3/2 - 5/2	P2
1		1752.117	1752.115	114 231.04	171 304.92	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[3]°	5/2 - 5/2	P2
4		1753.380	1753.376	114 231.04	171 263.87	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[4]°	5/2 - 7/2	P2
1		1753.758	1753.759	114 102.30	171 182.07	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[2]°	1/2 - 3/2	P2
8		1754.331	1754.326	114 279.33	171 281.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[4]°	7/2 - 9/2	P2
1w		1755.193	1755.172	114 804.37	171 778.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	2F - 2[2]°	5/2 -	P2
1		1755.680	1755.681	114 231.04	171 188.98	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	4D - 2[3]°	5/2 - 5/2	P2
1		1757.151	1757.159	114 279.33	171 189.39	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	4D - 2[3]°	7/2 - 7/2	P2
1		1759.120	1759.137	114 279.33	171 125.40	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[5]°	7/2 - 9/2	P2
1		1760.588	1760.574	114 200.54	171 000.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	4D - 2[1]°	3/2 -	P2
1		1761.277	1761.281	114 231.04	171 007.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	4D - 2[4]°	5/2 - 7/2	P2
1		1764.085	1764.087	114 279.33	170 965.87	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	4D - 2[4]°	7/2 - 9/2	P2
1		1770.121	1770.124	115 285.61	171 778.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	2F - 2[2]°	7/2 - 5/2	P2
1		1770.363	1770.361	114 162.30	170 647.95	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4D - 2[2]°	1/2 - 3/2	P2
1		1771.081	1771.084	114 200.54	170 663.13	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	4D - 2[2]°	3/2 - 5/2	P2
1		1773.043	1773.053	114 804.37	171 204.27	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	2F - 2[2]°	5/2 - 5/2	P2

S II - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
1	1	1773.534	1773.534	114 804.37	171 188.98	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F - <sup>2</sup> [3] <sup>o</sup>	5/2 - 5/2	P2
1	1	1778.546	1778.550	114 279.33	170 504.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	<sup>4</sup> D - <sup>2</sup> [3] <sup>o</sup>	7/2 - 7/2	P2
6	1	1779.245	1779.247	114 804.37	171 007.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F - <sup>2</sup> [4] <sup>o</sup>	5/2 - 7/2	P2
1	1	1783.415	1783.405	115 285.61	171 358.13	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	<sup>2</sup> F - <sup>2</sup> [3] <sup>o</sup>	7/2 - 7/2	P2
1	1	1783.580	1783.576	114 231.04	170 298.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )5f	<sup>4</sup> D - <sup>2</sup> [3] <sup>o</sup>	5/2 - 7/2	P2
1	1	1785.861	1785.852	115 285.61	171 281.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	<sup>2</sup> F - <sup>2</sup> [4] <sup>o</sup>	7/2 - 9/2	P2
1	1	1788.787	1788.788	115 285.61	171 189.39	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F - <sup>2</sup> [3] <sup>o</sup>	7/2 - 7/2	P2
4	1	1791.607	1791.613	114 804.37	170 620.00	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	<sup>2</sup> F - <sup>2</sup> [4] <sup>o</sup>	5/2 - 7/2	P2
1	1	1792.513	1792.520	105 599.06	161 386.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P - <sup>2</sup> [3] <sup>o</sup>	3/2 - 5/2	P2
1	1	1794.604	1794.614	115 285.61	171 007.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F - <sup>2</sup> [4] <sup>o</sup>	7/2 - 7/2	P2
1	10	1795.319	1795.315	114 804.37	170 504.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5f	<sup>2</sup> F - <sup>2</sup> [3] <sup>o</sup>	5/2 - 7/2	P2
1	1	1795.967	1795.969	115 285.61	170 965.87	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F - <sup>2</sup> [4] <sup>o</sup>	7/2 - 9/2	P2
1	1	1797.837	1797.850	105 599.06	161 221.05	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P - <sup>2</sup> [2] <sup>o</sup>	3/2 - 3/2	P2
1	1	1805.347	1805.345	24 571.54	79 962.61	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	<sup>2</sup> P <sup>o</sup> - <sup>4</sup> P	3/2 - 1/2	P2
1	1	1812.073	1812.077	24 571.54	79 756.83	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	<sup>2</sup> P <sup>o</sup> - <sup>4</sup> P	3/2 - 3/2	P2
1	7	1812.361	1812.356	106 044.24	161 221.05	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P - <sup>2</sup> [2] <sup>o</sup>	1/2 - 3/2	P2
1	1	1822.543	1822.541	105 599.06	160 467.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>2</sup> P - <sup>2</sup> [2] <sup>o</sup>	3/2 - 5/2	P2
1	1	1822.705	1822.716	105 599.06	160 462.24	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>2</sup> P - <sup>2</sup> [2] <sup>o</sup>	3/2 - 3/2	P2
1	1	1824.022	1824.024	24 571.54	79 395.39	3s <sup>2</sup> 3p <sup>3</sup> - 3s3p <sup>4</sup>	<sup>2</sup> P <sup>o</sup> - <sup>4</sup> P	3/2 - 5/2	P2
7	1	1828.511	1828.507	106 044.24	160 733.68	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P - <sup>2</sup> [1] <sup>o</sup>	1/2 -	P2
9	1	1829.535	1829.526	105 599.06	160 258.03	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>2</sup> P - <sup>2</sup> [3] <sup>o</sup>	3/2 - 5/2	P2
1	1	1831.378	1831.378	127 128.35	181 732.04	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )5f	<sup>2</sup> G - <sup>2</sup> [5] <sup>o</sup>	9/2 -	P2
8	1	1834.691	1834.692	105 599.06	160 104.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )4f	<sup>2</sup> P - <sup>2</sup> [3] <sup>o</sup>	3/2 - 5/2	P2
1	1	1864.324	1864.323	114 804.37	168 443.14	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)5p	<sup>2</sup> F - <sup>2</sup> F <sup>o</sup>	5/2 - 5/2	P2
1	1	1880.134	1880.128	115 285.61	168 473.48	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)5p	<sup>2</sup> F - <sup>2</sup> F <sup>o</sup>	7/2 - 7/2	P2
1	3	1882.647	1882.658	105 599.06	158 715.46	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	<sup>2</sup> P - <sup>2</sup> D <sup>o</sup>	3/2 - 5/2	P2
6bl	1	1901.871	1901.866	119 783.77	172 363.71	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> S - <sup>2</sup> [1] <sup>o</sup>	1/2 -	P2
10	1	1930.819	1930.808	79 395.39	131 187.19	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>2</sup> D <sup>o</sup>	5/2 - 5/2	P2
1	1	1936.731	1936.729	79 395.39	131 028.85	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> S <sup>o</sup>	5/2 - 3/2	P2
1	1	1944.379	1944.377	79 756.83	131 187.19	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>2</sup> D <sup>o</sup>	3/2 - 5/2	P2
10	1	1950.378	1950.382	79 756.83	131 028.85	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> S <sup>o</sup>	3/2 - 3/2	P2
1	1	1951.379	1951.382	79 395.39	130 641.11	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>2</sup> D <sup>o</sup>	5/2 - 3/2	P2
1	1	1952.766	1952.765	110 177.02	161 386.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [3] <sup>o</sup>	3/2 - 3/2	P2
1	1	1955.359	1955.357	110 313.40	161 454.96	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [3] <sup>o</sup>	5/2 - 7/2	P2
1	1	1957.989	1957.980	110 313.40	161 386.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [3] <sup>o</sup>	5/2 - 3/2	P2
9	1	1958.239	1958.241	79 962.61	131 028.85	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> S <sup>o</sup>	1/2 - 3/2	P2
1	1	1959.094	1959.093	110 177.02	161 221.05	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [2] <sup>o</sup>	3/2 - 3/2	P2
1	7	1964.339	1964.341	110 313.40	161 221.05	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [2] <sup>o</sup>	5/2 - 3/2	P2
7	1	1967.687	1967.693	110 508.71	161 329.65	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [4] <sup>o</sup>	7/2 - 7/2	P2
11	1	1970.878	1970.879	79 395.39	130 134.16	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	5/2 - 5/2	P2
8	1	1976.535	1976.533	110 766.56	161 360.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [4] <sup>o</sup>	9/2 - 9/2	P2
1	1	1977.739	1977.727	110 766.56	161 329.65	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [4] <sup>o</sup>	9/2 - 7/2	P2
10	1	1981.662	1981.658	79 395.39	129 858.18	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	5/2 - 3/2	P2
8	1	1983.643	1983.645	110 508.71	160 920.95	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [5] <sup>o</sup>	7/2 - 9/2	P2
9	1	1985.025	1985.020	79 756.83	130 134.16	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 5/2	P2
10	1	1993.231	1993.233	110 313.40	160 483.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>4</sup> F - <sup>2</sup> [4] <sup>o</sup>	5/2 - 7/2	P2
1	1	1993.847	{ 1993.843 1993.855	110 766.56	160 920.95	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [5] <sup>o</sup>	9/2 - 9/2	P2
1	1	1995.960	1995.954	110 313.40	160 467.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>4</sup> F - <sup>2</sup> [2] <sup>o</sup>	5/2 - 5/2	P2
8	1	1996.765	1996.765	79 756.83	129 858.18	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 3/2	P2
13	1	1997.518	1997.518	110 177.02	160 258.03	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>4</sup> F - <sup>2</sup> [3] <sup>o</sup>	3/2 - 5/2	P2
9	1	1998.705	1998.701	110 766.56	160 828.69	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>4</sup> F - <sup>2</sup> [5] <sup>o</sup>	9/2 - 11/2	P2
	1			79 756.83	129 787.83	3s3p <sup>4</sup> - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 1/2	P2











S II - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	6	2976.108	2976.097	2976.966	130 641.11	-164 232.36	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)4d$	$2D^o-^2F$	$3/2-5/2$	P2
	15	2998.253	2998.254	2999.128	125 485.29	-158 828.31	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^3P)4d$	$2S^o-^2P$	$1/2-3/2$	P2
	7	3004.983	3004.986	3005.862	97 918.86	-131 187.19	$3s 3p^4-3s^2 3p^2(^3P)4p$	$2D-^2D^o$	$5/2-5/2$	P2
	6	3015.682	3015.674	3016.553	131 187.19	-164 337.61	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)4d$	$2D^o-^2F$	$5/2-7/2$	P2
	6	3029.982	3029.974	3030.856	131 187.19	-164 181.17	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)4d$	$2D^o-^2G$	$5/2-7/2$	P2
	7	3049.246	3049.242	3050.129	133 399.97	-166 185.47	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)4d$	$2F^o-^2P$	$3/2-3/2$	P2
	6w	3052.500	3052.513	3053.401	97 890.74	-130 641.11	$3s 3p^4-3s^2 3p^2(^3P)4p$	$2D-^2D^o$	$3/2-3/2$	P2
	9	3059.099	3059.104	3059.993	138 509.17	-171 188.98	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2F-^2[3]$	$5/2-5/2$	P2
	11	3060.824	3060.827	3061.717	138 527.98	-171 189.39	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2F-^2[3]$	$7/2-7/2$	P2
	13	3066.843	3066.836	3067.727	138 527.98	-171 125.40	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^3P)5f$	$2F-^2[5]$	$7/2-9/2$	P2
	10	3074.250	3074.259	3075.152	139 844.99	-172 363.71	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2P-^2[1]$	$1/2-$	P2
	16	3076.151	3076.149	3077.042	138 509.17	-171 007.91	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2F-^2[4]$	$5/2-7/2$	P2
	12	3081.920	3081.919	3082.815	138 527.98	-170 905.87	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2F-^2[4]$	$7/2-9/2$	P2
	13	3090.595	3090.585	3091.483	140 016.77	-172 363.71	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2P-^2[1]$	$3/2-$	P2
	5	3113.304	3113.311	3114.214	138 509.17	-170 620.00	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^3P)5f$	$2F-^2[4]$	$5/2-7/2$	P2
	17	3147.499	3147.499	3148.410	140 016.77	-171 778.83	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2P-^2[2]$	$3/2-$	P2
	8	3214.831	3214.828	3215.757	130 641.11	-161 737.99	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)5s$	$2D^o-^2D$	$3/2-3/2$	P2
	14	3253.488	3253.482	3254.420	130 602.21	-161 329.65	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[4]$	$5/2-7/2$	P2
17	12	3257.868	3257.877	3258.816	112 937.57	-143 623.56	$3s^2 3p^2(^3P)4s-3s^2 3p^2(^1D)4p$	$2P-^2P^o$	$1/2-3/2$	P2
	10	3261.562	3261.568	3262.509	130 602.21	-161 253.47	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[2]$	$5/2-5/2$	P2
	17	3272.229	3272.231	3273.175	112 937.57	-143 488.95	$3s^2 3p^2(^3P)4s-3s^2 3p^2(^1D)4p$	$2P-^2P^o$	$1/2-1/2$	P2
	11	3272.817	3272.817	3273.761	131 187.19	-161 733.10	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^1D)5s$	$2D^o-^2D$	$5/2-5/2$	P2
	13	3284.785	3284.785	3285.732	130 818.85	-161 253.47	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[2]$	$3/2-5/2$	P2
	10	3288.304	3288.288	3289.236	130 818.85	-161 221.05	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[2]$	$3/2-3/2$	P2
	10	3302.411	3302.420	3303.371	130 948.94	-161 221.05	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[2]$	$1/2-3/2$	P2
	17	3314.469	3314.474	3315.428	113 461.54	-143 623.56	$3s^2 3p^2(^3P)4s-3s^2 3p^2(^1D)4p$	$2P-^2P^o$	$3/2-3/2$	P2
	8	3317.827	3317.835	3318.789	130 602.21	-160 733.68	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[1]$	$5/2-3/2$	P2
17	14	3329.330	3329.333	3330.291	113 461.54	-143 488.95	$3s^2 3p^2(^3P)4s-3s^2 3p^2(^1D)4p$	$2P-^2P^o$	$3/2-1/2$	P2
	16	3341.855	3341.863	3342.824	130 818.85	-160 733.68	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$4P-^2[1]$	$3/2-$	P2
	16	3347.412	3347.405	3348.368	130 602.21	-160 467.51	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[2]$	$5/2-5/2$	P2
	8w	3347.980	3347.996	3348.958	130 602.21	-160 462.24	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[2]$	$5/2-3/2$	P2
	19	3368.073	3368.074	3369.042	130 602.21	-160 284.24	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[3]$	$5/2-7/2$	P2
	12	3371.052	3371.051	3372.019	130 602.21	-160 258.03	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[3]$	$3/2-5/2$	P2
	17	3371.875	3371.865	3372.834	130 818.85	-160 467.51	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[2]$	$3/2-5/2$	P2
	15	3372.469	3372.465	3373.433	130 818.85	-160 462.24	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[2]$	$3/2-3/2$	P2
	17	3385.794	3385.794	3386.766	130 602.21	-160 128.90	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_0)4f$	$4P-^2[3]$	$5/2-7/2$	P2
	15	3387.330	3387.330	3388.303	130 948.94	-160 462.24	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[2]$	$1/2-3/2$	P2
	14	3395.861	3395.859	3396.834	130 818.85	-160 258.03	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_1)4f$	$4P-^2[3]$	$3/2-5/2$	P2
	12	3413.704	3413.708	3414.687	130 818.85	-160 104.11	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_0)4f$	$4P-^2[3]$	$3/2-5/2$	P2
	11	3464.626	3464.632	3465.624	130 641.11	-159 495.94	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^3P)4d$	$2D^o-^2D$	$3/2-3/2$	P2
	9	3525.779	3525.795	3526.803	144 009.42	-172 363.71	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2D-^2[1]$	$5/2-3/2$	P2
	14w	3531.852	3531.855	3532.865	131 187.19	-159 492.83	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^3P)4d$	$2D^o-^2D$	$5/2-5/2$	P2
	7	3546.696	3546.696	3547.710	130 641.11	-158 828.31	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^3P)4d$	$2D^o-^2P$	$3/2-3/2$	P2
	17	3567.157	3567.149	3568.168	133 360.86	-161 386.45	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[3]$	$3/2-5/2$	P2
	15	3584.157	3584.156	3585.179	133 360.86	-161 253.47	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[2]$	$3/2-5/2$	P2
	16	3594.439	3594.445	3595.471	112 937.57	-140 750.34	$3s^2 3p^2(^3P)4s-3s^2 3p^2(^1D)4p$	$2P-^2D^o$	$1/2-3/2$	P2
	4	3595.977	3595.979	3597.005	105 599.06	-133 399.97	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P)4p$	$2P-^2P^o$	$3/2-3/2$	P2
	8	3596.578	3596.570	3597.596	128 233.20	-156 029.54	$3s^2 3p^2(^3P)4p-3s^2 3p^2(^3P)4d$	$4D^o-^4P$	$5/2-3/2$	P2
	14	3600.056	3600.058	3601.085	144 009.42	-171 778.83	$3s^2 3p^2(^1D)3d-3s^2 3p^2(^1D_2)4f$	$2D-^2[2]$	$5/2-$	P2
	4	3613.030	3613.042	3614.072	105 599.06	-133 268.68	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P)4p$	$2P-^2P^o$	$3/2-1/2$	P2
	18	3616.911	3616.898	3617.929	133 814.84	-161 454.96	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[3]$	$5/2-7/2$	P2
	15	3625.889	3625.885	3626.919	133 814.84	-161 386.45	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[3]$	$5/2-5/2$	P2
	7	3633.358	3633.371	3634.406	133 814.84	-161 329.65	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[4]$	$5/2-7/2$	P2
	8	3643.452	3643.459	3644.497	133 814.84	-161 253.47	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P_2)4f$	$2D-^2[2]$	$5/2-5/2$	P2
	8	3643.750	3643.756	3644.794	130 602.21	-158 038.60	$3s^2 3p^2(^3P)3d-3s^2 3p^2(^3P)5p$	$4P-^4P^o$	$5/2-5/2$	P2

S II - Continued

Mult. No.	Rel. Int.	Air Wavelength ( $\text{\AA}$ )		Vacuum Wavelength ( $\text{\AA}$ )	Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.	
		Observed	Calculated		Lower	Upper					
4	12	3652.218	3652.218	3653.259	133 360.86	-160 733.68	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_2) 4f$	${}^2D - 2[1]^\circ$	$3/2 -$	P2	
	17	3654.497	3654.500	3655.541	106 044.24	-133 399.97	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P) 4p$	${}^2P - 2P^\circ$	$1/2 - 3/2$	P2	
	16	14	3663.458	3663.464	3664.507	113 461.54	-140 750.34	$3s^2 3p^2 ({}^3P) 4s - 3s^2 3p^2 ({}^1D) 4p$	${}^2P - 2D^\circ$	$3/2 - 3/2$	P2
	16	21	3669.035	3669.037	3670.082	113 461.54	-140 708.89	$3s^2 3p^2 ({}^3P) 4s - 3s^2 3p^2 ({}^1D) 4p$	${}^2P - 2D^\circ$	$3/2 - 5/2$	P2
4	9	3669.719	3669.714	3670.759	140 230.10	-167 472.42	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2F^\circ - 2D$	$5/2 - 3/2$	P2	
	18	3672.122	3672.124	3673.170	106 044.24	-133 268.68	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P) 4p$	${}^2P - 2P^\circ$	$1/2 - 1/2$	P2	
	13	3672.779	3672.784	3673.830	128 599.16	-155 818.71	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4D^\circ - 4P$	$7/2 - 5/2$	P2	
	10	3677.169	3677.160	3678.207	140 319.23	-167 506.39	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2F^\circ - 2D$	$7/2 - 5/2$	P2	
	17w	3678.130	3678.133	3679.180	144 009.42	-171 189.39	$3s^2 3p^2 ({}^1D) 3d - 3s^2 3p^2 ({}^1D_2) 4f$	${}^2D - 2[3]^\circ$	$5/2 - 7/2$	P2	
	11	3680.463	3680.463	3681.511	144 142.16	-171 304.92	$3s^2 3p^2 ({}^1D) 3d - 3s^2 3p^2 ({}^3P_2) 5f$	${}^2D - 2[3]^\circ$	$3/2 - 5/2$	P2	
	13	3688.089	3688.082	3689.132	133 360.86	-160 467.51	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_1) 4f$	${}^2D - 2[2]^\circ$	$3/2 - 5/2$	P2	
	11	3688.799	3688.799	3689.849	133 360.86	-160 462.24	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_1) 4f$	${}^2D - 2[2]^\circ$	$3/2 - 3/2$	P2	
	16	3696.239	3696.240	3697.292	144 142.16	-171 188.98	$3s^2 3p^2 ({}^1D) 3d - 3s^2 3p^2 ({}^1D_2) 4f$	${}^2D - 2[3]^\circ$	$3/2 - 7/2$	P2	
	8	3708.607	3708.617	3709.672	130 602.21	-157 558.77	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P) 5p$	${}^4P - 4P^\circ$	$5/2 - 7/2$	P2	
	10	3716.799	3716.806	3717.863	133 360.86	-160 258.03	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_1) 4f$	${}^2D - 2[3]^\circ$	$3/2 - 5/2$	P2	
	15w	3730.636	3730.631	3731.691	140 708.89	-167 506.39	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2D$	$5/2 - 5/2$	P2	
	10bl	3735.401	3735.366	3736.428	140 708.89	-167 472.42	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2D$	$5/2 - 3/2$	P2	
	10	3736.417	3736.410	3737.472	140 750.34	-167 506.39	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2D$	$3/2 - 5/2$	P2	
	12	3738.197	3738.198	3739.261	133 360.86	-160 104.11	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_0) 4f$	${}^2D - 2[3]^\circ$	$3/2 - 5/2$	P2	
	14	3741.157	3741.160	3742.224	140 750.34	-167 472.42	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2D$	$3/2 - 3/2$	P2	
	14	3748.696	3748.702	3749.768	133 814.84	-160 483.16	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_1) 4f$	${}^2D - 2[4]^\circ$	$5/2 - 7/2$	P2	
	10	3776.775	3776.787	3777.860	130 134.16	-156 604.17	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 2F$	$5/2 - 7/2$	P2	
	12	3780.611	3780.618	3781.692	133 814.84	-160 258.03	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P_1) 4f$	${}^2D - 2[3]^\circ$	$5/2 - 5/2$	P2	
	23	10	3782.556	3782.568	3783.642	114 279.33	-140 708.89	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^4D - 2D^\circ$	$7/2 - 5/2$	P2
41	18	3783.133	3783.143	3784.218	125 485.29	-151 910.83	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 5s$	${}^2S^\circ - 2P$	$1/2 - 3/2$	P2	
50	10	3792.446	3792.456	3793.533	129 787.83	-156 148.48	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$1/2 - 1/2$	P2	
50	14	3802.608	3802.605	3803.684	129 858.18	-156 148.48	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$3/2 - 1/2$	P2	
50	15	3809.637	3809.646	3810.727	129 787.83	-156 029.54	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$1/2 - 3/2$	P2	
56	14	3811.740	3811.745	3812.827	133 268.68	-159 495.94	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2D$	$1/2 - 3/2$	P2	
50	10bl	3819.863	3819.887	3820.971	129 858.18	-156 029.54	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$3/2 - 3/2$	P2	
56	13	3830.925	3830.922	3832.009	133 399.97	-159 495.94	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2D$	$3/2 - 3/2$	P2	
56	17	3831.383	3831.379	3832.466	133 399.97	-159 492.83	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2D$	$3/2 - 5/2$	P2	
22	13	3839.158	3839.171	3840.261	114 279.33	-140 319.23	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^4D - 2F^\circ$	$7/2 - 7/2$	P2	
13	3842.854	3842.849	3843.939	133 268.68	-159 283.66	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2P$	$1/2 - 1/2$	P2		
22	11	3845.208	3845.202	3846.293	114 231.04	-140 230.10	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^4D - 2F^\circ$	$5/2 - 5/2$	P2	
50	17	3850.906	3850.909	3852.001	129 858.18	-155 818.71	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$3/2 - 5/2$	P2	
30	16	3853.076	3853.070	3854.163	114 804.37	-140 750.34	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^2F - 2D^\circ$	$5/2 - 3/2$	P2	
30	12	3859.230	3859.236	3860.330	114 804.37	-140 708.89	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^2F - 2D^\circ$	$5/2 - 5/2$	P2	
41	15	3860.114	3860.130	3861.225	125 485.29	-151 383.81	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 5s$	${}^2S^\circ - 2P$	$1/2 - 1/2$	P2	
50	18	3860.608	3860.598	3861.693	130 134.16	-156 029.54	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$5/2 - 3/2$	P2	
50	9	3862.332	3862.342	3863.437	133 399.97	-159 283.66	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2P$	$3/2 - 1/2$	P2	
	18	3892.293	3892.288	3893.391	130 134.16	-155 818.71	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4P^\circ - 4P$	$5/2 - 5/2$	P2	
	8bl	3901.993	3902.005	3903.111	143 488.95	-169 109.54	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2P^\circ - 2S$	$1/2 - 1/2$	P2	
	3	15	3906.951	3906.955	3908.062	105 599.06	-131 187.19	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^3P) 4p$	${}^2P - 2D^\circ$	$3/2 - 5/2$	P2
29	13	3911.310	3911.312	3912.420	133 268.68	-158 828.31	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2P$	$1/2 - 3/2$	P2	
	10	3918.183	3918.175	3919.285	114 804.37	-140 319.23	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^2F - 2F^\circ$	$5/2 - 7/2$	P2	
10	3922.618	3922.615	3923.726	143 623.56	-169 109.54	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2P^\circ - 2S$	$3/2 - 1/2$	P2		
55	20	3923.460	3923.445	3924.556	130 641.11	-156 121.70	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2D^\circ - 2F$	$3/2 - 5/2$	P2	
	11	3924.053	3924.062	3925.174	140 708.89	-166 185.47	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2P$	$5/2 - 3/2$	P2	
	13	3931.512	3931.507	3932.620	133 399.97	-158 828.31	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2P^\circ - 2P$	$3/2 - 3/2$	P2	
29	17	3931.918	3931.911	3933.024	114 804.37	-140 230.10	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^2F - 2F^\circ$	$5/2 - 5/2$	P2	
30	17	3932.286	3932.280	3933.403	115 285.61	-140 708.89	$3s^2 3p^2 ({}^3P) 3d - 3s^2 3p^2 ({}^1D) 4p$	${}^2F - 2D^\circ$	$7/2 - 5/2$	P2	
55	21	3933.267	3933.264	3934.378	131 187.19	-156 604.17	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^2D^\circ - 2F$	$5/2 - 7/2$	P2	
10	3935.698	3935.697	3936.811	140 750.34	-166 151.61	$3s^2 3p^2 ({}^1D) 4p - 3s^2 3p^2 ({}^1D) 4d$	${}^2D^\circ - 2P$	$3/2 - 1/2$	P2		
45	11	3939.478	3939.481	3940.596	127 825.08	-153 201.95	$3s^2 3p^2 ({}^3P) 4p - 3s^2 3p^2 ({}^3P) 4d$	${}^4D^\circ - 4D$	$1/2 - 3/2$	P2	

S II - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
45	14	3946.952	3946.955	3948.072	127 825.08	-153 153.90	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$1/2 - 1/2$	P2
45	11	3950.398	3950.400	3951.518	127 976.34	-153 283.07	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$3/2 - 5/2$	P2
45	16	3963.107	3963.104	3964.225	127 976.34	-153 201.95	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$3/2 - 3/2$	P2
45	9	3970.209	3970.198	3971.321	128 233.20	-153 413.74	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$5/2 - 7/2$	P2
54	14	3970.672	3970.661	3971.784	130 641.11	-155 818.71	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$2D^{\circ} - 4P$	$3/2 - 5/2$	P2
45			3970.667	3971.791	127 976.34	-153 153.90	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$3/2 - 1/2$	
59	17	3979.829	3979.825	3980.950	131 028.85	-156 148.48	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4S^{\circ} - 4P$	$3/2 - 1/2$	P2
45	17	3990.913	3990.908	3992.037	128 233.20	-153 283.07	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$5/2 - 5/2$	P2
	9	3991.530	3991.522	3992.650	125 485.29	-150 531.31	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 5s$	$2S^{\circ} - 4P$	$1/2 - 3/2$	P2
3	9	3992.156	3992.154	3993.283	105 599.06	-130 641.11	$3s^2 3p^2 (^3P) 3d - 3s^2 3p^2 (^3P) 4p$	$2P - 2D^{\circ}$	$3/2 - 3/2$	P2
29	19	3993.502	3993.499	3994.628	115 285.61	-140 319.23	$3s^2 3p^2 (^3P) 3d - 3s^2 3p^2 (^1D) 4p$	$2F - 2F^{\circ}$	$7/2 - 7/2$	P2
59	18	3998.757	3998.759	3999.890	131 028.85	-156 029.54	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4S^{\circ} - 4P$	$3/2 - 3/2$	P2
45	17	4003.874	4003.874	4005.006	128 233.20	-153 201.95	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$5/2 - 3/2$	P2
29	12	4007.773	4007.768	4008.901	115 285.61	-140 230.10	$3s^2 3p^2 (^3P) 3d - 3s^2 3p^2 (^1D) 4p$	$2F - 2F^{\circ}$	$7/2 - 5/2$	P2
55	12	4009.361	4009.373	4010.506	131 187.19	-156 121.70	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$2D^{\circ} - 2F$	$5/2 - 5/2$	P2
45	21	4028.750	4028.750	4029.889	128 599.16	-153 413.74	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$7/2 - 7/2$	P2
59	19	4032.779	4032.768	4033.907	131 028.85	-155 818.71	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4S^{\circ} - 4P$	$3/2 - 5/2$	P2
45	15	4050.075	4050.078	4051.222	128 599.16	-153 283.07	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4D$	$7/2 - 5/2$	P2
54	0	4058.681	4058.692	4059.830	131 187.19	-155 818.71	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$2D^{\circ} - 4F$	$5/2 - 5/2$	P2
3	14	4064.404	4064.410	4065.558	106 044.24	-130 641.11	$3s^2 3p^2 (^3P) 3d - 3s^2 3p^2 (^3P) 4p$	$2P - 2D^{\circ}$	$1/2 - 3/2$	P2
	M1	4068.60	4068.60	4069.75	0.00	-24 571.54	$3s^2 3p^3 - 3s^2 3p^3$	$4S^{\circ} - 2P^{\circ}$	$3/2 - 3/2$	B2
	M1	4076.35	4076.35	4077.50	0.00	-24 524.83	$3s^2 3p^3 - 3s^2 3p^3$	$4S^{\circ} - 2P^{\circ}$	$3/2 - 1/2$	B2
44	21	4142.256	4142.259	4143.427	127 825.08	-151 959.69	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$1/2 - 3/2$	P2
44	22	4145.067	4145.060	4146.229	127 976.34	-152 094.64	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$3/2 - 5/2$	P2
64	17	4146.910	4146.916	4148.085	140 230.10	-164 337.61	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2F$	$5/2 - 7/2$	P2
44	23	4153.064	4153.068	4154.239	128 233.20	-152 305.00	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$5/2 - 7/2$	P2
64	15	4162.306	4162.305	4163.478	140 319.23	-164 337.61	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2F$	$7/2 - 7/2$	P2
44	24	4162.665	4162.665	4163.839	128 599.16	-152 615.46	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$7/2 - 3/2$	P2
64	14	4165.100	4165.100	4166.274	140 230.10	-164 232.36	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2F$	$5/2 - 5/2$	P2
44	18	4168.370	4168.363	4169.538	143 488.95	-167 472.42	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2P^{\circ} - 2D$	$1/2 - 3/2$	P2
44			4168.384	4169.559	127 976.34	-151 959.69	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$3/2 - 3/2$	
65	10	4174.002	4174.002	4175.170	140 230.10	-164 181.17	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2G$	$5/2 - 7/2$	P2
65	21	4174.265	4174.265	4175.442	140 319.23	-164 268.79	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2G$	$7/2 - 3/2$	P2
64	1	4180.7	4180.625	4181.803	140 319.23	-164 232.36	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2F^{\circ} - 2F$	$7/2 - 5/2$	H1
	14	4185.917	4185.929	4187.108	143 623.56	-167 506.39	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2P^{\circ} - 2D$	$3/2 - 5/2$	P2
44	18	4189.676	4189.681	4190.862	128 233.20	-152 094.64	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$3/2 - 5/2$	P2
10	15	4193.493	4193.486	4194.668	119 783.77	-143 623.56	$3s 3p^4 - 3s^2 3p^2 (^1D) 4p$	$2S - 2P^{\circ}$	$1/2 - 3/2$	P2
44	9	4213.517	4213.512	4214.698	128 233.20	-151 959.69	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$5/2 - 3/2$	P2
44	17	4217.179	4217.182	4218.370	128 599.16	-152 305.00	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$7/2 - 7/2$	P2
10	13	4217.293	4217.299	4218.487	119 783.77	-143 488.95	$3s 3p^4 - 3s^2 3p^2 (^1D) 4p$	$2S - 2P^{\circ}$	$1/2 - 1/2$	P2
66	17	4230.952	4230.946	4232.138	140 708.89	-164 337.61	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2D^{\circ} - 2F$	$5/2 - 7/2$	P2
66	10	4249.873	4249.877	4251.074	140 708.89	-164 232.36	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2D^{\circ} - 2F$	$5/2 - 5/2$	P2
44	3	4255.01	4254.940	4256.138	128 599.16	-152 094.64	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4D^{\circ} - 4F$	$7/2 - 5/2$	B4
66	17	4257.379	4257.379	4258.577	140 750.34	-164 232.36	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2D^{\circ} - 2F$	$3/2 - 5/2$	P2
67	16	4259.146	4259.146	4260.345	140 708.89	-164 181.17	$3s^2 3p^2 (^1D) 4p - 3s^2 3p^2 (^1D) 4d$	$2D^{\circ} - 2G$	$3/2 - 7/2$	P2
49	21	4267.759	4267.762	4268.963	129 858.18	-153 283.07	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$3/2 - 5/2$	P2
49	18	4269.724	4269.725	4270.927	129 787.83	-153 201.95	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$1/2 - 3/2$	P2
49	18	4278.500	4278.506	4279.710	129 787.83	-153 153.90	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$1/2 - 1/2$	P2
49	18	4282.595	4282.593	4283.798	129 858.18	-153 201.95	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$3/2 - 3/2$	P2
49	14	4291.432	4291.427	4292.634	129 858.18	-153 153.90	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$3/2 - 1/2$	P2
49	22	4294.398	4294.402	4295.610	130 134.16	-153 413.74	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$5/2 - 7/2$	P2
49	18	4318.645	4318.643	4319.858	130 134.16	-153 283.07	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$5/2 - 5/2$	P2
49	13	4333.828	4333.830	4335.049	130 134.16	-153 201.95	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 4d$	$4P^{\circ} - 4D$	$5/2 - 3/2$	P2
43	11	4342.808	4342.815	4344.035	127 976.34	-150 996.41	$3s^2 3p^2 (^3P) 4p - 3s^2 3p^2 (^3P) 5s$	$4D^{\circ} - 4P$	$3/2 - 5/2$	P2
	11	4356.866	4356.873	4358.098	138 509.17	-161 454.96	$3s^2 3p^2 (^1D) 3d - 3s^2 3p^2 (^3P) 4f$	$2F - 2[3]^{\circ}$	$5/2 - 7/2$	P2
	8	4362.564	4362.543	4363.769	133 300.86	-150 276.83	$3s^2 3p^2 (^3P) 3d - 3s^2 3p^2 (^3P) 4p$	$2D - 2P^{\circ}$	$3/2 - 3/2$	P2



Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
52	16	4824.066	4824.059	4825.407	131 187.19	- 151 910.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2D° - 2P	5/2 - 3/2	P2
	13	4826.772	4826.773	4828.121	151 651.72	- 172 363.71	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	2S - 2[1]°	1/2 -	P2
46	14	4835.848	4835.846	4837.197	129 858.18	- 150 531.31	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4P° - 4P	3/2 - 3/2	P2
	8	4848.976	4848.953	4850.307	139 844.99	- 160 462.24	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	2P - 2[2]°	1/2 - 3/2	P2
46	10	4883.672	4883.672	4885.036	129 787.83	- 150 258.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4P° - 4P	1/2 - 1/2	P2
15	17	4885.648	4885.648	4887.012	112 937.57	- 133 399.97	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2P°	1/2 - 3/2	P2
46	15	4900.513	4900.513	4901.881	129 858.18	- 150 258.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4P° - 4P	3/2 - 1/2	P2
46	14	4901.265	4901.277	4902.646	130 134.16	- 150 531.31	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4P° - 4P	5/2 - 3/2	P2
	16	4902.440	4902.426	4903.795	125 485.29	- 145 877.66	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s3p <sup>4</sup>	2S° - 2P	1/2 - 1/2	P2
15	19	4917.212	4917.198	4918.571	112 937.57	- 133 268.68	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2P°	1/2 - 1/2	P2
7	18	4924.115	4924.110	4925.485	109 831.59	- 130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	3/2 - 5/2	P2
	19	4925.347	4925.343	4926.718	109 560.69	- 129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	1/2 - 3/2	P2
7	6	4939.045	4939.025	4940.404	140 016.77	- 160 258.03	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	2P - 2[3]°	3/2 - 5/2	P2
	16	4942.466	4942.473	4943.853	109 560.69	- 129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	1/2 - 1/2	P2
7	9	4952.191	4952.183	4953.565	138 527.98	- 158 715.46	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	2F - 2D°	7/2 - 5/2	P2
	20	4991.974	4991.969	4993.361	109 831.59	- 129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	3/2 - 3/2	P2
57	17	4993.497	4993.500	4994.893	125 485.29	- 145 505.74	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s3p <sup>4</sup>	2S° - 2P	1/2 - 3/2	P2
	15	5006.727	5006.727	5008.123	131 028.85	- 150 996.41	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 5/2	P2
7	21	5009.564	5009.567	5010.964	109 831.59	- 129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	3/2 - 1/2	P2
	16	5011.608	5011.626	5013.024	136 328.79	- 156 276.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2S - 2P°	1/2 - 3/2	P2
15	21	5014.069	5014.042	5015.440	113 461.54	- 133 399.97	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2P°	3/2 - 3/2	P2
1	20	5027.221	5027.203	5028.605	105 599.06	- 125 485.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2S°	3/2 - 1/2	P2
7	23	5032.447	5032.434	5033.837	110 268.60	- 130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	5/2 - 5/2	P2
	13	5039.382	5039.362	5040.767	136 328.79	- 156 167.04	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2S - 2P°	1/2 - 1/2	P2
15	6	5046.742	5046.747	5048.154	131 187.19	- 150 996.41	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2D° - 4P	5/2 - 5/2	P2
	18	5047.292	5047.277	5048.684	113 461.54	- 133 268.68	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2P°	3/2 - 1/2	P2
7	7	5073.090	5073.074	5074.488	138 509.17	- 158 215.59	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p	2F - 2D°	5/2 - 3/2	P2
	4	5093.989	5094.005	5095.425	110 508.71	- 130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4F - 4P°	7/2 - 5/2	P2
7	19	5103.340	5103.332	5104.755	110 268.60	- 129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4P°	3/2 - 3/2	P2
57	13	5126.130	5126.130	5127.558	131 028.85	- 150 531.31	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 3/2	P2
1	18	5142.341	5142.322	5143.755	106 044.24	- 125 485.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P - 2S°	1/2 - 1/2	P2
57	11	5198.844	5198.852	5200.300	131 028.85	- 150 258.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	4S° - 4P	3/2 - 1/2	P2
39	20	5201.024	5201.027	5202.475	121 528.72	- 140 750.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2D - 2D°	3/2 - 3/2	P2
39	15	5201.387	5201.379	5202.827	121 530.02	- 140 750.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2D - 2D°	5/2 - 3/2	P2
39	21	5212.623	5212.620	5214.072	121 530.02	- 140 708.89	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2D - 2D°	5/2 - 5/2	P2
38	24	5320.732	5320.723	5322.204	121 530.02	- 140 319.23	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2D - 2F°	5/2 - 7/2	P2
	7	5322.205	5322.216	5323.697	140 708.89	- 159 492.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	2D° - 2D	5/2 - 5/2	P2
38	22	5345.721	5345.712	5347.199	121 528.72	- 140 230.10	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2D - 2F°	3/2 - 5/2	P2
61	10	5362.703	5362.697	5364.188	133 268.68	- 151 910.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	1/2 - 3/2	P2
61	15	5400.712	5400.733	5402.234	133 399.97	- 151 910.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	3/2 - 3/2	P2
6	23	5428.667	5428.655	5430.164	109 560.69	- 127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	1/2 - 3/2	P2
6	25	5432.815	5432.797	5434.307	109 831.59	- 128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	3/2 - 5/2	P2
6	27	5453.828	5453.855	5455.371	110 268.60	- 128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	5/2 - 7/2	P2
6	23	5473.620	5473.614	5475.135	109 560.69	- 127 825.08	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	1/2 - 1/2	P2
	11	5475.011	5474.990	5476.511	130 641.11	- 148 900.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	3/2 - 3/2	P2
6	10	5478.194	5478.218	5479.740	143 488.95	- 161 737.99	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)5s	2P° - 2D	1/2 - 3/2	P2
	6	5479.310	5479.293	5480.816	130 641.11	- 148 886.57	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	2D° - 2D	3/2 - 5/2	P2
6	23	5509.718	5509.705	5511.236	109 831.59	- 127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	3/2 - 3/2	P2
61	11	5518.732	5518.714	5520.247	133 268.68	- 151 383.81	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	1/2 - 1/2	P2
	12	5520.400	5520.418	5521.951	143 623.56	- 161 733.10	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)5s	2P° - 2D	3/2 - 5/2	P2
11	18	5526.253	5526.243	5527.778	110 508.71	- 128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4F - 4D°	7/2 - 7/2	P2
11	10	5536.723	5536.732	5538.270	110 177.02	- 128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4F - 4D°	3/2 - 5/2	P2
6	18	5556.007	5556.023	5557.566	109 831.59	- 127 825.08	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	3/2 - 1/2	P2
61	10bl	5559.060	5559.004	5560.548	133 399.97	- 151 383.81	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5s	2P° - 2P	3/2 - 1/2	P2
6	21	5564.976	5564.958	5566.503	110 268.60	- 128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s - 3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4P - 4D°	5/2 - 5/2	P2

## WAVELENGTHS AND ENERGY LEVEL CLASSIFICATIONS OF SULFUR

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S II - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
11	18	5578.889	5578.870	5580.419	110 313.40	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> F- <sup>4</sup> D°	5/2-5/2	P2
11	23	5606.151	5606.151	5607.707	110 766.56	-128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> F- <sup>4</sup> D°	3/2-7/2	P2
11	18	5616.639	5616.633	5618.192	110 177.02	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> F- <sup>4</sup> D°	3/2-3/2	P2
14	23	5639.972	5639.977	5641.542	113 461.54	-131 187.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>2</sup> D°	3/2-5/2	P2
11	21	5640.333	5640.346	5641.911	110 508.71	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> F- <sup>4</sup> D°	7/2-5/2	P2
	6	5643.757	5643.775	5645.342	131 187.19	-148 900.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> D°- <sup>2</sup> D	5/2-3/2	P2
6	15	5645.672	5645.681	5647.248	110 268.60	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P- <sup>4</sup> D°	3/2-3/2	P2
14	21	5647.033	5647.020	5648.588	112 937.57	-130 641.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>2</sup> D°	1/2-3/2	P2
	12	5648.354	5648.348	5649.915	131 187.19	-148 886.57	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> D°- <sup>2</sup> D	5/2-5/2	P2
11	21	5659.985	5660.001	5661.572	110 313.40	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> F- <sup>4</sup> D°	5/2-3/2	P2
	10	5730.531	5730.534	5732.124	144 009.42	-161 454.96	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> D- <sup>2</sup> [3] <sup>°</sup>	5/2-7/2	P2
	6	5797.504	5797.494	5799.102	144 009.42	-161 253.47	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> D- <sup>2</sup> [2] <sup>°</sup>	5/2-5/2	P2
14	19	5819.272	5819.254	5820.867	113 461.54	-130 641.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>2</sup> D°	3/2-3/2	P2
	4	5890.935	5890.946	5892.578	157 558.77	-174 529.27	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)5p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)6d	<sup>4</sup> D°- <sup>4</sup> F°	7/2-3/2	P2
	4	5895.910	5895.931	5897.565	114 231.04	-131 187.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>2</sup> D°	5/2-5/2	P2
13	11	5908.312	5908.315	5909.952	112 937.57	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>4</sup> P°	1/2-3/2	P2
20	6	5912.788	5912.771	5914.409	114 279.33	-131 187.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>2</sup> D°	7/2-5/2	P2
21	4	5927.277	5927.252	5928.895	114 162.30	-131 028.85	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> S°	1/2-3/2	P2
13	4	5932.962	5932.983	5934.627	112 937.57	-129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>4</sup> P°	1/2-1/2	P2
	9	5940.732	5940.721	5942.367	114 200.54	-131 028.85	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> S°	3/2-3/2	P2
	12	5951.522	5951.508	5953.157	114 231.04	-131 028.85	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> S°	5/2-3/2	P2
13	21b1	5996.161	5996.197	5997.858	113 461.54	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>4</sup> P°	3/2-5/2	P2
20	5	6080.838	6080.831	6082.514	114 200.54	-130 641.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>2</sup> D°	3/2-3/2	P2
20	9	6092.122	6092.133	6093.819	114 231.04	-130 641.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>2</sup> D°	5/2-3/2	P2
	6	6097.123	6097.123	6098.810	113 461.54	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>4</sup> P°	3/2-3/2	P2
26	18	6102.277	6102.266	6103.955	114 804.37	-131 187.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>2</sup> D°	5/2-5/2	P2
	6	6123.383	6123.395	6125.090	113 461.54	-129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> P- <sup>4</sup> P°	3/2-1/2	P2
63	12	6138.940	6138.944	6140.643	140 319.23	-156 604.17	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	<sup>2</sup> F°- <sup>2</sup> F°	7/2-7/2	P2
27	3	6161.84	6161.821	6163.526	114 804.37	-131 028.85	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>4</sup> S°	5/2-3/2	B5
	12	6274.306	6274.302	6276.038	114 200.54	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	3/2-5/2	P2
19	26	6286.351	6286.336	6288.074	114 231.04	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	5/2-5/2	P2
26	33	6286.956	6286.944	6288.683	115 285.61	-131 187.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>2</sup> D°	7/2-5/2	P2
63	9	6290.865	6290.893	6292.633	140 230.10	-156 121.70	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d	<sup>2</sup> F°- <sup>2</sup> F°	5/2-5/2	P2
	8	6295.207	6295.207	6296.948	145 505.74	-161 386.45	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P- <sup>2</sup> [3] <sup>°</sup>	3/2-5/2	P2
19	33	6305.483	6305.483	6307.226	114 279.33	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	7/2-5/2	P2
26	29	6312.661	6312.685	6314.431	114 804.37	-130 641.11	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>2</sup> D°	5/2-3/2	P2
19	17	6369.342	6369.338	6371.099	114 162.30	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	1/2-3/2	P2
19	27	6384.893	6384.893	6386.659	114 200.54	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	3/2-3/2	P2
5	6	6386.48	6386.501	6388.266	109 831.59	-125 485.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> P- <sup>2</sup> S°	3/2-1/2	B5
	12	6395.264	6395.272	6397.040	133 268.68	-148 900.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> P°- <sup>2</sup> D	1/2-3/2	P2
19	29	6397.359	6397.355	6399.124	114 231.04	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	5/2-3/2	P2
19	27	6397.990	6398.014	6399.783	114 162.30	-129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	1/2-1/2	P2
19	26	6413.706	6413.711	6415.483	114 200.54	-129 787.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>4</sup> D- <sup>4</sup> P°	3/2-1/2	P2
	13	6455.390	6455.411	6457.195	133 399.97	-148 886.57	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> P°- <sup>2</sup> D	3/2-5/2	P2
	6	6521.428	6521.445	6523.247	114 804.37	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>4</sup> P°	5/2-5/2	P2
	7	6565.054	6565.063	6566.876	145 505.74	-160 733.68	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P- <sup>2</sup> [1] <sup>°</sup>	3/2-	P2
	5w	6635.089	6635.066	6636.898	156 121.70	-171 188.98	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F- <sup>2</sup> [3] <sup>°</sup>	5/2-5/2	P2
25	3	6641.06	6641.003	6642.837	114 804.37	-129 858.18	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>4</sup> P°	5/2-3/2	B5
	12	6681.834	6681.856	6683.701	145 505.74	-160 467.51	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	<sup>2</sup> P- <sup>2</sup> [2] <sup>°</sup>	3/2-5/2	P2
	6	6715.768	6715.773	6717.627	156 121.70	-171 007.91	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D <sub>2</sub> )4f	<sup>2</sup> F- <sup>2</sup> [4] <sup>°</sup>	5/2-7/2	P2
	E2	6716.440	6716.440	6718.295	0.00	-14 884.73	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	<sup>4</sup> S°- <sup>2</sup> D°	3/2-5/2	B2,B3,T3
	8	6729.438	6729.420	6731.278	145 877.66	-160 733.68	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	<sup>2</sup> P- <sup>2</sup> [1] <sup>°</sup>	1/2-	P2
	E2,M1	6730.815	6730.816	6732.674	0.00	-14 852.94	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	<sup>4</sup> S°- <sup>2</sup> D°	3/2-3/2	B2,B3,T3
25	6	6732.815	6732.806	6734.664	115 285.61	-130 134.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	<sup>2</sup> F- <sup>4</sup> P°	7/2-3/2	P2

S II - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	<i>J</i> Values	Ref.					
		Observed	Calculated		Lower	Upper									
10	7	6776.715	6776.738	6778.609	145 505.74	-160 258.03	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	2P-2[3] <sup>o</sup>	3/2-5/2	P2					
	7	6848.209	6848.190	6850.080	145 505.74	-160 104.11	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )4f	2P-2[3] <sup>o</sup>	3/2-5/2	P2					
	8	6854.642	6854.665	6856.557	145 877.66	-160 462.24	3s3p <sup>4</sup> -3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f	2P-2[2] <sup>o</sup>	1/2-3/2	P2					
	6	6879.732	6879.713	6881.612	125 485.29	-140 016.77	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2S <sup>o</sup> -2P	1/2-3/2	P2					
	7	6884.560	6884.570	6886.469	156 604.17	-171 125.40	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5f	2F-2[5] <sup>o</sup>	7/2-9/2	P2					
18	9	6957.934	6957.934	6959.853	114 231.04	-128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	5/2-7/2	P2					
	5	6962.031	6962.013	6963.934	125 485.29	-139 844.99	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d	2S <sup>o</sup> -2P	1/2-1/2	P2					
18	15	6981.398	6981.398	6983.323	114 279.33	-128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4P	7/2-7/2	P2					
18	9	7124.279	7124.269	7126.233	114 200.54	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	3/2-5/2	P2					
18	12	7139.807	7139.787	7141.755	114 231.04	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	5/2-5/2	P2					
18	10	7164.491	7164.496	7166.471	114 279.33	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	7/2-5/2	P2					
	8	7237.007	7237.018	7239.012	114 162.30	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	1/2-3/2	P2					
	9	7257.107	7257.107	7259.107	114 200.54	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	3/2-3/2	P2					
	3	7273.20	7273.210	7275.214	114 231.04	-127 976.34	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	5/2-3/2	B4					
	7	7317.155	7317.139	7319.155	114 162.30	-127 825.08	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	1/2-1/2	P2					
	8	7337.660	7337.676	7339.697	114 200.54	-127 825.08	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	4D-4D <sup>o</sup>	3/2-1/2	P2					
	6	7444.609	7444.615	7446.665	114 804.37	-128 233.20	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2F-4D <sup>o</sup>	5/2-5/2	P2					
24	7	7509.066	7509.077	7511.145	115 285.61	-128 599.16	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2F-4D <sup>o</sup>	7/2-7/2	P2					
	19	7578.909	7578.909	7580.995	127 128.35	-140 319.23	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2G-2F <sup>o</sup>	3/2-7/2	P2					
	17	7629.740	7629.740	7631.840	127 127.10	-140 230.10	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4p	2G-2F <sup>o</sup>	7/2-5/2	P2					
10	9	7928.656	7928.675	7930.856	133 268.68	-145 877.66	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s3p <sup>4</sup>	2P <sup>o</sup> -2P	1/2-1/2	P2					
	9	7954.268	7954.281	7956.469	148 886.57	-161 454.96	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	2D-2[3] <sup>o</sup>	5/2-7/2	P2					
	12	7967.371	7967.384	7969.575	112 937.57	-125 485.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P-2S <sup>o</sup>	1/2-1/2	P2					
	7w	8007.044	8007.063	8009.265	148 900.91	-161 386.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f	2D-2[3] <sup>o</sup>	3/2-5/2	P2					
6	8012.113	8012.100	8014.304	133 399.97	-145 877.66	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s3p <sup>4</sup>	2P <sup>o</sup> -2P	3/2-1/2	P2						
	7	8149.446	8149.439	8151.680	144 009.42	-156 276.83	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)3d-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> S)4p	2D-2P <sup>o</sup>	5/2-3/2	P2					
	6	8169.638	8169.651	8171.897	133 268.68	-145 505.74	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s3p <sup>4</sup>	2P <sup>o</sup> -2P	1/2-3/2	P2					
13	8258.254	8258.254	8260.524	133 399.97	-145 505.74	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p-3s3p <sup>4</sup>	2P <sup>o</sup> -2P	3/2-3/2	P2						
	18	8314.594	8314.588	8316.873	113 461.54	-125 485.29	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2P-2S <sup>o</sup>	3/2-1/2	P2					
	37	8422.300	8422.321	8424.635	121 530.02	-133 399.97	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2D-2P <sup>o</sup>	5/2-3/2	P2					
37	8bl	8515.475	8515.577	8517.917	121 528.72	-133 268.68	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>1</sup> D)4s-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P)4p	2D-2P <sup>o</sup>	3/2-1/2	P2					
	6w	9372.351	9372.355	9374.927	160 828.69	-171 495.44	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5g	2[5] <sup>o</sup> -2[5]	11/2-11/2	P2					
	8	9418.735	9418.739	9421.323	160 258.03	-170 872.25	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[3] <sup>o</sup> -2[4]	5/2-7/2	P2					
	9	9438.357	9438.356	9440.945	160 828.69	-171 420.85	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5g	2[5] <sup>o</sup> -2[6]	11/2-13/2	P2					
	9	9441.880	9441.877	9444.467	160 284.24	-170 872.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[3] <sup>o</sup> -2[4]	7/2-9/2	P2					
	8	9505.497	9505.500	9508.108	160 104.11	-170 621.45	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )5g	2[3] <sup>o</sup> -2[4]	5/2-7/2	P2					
	9	9521.134	9521.134	9523.746	160 920.95	-171 421.02	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>2</sub> )5g	2[5] <sup>o</sup> -2[6]	9/2-11/2	P2					
	10w	9527.581	9527.577	9530.190	160 128.90	-170 621.87	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>0</sub> )5g	2[3] <sup>o</sup> -2[4]	7/2-9/2	P2					
	6w	9527.577	9530.190	160 442.67	-170 935.64	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[4] <sup>o</sup> -2[5]	9/2-11/2	P2						
		9532.081	9532.083	9534.697	160 462.24	-170 950.25	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[2] <sup>o</sup> -2[3]	3/2-5/2	P2					
	7	9536.637	9536.638	9539.254	160 467.51	-170 950.51	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[2] <sup>o</sup> -2[3]	5/2-7/2	P2					
8	9563.977	9563.981	9566.604	160 483.16	-170 936.19	3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )4f-3s <sup>2</sup> 3p <sup>2</sup> ( <sup>3</sup> P <sub>1</sub> )5g	2[4] <sup>o</sup> -2[5]	7/2-9/2	P2						
M1,E2		Wavenumber (cm <sup>-1</sup> )		Vacuum Wavelength (Å)	14 852.94	-24 571.54	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	2D <sup>o</sup> -2P <sup>o</sup>	3/2-3/2						
		Observed	Calculated								14 884.73	-24 571.54	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	2D <sup>o</sup> -2P <sup>o</sup>	5/2-3/2
											14 852.94	-24 524.83	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	2D <sup>o</sup> -2P <sup>o</sup>	3/2-1/2
											14 884.73	-24 524.83	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	2D <sup>o</sup> -2P <sup>o</sup>	5/2-1/2
M1				μm	24 524.83	-24 571.54	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>	2D <sup>o</sup> -2D <sup>o</sup>	3/2-5/2						
		Observed	Calculated								31.79	314.6	14 852.94	-14 884.73	3s <sup>2</sup> 3p <sup>3</sup> -3s <sup>2</sup> 3p <sup>3</sup>



## S III

## Si I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 3s^2 3p^2 \ ^3P_0$ Ionization energy  $280\,600\text{ cm}^{-1}$  (34.79 eV)

Most of the experimental wavelengths are from a recent progress report on a continuing extension of the S III analysis by Johansson *et al.* [J8]. Energy-level classifications for some 240 lines are tabulated in [J8], including about 60 lines not previously observed. "The estimated maximum error in the wavelengths is  $0.01 - 0.03\text{ \AA}$ , depending on the wavelength region..." [J8], with the longer wavelengths having in general the larger uncertainties. The errors of Kaufman's measurements [K5] are probably about  $0.010\text{ \AA}$ , and the estimated uncertainty of the  $3s^2 3p^2 \ ^3P_{1,2} - 3s^2 3p^3 \ ^5S_2$  wavelength determinations was  $0.005\text{ \AA}$  [S5]. We have included a few two-place wavelengths [B11] for which more accurate calculated values are also given.

All but three of the level values adopted here were derived by applying a least-squares optimization procedure to the wavelength measurements from [J8], [K5], and [S5], and from several astrophysical observations [B2, B9, B10, C1, G6; see MZM90]. We have increased the resulting statistically determined values of the  $3s^2 3p^2 \ ^1D_2$ ,  $^1S_0$  and  $3s^2 3p^3 \ ^1D_2$  levels by small amounts to improve agreement with the vacuum-ultraviolet measurements from [J8]. This adjustment gives a value of  $3721.63\text{ \AA}$  for the calculated wavelength of the  $3s^2 3p^2 \ ^3P_1 - ^1S_0$  forbidden transition, which is in acceptable agreement with the observed value of  $3721.69 \pm 0.10\text{ \AA}$  [B9]. The  $3s^2 3p^2 \ ^1D_2 - ^1S_0$  separation is probably accurate to  $0.1\text{ cm}^{-1}$  [B2], but the uncertainty of these two levels relative to the  $3s^2 3p^2 \ ^3P$  levels is of the order of  $1\text{ cm}^{-1}$ . The error of most of the excited-configuration levels relative to the  $3s^2 3p^2 \ ^3P$  levels is probably less than  $1\text{ cm}^{-1}$ . Most of the level separations *within* the group of levels given to two decimal places are probably accurate to  $0.2\text{ cm}^{-1}$ .

The experimental and calculated wavelengths are, in general, consistent within the estimated experimental errors; the calculated wavelengths should be preferred in cases of significant disagreement. The intensities of all lines of the UV multiplets UV1, 2, 4, 5, and 7 have been taken from Kaufman [K5] or adjusted to his scale.

## References

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 B9 Bowen, I. S. [1960], *Astrophys. J.* **132**, 1–17.  
 B10 Baluteau, J. P., Bussoletti, E., Anderegg, M., Moorwood, A. F. M., and Coron, N. [1976], *Astrophys. J.* **210**, L45–L48.  
 B11 Bloch, L., and Bloch, E. [1935], *J. Phys. (Paris)* **6**, 441–450.  
 C1 Colgan, S. W. J., Simpson, J. P., Rubin, R. H., Erickson, E. F., Haas, M. R., and Wolf, J. [1991], *Astrophys. J.* **366**, 172–180. The accurate measurement of the S III  $3s^2 3p^2 \ ^3P_0 - ^3P_1$  wavelength made in connection with the observations described in this reference was not published. The value obtained was  $33.480 \pm 0.004\text{ \mu m}$  (Haas, M. R. [1989], private communication).  
 G6 Graf, P. H. [1988], *A Fabry-Perot for Airborne Infrared Astronomy and the [Si II] Emission from the Galactic Center*, Ph.D Thesis, Cornell Univ., CRSR 889. Graf obtained a wavelength of  $33.482 \pm 0.002\text{ \mu m}$  for the S III  $^3P_0 - ^3P_1$  ground-term interval assuming  $V_{\text{LSR}} = 0$  for the Omega Nebula source. Correction to  $V_{\text{LSR}} = 17\text{ km/s}$  for the central region of this nebula (Reifenstein, E. C., III *et al.*, [1970], *Astron. Astrophys.* **4**, 357–377) yields a rest wavelength of  $33.480 \pm 0.002\text{ \mu m}$ .  
 J8 Johansson, L., Magnusson, C. E., Joelsson, I., and Zetterberg, P. O. [1992], *Phys. Scr.* **46**, 221–224.  
 J10 Johansson, L. [1992], private communication; includes a few wavelengths that are revisions of the values in [J8].  
 K5 Kaufman, V. [1971], unpublished material.  
 S5 Smith, P. L., Magnusson, C. E., and Zetterberg, P. O. [1984], *Astrophys. J.* **277**, L79–L81.

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	5	440.765	440.776	11 322.7	238 195.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5d	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	7g,w	475.286	475.284	298.69	210 699.24	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
	4g	476.351	476.355	0.00	209 927.43	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
	7g,w	476.495	476.494	833.08	210 699.24	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	2-2	J8
	4g	477.035	477.034	298.69	209 927.43	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-1	J8
	5g	477.386	477.381	298.69	209 774.91	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
	5g	478.257	478.253	833.08	209 927.43	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	2-1	J8
	5g,w	480.533	480.527	0.00	208 104.89	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
	6g	480.968	480.970	298.69	208 211.96	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
	4g	481.234	481.218	298.69	208 104.89	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	1-1	J8
	1g	481.712	481.709	298.69	207 892.98	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
	6g,w	482.463	482.458	833.08	208 104.89	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	2-1	J8
	8g	482.953	482.952	833.08	207 892.98	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> P°	2-2	J8
	6g	484.172	484.167	0.00	206 540.39	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	0-1	J8
	7g	484.564	484.556	298.69	206 673.11	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	1-2	J8
	5g	484.874	484.868	298.69	206 540.39	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	1-1	J8
	7g,w	485.255	485.249	833.08	206 912.65	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	2-3	J8
	5g	485.818	485.814	833.08	206 673.11	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	2-2	J8
	1g	486.140	486.128	833.08	206 540.39	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> D°	2-1	J8
	6g,w	489.627	489.621	833.08	205 072.53	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> F°	2-3	J8
	2g,w	490.803	490.803	833.08	204 580.68	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>3</sup> P - <sup>3</sup> F°	2-2	J8
	7g,w	494.511	494.511	11 322.7	213 542.54	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	7	499.988	499.984	11 322.7	211 329.07	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	10	500.444	500.434	11 322.7	211 149.32	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>1</sup> D - <sup>1</sup> F°	2-3	J8
	7	503.516	503.513	11 322.7	209 927.43	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>1</sup> D - <sup>3</sup> P°	2-1	J8
	8	515.931	515.929	11 322.7	205 147.80	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>1</sup> D - <sup>1</sup> D°	2-2	J8
	5	536.547	536.534	27 161.0	213 542.54	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4d	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
	7	542.984	542.982	27 161.0	211 329.07	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
	3	547.147	547.146	27 161.0	209 927.43	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p5s	<sup>1</sup> S - <sup>3</sup> P°	0-1	J8
	1bl	654.34	654.372	11 322.7	164 140.97	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>1</sup> P°	2-1	B11
UV7	20g	677.734	677.729	0.00	147 551.60	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> D°	0-1	K5
UV7	30g	678.458	678.456	298.69	147 692.21	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> D°	1-2	K5
UV7	10g	679.115	679.104	298.69	147 551.60	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> D°	1-1	K5
UV7	20g	680.681	680.677	833.08	147 745.70	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> D°	2-3	K5
UV7	8g	680.929	680.925	833.08	147 692.21	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> D°	2-2	K5
UV6	12g	680.961	680.974	298.69	147 147.11	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
UV6	4g	681.470	681.489	0.00	146 737.55	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
UV6	4g	682.879	682.879	298.69	146 737.55	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	1-1	J8
UV6	4g	683.067	683.066	298.69	146 697.37	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
UV6	5g	683.459	683.461	833.08	147 147.11	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	2-2	J8
	15	683.586	683.585	11 322.7	157 610.31	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>1</sup> F°	2-3	J8
UV6	8g	685.380	685.380	833.08	146 737.55	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>3</sup> P - <sup>3</sup> P°	2-1	J8
UV5	11g	698.731	698.727	0.00	143 117.41	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
UV5	15g	700.151	700.150	298.69	143 125.28	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	1-2	K5
UV5	5g	700.187	700.188	298.69	143 117.41	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	1-1	K5
UV5	20g	700.280	700.288	298.69	143 097.08	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	1-0	K5
UV5	35g	702.778	702.779	833.08	143 125.28	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	2-2	K5
	30	710.951	710.955	11 322.7	151 978.54	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>1</sup> D - <sup>1</sup> D°	2-2	K5
UV4	10g	724.280	724.288	0.00	138 066.6	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> S°	0-1	K5
UV4	25g	725.858	725.858	298.69	138 066.6	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> S°	1-1	K5
UV4	35g	728.685	728.685	833.08	138 066.6	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> S°	2-1	K5
UV3	12	729.519	729.521	11 322.7	148 398.97	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	9w	730.040	730.034	27 161.0	164 140.97	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
UV3	10g	730.758	730.760	0.00	136 843.78	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>3</sup> P - <sup>1</sup> P°	0-1	J8
UV3	10g	732.368	732.359	298.69	136 843.78	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>3</sup>	<sup>3</sup> P - <sup>1</sup> P°	1-1	J8

S III - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
UV3	2	733.021	733.014	11 322.7	- 147 745.70	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>3</sup> D°	2-3	J8
	9bl	733.328	733.302	11 322.7	- 147 692.21	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>3</sup> D°	2-2	J10
	3	734.061	734.059	11 322.7	- 147 551.60	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>3</sup> D°	2-1	J8
	11g	735.238	735.236	833.08	- 136 843.78	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>1</sup> P°	2-1	J8
	5w	736.250	736.245	11 322.7	- 147 147.11	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>1</sup> D - <sup>3</sup> P°	2-2	J8
UV11	9bl,w	738.471	738.471	11 322.7	- 146 737.55	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>1</sup> D - <sup>3</sup> P°	2-1	J8
UV10	10	788.989	788.993	11 322.7	- 138 066.6	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>1</sup> D - <sup>3</sup> S°	2-1	J8
UV9	11bl	796.675	796.679	11 322.7	- 136 843.78	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	3g	820.880	820.885	298.69	- 122 118.5	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
	4g	822.567	822.565	833.08	- 122 404.0	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>3</sup> P - <sup>3</sup> F°	2-3	J8
UV14	6	824.828	824.824	27 161.0	- 148 398.97	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
UV13	9bl	836.293	836.284	27 161.0	- 146 737.55	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p4s	<sup>1</sup> S - <sup>3</sup> P°	0-1	J8
	1	900.28	900.242	11 322.7	- 122 404.0	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>3</sup> P°	2-3	B11
	1	901.677	901.668	27 161.0	- 138 066.6	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>1</sup> S - <sup>3</sup> S°	0-1	J8
	4	902.571	902.561	11 322.7	- 122 118.5	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>3</sup> F°	2-2	J10
	5	911.734	911.720	27 161.0	- 136 843.78	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
UV2	50g	1012.504	1012.495	0.00	- 98 765.9	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	0-1	K5
UV2	25g	1015.487	1015.502	298.69	- 98 772.2	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
UV2	12g	1015.573	1015.567	298.69	- 98 765.9	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	1-1	K5
UV2	25g	1015.783	1015.779	298.69	- 98 745.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	1-2	K5
UV2	150g	1021.112	1021.108	833.08	- 98 765.9	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	2-1	K5
UV2	150g	1021.328	1021.323	833.08	- 98 745.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> P°	2-2	K5
UV8	150	1077.145	1077.157	11 322.7	- 104 159.7	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p3d	<sup>1</sup> D - <sup>1</sup> D°	2-2	J8
	4	1121.760	1121.750	84 046.7	- 173 193.14	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	2-2	J8
	7	1122.413	1122.413	84 099.4	- 173 193.14	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	3-2	J8
	5	1126.536	1126.533	84 019.3	- 172 787.26	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	1-1	J8
	7	1126.879	1126.880	84 046.7	- 172 787.26	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	2-1	J8
	5	1128.497	1128.496	84 019.3	- 172 632.79	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	1-0	J8
	3	1154.689	1154.683	84 046.7	- 170 650.55	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-3	J8
	6	1155.389	1155.386	84 099.4	- 170 650.55	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	3-3	J8
	3w	1162.132	1162.123	84 019.3	- 170 068.73	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	1-2	J8
	6	1162.494	1162.493	84 046.7	- 170 068.73	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-2	J8
	5	1163.209	1163.206	84 099.4	- 170 068.73	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	3-2	J8
	6	1166.150	1166.152	84 019.3	- 169 771.43	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	1-1	J8
	4	1166.526	1166.525	84 046.7	- 169 771.43	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-1	J8
UV1	100g	1190.206	1190.203	0.00	- 84 019.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	0-1	K5
UV1	150g	1194.061	1194.058	298.69	- 84 046.7	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	1-2	K5
UV1	100g	1194.457	1194.449	298.69	- 84 019.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	1-1	K5
UV1	250g	1200.970	1200.966	833.08	- 84 099.4	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	2-3	K5
UV1	100g	1201.730	1201.726	833.08	- 84 046.7	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	2-2	K5
UV1	30g	1202.120	1202.122	833.08	- 84 019.3	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>3</sup> D°	2-1	J8
	10	1328.164	1328.155	98 745.3	- 174 037.69	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> S	2-1	J8
	8	1328.524	1328.519	98 765.9	- 174 037.69	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> S	1-1	J8
	4	1328.630	1328.630	98 772.2	- 174 037.69	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> S	0-1	J8
	7	1343.222	1343.222	98 745.3	- 173 193.14	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-2	J8
	4	1343.592	1343.594	98 765.9	- 173 193.14	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-2	J8
	6	1350.592	1350.586	98 745.3	- 172 787.26	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-1	J8
	2	1351.089	1350.961	98 765.9	- 172 787.26	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-1	J8
			1351.076	98 772.2	- 172 787.26	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	0-1	
	3	1353.790	1353.787	98 765.9	- 172 632.79	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-0	J8
	6	1373.156	1373.160	104 159.7	- 176 984.44	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>1</sup> D° - <sup>1</sup> D	2-2	J8
	5	1390.736	1390.719	98 745.3	- 170 650.55	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-3	J8
	1w	1396.556	1396.552	27 161.0	- 98 765.9	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>1</sup> S - <sup>3</sup> P°	0-1	J8
	3	1402.053	1402.064	98 745.3	- 170 068.73	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-2	J8
	3	1402.473	1402.469	98 765.9	- 170 068.73	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-2	J8

S III - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	1	1408.339	1408.341	98 765.9	- 169 771.43	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-1	J8
	2 <sub>w</sub>	1408.459	1408.466	98 772.2	- 169 771.43	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	0-1	J8
	2	1415.569	1415.588	167 553.27	- 238 195.3	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5d	<sup>1</sup> P - <sup>1</sup> P°	1-1	J8
	9	1577.434	1577.447	104 159.7	- 167 553.27	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>1</sup> D° - <sup>1</sup> P	2-1	J8
	1 <sub>w</sub>	1633.700	1633.697	176 984.44	- 238 195.3	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5d	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	2 <sub>g,w</sub>	1713.117	1713.114	298.69	- 58 671.92	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>5</sup> S°	1-2	S5
	4 <sub>g</sub>	1728.939	1728.942	833.08	- 58 671.92	3s <sup>2</sup> 3p <sup>2</sup> - 3s3p <sup>3</sup>	<sup>3</sup> P - <sup>5</sup> S°	2-2	S5
	2 <sub>w</sub>	1803.897	1803.875	182 759.09	- 238 195.3	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5d	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	1	2059.854	2059.835	2060.494	122 118.5	- 170 650.55	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	2-3	J8
	10	2072.030	2072.026	2072.687	122 404.0	- 170 650.55	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	3-3	J8
	11	2084.833	2084.832	2085.496	122 118.5	- 170 068.73	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	2-2	J8
	19	2089.115	2089.115	2089.779	122 798.6	- 170 650.55	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	4-3	J8
	19	2097.318	2097.321	2097.987	122 404.0	- 170 068.73	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	3-2	J8
	14 <sub>bl,w</sub>	2097.826	2097.841	2098.507	122 118.5	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>3</sup> D	2-1	J8
	10	2177.233	2177.241	2177.923	136 843.78	- 182 759.09	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>1</sup> S	1-0	J8
	9	2200.267	2200.271	2200.958	122 118.5	- 167 553.27	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> F° - <sup>1</sup> P	2-1	J8
	7	2283.646	2283.662	2284.367	167 553.27	- 211 329.07	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>1</sup> P - <sup>1</sup> P°	1-1	J8
	8	2359.186	2359.207	2359.929	167 553.27	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>1</sup> P - <sup>3</sup> P°	1-1	J10
	6 <sub>w</sub>	2405.562	2405.565	2406.296	169 771.43	- 211 329.07	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>1</sup> P°	1-1	J8
	10	2422.897	2422.899	2423.635	170 068.73	- 211 329.07	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>1</sup> P°	2-1	J8
UV17	2 <sub>w</sub>	2442.581	2442.586	2443.326	169 771.43	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	1-2	J8
UV17	7	2460.496	2460.460	2461.205	170 068.73	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	2-2	J8
UV17	10	2489.566	2489.537	2490.288	169 771.43	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	1-1	J8
	10	2490.488	2490.488	2491.240	136 843.78	- 176 984.44	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>1</sup> D	1-2	J8
UV17	15	2496.239	2496.208	2496.961	170 650.55	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	3-2	J8
UV17	12	2499.030	2499.029	2499.783	169 771.43	- 209 774.91	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	1-0	J8
UV17	12	2508.097	2508.107	2508.863	170 068.73	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> D - <sup>3</sup> P°	2-1	J8
	6	2555.472	2555.481	2556.248	167 553.27	- 206 673.11	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>1</sup> P - <sup>3</sup> D°	1-2	J8
	4	2564.171	2564.181	2564.950	167 553.27	- 206 540.39	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>1</sup> P - <sup>3</sup> D°	1-1	J8
	4	2593.804	2593.809	2594.585	172 787.26	- 211 329.07	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>1</sup> P°	1-1	J8
	2 <sub>bl,w</sub>	2607.918	2607.908	2608.687	169 771.43	- 208 104.89	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> P°	1-1	J8
	1 <sub>w</sub>	2622.382	2622.406	2623.188	169 771.43	- 207 892.98	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> P°	1-2	J8
	4	2628.261	2628.293	2629.077	170 068.73	- 208 104.89	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> P°	2-1	J8
UV19	5 <sub>bl,w</sub>	2636.872	2636.903	2637.689	172 787.26	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
	1	2643.015	2643.019	2643.807	170 068.73	- 207 892.98	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> P°	2-2	J8
	12	2659.180	2659.170	2659.961	167 553.27	- 205 147.80	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>1</sup> P - <sup>1</sup> D°	1-2	J8
UV19	10	2665.408	2665.440	2666.233	173 193.14	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	2-2	J8
UV19	8	2680.549	2680.554	2681.350	172 632.79	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
	4 <sub>w</sub>	2684.305	2684.312	2685.109	170 650.55	- 207 892.98	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> P°	3-2	J8
UV19	10	2691.713	2691.703	2692.502	172 787.26	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-1	J8
UV19	8	2702.816	2702.803	2703.605	172 787.26	- 209 774.91	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
UV16	3	2709.076	2709.101	2709.904	169 771.43	- 206 673.11	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> D°	1-2	J8
UV16	3 <sub>w</sub>	2713.334	2713.348	2714.152	170 068.73	- 206 912.65	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> D°	2-3	J8
UV16	9	2718.882	2718.880	2719.685	169 771.43	- 206 540.39	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> D°	1-1	J8
UV19	7	2721.444	2721.446	2722.252	173 193.14	- 209 927.43	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> P - <sup>3</sup> P°	2-1	J8
UV20	10	2726.852	2726.846	2727.653	174 037.69	- 210 699.24	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p5s	<sup>3</sup> S - <sup>3</sup> P°	1-2	J8
UV16	11	2731.103	2731.105	2731.914	170 068.73	- 206 673.11	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> D°	2-2	J8
UV16	6	2741.027	2741.044	2741.855	170 068.73	- 206 540.39	3s <sup>2</sup> 3p4p - 3s <sup>2</sup> 3p4d	<sup>3</sup> D - <sup>3</sup> D°	2-1	J8

S III - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
UV16	12	2756.878	2756.885	2757.700	170 650.55	- 206 912.65	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> D°	3-3	J8
UV16	8	2775.258	2775.219	2776.038	170 650.55	- 206 673.11	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> D°	3-2	J8
			2775.297	2776.117	146 737.55	- 182 759.09	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>1</sup> S	1-0	
UV20	11	2785.470	2785.490	2786.312	174 037.69	- 209 927.43	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 5s	<sup>3</sup> S - <sup>3</sup> P°	1-1	J8
UV20	4	2797.365	2797.378	2798.203	174 037.69	- 209 774.91	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 5s	<sup>3</sup> S - <sup>3</sup> P°	1-0	J8
	8	2818.296	2818.287	2819.117	172 632.79	- 208 104.89	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	0-1	J8
	9	2822.061	2822.058	2822.889	172 787.26	- 208 211.96	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	1-0	J8
	13	2825.933	2825.914	2826.746	169 771.43	- 205 147.80	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>1</sup> D°	1-2	J10
	8	2830.618	2830.614	2831.447	172 787.26	- 208 104.89	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	1-1	J8
	9	2847.696	2847.702	2848.539	172 787.26	- 207 892.98	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	1-2	J8
UV15	17	2856.003	2855.994	2856.833	170 068.73	- 205 072.53	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> F°	2-3	J8
UV15	11	2863.511	2863.511	2864.352	170 650.55	- 205 562.46	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> P°	3-4	J8
			2863.524	2864.365	173 193.14	- 208 104.89	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	2-1	
UV15	13	2871.971	2871.957	2872.800	169 771.43	- 204 580.68	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> F°	1-2	J8
	14	2881.031	2881.013	2881.858	173 193.14	- 207 892.98	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> P°	2-2	J8
UV15	9	2896.711	2896.698	2897.547	170 068.73	- 204 580.68	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> F°	2-2	J8
UV15	9	2904.266	2904.270	2905.121	170 650.55	- 205 072.53	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> F°	3-3	J8
	11	2909.506	2909.499	2910.351	148 398.97	- 182 759.09	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>1</sup> P° - <sup>1</sup> S	1-0	J8
	12	2910.823	2910.811	2911.663	176 984.44	- 211 329.07	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 5s	<sup>1</sup> D - <sup>1</sup> P°	2-1	J8
	10	2925.319	2925.322	2926.178	174 037.69	- 208 211.96	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> S - <sup>3</sup> P°	1-0	J8
	16	2926.125	2926.126	2926.982	176 984.44	- 211 149.32	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>1</sup> D - <sup>1</sup> F°	2-3	J8
	13	2934.535	2934.516	2935.375	174 037.69	- 208 104.89	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> S - <sup>3</sup> P°	1-1	J8
	1	2946.343	2946.372	2947.233	170 650.55	- 204 580.68	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> D - <sup>3</sup> F°	3-2	J8
UV18	12	2948.327	2948.330	2949.191	172 632.79	- 206 540.39	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	0-1	J8
UV18	14	2950.218	2950.222	2951.084	172 787.26	- 206 673.11	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	1-2	J8
	14	2952.901	2952.885	2953.748	174 037.69	- 207 892.98	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> S - <sup>3</sup> P°	1-2	J8
UV18	11	2961.823	2961.823	2962.688	172 787.26	- 206 540.39	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	1-1	J8
UV18	15	2964.794	2964.776	2965.642	173 193.14	- 206 912.65	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	2-3	J8
UV18	10	2985.986	2985.989	2986.861	173 193.14	- 206 673.11	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	2-2	J8
UV18	1	2997.895	2997.874	2998.748	173 193.14	- 206 540.39	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> D°	2-1	J8
	1	3008.937	3008.909	3009.786	136 843.78	- 170 068.73	3s 3p <sup>3</sup> - 3s <sup>2</sup> 3p 4p	<sup>1</sup> P° - <sup>3</sup> D	1-2	J8
13	1	3135.910	3135.914	3136.823	173 193.14	- 205 072.53	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> F°	2-3	J8
	5d	3185.185	3185.057	3185.978	173 193.14	- 204 580.68	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>3</sup> P - <sup>3</sup> F°	2-2	J8
	3	3231.069	3231.066	3231.998	143 097.08	- 174 037.69	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	0-1	J8
	3	3233.181	3233.190	3234.123	143 117.41	- 174 037.69	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	1-1	J8
	3	3233.987	3234.013	3234.947	143 125.28	- 174 037.69	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	2-1	J8
	6	3247.561	3247.562	3248.499	182 759.09	- 213 542.54	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
	3	3255.367	3255.384	3256.322	136 843.78	- 167 553.27	3s 3p <sup>3</sup> - 3s <sup>2</sup> 3p 4p	<sup>1</sup> P° - <sup>1</sup> P	1-1	J8
	2	3323.990	3323.984	3324.940	143 117.41	- 173 193.14	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-2	J8
	2	3324.863	3324.854	3325.810	143 125.28	- 173 193.14	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	2-2	J8
	2	3367.158	3367.150	3368.117	143 097.08	- 172 787.26	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	0-1	J8
	2	3369.489	3369.457	3370.425	143 117.41	- 172 787.26	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-1	J8
	2	3370.373	3370.351	3371.319	143 125.28	- 172 787.26	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	2-1	J8
	2	3387.129	3387.092	3388.064	143 117.41	- 172 632.79	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-0	J8
	17	3497.285	3497.280	3498.281	148 398.97	- 176 984.44	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>1</sup> P° - <sup>1</sup> D	1-2	J8
	10	3499.180	3499.176	3500.177	182 759.09	- 211 329.07	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 5s	<sup>1</sup> S - <sup>1</sup> P°	0-1	J8
	12	3549.693	3549.699	3550.713	176 984.44	- 205 147.80	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>1</sup> D - <sup>1</sup> D°	2-2	J8
	10	3622.672	3622.649	3623.682	176 984.44	- 204 580.68	3s <sup>2</sup> 3p 4p - 3s <sup>2</sup> 3p 4d	<sup>1</sup> D - <sup>3</sup> F°	2-2	J10
1	15	3631.972	3631.990	3633.025	143 125.28	- 170 650.55	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	2-3	J8
6	11	3656.572	3656.560	3657.602	146 697.37	- 174 037.69	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	0-1	J8
6	13	3661.946	3661.942	3662.985	146 737.55	- 174 037.69	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	1-1	J8
1	14	3709.325	3709.338	3710.393	143 117.41	- 170 068.73	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	1-2	J8
1	10	3710.405	3710.422	3711.477	143 125.28	- 170 068.73	3s <sup>2</sup> 3p 3d - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	2-2	J8
6	17	3717.722	3717.717	3718.774	147 147.11	- 174 037.69	3s <sup>2</sup> 3p 4s - 3s <sup>2</sup> 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	2-1	J8
	MI	3721.69	3721.63	3722.69	298.69	- 27 161.0	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>3</sup> P - <sup>1</sup> S	1-0	B9

S III - Continuer<sup>1</sup>

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
1	13	3747.845	3747.855	3748.920	143 097.08	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	0-1	J8
1	12	3750.697	3750.713	3751.779	143 117.41	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-1	J8
1	1bl,w	3751.850	3751.821	3752.887	143 125.28	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-1	J8
9	10	3774.500	3774.494	3775.567	147 551.60	- 174 037.69	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> S	1-1	J8
5	13	3778.868	3778.846	3779.919	146 737.55	- 173 193.14	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-2	J8
9	13	3794.650	3794.640	3795.718	147 692.21	- 174 037.69	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> S	2-1	J8
5	14	3831.819	3831.815	3832.902	146 697.37	- 172 787.26	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	0-1	J8
5	13	3837.709	3837.726	3838.814	146 737.55	- 172 787.26	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-1	J8
5	16	3838.281	3838.268	3839.357	147 147.11	- 173 193.14	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-2	J8
5	13	3860.608	3860.619	3861.714	146 737.55	- 172 632.79	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	1-0	J8
8	4bl,w	3899.032	3898.817	3899.922	147 551.60	- 173 193.14	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	1-2	J8
5			3899.029	3900.133	147 147.11	- 172 787.26	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-1	
12	10	3899.247	3899.246	3900.351	148 398.97	- 174 037.69	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>3</sup> S	1-1	J10
8	5	3920.292	3920.315	3921.426	147 692.21	- 173 193.14	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	2-2	J8
8	14	3928.537	3928.556	3929.668	147 745.70	- 173 193.14	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	3-2	J8
8	12	3961.516	3961.526	3962.647	147 551.60	- 172 787.26	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	1-1	J8
8	14	3983.722	3983.723	3984.850	147 692.21	- 172 787.26	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	2-1	J8
8	12	3985.921	3985.924	3987.052	147 551.60	- 172 632.79	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> P	1-0	J8
	10	3997.924	3997.926	3999.056	151 978.54	- 176 984.44	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>1</sup> D° - <sup>1</sup> D	2-2	J8
	4	4087.791	4087.790	4088.944	143 097.08	- 167 553.27	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>1</sup> P	0-1	J8
	10	4091.170	4091.191	4092.346	143 117.41	- 167 553.27	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>1</sup> P	1-1	J8
11	9	4099.143	4099.172	4100.328	148 398.97	- 172 787.26	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>3</sup> P	1-1	J8
11	5	4125.291	4125.301	4126.465	148 398.97	- 172 632.79	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>3</sup> P	1-0	J8
4	19	4253.473	4253.499	4254.696	147 147.11	- 170 650.55	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-3	J8
4	17	4284.885	4284.904	4286.110	146 737.55	- 170 068.73	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-2	J8
4	15	4332.644	4332.653	4333.871	146 697.37	- 169 771.43	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	0-1	J8
4	14	4340.230	4340.211	4341.431	146 737.55	- 169 771.43	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-1	J8
7	14	4354.516	4354.492	4355.716	147 692.21	- 170 650.55	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-3	J8
4	16	4361.476	4361.468	4362.693	147 147.11	- 170 068.73	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-2	J8
7	12	4364.682	4364.661	4365.888	147 745.70	- 170 650.55	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	3-3	J8
4	10	4418.782	4418.781	4420.022	147 147.11	- 169 771.43	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-1	J8
7	12	4439.826	4439.817	4441.063	147 551.60	- 170 068.73	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	1-2	J8
7	9	4467.716	4467.716	4468.970	147 692.21	- 170 068.73	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-2	J8
7	6	4478.419	4478.422	4479.679	147 745.70	- 170 068.73	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	3-2	J8
7	6	4499.223	4499.222	4500.484	147 551.60	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	1-1	J8
7	6	4527.875	4527.876	4529.146	147 692.21	- 169 771.43	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>3</sup> D° - <sup>3</sup> D	2-1	J8
10	9bl	4613.440	4613.433	4614.726	148 398.97	- 170 068.73	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>3</sup> D	1-2	J8
10	9	4677.615	4677.609	4678.919	148 398.97	- 169 771.43	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>3</sup> D	1-1	J8
	13	5160.084	5160.085	5161.522	157 610.31	- 176 984.44	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>1</sup> F° - <sup>1</sup> D	3-2	J8
	13	5219.322	5219.307	5220.760	148 398.97	- 167 553.27	3s <sup>2</sup> 3p4s - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>1</sup> P	1-1	J8
	1w	5369.618	5369.618	5371.112	164 140.97	- 182 759.09	3s <sup>2</sup> 3p3d - 3s <sup>2</sup> 3p4p	<sup>1</sup> P° - <sup>1</sup> S	1-0	J8
	E2	6312.06	6312.06	6313.81	11 322.7	- 27 161.0	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>1</sup> D - <sup>1</sup> S	2-0	B2
	9	6418.882	6418.883	6420.657	151 978.54	- 167 553.27	3s3p <sup>3</sup> - 3s <sup>2</sup> 3p4p	<sup>1</sup> D° - <sup>1</sup> P	2-1	J8
	M1		9068.6	9071.1	298.69	- 11 322.7	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>3</sup> P - <sup>1</sup> D	1-2	
	M1		9530.6	9533.2	833.08	- 11 322.7	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>3</sup> P - <sup>1</sup> D	2-2	
		Wavenumber (cm <sup>-1</sup> )		Vacuum Wavelength (μm)						
		Observed	Calculated							
	M1	534.39	534.39	18.713	298.69	- 833.08	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>3</sup> P - <sup>3</sup> P	1-2	B10
	M1	298.69	298.69	33.480	0.000	- 298.69	3s <sup>2</sup> 3p <sup>2</sup> - 3s <sup>2</sup> 3p <sup>2</sup>	<sup>3</sup> P - <sup>3</sup> P	0-1	C1,G6

S IV

Al I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 3s^2 3p^2 P_{1/2}^o$

Ionization energy  $380\,870 \pm 100 \text{ cm}^{-1}$  ( $47.222 \pm 0.012 \text{ eV}$ )

An extension of the analysis of S IV based on observations by Joelsson *et al.* [see S V] is underway at the University of Lund. The preliminary data have been communicated by Engström [E2] for this compilation. The estimated wavelength uncertainty is  $0.02 \text{ \AA}$  for most of the lines below  $2000 \text{ \AA}$  and  $0.03 \text{ \AA}$  for most of those above  $2000 \text{ \AA}$ .

The value adopted here for the  $3s^2 3p^2 P_{1/2}^o - P_{3/2}^o$  ground-term splitting is from measurements of the corresponding forbidden line wavenumber with an estimated uncertainty of  $0.01 \text{ cm}^{-1}$  [L1]. Since a slightly different value of  $951.2 \text{ cm}^{-1}$  was obtained from the analysis [E2],

we have, for consistency, reevaluated all levels using a least-squares optimization procedure. The results are, of course, in agreement with the values from [E2] within the experimental uncertainties.

References

- E2 Engström, L. [1991], unpublished material from an analysis of S IV in progress at the University of Lund, Sweden.
- L1 Lacy, J. H. [1989], private communication. The line was measured in the spectra of several different planetary nebulae; see Beck, S. C., *et al.* [1981], *Astrophys. J.* **249**, 592–601.

S IV

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	1g	271.070	271.073	0.00	368 904.8	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2D$	$1/2 - 3/2$	E2
	3g	271.335	271.333	951.43	369 502.9	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2D$	$3/2 - 5/2$	E2
	1g	273.532	273.534	0.00	365 585.4	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2P$	$1/2 - 3/2$	E2
	1g	273.804	273.790	0.00	365 243.1	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2P$	$1/2 - 1/2$	E2
	2g	274.249	274.248	951.43	365 585.4	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2P$	$3/2 - 3/2$	E2
	1g	274.522	274.505	951.43	365 243.1	$3s^2(^1S)3p - 3s3p(^3P^o)5p$	$2P^o - ^2P$	$3/2 - 1/2$	E2
	1g	290.845	290.845	0.00	343 826.2	$3s^2(^1S)3p - 3s3p(^1P^o)4p$	$2P^o - ^2S$	$1/2 - 1/2$	E2
	1g	291.656	291.652	951.43	343 826.2	$3s^2(^1S)3p - 3s3p(^1P^o)4p$	$2P^o - ^2S$	$3/2 - 1/2$	E2
	1g	294.125	294.117	0.00	340 000.6	$3s^2(^1S)3p - 3s3p(^1P^o)4p$	$2P^o - ^2P$	$1/2 - 3/2$	E2
	1g	294.286	294.279	0.00	339 813.7	$3s^2(^1S)3p - 3s3p(^1P^o)4p$	$2P^o - ^2P$	$1/2 - 1/2$	E2
	1g	295.921	295.918	951.43	338 883.1	$3s^2(^1S)3p - 3s3p(^1P^o)4p$	$2P^o - ^2D$	$3/2 - 3/2$	E2
	2g	300.327	300.331	0.00	332 965.5	$3s^2(^1S)3p - 3s^2(^1S)7s$	$2P^o - ^2S$	$1/2 - 1/2$	E2
	3g	301.187	301.192	951.43	332 965.5	$3s^2(^1S)3p - 3s^2(^1S)7s$	$2P^o - ^2S$	$3/2 - 1/2$	E2
	6g	321.021	321.027	0.00	311 500.6	$3s^2(^1S)3p - 3s^2(^1S)6s$	$2P^o - ^2S$	$1/2 - 1/2$	E2
	5g	321.993	322.010	951.43	311 500.6	$3s^2(^1S)3p - 3s^2(^1S)6s$	$2P^o - ^2S$	$3/2 - 1/2$	E2
	2g	323.874	323.875	0.00	308 760.9	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2S$	$1/2 - 1/2$	E2
	3g	324.868	324.876	951.43	308 760.9	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2S$	$3/2 - 1/2$	E2
	7g	329.653	329.665	0.00	303 337.8	$3s^2(^1S)3p - 3s^2(^1S)5d$	$2P^o - ^2D$	$1/2 - 3/2$	E2
	8g	330.532	330.547	951.43	303 480.1	$3s^2(^1S)3p - 3s^2(^1S)5d$	$2P^o - ^2D$	$3/2 - 5/2$	E2
	4g	330.691	330.703	951.43	303 337.8	$3s^2(^1S)3p - 3s^2(^1S)5d$	$2P^o - ^2D$	$3/2 - 3/2$	E2
	5g	332.088	332.105	0.00	301 109.8	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2D$	$1/2 - 3/2$	E2
	7g	332.629	332.640	951.43	301 576.4	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2D$	$3/2 - 5/2$	E2
	4g	333.141	333.157	951.43	301 109.8	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2D$	$3/2 - 3/2$	E2
	1g	334.031	334.036	0.00	299 369.2	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^4S$	$1/2 - 3/2$	E2
	1g	336.630	336.634	951.43	298 010.3	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^4P$	$3/2 - 5/2$	E2
	1g	337.115	337.108	951.43	297 592.6	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^4P$	$3/2 - 3/2$	E2
	5g	340.749	340.758	0.00	293 463.1	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^4D$	$1/2 - 3/2$	E2
	5g	340.930	340.935	0.00	293 310.8	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^4D$	$1/2 - 1/2$	E2
	5g	341.413	341.421	0.00	292 893.9	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2P$	$1/2 - 3/2$	E2
	5g	341.787	341.799	0.00	292 569.2	$3s^2(^1S)3p - 3s3p(^3P^o)4p$	$2P^o - ^2P$	$1/2 - 1/2$	E2

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	4g	341.854	341.867	951.43	- 293 463.1	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p( <sup>3</sup> P°)4p	2P° - <sup>4</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	3g	342.043	342.045	951.43	- 293 310.8	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p( <sup>3</sup> P°)4p	2P° - <sup>4</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	8g	342.521	342.533	951.43	- 292 893.9	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p( <sup>3</sup> P°)4p	2P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	4g	342.908	342.915	951.43	- 292 569.2	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p( <sup>3</sup> P°)4p	2P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	1	349.105	349.103	94 150.4	- 380 599.2	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> D°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	5	353.051	353.053	71 528.7	- 354 772.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	4	353.426	353.438	71 184.1	- 354 119.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	6	353.728	353.734	72 074.4	- 354 772.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	3	353.865	{ 353.867 353.869	71 184.1	- 353 776.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
				71 528.7	- 354 119.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	3	354.299	354.299	71 528.7	- 353 776.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	6bl	354.532	354.553	72 074.4	- 354 119.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	4P - <sup>4</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	8g	368.971	368.975	0.00	- 271 020.9	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)5s	2P° - <sup>2</sup> S	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	9g	370.260	370.275	951.43	- 271 020.9	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)5s	2P° - <sup>2</sup> S	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	1	371.323	371.302	71 528.7	- 340 851.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	1	371.923	371.915	71 528.7	- 340 407.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	1w	372.271	372.287	72 074.4	- 340 684.4	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	2w	372.651	372.672	72 074.4	- 340 407.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	1	376.396	376.398	72 074.4	- 337 750.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> F°	<sup>5</sup> / <sub>2</sub> - <sup>7</sup> / <sub>2</sub>	E2
	4	377.202	377.198	71 184.1	- 336 297.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> D°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	3	377.603	377.604	71 528.7	- 336 356.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	5	377.689	377.689	71 528.7	- 336 297.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	1	377.877	377.878	94 150.4	- 358 786.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	<sup>2</sup> D - <sup>2</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	1	378.126	378.126	72 074.4	- 336 536.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> D°	<sup>5</sup> / <sub>2</sub> - <sup>7</sup> / <sub>2</sub>	E2
	2	378.392	378.384	72 074.4	- 336 356.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	4P - <sup>4</sup> D°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	2g	391.555	391.549	0.00	- 255 395.8	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	2P° - <sup>2</sup> D	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	5g	393.005	{ 393.006 393.013	951.43	- 255 400.3	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	2P° - <sup>2</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
				951.43	- 255 395.8	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	2P° - <sup>2</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	1	397.569	397.580	94 103.1	- 345 624.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	2	402.360	402.351	94 150.4	- 342 689.5	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	<sup>5</sup> / <sub>2</sub> - <sup>7</sup> / <sub>2</sub>	E2
	2	403.117	403.115	94 103.1	- 342 171.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	3	406.085	406.080	94 150.4	- 340 407.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	1	410.866	410.850	94 103.1	- 337 501.1	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> F°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	1	412.883	{ 412.872 412.892	94 150.4	- 336 356.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> D°	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
				94 103.1	- 336 297.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	4	419.227	419.225	94 103.1	- 332 638.6	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)6f	<sup>2</sup> D - <sup>2</sup> F°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	7	419.299	419.297	94 150.4	- 332 644.6	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)6f	<sup>2</sup> D - <sup>2</sup> F°	<sup>5</sup> / <sub>2</sub> - <sup>7</sup> / <sub>2</sub>	E2
	3	425.033	425.031	123 509.3	- 358 786.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	<sup>2</sup> S - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	4	426.163	426.164	123 509.3	- 358 161.	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	<sup>2</sup> S - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
	1	445.339	{ 445.352 445.354 445.362	133 619.6	- 358 161.	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	2P - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	E2
				134 245.4	- 358 786.0	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)5s	2P - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
				94 103.1	- 318 639.3	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)6p	<sup>2</sup> D - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	1	450.935	450.918	123 509.3	- 345 278.9	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	<sup>2</sup> S - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	4	460.288	460.293	94 103.1	- 311 356.1	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5f	<sup>2</sup> D - <sup>2</sup> F°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	8w	460.391	460.396	94 150.4	- 311 354.5	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5f	<sup>2</sup> D - <sup>2</sup> F°	<sup>5</sup> / <sub>2</sub> - <sup>7</sup> / <sub>2</sub>	E2
	2	465.346	465.347	94 103.1	- 308 996.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	<sup>2</sup> D - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	9w	465.460	{ 465.450 465.471	94 150.4	- 308 996.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	<sup>2</sup> D - <sup>2</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
				94 103.1	- 308 939.4	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	<sup>2</sup> D - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	
	3	473.866	473.858	134 245.4	- 345 278.9	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	2P - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	8w	491.649	491.651	134 245.4	- 337 641.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	2P - <sup>4</sup> F°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	4	492.460	492.459	134 245.4	- 337 308.1	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4d	2P - <sup>2</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2
	1	501.607	501.599	72 074.4	- 271 436.9	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	4P - <sup>2</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	E2
	10	519.379	519.376	71 528.7	- 264 067.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	4P - <sup>4</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	E2



S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	10	520.128	520.118	71 184.1	- 263 448.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	1/2 - 3/2	E2
	12	520.852	520.852	72 074.4	- 264 067.6	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	5/2 - 5/2	E2
	10	521.061	521.052	71 528.7	- 263 448.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	3/2 - 3/2	E2
			521.069	71 184.1	- 263 097.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	1/2 - 1/2	
	11	522.009	522.007	71 528.7	- 263 097.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	3/2 - 1/2	E2
	11	522.541	522.538	72 074.4	- 263 448.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>4</sup> P - <sup>4</sup> P°	5/2 - 3/2	E2
	1	523.135	523.161	94 150.4	- 285 296.0	3s 3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S) 5p	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	1	523.513	523.508	94 103.1	- 285 122.2	3s 3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S) 5p	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2
	1	530.359	530.360	152 133.2	- 340 684.4	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s 3p ( <sup>3</sup> P°) 4d	<sup>2</sup> D - <sup>4</sup> P°	3/2 - 3/2	E2
	1	534.379	534.392	94 103.1	- 281 231.6	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 5/2	E2
	3w	534.540	534.527	94 150.4	- 281 231.6	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 5/2	E2
	7	534.765	534.787	94 103.1	- 281 093.6	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 3/2	E2
	4	539.107	539.098	152 146.8	- 337 641.7	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s 3p ( <sup>3</sup> P°) 4d	<sup>2</sup> D - <sup>4</sup> P°	5/2 - 5/2	E2
	4	539.107	539.121	123 509.3	- 308 996.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	3	539.291	539.287	123 509.3	- 308 939.4	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	1w	540.878	540.880	152 146.8	- 337 030.8	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s 3p ( <sup>3</sup> P°) 4d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 3/2	E2
	5	541.788	541.789	94 103.1	- 278 676.9	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2
	1	541.894	541.890	94 103.1	- 278 642.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 3/2	E2
	7	542.023	542.029	94 150.4	- 278 642.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	1	542.317	542.317	134 245.4	- 318 639.3	3s 3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S) 6p	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2
	1	542.412	542.406	134 245.4	- 318 609.3	3s 3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S) 6p	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 1/2	E2
			542.432	185 148.0	- 369 502.9	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 5p	<sup>2</sup> D° - <sup>2</sup> D	5/2 - 5/2	
	1	543.921	543.923	185 055.1	- 368 904.8	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 5p	<sup>2</sup> D° - <sup>2</sup> D	3/2 - 3/2	E2
	8w	544.732	544.723	94 103.1	- 277 682.8	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - c <sup>2</sup> F°	3/2 - 5/2	E2
	5	544.868	544.863	94 150.4	- 277 682.8	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - c <sup>2</sup> F°	5/2 - 5/2	E2
	9	545.126	545.120	94 150.4	- 277 596.1	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - c <sup>2</sup> F°	5/2 - 7/2	E2
UV5	18g	551.129	551.122	0.00	- 181 448.1	3s <sup>2</sup> ( <sup>1</sup> S) 3p - 3s <sup>2</sup> ( <sup>1</sup> S) 4s	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	E2
	18g	554.033	554.023	152 146.8	- 332 644.6	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s <sup>2</sup> ( <sup>1</sup> S) 6f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	E2
UV5			554.027	951.43	- 181 448.1	3s <sup>2</sup> ( <sup>1</sup> S) 3p - 3s <sup>2</sup> ( <sup>1</sup> S) 4s	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	
	5	554.209	554.209	185 148.0	- 365 585.4	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 5p	<sup>2</sup> D° - <sup>2</sup> P	5/2 - 3/2	E2
	4w	554.972	554.976	185 055.1	- 365 243.1	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 5p	<sup>2</sup> D° - <sup>2</sup> P	3/2 - 1/2	E2
	4bl	563.911	563.908	94 103.1	- 271 436.9	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 3/2	E2
	12	564.068	564.059	94 150.4	- 271 436.9	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	5w	565.844	565.855	94 103.1	- 270 826.7	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 4s	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2
	5	570.212	570.201	133 619.6	- 308 996.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 3/2	E2
	7	570.397	570.386	133 619.6	- 308 939.4	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 1/2	E2
	6	572.244	572.243	134 245.4	- 308 996.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2
	4	572.435	572.430	134 245.4	- 308 939.4	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 1/2	E2
	6	584.963	584.960	94 103.1	- 265 055.1	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2
	3	585.558	585.550	94 103.1	- 264 882.8	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 3/2	E2
	7	585.721	585.712	94 150.4	- 264 882.8	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 3d	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	2	587.040	587.037	72 074.4	- 242 421.3	3s 3p <sup>2</sup> - 3s 3p ( <sup>3</sup> P°) 3d	<sup>4</sup> P - <sup>2</sup> F°	5/2 - 7/2	E2
	14	611.098	611.100	94 103.1	- 257 742.5	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - b <sup>2</sup> F°	3/2 - 5/2	E2
	5	611.268	611.276	94 150.4	- 257 742.5	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - b <sup>2</sup> F°	5/2 - 5/2	E2
	16	611.767	611.767	94 150.4	- 257 611.3	3s 3p <sup>2</sup> - (ψ)	<sup>2</sup> D - b <sup>2</sup> F°	5/2 - 7/2	E2
	1w	618.109	618.098	123 509.3	- 285 296.0	3s 3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S) 5p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	2	624.138	624.141	185 148.0	- 345 368.1	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 4f	<sup>2</sup> D° - <sup>2</sup> F	3/2 - 7/2	E2
	1	624.277	624.281	185 055.1	- 345 239.5	3p <sup>3</sup> - 3s 3p ( <sup>3</sup> P°) 4f	<sup>2</sup> D° - <sup>2</sup> F	3/2 - 5/2	E2
	12	628.053	628.050	152 133.2	- 311 356.1	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s <sup>2</sup> ( <sup>1</sup> S) 5f	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	E2
	12	628.107	628.104	152 146.8	- 311 356.1	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s <sup>2</sup> ( <sup>1</sup> S) 5f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 5/2	E2
			628.110	152 146.8	- 311 354.5	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s <sup>2</sup> ( <sup>1</sup> S) 5f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	
	2	633.581	633.584	233 610.3	- 391 442.6	3s 3p ( <sup>3</sup> P°) 3d - 3s 3p ( <sup>1</sup> P°) 4f	<sup>2</sup> D° - <sup>2</sup> F	5/2 - 7/2	E2
	1	633.775	633.773	233 641.7	- 391 426.9	3s 3p ( <sup>3</sup> P°) 3d - 3s 3p ( <sup>1</sup> P°) 4f	<sup>2</sup> D° - <sup>2</sup> F	3/2 - 5/2	E2
	2	634.586	634.581	123 509.3	- 281 093.6	3s 3p <sup>2</sup> - 3s 3p ( <sup>1</sup> P°) 3d	<sup>2</sup> S - <sup>2</sup> D°	1/2 - 3/2	E2
	4	637.553	637.554	152 146.8	- 308 996.3	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	3	637.728	637.730	152 133.2	- 308 939.4	3s <sup>2</sup> ( <sup>1</sup> S) 3d - 3s 3p ( <sup>1</sup> P°) 4s	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	2w	643.863	643.864	181 448.1	- 336 760.4	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)7p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	2	643.950	643.966	181 448.1	- 336 735.7	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)7p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	4bl	644.459	644.464	123 509.3	- 278 676.9	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	4bl	644.619	644.608	123 509.3	- 278 642.3	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	1	649.706	649.700	185 055.1	- 338 972.4	3p <sup>3</sup> - 3s3p( <sup>1</sup> P°)4p	<sup>2</sup> D° - <sup>2</sup> D	3/2 - 5/2	E2
	1	649.891	{ 649.872 649.913	211 366.6	- 365 243.1	3p <sup>3</sup> - 3s3p( <sup>3</sup> P°)5p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 1/2	E2
				211 376.3	- 365 243.1	3p <sup>3</sup> - 3s3p( <sup>3</sup> P°)5p	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 1/2	
	4bl	650.085	{ 650.077 650.092	185 055.1	- 338 883.1	3p <sup>3</sup> - 3s3p( <sup>1</sup> P°)4p	<sup>2</sup> D° - <sup>2</sup> D	3/2 - 3/2	E2
				185 148.0	- 338 972.4	3p <sup>3</sup> - 3s3p( <sup>1</sup> P°)4p	<sup>2</sup> D° - <sup>2</sup> D	5/2 - 3/2	
UV8	11	652.525	652.522	71 184.1	- 224 435.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 3/2	E2
UV8	11	652.923	652.918	71 184.1	- 224 342.8	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 1/2	E2
UV8	11	653.550	653.550	71 528.7	- 224 539.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 5/2	E2
UV8	11	653.993	653.993	71 528.7	- 224 435.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 3/2	E2
UV8	10	654.388	654.390	71 528.7	- 224 342.8	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 1/2	E2
UV8	12	655.549	655.554	72 074.4	- 224 617.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 1/2	E2
UV8	11	655.886	655.889	72 074.4	- 224 539.2	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 5/2	E2
UV8	10	656.335	656.335	72 074.4	- 224 435.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 3/2	E2
UV4	15g	657.328	657.319	0.00	- 152 133.2	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	E2
	4	659.285	659.298	133 619.6	- 285 296.0	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 3/2	E2
UV7	9w	660.035	{ 660.030 660.055	71 184.1	- 222 692.4	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	1/2 - 1/2	E2
				133 619.6	- 285 122.2	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 1/2	
UV7	10bl	660.913	660.919	71 184.1	- 222 488.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	1/2 - 3/2	E2
UV4	17g	661.443	{ 661.396 661.455	951.43	- 152 146.8	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	E2
UV4				951.43	- 152 133.2	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)3d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	
UV7	11	661.527	661.534	71 528.7	- 222 692.4	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	3/2 - 1/2	E2
UV7	1	662.024	662.030	134 245.4	- 285 296.0	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2
UV7	3	662.430	662.428	71 528.7	- 222 488.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	3/2 - 3/2	E2
UV7	11	663.696	663.704	71 528.7	- 222 198.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	3/2 - 5/2	E2
UV7	10	664.826	664.831	72 074.4	- 222 488.6	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	5/2 - 3/2	E2
UV7	11	666.113	666.116	72 074.4	- 222 198.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>4</sup> P - <sup>4</sup> P°	5/2 - 5/2	E2
	5	667.661	667.643	241 646.3	- 391 426.9	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>1</sup> P°)4f	<sup>2</sup> F° - <sup>2</sup> F	5/2 - 5/2	E2
	3	671.031	671.045	242 421.3	- 391 442.6	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>1</sup> P°)4f	<sup>2</sup> F° - <sup>2</sup> F	7/2 - 7/2	E2
	4	672.749	672.747	203 442.8	- 352 087.2	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	3/2 - 5/2	E2
	6	672.958	672.958	203 632.7	- 352 230.3	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	5/2 - 7/2	E2
	2	673.272	673.271	203 906.3	- 352 434.9	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	7/2 - 9/2	E2
	2	673.496	673.484	204 264.9	- 352 746.5	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	9/2 - 11/2	E2
	3	673.605	673.607	203 632.7	- 352 087.2	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	5/2 - 5/2	E2
	3	674.197	674.200	203 906.3	- 352 230.3	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	7/2 - 7/2	E2
	6	674.468	674.441	94 150.4	- 242 421.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	E2
	10bl	674.902	674.900	204 264.9	- 352 434.9	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	9/2 - 9/2	E2
	8	676.008	676.006	123 509.3	- 271 436.9	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	12bl	677.746	677.768	94 103.1	- 241 646.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	E2
	2	677.987	677.985	94 150.4	- 241 646.3	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 5/2	E2
	11bl	678.082	678.086	133 619.6	- 281 093.6	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> D°	1/2 - 3/2	E2
	4	678.811	678.806	123 509.3	- 270 826.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P°)4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	10bl	680.339	680.336	134 245.4	- 281 231.6	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> D°	3/2 - 5/2	E2
	12bl	680.961	680.975	134 245.4	- 281 093.6	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> D°	3/2 - 3/2	E2
	2	687.097	687.113	203 442.8	- 348 979.3	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	3/2 - 5/2	E2
	7bl	687.266	687.261	203 442.8	- 348 947.9	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	3/2 - 3/2	E2
	3bl	687.742	687.721	203 632.7	- 349 040.5	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	5/2 - 7/2	E2
	7bl	688.023	688.011	203 632.7	- 348 979.3	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	5/2 - 5/2	E2
	4	688.549	688.551	203 906.3	- 349 138.9	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	7/2 - 9/2	E2
	5w	689.024	689.017	203 906.3	- 349 040.5	3s3p( <sup>3</sup> P°)3d - 3s3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	7/2 - 7/2	E2
	7w	689.374	689.383	133 619.6	- 278 676.9	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 1/2	E2
	8w	689.545	689.547	133 619.6	- 278 642.3	3s3p <sup>2</sup> - 3s3p( <sup>1</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 3/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
UV3	7bl	690.250	{ 690.250 690.255 690.296	211 366.6	- 356 241.7	3p <sup>3</sup> - 3s3p ( <sup>3</sup> P°)4f	<sup>2</sup> P° - <sup>4</sup> D	3/2 - 1/2	E2
	13bl	706.474	706.485	123 509.3	- 265 055.1	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> F	3/2 - 3/2	E2
	10	707.346	707.346	123 509.3	- 264 882.8	3p <sup>3</sup> - 3s3p ( <sup>3</sup> P°)4f	<sup>2</sup> P° - <sup>4</sup> D	1/2 - 1/2	E2
	2w	713.365	713.356	71 184.1	- 211 366.6	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	3	715.129	715.114	71 528.7	- 211 366.6	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>4</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2
	12	716.647	716.648	94 103.1	- 233 641.7	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 3/2	E2
	4	716.814	716.809	94 103.1	- 233 610.3	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 3/2	E2
	4	716.877	716.891	94 150.4	- 233 641.7	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 3/2	E2
	13	717.055	717.052	94 150.4	- 233 610.3	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 3/2	E2
	1w	717.910	717.915	72 074.4	- 211 366.6	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>4</sup> P - <sup>2</sup> P°	5/2 - 3/2	E2
	2	725.592	725.598	133 619.6	- 271 436.9	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)4s	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 3/2	E2
	2w	726.897	726.894	211 376.3	- 348 947.9	3p <sup>3</sup> - 3s3p ( <sup>3</sup> P°)4f	<sup>2</sup> P° - <sup>4</sup> F	1/2 - 1/2	E2
	3	728.899	{ 728.908 728.910	134 245.4	- 271 436.9	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)4s	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2
				181 448.1	- 318 639.3	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)6p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	
	2bl	729.069	729.069	181 448.1	- 318 609.3	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)6p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	5w	732.131	732.165	134 245.4	- 270 826.7	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)4s	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 1/2	E2
	16g	744.904	744.904	0.00	- 134 245.4	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 3/2	E2
	3	747.199	747.209	257 611.3	- 391 442.6	(ψ) - 3s3p ( <sup>1</sup> P°)4f	b <sup>2</sup> F° - <sup>2</sup> F	7/2 - 7/2	E2
	3	747.707	747.697	222 198.3	- 355 942.4	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	5/2 - 5/2	E2
	3	748.030	{ 748.030 748.033	257 742.5	- 391 426.9	(ψ) - 3s3p ( <sup>1</sup> P°)4f	b <sup>2</sup> F° - <sup>2</sup> F	5/2 - 5/2	E2
				222 488.6	- 356 172.6	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	3/2 - 3/2	
	15g	748.397	748.393	0.00	- 133 619.6	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 1/2	E2
	3	748.787	748.787	222 692.4	- 356 241.7	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	1/2 - 1/2	E2
	5w	749.252	749.248	222 198.3	- 355 665.4	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	5/2 - 7/2	E2
	3w	749.323	749.323	222 488.6	- 355 942.4	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	3/2 - 5/2	E2
	16g	750.225	750.221	951.43	- 134 245.4	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 3/2	E2
	2w	751.030	751.037	152 146.8	- 285 296.0	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2
	2	751.936	751.942	152 133.2	- 285 122.2	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2
	18g	753.762	753.760	951.43	- 133 619.6	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 1/2	E2
	1	754.966	754.947	211 366.6	- 343 826.2	3p <sup>3</sup> - 3s3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	E2
1	759.091	759.088	224 495.6	- 356 172.6	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)4f	<sup>4</sup> D° - <sup>4</sup> D	3/2 - 3/2	E2	
6	760.836	760.829	133 619.6	- 265 055.1	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 1/2	E2	
6	761.835	761.828	133 619.6	- 264 882.8	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	1/2 - 3/2	E2	
10bl	764.427	764.469	134 245.4	- 265 055.1	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 1/2	E2	
6	765.480	765.478	134 245.4	- 264 882.8	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> P - <sup>2</sup> P°	3/2 - 3/2	E2	
3	766.489	766.479	94 150.4	- 224 617.2	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> D°	5/2 - 7/2	E2	
2	766.941	766.937	94 150.4	- 224 539.2	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> D°	5/2 - 5/2	E2	
1	767.261	767.268	94 103.1	- 224 435.6	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> D°	3/2 - 3/2	E2	
2	767.387	767.391	213 514.6	- 343 826.2	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	E2	
3	767.541	767.547	94 150.4	- 224 435.6	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> D°	5/2 - 3/2	E2	
1	770.240	770.247	133 619.6	- 263 448.1	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)4s	<sup>2</sup> P - <sup>4</sup> P°	1/2 - 3/2	E2	
9	774.679	774.685	152 146.8	- 281 231.6	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p ( <sup>1</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 5/2	E2	
4w	777.399	777.399	211 366.6	- 340 000.6	3p <sup>3</sup> - 3s3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 3/2	E2	
1	778.530	778.531	211 366.6	- 339 813.7	3p <sup>3</sup> - 3s3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 1/2	E2	
3w	778.584	778.589	211 376.3	- 339 813.7	3p <sup>3</sup> - 3s3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 1/2	E2	
4	780.679	780.669	94 103.1	- 222 198.3	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> P°	3/2 - 5/2	E2	
1	780.961	780.958	94 150.4	- 222 198.3	3s3p <sup>2</sup> - 3s3p ( <sup>3</sup> P°)3d	<sup>2</sup> D - <sup>4</sup> P°	5/2 - 5/2	E2	
3	782.125	782.126	241 646.3	- 369 502.9	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)5p	<sup>2</sup> F° - <sup>2</sup> D	5/2 - 5/2	E2	
6	784.025	784.017	181 448.1	- 308 996.3	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s3p ( <sup>1</sup> P°)4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2	
5	784.370	784.367	181 448.1	- 308 939.4	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s3p ( <sup>1</sup> P°)4s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2	
6bl	786.911	786.896	242 421.3	- 369 502.9	3s3p ( <sup>3</sup> P°)3d - 3s3p ( <sup>3</sup> P°)5p	<sup>2</sup> F° - <sup>2</sup> D	7/2 - 5/2	E2	
10	790.231	790.241	152 133.2	- 278 676.9	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p ( <sup>1</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	E2	
9	790.534	790.542	152 146.8	- 278 642.3	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p ( <sup>1</sup> P°)3d	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	E2	
10	796.497	796.498	152 133.2	- 277 682.8	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - c <sup>2</sup> F°	3/2 - 5/2	E2	

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
UV6	11bl	796.675	796.584?	152 146.8	277 682.8?	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - c <sup>2</sup> F <sup>o</sup>	5/2 - 5/2	E2
	12	797.140	797.135	152 146.8	277 596.1	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - c <sup>2</sup> F <sup>o</sup>	5/2 - 7/2	E2
	8w	797.646	797.649	213 514.6	338 883.1	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	1/2 - 3/2	E2
	11	798.270	798.267	71 184.1	196 455.5	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>4</sup> P - <sup>4</sup> S	1/2 - 3/2	E2
UV6	3	798.723	798.729	255 400.3	380 599.2	3s <sup>2</sup> ( <sup>1</sup> S)4d - 3s3p( <sup>1</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> D <sup>o</sup>	5/2 - 5/2	E2
	3	798.846	798.845	255 395.8	380 576.5	3s <sup>2</sup> ( <sup>1</sup> S)4d - 3s3p( <sup>1</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> D <sup>o</sup>	3/2 - 3/2	E2
	4bl	798.965	798.991	213 725.2	338 883.1	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	E2
	13	800.466	800.469	71 528.7	196 455.5	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>4</sup> P - <sup>4</sup> S	3/2 - 3/2	E2
UV6	3	802.530	802.535	224 342.8	348 947.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>4</sup> D <sup>o</sup> - <sup>4</sup> F	1/2 - 3/2	E2
	2bl	802.916	802.931	224 435.6	348 979.3	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>4</sup> D <sup>o</sup> - <sup>4</sup> F	3/2 - 5/2	E2
	3bl	803.078	803.073	224 617.2	349 138.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>4</sup> D <sup>o</sup> - <sup>4</sup> F	7/2 - 9/2	E2
	1w	803.609	803.599	224 539.2	348 979.3	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>4</sup> D <sup>o</sup> - <sup>4</sup> F	5/2 - 5/2	E2
UV6	1	803.697	803.708	224 617.2	349 040.5	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>4</sup> D <sup>o</sup> - <sup>4</sup> F	7/2 - 7/2	E2
	12	803.980	803.981	72 074.4	196 455.5	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>4</sup> P - <sup>4</sup> S	5/2 - 3/2	E2
UV2	16g	809.659	809.656	0.00	123 509.3	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> S	1/2 - 1/2	E2
UV2	15g	815.945	815.941	951.43	123 509.3	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s3p <sup>2</sup>	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> S	3/2 - 1/2	E2
	6bl	835.970	835.966	94 103.1	213 725.2	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 3/2	E2
UV2	9bl	836.293	836.297	94 150.4	213 725.2	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	E2
	10	837.440	837.440	94 103.1	213 514.6	3s3p <sup>2</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	E2
UV2	2	838.189	838.197	152 133.2	271 436.9	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p( <sup>2</sup> P <sup>o</sup> )4s	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 3/2	E2
	6	838.291	838.293	152 146.8	271 436.9	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p( <sup>2</sup> P <sup>o</sup> )4s	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	E2
UV2	1	838.644	838.643	213 725.2	332 965.5	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s <sup>2</sup> ( <sup>1</sup> S)7s	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> S	3/2 - 1/2	E2
	4	842.513	842.506	152 133.2	270 826.7	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3s3p( <sup>2</sup> P <sup>o</sup> )4s	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	E2
UV2	2	845.083	845.079	185 148.0	303 480.1	3p <sup>3</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	5/2 - 5/2	E2
	3w	845.409	845.432	185 055.1	303 337.8	3p <sup>3</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	E2
UV2	10	852.719	852.710	94 103.1	211 376.3	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	E2
	10	853.124	853.124	94 150.4	211 366.6	3s3p <sup>2</sup> - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	E2
UV2	4	858.898	858.897	185 148.0	301 576.4	3p <sup>3</sup> - 3s3p( <sup>2</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	5/2 - 3/2	E2
	1	862.964	862.959	185 148.0	301 109.8	3p <sup>3</sup> - 3s3p( <sup>2</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	5/2 - 3/2	E2
UV2	1	864.623	864.620	224 342.8	340 000.6	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>4</sup> D <sup>o</sup> - <sup>2</sup> P	1/2 - 1/2	E2
	1	878.377	878.376	277 596.1	391 442.6	(ψ) - 3s3p( <sup>1</sup> P <sup>o</sup> )4f	c <sup>2</sup> F <sup>o</sup> - <sup>2</sup> F	7/2 - 7/2	E2
UV2	1w	889.042	889.048	242 421.3	355 665.4	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>2</sup> F <sup>o</sup> - <sup>4</sup> D	7/2 - 7/2	E2
	3	888.068	888.063	203 906.3	316 510.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	7/2 - 1/2	E2
UV2	5	889.045	889.049	203 442.8	315 922.5	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	3/2 - 5/2	E2
	5	890.540	890.544	203 442.8	315 733.7	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	3/2 - 3/2	E2
UV2	5	890.540	890.553	203 632.7	315 922.5	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	5/2 - 5/2	E2
	5	890.657	890.658	203 906.3	316 182.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	7/2 - 7/2	E2
UV2	8	890.904	890.900	204 264.9	316 510.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	9/2 - 9/2	E2
	4	892.050	892.053	203 632.7	315 733.7	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	5/2 - 3/2	E2
UV2	4	892.729	892.728	203 906.3	315 922.5	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	7/2 - 5/2	E2
	4	893.524	893.511	204 264.9	316 182.9	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3p <sup>2</sup> ( <sup>3</sup> P)3d	<sup>4</sup> F <sup>o</sup> - <sup>4</sup> F	9/2 - 7/2	E2
UV2	6bl	894.804	894.792	233 610.3	345 368.1	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> F	5/2 - 7/2	E2
	2	896.077	896.075	233 641.7	345 239.5	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> F	3/2 - 5/2	E2
UV2	1	923.750	923.739	185 055.1	293 310.8	3p <sup>3</sup> - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>4</sup> D	1/2 - 1/2	E2
	1	927.312	927.310	185 055.1	292 893.9	3p <sup>3</sup> - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> P	3/2 - 3/2	E2
UV2	4	928.110	928.110	185 148.0	292 893.9	3p <sup>3</sup> - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> P	5/2 - 3/2	E2
	3	930.114	930.111	185 055.1	292 569.2	3p <sup>3</sup> - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> P	3/2 - 1/2	E2
UV2	1	939.951	939.935	233 610.3	340 000.6	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> P	5/2 - 3/2	E2
	4	946.887	946.886	152 133.2	257 742.5	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - b <sup>2</sup> F <sup>o</sup>	9/2 - 5/2	E2
UV2	1	946.985	947.008	152 146.8	257 742.5	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - b <sup>2</sup> F <sup>o</sup>	5/2 - 5/2	E2
	5	948.185	948.186	152 146.8	257 611.3	3s <sup>2</sup> ( <sup>1</sup> S)3d - (ψ)	<sup>2</sup> D - b <sup>2</sup> F <sup>o</sup>	5/2 - 7/2	E2
UV2	1	949.104	949.108	233 610.3	338 972.4	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	5/2 - 5/2	E2
	1	950.191	950.196	233 641.7	338 883.1	3s3p( <sup>3</sup> P <sup>o</sup> )3d - 3s3p( <sup>1</sup> P <sup>o</sup> )4p	<sup>2</sup> D <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	E2
UV2	1	962.955	962.947	181 448.1	285 296.0	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 3/2	E2
	1	964.581	964.561	181 448.1	285 122.2	3s <sup>2</sup> ( <sup>1</sup> S)4s - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 1/2	E2
UV2	5	999.787	999.779	133 619.6	233 641.7	3s3p <sup>2</sup> - 3s3p( <sup>3</sup> P <sup>o</sup> )3d	<sup>2</sup> P - <sup>2</sup> D <sup>o</sup>	1/2 - 9/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
UV1	3bl	1006.097	1006.074	134 245.4	- 233 641.7	3s3p <sup>2</sup> - 3s3p(³P°)3d	²P° - ²D°	³/₂ - ³/₂	E2
	5	1006.403	1006.392	134 245.4	- 233 610.3	3s3p <sup>2</sup> - 3s3p(³P°)3d	²P° - ²D°	³/₂ - ⁵/₂	E2
	1	1020.551	1020.554	213 514.6	- 311 500.6	3s²(¹S)4p - 3s²(¹S)6s	²P° - ²S	¹/₂ - ¹/₂	E2
	1	1022.761	1022.752	213 725.2	- 311 500.6	3s²(¹S)4p - 3s²(¹S)6s	²P° - ²S	³/₂ - ¹/₂	E2
	1	1026.757	1026.754	211 366.6	- 308 760.9	3p³ - 3s3p(³P°)4p	²P° - ²S	³/₂ - ¹/₂	E2
	1	1026.849	1026.856	211 376.3	- 308 760.9	3p³ - 3s3p(³P°)4p	²P° - ²S	¹/₂ - ¹/₂	E2
	15g	1062.656	{ 1062.654 1062.664	203 906.3	- 298 010.3	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴P	⁷/₂ - ⁵/₂	E2
				0.00	- 94 103.1	3s²(¹S)3p - 3s3p²	²P° - ²D	¹/₂ - ³/₂	
	16g	1072.962	1072.973	951.43	- 94 150.4	3s²(¹S)3p - 3s3p²	²P° - ²D	³/₂ - ⁵/₂	E2
	12g	1073.508	1073.518	951.43	- 94 103.1	3s²(¹S)3p - 3s3p²	²P° - ²D	³/₂ - ³/₂	E2
	4	1088.212	1088.214	224 617.2	- 316 510.9	3s3p(³P°)3d - 3p²(³P)3d	⁴D° - ⁴F	⁷/₂ - ⁹/₂	E2
	4	1091.180	1091.182	224 539.2	- 316 182.9	3s3p(³P°)3d - 3p²(³P)3d	⁴D° - ⁴F	⁵/₂ - ⁷/₂	E2
	3w	1093.041	1093.053	224 435.6	- 315 922.5	3s3p(³P°)3d - 3p²(³P)3d	⁴D° - ⁴F	³/₂ - ⁵/₂	E2
	3w	1094.191	1094.201	224 342.8	- 315 733.7	3s3p(³P°)3d - 3p²(³P)3d	⁴D° - ⁴F	¹/₂ - ³/₂	E2
	1w	1095.310	{ 1095.313 1095.314	224 435.6	- 315 733.7	3s3p(³P°)3d - 3p²(³P)3d	⁴D° - ⁴F	³/₂ - ³/₂	E2
				257 742.5	- 349 040.5	(ψ) - 3s3p(³P°)4f	b²F° - ⁴F	⁵/₂ - ⁷/₂	
	6	1098.357	1098.359	94 103.1	- 185 148.0	3s3p² - 3p³	²D - ²D°	³/₂ - ⁵/₂	E2
	11	1098.917	1098.930	94 150.4	- 185 148.0	3s3p² - 3p³	²D - ²D°	⁵/₂ - ⁵/₂	E2
	10	1099.472	1099.481	94 103.1	- 185 055.1	3s3p² - 3p³	²D - ²D°	³/₂ - ³/₂	E2
	7	1100.040	1100.053	94 150.4	- 185 055.1	3s3p² - 3p³	²D - ²D°	⁵/₂ - ³/₂	E2
4	1107.733	1107.733	152 146.8	- 242 421.3	3s²(¹S)3d - 3s3p(³P°)3d	²D - ²F°	⁵/₂ - ⁷/₂	E2	
5	1108.449	1108.452	123 509.3	- 213 725.2	3s3p² - 3s²(¹S)4p	²S - ²P°	¹/₂ - ³/₂	E2	
4	1109.832	1109.829	203 632.7	- 293 736.7	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	⁵/₂ - ⁵/₂	E2	
5	1110.885	{ 1110.861 1110.898	203 442.8	- 293 463.1	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	³/₂ - ³/₂	E2	
			204 264.9	- 294 282.2	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	⁹/₂ - ⁷/₂		
3	1111.044	1111.046	123 509.3	- 213 514.6	3s3p² - 3s²(¹S)4p	²S - ²P°	¹/₂ - ¹/₂	E2	
2	1111.246	1111.249	181 448.1	- 271 436.9	3s²(¹S)4s - 3s3p(³P°)4s	²S - ²P°	¹/₂ - ³/₂	E2	
3	1112.724	1112.743	203 442.8	- 293 310.8	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	³/₂ - ¹/₂	E2	
7	1113.204	{ 1113.209 1113.209	203 906.3	- 293 736.7	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	⁷/₂ - ⁵/₂	E2	
			203 632.7	- 293 463.1	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴D	⁵/₂ - ³/₂		
1w	1114.149	1114.145	213 725.2	- 303 480.1	3s²(¹S)4p - 3s²(¹S)5d	²P° - ²D	³/₂ - ⁵/₂	E2	
4w	1117.161	1117.155	152 133.2	- 241 646.3	3s²(¹S)3d - 3s3p(³P°)3d	²D - ²F°	³/₂ - ⁵/₂	E2	
2w	1117.934	1117.929	203 442.8	- 292 893.9	3s3p(³P°)3d - 3s3p(³P°)4p	⁴F° - ⁴P	³/₂ - ³/₂	E2	
1w	1118.823	1118.836	181 448.1	- 270 826.7	3s²(¹S)4s - 3s3p(³P°)4s	²S - ²P°	¹/₂ - ¹/₂	E2	
2	1138.076	1138.084	123 509.3	- 211 376.3	3s3p² - 3p³	²S - ²P°	¹/₂ - ¹/₂	E2	
8	1138.210	1138.209	123 509.3	- 211 366.6	3s3p² - 3p³	²S - ²P°	¹/₂ - ³/₂	E2	
1w	1141.619	1141.615	213 514.6	- 301 109.8	3s²(¹S)4p - 3s3p(³P°)4p	²P° - ²D	¹/₂ - ³/₂	E2	
1	1193.566	1193.565	285 122.2	- 368 904.8	3s²(¹S)5p - 3s3p(³P°)5p	²P° - ²D	¹/₂ - ³/₂	E2	
1w	1218.085	1218.079	211 366.6	- 293 463.1	3p³ - 3s3p(³P°)4p	²P° - ⁴D	³/₂ - ³/₂	E2	
2w	1220.471	1220.487	211 376.3	- 293 310.8	3p³ - 3s3p(³P°)4p	²P° - ⁴D	¹/₂ - ¹/₂	E2	
1	1220.899	1220.885	255 400.3	- 337 308.1	3s²(¹S)4d - 3s3p(³P°)4d	²D - ²D°	⁵/₂ - ⁵/₂	E2	
2bl	1226.703	1226.729	211 376.3	- 292 893.9	3p³ - 3s3p(³P°)4p	²P° - ²P	¹/₂ - ³/₂	E2	
3	1226.868	1226.866	152 133.2	- 233 641.7	3s²(¹S)3d - 3s3p(³P°)3d	²D - ²D°	³/₂ - ³/₂	E2	
7w	1227.529	1227.544	152 146.8	- 233 610.3	3s²(¹S)3d - 3s3p(³P°)3d	²D - ²D°	⁵/₂ - ⁵/₂	E2	
3w	1229.110	{ 1229.089 1229.104	257 611.3	- 338 972.4	(ψ) - 3s3p(¹P°)4p	b²F° - ²D	⁷/₂ - ⁵/₂	E2	
			255 400.3	- 336 760.4	3s²(¹S)4d - 3s²(¹S)7p	²D - ²P°	⁵/₂ - ³/₂		
1w	1229.414	1229.409	255 395.8	- 336 735.7	3s²(¹S)4d - 3s²(¹S)7p	²D - ²P°	³/₂ - ¹/₂	E2	
1	1231.486	1231.488	211 366.6	- 292 569.2	3p³ - 3s3p(³P°)4p	²P° - ²P	³/₂ - ¹/₂	E2	
1w	1231.658	1231.635	211 376.3	- 292 569.2	3p³ - 3s3p(³P°)4p	²P° - ²P	¹/₂ - ¹/₂	E2	
6	1248.345	1248.352	133 619.6	- 213 725.2	3s3p² - 3s²(¹S)4p	²P° - ²P°	¹/₂ - ³/₂	E2	
8	1251.653	1251.643	133 619.6	- 213 514.6	3s3p² - 3s²(¹S)4p	²P° - ²P°	¹/₂ - ¹/₂	E2	
8	1258.173	1258.181	134 245.4	- 213 725.2	3s3p² - 3s²(¹S)4p	²P° - ²P°	³/₂ - ³/₂	E2	
3	1261.523	1261.524	134 245.4	- 213 514.6	3s3p² - 3s²(¹S)4p	²P° - ²P°	³/₂ - ¹/₂	E2	
1	1263.114	1263.125	213 725.2	- 292 893.9	3s²(¹S)4p - 3s3p(³P°)4p	²P° - ²P	³/₂ - ³/₂	E2	
4	1267.388	1267.392	224 435.6	- 303 337.8	3s3p(³P°)3d - 3s²(¹S)5d	⁴D° - ²D	³/₂ - ³/₂	E2	
7	1286.050	1286.063	133 619.6	- 211 376.3	3s3p² - 3p³	²P° - ²P°	¹/₂ - ¹/₂	E2	

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	3	1286.221	1286.223	133 619.6	- 211 366.6	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2P <sup>o</sup>	1/2-3/2	E2
	7	1294.592	1294.594	255 400.3	- 332 644.6	3s <sup>2</sup> (1S)4d-3s <sup>2</sup> (1S)6f	2D-2F <sup>o</sup>	5/2-7/2	E2
			1294.619	255 395.8	- 332 638.6	3s <sup>2</sup> (1S)4d-3s <sup>2</sup> (1S)6f	2D-2F <sup>o</sup>	3/2-5/2	
	4	1295.837	1295.825	222 198.3	- 299 369.2	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4S	5/2-3/2	E2
	5	1296.491	1296.497	134 245.4	- 211 376.3	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2P <sup>o</sup>	3/2-1/2	E2
	8	1296.659	1296.660	134 245.4	- 211 366.6	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2P <sup>o</sup>	3/2-3/2	E2
	7	1300.718	1300.718	222 488.6	- 299 369.2	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4S	3/2-3/2	E2
	4	1304.177	1304.175	222 692.4	- 299 369.2	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4S	1/2-3/2	E2
	6	1319.036	1319.052	222 198.3	- 298 010.3	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4P	5/2-5/2	E2
	3	1324.117	1324.123	222 488.6	- 298 010.3	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4P	3/2-5/2	E2
	4	1334.961	1334.962	222 488.6	- 297 397.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4P	3/2-1/2	E2
	3	1335.109	1335.110	222 692.4	- 297 592.6	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4P	1/2-3/2	E2
	3	1338.621	1338.604	222 692.4	- 297 397.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4P	1/2-1/2	E2
	1	1359.162	1359.163	224 435.6	- 298 010.3	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	3/2-5/2	E2
	3	1361.081	1361.079	224 539.2	- 298 010.3	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	5/2-5/2	E2
	8	1362.531	1362.526	224 617.2	- 298 010.3	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	7/2-5/2	E2
	4	1365.192	1365.191	224 342.8	- 297 592.6	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	1/2-3/2	E2
	7	1366.921	1366.923	224 435.6	- 297 592.6	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	3/2-3/2	E2
	8	1368.843	1368.845	224 342.8	- 297 397.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	1/2-1/2	E2
			1368.862	224 539.2	- 297 592.6	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	5/2-3/2	
	6	1370.585	1370.586	224 435.6	- 297 397.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4P	3/2-1/2	E2
	1g	1398.045	1398.040	0.00	- 71 528.7	3s <sup>2</sup> (1S)3p-3s3p <sup>2</sup>	2P <sup>o</sup> -4P	1/2-3/2	E2
	1	1400.895	1400.890	277 596.1	- 348 979.3	(ψ)-3s3p(3P <sup>o</sup> )4f	c <sup>2</sup> F <sup>o</sup> -4F	7/2-5/2	E2
	1	1403.553	1403.546	222 488.6	- 293 736.7	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4D	3/2-5/2	E2
	3g	1404.808	1404.808	0.00	- 71 184.1	3s <sup>2</sup> (1S)3p-3s3p <sup>2</sup>	2P <sup>o</sup> -4P	1/2-1/2	E2
	6g	1406.009	1406.016	951.43	- 72 074.4	3s <sup>2</sup> (1S)3p-3s3p <sup>2</sup>	2P <sup>o</sup> -4P	3/2-5/2	E2
	1	1413.023	1413.014	222 692.4	- 293 463.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4D	1/2-3/2	E2
	5	1416.063	1416.062	222 692.4	- 293 310.8	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -4D	1/2-1/2	E2
	1	1421.654	1421.652	185 055.1	- 255 395.8	3p <sup>3</sup> -3s <sup>2</sup> (1S)4d	2D <sup>o</sup> -2D	3/2-3/2	E2
	6gl	1423.845	1423.839	951.43	- 71 184.1	3s <sup>2</sup> (1S)3p-3s3p <sup>2</sup>	2P <sup>o</sup> -4P	3/2-1/2	E2
	2w	1424.467	1424.471	222 692.4	- 292 893.9	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -2P	1/2-3/2	E2
	1	1431.070	1431.090	222 692.4	- 292 569.2	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4P <sup>o</sup> -2P	1/2-1/2	E2
	7	1435.445	1435.441	224 617.2	- 294 282.2	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	7/2-7/2	E2
	4	1442.977	1442.979	224 435.6	- 293 736.7	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	3/2-5/2	E2
	6w	1445.141	1445.139	224 539.2	- 293 736.7	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	5/2-5/2	E2
	5	1446.767	1446.753	224 342.8	- 293 463.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	1/2-3/2	E2
			1446.770	224 617.2	- 293 736.7	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	7/2-5/2	
	4	1448.710	1448.698	224 435.6	- 293 463.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	3/2-3/2	E2
	3	1450.886	1450.876	224 539.2	- 293 463.1	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -4D	5/2-3/2	E2
	1	1458.764	1458.766	224 342.8	- 292 893.9	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	4D <sup>o</sup> -2P	1/2-3/2	E2
	3w	1471.304	1471.322	233 610.3	- 301 576.4	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	2D <sup>o</sup> -2D	5/2-5/2	E2
	2	1480.690	1480.703	271 436.9	- 338 972.4	3s3p(3P <sup>o</sup> )4s-3s3p(1P <sup>o</sup> )4p	2P <sup>o</sup> -2D	3/2-5/2	E2
	1	1482.189	1482.182	233 641.7	- 301 109.8	3s3p(3P <sup>o</sup> )3d-3s3p(3P <sup>o</sup> )4p	2D <sup>o</sup> -2D	3/2-3/2	E2
	1	1521.150	1521.155	271 020.9	- 336 760.4	3s <sup>2</sup> (1S)5s-3s <sup>2</sup> (1S)7p	2S-2P <sup>o</sup>	1/2-3/2	E2
	2w	1534.089	1534.121	278 642.3	- 343 826.2	3s3p(1P <sup>o</sup> )3d-3s3p(1P <sup>o</sup> )4p	2P <sup>o</sup> -2S	3/2-1/2	E2
	1	1534.935	1534.936	278 676.9	- 343 826.2	3s3p(1P <sup>o</sup> )3d-3s3p(1P <sup>o</sup> )4p	2P <sup>o</sup> -2S	1/2-1/2	E2
	1	1546.695	1546.695	315 922.5	- 380 576.5	3p <sup>2</sup> (3P)3d-3s3p(1P <sup>o</sup> )4d	4F-2D <sup>o</sup>	5/2-3/2	E2
	4w	1620.966	1620.969	241 646.3	- 303 337.8	3s3p(3P <sup>o</sup> )3d-3s <sup>2</sup> (1S)5d	2F <sup>o</sup> -2D	5/2-3/2	E2
	2	1623.588	1623.587	152 133.2	- 213 725.2	3s <sup>2</sup> (1S)3d-3s <sup>2</sup> (1S)4p	2D-2P <sup>o</sup>	3/2-3/2	E2
	10	1623.946	1623.946	152 146.8	- 213 725.2	3s <sup>2</sup> (1S)3d-3s <sup>2</sup> (1S)4p	2D-2P <sup>o</sup>	5/2-3/2	E2
	1w	1624.814	1624.806	123 509.3	- 185 055.1	3s3p <sup>2</sup> -3p <sup>3</sup>	2S-2D <sup>o</sup>	1/2-3/2	E2
	9	1629.143	1629.158	152 133.2	- 213 514.6	3s <sup>2</sup> (1S)3d-3s <sup>2</sup> (1S)4p	2D-2P <sup>o</sup>	3/2-1/2	E2
	2	1629.780	1629.771	278 642.3	- 340 000.6	3s3p(1P <sup>o</sup> )3d-3s3p(1P <sup>o</sup> )4p	2P <sup>o</sup> -2P	3/2-3/2	E2
	1	1630.692	1630.691	278 676.9	- 340 000.6	3s3p(1P <sup>o</sup> )3d-3s3p(1P <sup>o</sup> )4p	2P <sup>o</sup> -2P	1/2-3/2	E2
	1w	1631.073	1631.069	293 463.1	- 354 772.6	3s3p(3P <sup>o</sup> )4p-3s3p(3P <sup>o</sup> )5s	4D-4P <sup>o</sup>	3/2-5/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
1	1w	1634.761	1634.751	278 642.3	- 339 813.7	3s3p( <sup>1</sup> P°)3d-3s3p( <sup>1</sup> P°)4p	2P°-2P	3/2-1/2	E2
		1635.667	1635.676	278 676.9	- 339 813.7	3s3p( <sup>1</sup> P°)3d-3s3p( <sup>1</sup> P°)4p	2P°-2P	1/2-1/2	E2
5		1637.769	1637.766	242 421.3	- 303 480.1	3s3p( <sup>3</sup> P°)3d-3s <sup>2</sup> ( <sup>1</sup> S)5d	2F°-2D	7/2-5/2	E2
1		1638.408	1638.380	293 736.7	- 354 772.6	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4D-4P°	5/2-5/2	E2
4		1653.168	1653.155	294 282.2	- 354 772.6	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4D-4P°	7/2-5/2	E2
3		1656.093	1656.106	293 736.7	- 354 119.3	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4D-4P°	5/2-3/2	E2
1		1668.617	1668.611	241 646.3	- 301 576.4	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2F°-2D	5/2-5/2	E2
1w		1675.919	1675.909	233 641.7	- 293 310.8	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2D°-4D	3/2-1/2	E2
3w		1676.332	1676.325	211 366.6	- 271 020.9	3p <sup>3</sup> -3s <sup>2</sup> ( <sup>1</sup> S)5s	2P°-2S	5/2-1/2	E2
2		1676.617	1676.598	211 376.3	- 271 020.9	3p <sup>3</sup> -3s <sup>2</sup> ( <sup>1</sup> S)5s	2P°-2S	1/2-1/2	E2
4		1686.821	1686.807	233 610.3	- 292 893.9	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2D°-2P	5/2-3/2	E2
7		1687.945	1687.960	152 133.2	- 211 376.3	3s <sup>2</sup> ( <sup>1</sup> S)3d-3p <sup>3</sup>	2D-2P°	3/2-1/2	E2
3		1688.245	1688.237	152 133.2	- 211 366.6	3s <sup>2</sup> ( <sup>1</sup> S)3d-3p <sup>3</sup>	2D-2P°	3/2-3/2	E2
8		1688.629	1688.624	152 146.8	- 211 366.6	3s <sup>2</sup> ( <sup>1</sup> S)3d-3p <sup>3</sup>	2D-2P°	5/2-3/2	E2
8		1690.479	1690.471	242 421.3	- 301 576.4	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2F°-2D	7/2-5/2	E2
5w		1697.007	1697.001	233 641.7	- 292 569.2	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2D°-2P	3/2-1/2	E2
2		1697.584	1697.591	281 093.6	- 340 000.6	3s3p( <sup>1</sup> P°)3d-3s3p( <sup>1</sup> P°)4p	2D°-2P	3/2-3/2	E2
2		1701.576	1701.577	281 231.6	- 340 000.6	3s3p( <sup>1</sup> P°)3d-3s3p( <sup>1</sup> P°)4p	2D°-2P	5/2-3/2	E2
1		1708.525	1708.520	285 296.0	- 343 826.2	3s <sup>2</sup> ( <sup>1</sup> S)5p-3s3p( <sup>1</sup> P°)4p	2P°-2S	3/2-1/2	E2
5		1738.955	1738.940	213 514.6	- 271 020.9	3s <sup>2</sup> ( <sup>1</sup> S)4p-3s <sup>2</sup> ( <sup>1</sup> S)5s	2P°-2S	1/2-1/2	E2
7		1745.340	1745.332	213 725.2	- 271 020.9	3s <sup>2</sup> ( <sup>1</sup> S)4p-3s <sup>2</sup> ( <sup>1</sup> S)5s	2P°-2S	3/2-1/2	E2
3		1748.847	1748.863	297 592.6	- 354 772.6	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	3/2-5/2	E2
6		1761.715	1761.733	298 010.3	- 354 772.6	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	5/2-5/2	E2
2		1762.966	1762.978	297 397.1	- 354 119.3	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	1/2-3/2	E2
1		1773.706	1773.704	297 397.1	- 353 776.3	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	1/2-1/2	E2
1		1774.169	1774.182	241 646.3	- 298 010.3	3s3p( <sup>3</sup> P°)3d-3s3p( <sup>3</sup> P°)4p	2F°-4P	5/2-5/2	E2
1		1779.871	1779.876	297 592.6	- 353 776.3	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	3/2-1/2	E2
6bl		1782.267	1782.245	298 010.3	- 354 119.3	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4P-4P°	5/2-3/2	E2
7		1786.983	1786.981	255 395.8	- 311 356.1	3s <sup>2</sup> ( <sup>1</sup> S)4d-3s <sup>2</sup> ( <sup>1</sup> S)5f	2D-2F°	3/2-3/2	E2
7		1787.179	1787.176	255 400.3	- 311 354.5	3s <sup>2</sup> ( <sup>1</sup> S)4d-3s <sup>2</sup> ( <sup>1</sup> S)5f	2D-2F°	5/2-7/2	E2
2w		1804.937	1804.943	299 369.2	- 354 772.6	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)5s	4S-4P°	3/2-5/2	E2
1		1808.127	1808.125	303 480.1	- 358 786.0	3s <sup>2</sup> ( <sup>1</sup> S)5d-3s3p( <sup>3</sup> P°)5s	2D-2P°	5/2-3/2	E2
1w		1847.258	1847.251	337 308.1	- 391 442.6	3s3p( <sup>3</sup> P°)4d-3s3p( <sup>1</sup> P°)4f	2D°-2F	5/2-7/2	E2
1		1863.016	1863.016	285 296.0	- 338 972.4	3s <sup>2</sup> ( <sup>1</sup> S)5p-3s3p( <sup>1</sup> P°)4p	2P°-2D	3/2-5/2	E2
	1863.023		337 750.7	- 391 426.9	3s3p( <sup>3</sup> P°)4d-3s3p( <sup>1</sup> P°)4f	4F°-2F	7/2-5/2		
1		1884.833	1884.819	292 569.2	- 345 624.7	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)4d	2P-2P°	1/2-1/2	E2
1		1897.182	1897.184	292 569.2	- 345 278.9	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)4d	2P-2P°	1/2-3/2	E2
2		1908.942	1908.943	292 893.9	- 345 278.9	3s3p( <sup>3</sup> P°)4p-3s3p( <sup>3</sup> P°)4d	2P-2P°	3/2-3/2	E2
1		1911.680	1911.691	257 611.3	- 309 921.0	ψ-3s <sup>2</sup> ( <sup>1</sup> S)5g	b <sup>2</sup> F°-2G	7/2-9/2	E2
1		1916.487	1916.491	257 742.5	- 309 921.2	ψ-3s <sup>2</sup> ( <sup>1</sup> S)5g	b <sup>2</sup> F°-2G	5/2-7/2	E2
10		1944.180	1944.183	133 619.6	- 185 055.1	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2D°	1/2-3/2	E2
10		1964.542	1964.536	134 245.4	- 185 148.0	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2D°	3/2-3/2	E2
5		1968.140	1968.128	134 245.4	- 185 055.1	3s3p <sup>2</sup> -3p <sup>3</sup>	2P-2D°	3/2-3/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	1	2099.363	2099.362	2100.029	271 020.9	318 639.3	3s <sup>2</sup> ( <sup>1</sup> S)5s - 3s <sup>2</sup> ( <sup>1</sup> S)6p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 3/2	E2
	1	2100.682	2100.686	2101.352	271 020.9	318 609.3	3s <sup>2</sup> ( <sup>1</sup> S)5s - 3s <sup>2</sup> ( <sup>1</sup> S)6p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 1/2	E2
	1	2114.900	2114.900	2115.569	298 010.3	345 278.9	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	E2
	2	2129.359	2129.357	2130.030	293 736.7	340 684.4	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	5/2 - 3/2	E2
	1bl	2129.508	2129.530	2130.202	293 463.1	340 407.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	3/2 - 5/2	E2
	1	2142.014	2142.015	2142.690	293 736.7	340 407.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	5/2 - 5/2	E2
	7	2179.439	2179.449	2180.131	257 611.3	303 480.1	ψ - 3s <sup>2</sup> ( <sup>1</sup> S)5d	b <sup>2</sup> F <sup>o</sup> - <sup>2</sup> D	7/2 - 5/2	E2
	7	2192.501	2192.523	2193.209	257 742.5	303 337.8	ψ - 3s <sup>2</sup> ( <sup>1</sup> S)5d	b <sup>2</sup> F <sup>o</sup> - <sup>2</sup> D	5/2 - 3/2	E2
	5	2224.910	2224.898	2225.590	292 569.2	337 501.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>4</sup> F <sup>o</sup>	1/2 - 3/2	E2
	7w	2234.061	2234.053	2234.747	292 893.9	337 641.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>4</sup> F <sup>o</sup>	3/2 - 5/2	E2
	1	2245.729	2245.742	2246.439	301 109.8	345 624.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	E2
	9	2248.437	2248.435	2249.132	292 569.2	337 030.8	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>2</sup> D <sup>o</sup>	1/2 - 3/2	E2
	8w	2250.836	2250.835	2251.532	292 893.9	337 308.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>2</sup> D <sup>o</sup>	3/2 - 5/2	E2
	8	2262.223	2262.240	2262.940	293 310.8	337 501.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	1/2 - 3/2	E2
	5	2264.971	2264.977	2265.678	292 893.9	337 030.8	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>2</sup> D <sup>o</sup>	3/2 - 3/2	E2
	1	2270.063	2270.064	2270.766	293 463.1	337 501.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	3/2 - 3/2	E2
	12	2270.286	2270.286	2270.988	211 366.6	255 400.3	3p <sup>3</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 5/2	E2
	1	2270.524	2270.518	2271.220	211 366.6	255 395.8	3p <sup>3</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	E2
	9	2271.002	2271.018	2271.720	211 376.3	255 395.8	3p <sup>3</sup> - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	1/2 - 3/2	E2
	8	2271.298	2271.302	2272.004	293 736.7	337 750.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	5/2 - 7/2	E2
	4bl	2273.837	2273.829	2274.531	257 611.3	301 576.4	ψ - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	b <sup>2</sup> F <sup>o</sup> - <sup>2</sup> D	7/2 - 5/2	E2
	5	2276.944	2276.942	2277.645	293 736.7	337 641.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	5/2 - 5/2	E2
	4	2280.074	2280.058	2280.762	293 463.1	337 308.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>2</sup> D <sup>o</sup>	3/2 - 5/2	E2
	10	2283.924	2283.923	2284.628	294 282.2	338 053.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	7/2 - 3/2	E2
	2	2286.161	2286.169	2286.875	292 569.2	336 297.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>4</sup> D <sup>o</sup>	1/2 - 3/2	E2
	4	2286.573	2286.577	2287.283	293 310.8	337 030.8	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>2</sup> D <sup>o</sup>	1/2 - 3/2	E2
	2	2287.508	2287.493	2288.199	301 576.4	345 278.9	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	E2
	5	2294.381	2294.376	2295.083	293 736.7	337 308.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>2</sup> D <sup>o</sup>	5/2 - 5/2	E2
	2w	2300.117	2300.136	2300.845	292 893.9	336 356.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> P - <sup>4</sup> D <sup>o</sup>	3/2 - 5/2	E2
	2	2305.195	2305.175	2305.885	257 742.5	301 109.8	ψ - 3s3p( <sup>3</sup> P <sup>o</sup> )4p	b <sup>2</sup> F <sup>o</sup> - <sup>2</sup> D	5/2 - 3/2	E2
	1	2305.615	2305.590	2306.300	294 282.2	337 641.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> F <sup>o</sup>	7/2 - 5/2	E2
	4	2309.438	2309.436	2310.146	297 397.1	340 684.4	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	1/2 - 3/2	E2
	4	2310.955	2310.968	2311.679	297 592.6	340 851.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 1/2	E2
	1	2319.902	2319.914	2320.627	297 592.6	340 684.4	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 3/2	E2
	1	2323.469	2323.468	2324.181	294 282.2	337 308.1	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>2</sup> D <sup>o</sup>	7/2 - 5/2	E2
	5	2325.630	2325.614	2326.328	293 310.8	336 297.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	1/2 - 3/2	E2
	1w	2327.874	2327.878	2328.592	293 310.8	336 255.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	1/2 - 1/2	E2
	6w	2330.666	2330.662	2331.377	293 463.1	336 356.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	3/2 - 5/2	E2
	6	2334.905	2334.947	2335.663	297 592.6	340 407.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	3/2 - 5/2	E2
	4w	2335.721	2335.732	2336.449	293 736.7	336 536.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	5/2 - 7/2	E2
	4	2342.624	2342.624	2343.342	298 010.3	340 684.4	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	5/2 - 3/2	E2
	4	2345.583	2345.625	2346.344	293 736.7	336 356.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	5/2 - 5/2	E2
	4	2357.966	2357.953	2358.674	298 010.3	340 407.0	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> P - <sup>4</sup> P <sup>o</sup>	5/2 - 5/2	E2
	8	2365.890	2365.889	2366.612	294 282.2	336 536.7	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	7/2 - 7/2	E2
	2	2376.048	2376.040	2376.765	294 282.2	336 356.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> D - <sup>4</sup> D <sup>o</sup>	7/2 - 5/2	E2
	17	2386.952	2386.978	2387.706	213 514.6	255 395.8	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	1/2 - 3/2	E2
	2	2396.416	2396.426	2397.156	338 883.1	380 599.2	3s3p( <sup>1</sup> P <sup>o</sup> )4p - 3s3p( <sup>1</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> D <sup>o</sup>	3/2 - 5/2	E2
	1	2397.726	2397.731	2398.461	338 883.1	380 576.5	3s3p( <sup>1</sup> P <sup>o</sup> )4p - 3s3p( <sup>1</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> D <sup>o</sup>	3/2 - 3/2	E2
	19	2398.802	2398.784	2399.514	213 725.2	255 400.3	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 5/2	E2
	6	2399.018	2399.043	2399.773	213 725.2	255 395.8	3s <sup>2</sup> ( <sup>1</sup> S)4p - 3s <sup>2</sup> ( <sup>1</sup> S)4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	E2
	2	2401.582	2401.568	2402.299	338 972.4	380 599.2	3s3p( <sup>1</sup> P <sup>o</sup> )4p - 3s3p( <sup>1</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> D <sup>o</sup>	5/2 - 5/2	E2
	6w	2409.972	2409.951	2410.684	299 369.2	340 851.2	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> S - <sup>4</sup> P <sup>o</sup>	3/2 - 1/2	E2
	11	2419.674	2419.682	2420.417	299 369.2	340 684.4	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>4</sup> S - <sup>4</sup> P <sup>o</sup>	3/2 - 3/2	E2
	13	2431.594	2431.577	2432.315	301 576.4	342 689.5	3s3p( <sup>3</sup> P <sup>o</sup> )4p - 3s3p( <sup>3</sup> P <sup>o</sup> )4d	<sup>2</sup> D - <sup>2</sup> F <sup>o</sup>	5/2 - 7/2	E2
	1	2433.513	2433.513	2434.251	311 354.5	352 434.9	3s <sup>2</sup> ( <sup>1</sup> S)5f - 3s3p( <sup>3</sup> P <sup>o</sup> )4f	<sup>2</sup> F <sup>o</sup> - <sup>4</sup> G	7/2 - 9/2	E2



S IV - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
10	12bl	2434.610	2434.639	2435.377	301 109.8	- 342 171.2	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	E2
	10	2436.035	2436.039	2436.778	299 369.2	- 340 407.0	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>1</sup> S - <sup>1</sup> F°	3/2 - 5/2	E2
	1	2445.788	2445.790	2446.531	311 356.1	- 352 230.3	3s <sup>2</sup> ( <sup>1</sup> S)5f - 3s 3p ( <sup>3</sup> P°)4f	<sup>2</sup> F° - <sup>4</sup> G	5/2 - 7/2	E2
	1w	2457.835	2457.835	2458.579	270 826.7	- 311 500.6	3s 3p ( <sup>3</sup> P°)4s - 3s <sup>2</sup> ( <sup>1</sup> S)6s	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	E2
	16	2462.651	2462.625	2463.370	301 576.4	- 342 171.2	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 5/2	E2
3w	2w	2463.770	2463.772	2464.517	340 000.6	- 380 576.5	3s 3p ( <sup>1</sup> P°)4p - 3s 3p ( <sup>1</sup> P°)4d	<sup>2</sup> P - <sup>2</sup> D°	3/2 - 3/2	E2
	3w	2495.233	2495.273	2496.025	271 436.9	- 311 500.6	3s 3p ( <sup>3</sup> P°)4s - 3s <sup>2</sup> ( <sup>1</sup> S)6s	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	E2
	4	2515.312	2515.302	2516.059	292 893.9	- 332 638.6	3s 3p ( <sup>3</sup> P°)4p - 3s <sup>2</sup> ( <sup>1</sup> S)6f	<sup>2</sup> P - <sup>2</sup> F°	3/2 - 5/2	E2
	5	2515.579	2515.574	2516.331	298 010.3	- 337 750.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> F°	5/2 - 7/2	E2
	4	2522.481	2522.493	2523.252	298 010.3	- 337 641.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> F°	5/2 - 5/2	E2
10	1bl	2534.831	2534.851	2535.613	297 592.6	- 337 030.8	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>2</sup> D°	3/2 - 3/2	E2
	1	2543.908	2543.908	2544.672	298 010.3	- 337 308.1	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>2</sup> D°	5/2 - 5/2	E2
	10	2549.634	2549.644	2550.409	303 480.1	- 342 689.5	3s <sup>2</sup> ( <sup>1</sup> S)5d - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	E2
	1	2551.864	2551.850	2552.616	293 463.1	- 332 638.6	3s 3p ( <sup>3</sup> P°)4p - 3s <sup>2</sup> ( <sup>1</sup> S)6f	<sup>4</sup> D - <sup>2</sup> F°	3/2 - 5/2	E2
	6	2569.928	2569.931	2570.701	297 397.1	- 336 297.0	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 1/2	E2
	1	2572.693	2572.695	2573.466	297 397.1	- 336 255.2	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 1/2	E2
10	5w	2574.332	2574.332	2575.103	303 337.8	- 342 171.2	3s <sup>2</sup> ( <sup>1</sup> S)5d - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	E2
	10	2578.994	2578.968	2579.740	297 592.6	- 336 356.2	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 5/2	E2
	6	2582.922	2582.913	2583.686	297 592.6	- 336 297.0	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 5/2	E2
	1w	2590.079	2590.080	2590.855	264 882.8	- 303 480.1	3s 3p ( <sup>3</sup> P°)3d - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	E2
	10	2594.852	2594.847	2595.623	298 010.3	- 336 536.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 7/2	E2
10	9	2607.068	2607.062	2607.841	298 010.3	- 336 356.2	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 5/2	E2
	2	2611.086	2611.093	2611.873	298 010.3	- 336 297.0	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 5/2	E2
	5	2635.353	2635.358	2636.144	270 826.7	- 308 760.9	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	E2
	9	2678.438	2678.445	2679.241	271 436.9	- 308 760.9	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	E2
	4	2711.881	2711.884	2712.688	308 760.9	- 345 624.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	E2
	3w	2724.467	2724.464	2725.271	264 882.8	- 301 576.4	3s 3p ( <sup>3</sup> P°)3d - 3s 3p ( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	E2
	2	2736.503	2736.524	2737.334	301 109.8	- 337 641.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> F°	3/2 - 5/2	E2
	7w	2737.543	2737.566	2738.376	308 760.9	- 345 278.9	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> S - <sup>2</sup> F°	1/2 - 3/2	E2
	5	2756.117	2756.125	2756.940	263 097.1	- 299 369.2	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> S	1/2 - 3/2	E2
10	1	2759.531	2759.557	2760.372	264 882.8	- 301 109.8	3s 3p ( <sup>3</sup> P°)3d - 3s 3p ( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	E2
	1	2761.751	2761.745	2762.501	301 109.8	- 337 308.1	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 5/2	E2
	5w	2771.951	2771.930	2772.748	301 576.4	- 337 641.7	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> F°	5/2 - 5/2	E2
	3w	2772.730	2772.745	2773.564	265 055.1	- 301 109.8	3s 3p ( <sup>3</sup> P°)3d - 3s 3p ( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	E2
	1	2782.790	2782.779	2783.600	301 576.4	- 337 501.1	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>4</sup> F°	5/2 - 3/2	E2
10	3	2797.806	2797.811	2798.635	301 576.4	- 337 308.1	3s 3p ( <sup>3</sup> P°)4p - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 5/2	E2
	10	2831.892	2831.900	2832.733	264 067.6	- 299 369.2	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> S	5/2 - 3/2	E2
	1	2837.575	2837.567	2838.401	345 368.1	- 380 599.2	3s 3p ( <sup>3</sup> P°)4f - 3s 3p ( <sup>1</sup> P°)4d	<sup>2</sup> F - <sup>2</sup> D°	7/2 - 5/2	E2
	2	2870.261	2870.254	2871.096	308 996.3	- 343 826.2	3s 3p ( <sup>1</sup> P°)4s - 3s 3p ( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	E2
	10	2892.483	2892.486	2893.334	263 448.1	- 298 010.3	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	3/2 - 5/2	E2
10	10	2898.092	2898.079	2898.929	263 097.1	- 297 592.6	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	1/2 - 3/2	E2
	5	2914.607	2914.598	2915.452	263 097.1	- 297 397.1	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	1/2 - 1/2	E2
	10	2927.862	2927.873	2928.729	263 448.1	- 297 592.6	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	3/2 - 3/2	E2
	10	2944.729	2944.734	2945.595	263 448.1	- 297 397.1	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	3/2 - 1/2	E2
	13	2945.303	2945.281	2946.142	264 067.6	- 298 010.3	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	5/2 - 5/2	E2
	1	2955.266	2955.268	2956.131	303 480.1	- 337 308.1	3s <sup>2</sup> ( <sup>1</sup> S)5d - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 5/2	E2
17	1w	2959.631	2959.616	2960.481	311 500.6	- 345 278.9	3s <sup>2</sup> ( <sup>1</sup> S)6s - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	1	2967.127	2967.109	2967.976	303 337.8	- 337 030.8	3s <sup>2</sup> ( <sup>1</sup> S)5d - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 3/2	E2
	17	2981.984	2981.978	2982.849	264 067.6	- 297 592.6	3s 3p ( <sup>3</sup> P°)4s - 3s 3p ( <sup>3</sup> P°)4p	<sup>4</sup> P° - <sup>4</sup> P	5/2 - 3/2	E2
3	3028.066	3028.063	3028.945	152 133.2	- 185 148.0	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 5/2	E2	
11	12	3029.320	3029.311	3030.193	152 146.8	- 185 148.0	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 5/2	E2
	11	3036.607	3036.608	3037.492	152 133.2	- 185 055.1	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> D°	3/2 - 3/2	E2
	3	3037.859	3037.863	3038.747	152 146.8	- 185 055.1	3s <sup>2</sup> ( <sup>1</sup> S)3d - 3p <sup>3</sup>	<sup>2</sup> D - <sup>2</sup> D°	5/2 - 3/2	E2
	1	3050.832	3050.824	3051.711	309 921.0	- 342 689.5	3s <sup>2</sup> ( <sup>1</sup> S)5g - 3s 3p ( <sup>3</sup> P°)4d	<sup>2</sup> G - <sup>2</sup> F°	3/2 - 7/2	E2
	5	3071.440	3071.436	3072.329	336 356.2	- 368 904.8	3s 3p ( <sup>3</sup> P°)4d - 3s 3p ( <sup>3</sup> P°)5p	<sup>4</sup> D° - <sup>2</sup> D	5/2 - 3/2	E2

S IV - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
1	4	3092.699	3092.693	3093.590	277 596.1	309 921.0	$(\psi) - 3s^2(^1S)5g$	$c^2F^o - ^2G$	$7/2 - 9/2$	E2
	19	3097.271	3097.273	3098.172	181 448.1	213 725.2	$3s^2(^1S)4s - 3s^2(^1S)4p$	$^2S - ^2P^o$	$1/2 - 3/2$	E2
1	1	3100.997	3100.991	3101.891	277 682.8	309 921.2	$(\psi) - 3s^2(^1S)5g$	$c^2F^o - ^2G$	$5/2 - 7/2$	E2
	18	3117.605	3117.615	3118.519	181 448.1	213 514.6	$3s^2(^1S)4s - 3s^2(^1S)4p$	$^2S - ^2P^o$	$1/2 - 1/2$	E2
1	1	3123.908	3123.919	3124.824	337 501.1	369 502.9	$3s3p(^3P^o)4d - 3s3p(^3P^o)5p$	$^4F^o - ^2D$	$3/2 - 5/2$	E2
	1	3217.793	3217.796	3218.725	301 576.4	332 644.6	$3s3p(^3P^o)4p - 3s^2(^1S)6f$	$^2D - ^2F^o$	$5/2 - 7/2$	E2
1	3	3218.521	3218.521	3219.451	308 939.4	340 000.6	$3s3p(^1P^o)4s - 3s3p(^1P^o)4p$	$^2P^o - ^2P$	$1/2 - 3/2$	E2
	7	3224.427	3224.428	3225.359	308 996.3	340 000.6	$3s3p(^1P^o)4s - 3s3p(^1P^o)4p$	$^2P^o - ^2P$	$3/2 - 3/2$	E2
1	2w	3243.983	3243.984	3244.920	308 996.3	339 813.7	$3s3p(^1P^o)4s - 3s3p(^1P^o)4p$	$^2P^o - ^2P$	$3/2 - 1/2$	E2
	9	3292.236	3292.209	3293.157	263 097.1	293 463.1	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$1/2 - 3/2$	E2
1	9	3300.638	3300.622	3301.572	263 448.1	293 736.7	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$3/2 - 5/2$	E2
	8	3301.245	3301.221	3302.172	270 826.7	301 109.8	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^2D$	$1/2 - 3/2$	E2
1	11	3308.747	3308.706	3309.658	264 067.6	294 282.2	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$5/2 - 7/2$	E2
	11	3316.948	3316.951	3317.905	263 097.1	293 310.8	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$1/2 - 1/2$	E2
1	9	3330.731	3330.709	3331.667	263 448.1	293 463.1	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$3/2 - 3/2$	E2
	10	3340.360	3340.370	3341.330	181 448.1	211 376.3	$3s^2(^1S)4s - 3p^3$	$^2S - ^2P^o$	$1/2 - 1/2$	E2
1	11	3341.456	3341.453	3342.414	181 448.1	211 366.6	$3s^2(^1S)4s - 3p^3$	$^2S - ^2P^o$	$1/2 - 3/2$	E2
	2	3343.495	3343.498	3344.459	255 395.8	285 296.0	$3s^2(^1S)4d - 3s^2(^1S)5p$	$^2D - ^2P^o$	$3/2 - 3/2$	E2
1	10	3343.957	3344.001	3344.963	255 400.3	285 296.0	$3s^2(^1S)4d - 3s^2(^1S)5p$	$^2D - ^2P^o$	$5/2 - 3/2$	E2
	3	3355.134	3355.101	3356.065	263 097.1	292 893.9	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^2P$	$1/2 - 3/2$	E2
1	12	3363.113	3363.047	3364.013	255 395.8	285 122.2	$3s^2(^1S)4d - 3s^2(^1S)5p$	$^2D - ^2P^o$	$3/2 - 1/2$	E2
	1	3369.074	3369.111	3370.078	271 436.9	301 109.8	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^2D$	$3/2 - 3/2$	E2
1	10bl	3369.489	3369.542	3370.510	264 067.6	293 736.7	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^4D$	$5/2 - 5/2$	E2
	7w	3392.076	3392.066	3393.040	263 097.1	292 569.2	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^2P$	$1/2 - 1/2$	E2
1	8w	3395.092	3395.096	3396.070	263 448.1	292 893.9	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^2P$	$3/2 - 3/2$	E2
	5w	3411.900	3411.897	3412.876	303 337.8	332 638.6	$3s^2(^1S)5d - 3s^2(^1S)6f$	$^2D - ^2F^o$	$3/2 - 5/2$	E2
1	5w	3427.844	3427.843	3428.826	303 480.1	332 644.6	$3s^2(^1S)5d - 3s^2(^1S)6f$	$^2D - ^2F^o$	$5/2 - 7/2$	E2
	1w	3428.544	3428.549	3429.532	303 480.1	332 638.6	$3s^2(^1S)5d - 3s^2(^1S)6f$	$^2D - ^2F^o$	$5/2 - 5/2$	E2
1	1	3468.071	3468.061	3469.054	264 067.6	292 893.9	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^4P^o - ^2P$	$5/2 - 3/2$	E2
	4w	3497.909	3497.913	3498.914	264 882.8	293 463.1	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$3/2 - 3/2$	E2
1	2w	3516.671	3516.653	3517.659	264 882.8	293 310.8	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$3/2 - 1/2$	E2
	1w	3519.107	3519.129	3520.135	265 055.1	293 463.1	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$1/2 - 3/2$	E2
1	2w	3538.099	3538.098	3539.109	265 055.1	293 310.8	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$1/2 - 1/2$	E2
	5w	3591.092	3591.084	3592.109	265 055.1	292 893.9	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^2P$	$1/2 - 3/2$	E2
1	5w	3610.863	3610.852	3611.882	264 882.8	292 569.2	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^2P$	$3/2 - 1/2$	E2
	6w	3633.484	3633.464	3634.500	265 055.1	292 569.2	$3s3p(^3P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^2P$	$1/2 - 1/2$	E2
1	11	3789.937	3789.904	3790.980	285 122.2	311 500.6	$3s^2(^1S)5p - 3s^2(^1S)6s$	$^2P^o - ^2S$	$1/2 - 1/2$	E2
	9w	3815.037	3815.041	3816.124	285 296.0	311 500.6	$3s^2(^1S)5p - 3s^2(^1S)6s$	$^2P^o - ^2S$	$3/2 - 1/2$	E2
1	1	3846.790	3846.794	3847.885	316 182.9	342 171.2	$3p^2(^3P)3d - 3s3p(^3P^o)4d$	$^4F - ^2F^o$	$7/2 - 5/2$	E2
	9bl	3862.270	3862.295	3863.391	277 596.1	303 480.1	$(\psi) - 3s^2(^1S)5d$	$c^2F^o - ^2D$	$7/2 - 5/2$	E2
1	4w	3875.313	3875.276	3876.375	277 682.8	303 480.1	$(\psi) - 3s^2(^1S)5d$	$c^2F^o - ^2D$	$5/2 - 5/2$	E2
	9	3896.769	3896.772	3897.876	277 682.8	303 337.8	$(\psi) - 3s^2(^1S)5d$	$c^2F^o - ^2D$	$5/2 - 3/2$	E2
1	1	3969.201	3969.195	3970.318	318 639.3	343 826.2	$3s^2(^1S)6p - 3s3p(^1P^o)4p$	$^2P^o - ^2S$	$3/2 - 1/2$	E2
	9	4168.896	4168.914	4170.090	277 596.1	301 576.4	$(\psi) - 3s3p(^3P^o)4p$	$c^2F^o - ^2D$	$7/2 - 5/2$	E2
1	7	4260.458	4260.485	4261.684	285 296.0	308 760.9	$3s^2(^1S)5p - 3s3p(^3P^o)4p$	$^2P^o - ^2S$	$3/2 - 1/2$	E2
	1	4267.376	4267.378	4268.579	277 682.8	301 109.8	$(\psi) - 3s3p(^3P^o)4p$	$c^2F^o - ^2D$	$5/2 - 3/2$	E2
1	3	4416.409	4416.423	4417.664	270 826.7	293 463.1	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$1/2 - 3/2$	E2
	8	4446.329	4446.339	4447.587	270 826.7	293 310.8	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$1/2 - 1/2$	E2
1	1	4449.644	4449.624	4450.873	278 642.3	301 109.8	$3s3p(^1P^o)3d - 3s3p(^3P^o)4p$	$^2P^o - ^2D$	$3/2 - 3/2$	E2
	16	4485.609	4485.662	4486.921	255 395.8	277 682.8	$3s^2(^1S)4d - (\psi)$	$^2D - c^2F^o$	$3/2 - 5/2$	E2
1	12	4486.652	4486.568?	4487.911	255 400.3	277 682.8?	$3s^2(^1S)4d - (\psi)$	$^2D - c^2F^o$	$5/2 - 5/2$	E2
	14	4504.095	4504.093	4505.357	255 400.3	277 596.1	$3s^2(^1S)4d - (\psi)$	$^2D - c^2F^o$	$5/2 - 7/2$	E2
1	5	4530.330	4530.342	4531.613	270 826.7	292 893.9	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^2P$	$1/2 - 3/2$	E2
	4	4570.348	4570.378	4571.658	271 436.9	293 310.8	$3s3p(^3P^o)4s - 3s3p(^3P^o)4p$	$^2P^o - ^4D$	$3/2 - 1/2$	E2

S IV - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	10	4598.011	4597.999	4599.287	270 826.7	292 569.2	3s 3p( <sup>3</sup> P°)4s - 3s 3p( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 1/2	E2
	1	4602.930	4602.932	4604.221	315 922.5	337 641.7	3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s 3p( <sup>3</sup> P°)4d	<sup>4</sup> F - <sup>4</sup> F°	5/2 - 5/2	E2
	10	4659.168	4659.179	4660.484	271 436.9	292 893.9	3s 3p( <sup>3</sup> P°)4s - 3s 3p( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 3/2	E2
	1w	4680.048	4680.053	4681.363	318 639.3	340 000.6	3s <sup>2</sup> ( <sup>1</sup> S)6p - 3s 3p( <sup>1</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 3/2	E2
	2	4694.156	4694.161	4695.475	315 733.7	337 030.8	3p <sup>2</sup> ( <sup>3</sup> P)3d - 3s 3p( <sup>3</sup> P°)4d	<sup>4</sup> F - <sup>2</sup> D°	3/2 - 3/2	E2
	7	4730.704	4730.769	4732.093	271 436.9	292 569.2	3s 3p( <sup>3</sup> P°)4s - 3s 3p( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> P	3/2 - 1/2	E2
	9	5488.251	5488.275	5489.800	285 122.2	303 337.8	3s <sup>2</sup> ( <sup>1</sup> S)5p - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	E2
	11	5497.750	5497.782	5499.310	285 296.0	303 480.1	3s <sup>2</sup> ( <sup>1</sup> S)5p - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	E2
	3	5541.157	5541.145	5542.684	285 296.0	303 337.8	3s <sup>2</sup> ( <sup>1</sup> S)5p - 3s <sup>2</sup> ( <sup>1</sup> S)5d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	E2
	1	5676.248	5676.243	5677.818	338 053.0	355 665.4	3s 3p( <sup>3</sup> P°)4d - 3s 3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> D	9/2 - 7/2	E2
	1	6117.988	6117.995	6119.689	332 638.6	348 979.3	3s <sup>2</sup> ( <sup>1</sup> S)6f - 3s 3p( <sup>3</sup> P°)4f	<sup>2</sup> F° - <sup>4</sup> F	5/2 - 5/2	E2
	4	6140.646	6140.656	6142.355	285 296.0	301 576.4	3s <sup>2</sup> ( <sup>1</sup> S)5p - 3s 3p( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	E2
	2	6253.119	6253.118	6254.848	285 122.2	301 109.8	3s <sup>2</sup> ( <sup>1</sup> S)5p - 3s 3p( <sup>3</sup> P°)4p	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	E2
	1	6435.149	6435.133	6436.912	340 407.0	355 942.4	3s 3p( <sup>3</sup> P°)4d - 3s 3p( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	5/2 - 5/2	E2
	1	6551.953	6551.957	6553.767	340 407.0	355 665.4	3s 3p( <sup>3</sup> P°)4d - 3s 3p( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	5/2 - 7/2	E2
	1w	6552.125	6552.129	6553.939	340 684.4	355 942.4	3s 3p( <sup>3</sup> P°)4d - 3s 3p( <sup>3</sup> P°)4f	<sup>4</sup> P° - <sup>4</sup> D	3/2 - 5/2	E2
	3	6803.890	6803.853	6805.730	338 053.0	352 746.5	3s 3p( <sup>3</sup> P°)4d - 3s 3p( <sup>3</sup> P°)4f	<sup>4</sup> F° - <sup>4</sup> G	9/2 - 11/2	E2
	4w	7003.274	7003.273	7005.205	271 020.9	285 296.0	3s <sup>2</sup> ( <sup>1</sup> S)5s - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	E2
	1	7089.567	7089.590	7091.545	271 020.9	285 122.2	3s <sup>2</sup> ( <sup>1</sup> S)5s - 3s <sup>2</sup> ( <sup>1</sup> S)5p	<sup>2</sup> S - <sup>2</sup> F°	1/2 - 1/2	E2
		Wavenumber (cm <sup>-1</sup> )		Vacuum Wavelength (μm)						
		Observed	Calculated							
	M1	951.43	951.43	10.5105	0.00 -	951.43	3s <sup>2</sup> ( <sup>1</sup> S)3p - 3s <sup>2</sup> ( <sup>1</sup> S)3p	<sup>2</sup> P° - <sup>2</sup> P°	1/2 - 3/2	L1

## S v

Mg I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 3s^2 \ ^1S_0$ Ionization energy  $585\,514.1 \pm 3.0 \text{ cm}^{-1}$  ( $72.5945 \pm 0.0004 \text{ eV}$ )

In accordance with MZM90, we have omitted lines from [J4] involving levels of the  $3d^2$  and  $3p4d$  levels. An extension of the S v analysis is underway at the University of Lund, Sweden [Engström and Jupén, 1992]. Pending completion of this research, we here omit lines involving the  $3s\,6g$ ,  $7h$ , and  $8h$  levels, and give classifications involving the  $3p\,3d \ ^1F^\circ$  level at  $366\,862 \text{ cm}^{-1}$  as tentative.

## References

- Engström, L., and Jupén, C. [1992], private communication.  
 J4 Joelsson, I., Zetterberg, P. O., and Magnusson, C. E. [1981], Phys. Scr. 23, 1087–1095.

## S v

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	0g	187.018	187.024	0.0	– 534 691	$3s^2-3s\,8p$	$^1S-^1P^\circ$	0–1	J4
	1g	192.553	192.555	0.0	– 519 332	$3s^2-3s\,7p$	$^1S-^1P^\circ$	0–1	J4
	3g	202.965	202.961	0.0	– 492 706.0	$3s^2-3s\,6p$	$^1S-^1P^\circ$	0–1	J4
	0	214.648	214.649	84 155.2	– 550 031	$3s\,3p-3s\,9d$	$^3P^\circ-^3D$	2–3	J4
	0	216.790	216.784	83 393.5	– 544 683	$3s\,3p-3s\,9s$	$^3P^\circ-^3S$	1–1	J4
	0	217.138	217.142	84 155.2	– 544 683	$3s\,3p-3s\,9s$	$^3P^\circ-^3S$	2–1	J4
	1w	218.781	218.791	83 393.5	– 540 451	$3s\,3p-3s\,8d$	$^3P^\circ-^1D$	1–2	J4
	1w	219.146	219.146	84 155.2	– 540 471	$3s\,3p-3s\,8d$	$^3P^\circ-^3D$	2–3	J4
	0	222.663	222.663	83 393.5	– 532 503	$3s\,3p-3s\,8s$	$^3P^\circ-^3S$	1–1	J4
	0	223.041	223.041	84 155.2	– 532 503	$3s\,3p-3s\,8s$	$^3P^\circ-^3S$	2–1	J4
	6g	223.253	223.251	0.0	– 447 925.9	$3s^2-3s\,5p$	$^1S-^1P^\circ$	0–1	J4
	0	225.482	225.501	83 024.0	– 526 480.3	$3s\,3p-3s\,7d$	$^3P^\circ-^3D$	0–1	J4
	2	225.680	225.682	83 393.5	– 526 494.1	$3s\,3p-3s\,7d$	$^3P^\circ-^3D$	1–2	J4
	3	226.067	226.067	84 155.2	– 526 501.7	$3s\,3p-3s\,7d$	$^3P^\circ-^3D$	2–3	J4
	0	232.075	232.067	83 024.0	– 513 933.6	$3s\,3p-3s\,7s$	$^3P^\circ-^3S$	0–1	J4
	0	232.267	232.266	83 393.5	– 513 933.6	$3s\,3p-3s\,7s$	$^3P^\circ-^3S$	1–1	J4
	1	232.676	232.678	84 155.2	– 513 933.6	$3s\,3p-3s\,7s$	$^3P^\circ-^3S$	2–1	J4
	5g	235.560	235.557	0.0	– 424 526.0	$3s^2-3p\,4s$	$^1S-^1P^\circ$	0–1	J4
	0	236.304	236.304	127 150.7	– 550 334	$3s\,3p-3s\,9d$	$^1P^\circ-^1D$	1–2	J4
	0	237.376	237.376	83 024.0	– 504 296.5	$3s\,3p-3s\,6d$	$^3P^\circ-^3D$	0–1	J4
	0g	237.489	237.498	0.0	– 421 056.8	$3s^2-3p\,4s$	$^1S-^3P^\circ$	0–1	J4
	2	237.578	237.579	83 393.5	– 504 305.7	$3s\,3p-3s\,6d$	$^3P^\circ-^3D$	1–2	J4
	3	238.011	238.007	84 155.2	– 504 310.5	$3s\,3p-3s\,6d$	$^3P^\circ-^3D$	2–3	J4
	0	241.955	241.955	127 150.7	– 540 451	$3s\,3p-3s\,8d$	$^1P^\circ-^1D$	1–2	J4
	0	249.606	249.607	83 024.0	– 483 653.6	$3s\,3p-3s\,6s$	$^3P^\circ-^3S$	0–1	J4
	2	249.837	249.838	83 393.5	– 483 653.6	$3s\,3p-3s\,6s$	$^3P^\circ-^3S$	1–1	J4
	3	250.310	250.310	127 150.7	– 526 655.3	$3s\,3p-3s\,7d$	$^1P^\circ-^1D$	1–2	J4
			250.314	84 155.2	– 483 653.6	$3s\,3p-3s\,6s$	$^3P^\circ-^3S$	2–1	
	0g, E2	251.497	251.506	0.0	– 397 605.2	$3s^2-3s\,4d$	$^1S-^1D$	0–2	J4
	0	258.109	258.101	127 150.7	– 514 595.2	$3s\,3p-3s\,7s$	$^1P^\circ-^1S$	1–0	J4
	1	259.724	259.724	83 024.0	– 468 048.2	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	0–1	J4
	3	259.954	259.954	83 393.5	– 468 076.9	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	1–2	J4
			259.973	83 393.5	– 468 048.2	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	1–1	
	5	260.455	260.432	84 155.2	– 468 132.1	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	2–3	J4
			260.470	84 155.2	– 468 076.9	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	2–2	
			260.489	84 155.2	– 468 048.2	$3s\,3p-3s\,5d$	$^3P^\circ-^3D$	2–1	

S v -- Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	2	264.823	264.823	127 150.7	504 761.4	3s 3p - 3s 6d	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
	0	265.356	265.344	83 024.0	459 893.7	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	0-1	J4
	1	265.604	265.604	83 393.5	459 893.7	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	1-1	J4
	4	266.143	266.143	84 155.2	459 893.7	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> S	2-1	J4
	4	266.633	266.633	83 393.5	458 440.9	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-2	J4
	4	266.745	266.745	83 024.0	457 913.5	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	0-1	J4
	4	267.009	267.008	83 393.5	457 913.5	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-1	J4
	8	267.182	267.176	84 155.2	458 440.9	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	2-2	J4
			267.185	83 393.5	457 665.5	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	1-0	
	5	267.558	267.553	84 155.2	457 913.5	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> P	2-1	J4
	12	270.959	270.959	83 024.0	452 083.8	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
			270.964	83 393.5	452 446.8	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	1-2	
			270.974	84 155.2	453 194.7	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	2-3	
	4	271.239	271.230	83 393.5	452 083.8	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	1-1	J4
	4	271.527	271.524	84 155.2	452 446.8	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	2-2	J4
	0	271.792	271.792	84 155.2	452 083.8	3s 3p - 3p 4p	<sup>3</sup> P° - <sup>3</sup> D	2-1	J4
	2	279.150	279.146	127 150.7	485 386.8	3s 3p - 3s 6s	<sup>1</sup> P° - <sup>1</sup> S	1-0	J4
	16g	286.094	286.095	0.0	349 534.4	3s <sup>2</sup> - 3s 4p	<sup>1</sup> S - <sup>1</sup> P°	0-1	J4
	12g	286.403	286.401	0.0	349 161.1	3s <sup>2</sup> - 3s 4p	<sup>1</sup> S - <sup>3</sup> P°	0-1	J4
	5	289.531	289.507	83 024.0	428 439.0	3s 3p - 3p 5s	<sup>3</sup> P° - <sup>3</sup> S	0-1	J4
			289.540	127 150.7	472 526.1	3s 3p - 3p 4p	<sup>1</sup> P° - <sup>1</sup> S	1-0	
	7	289.817	289.817	83 393.5	428 439.0	3s 3p - 3p 5s	<sup>3</sup> P° - <sup>3</sup> S	1-1	J4
	8	290.461	290.458	84 155.2	428 439.0	3s 3p - 3p 5s	<sup>3</sup> P° - <sup>3</sup> S	2-1	J4
	4	291.478	291.478	127 150.7	470 229.4	3s 3p - 3s 5d	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
	0	293.298	293.297	193 739.1	534 691	3p <sup>2</sup> - 3s 8p	<sup>1</sup> D - <sup>1</sup> P°	2-1	J4
	1	297.809	297.807	193 739.1	529 527	3p <sup>2</sup> - 3s 7f	<sup>1</sup> D - <sup>1</sup> F°	2-3	J4
	2	300.231	300.235	127 150.7	460 223.4	3s 3p - 3p 4p	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
	1	305.136	305.128	234 941.5	562 673	3s 3d - 3s 11f	<sup>3</sup> D - <sup>3</sup> F°	1-2	J4
			305.133	234 947.1	562 673	3s 3d - 3s 11f	<sup>3</sup> D - <sup>3</sup> F°	2-3	
			305.141	234 956.0	562 673	3s 3d - 3s 11f	<sup>3</sup> D - <sup>3</sup> F°	3-4	
	0	307.130	307.132	193 739.1	519 332	3p <sup>2</sup> - 3s 7p	<sup>1</sup> D - <sup>1</sup> P°	2-1	J4
	5	309.651	309.654	127 150.7	450 091.5	3s 3p - 3p 4p	<sup>1</sup> P° - <sup>1</sup> P	1-1	J4
	2	309.701	309.693	234 941.5	557 842	3s 3d - 3s 10f	<sup>3</sup> D - <sup>3</sup> F°	1-2	J4
			309.698	234 947.1	557 842	3s 3d - 3s 10f	<sup>3</sup> D - <sup>3</sup> F°	2-3	
			309.707	234 956.0	557 842	3s 3d - 3s 10f	<sup>3</sup> D - <sup>3</sup> F°	3-4	
	4w	316.086	316.077	234 941.5	551 320	3s 3d - 3s 9f	<sup>3</sup> D - <sup>3</sup> F°	1-2	J4
			316.083	234 947.1	551 320	3s 3d - 3s 9f	<sup>3</sup> D - <sup>3</sup> F°	2-3	
			316.092	234 956.0	551 320	3s 3d - 3s 9f	<sup>3</sup> D - <sup>3</sup> F°	3-4	
	3	319.035	319.030	84 155.2	397 605.2	3s 3p - 3s 4d	<sup>3</sup> P° - <sup>1</sup> D	2-2	J4
	8	319.487	319.487	83 024.0	396 025.5	3s 3p - 3s 4d	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
	12	319.850	319.851	83 393.5	396 039.5	3s 3p - 3s 4d	<sup>3</sup> P° - <sup>3</sup> D	1-2	J4
	16	320.610	320.610	84 155.2	396 060.6	3s 3p - 3s 4d	<sup>3</sup> P° - <sup>3</sup> D	2-3	J4
	3	325.455	325.446	234 941.5	542 212	3s 3d - 3s 8f	<sup>3</sup> D - <sup>3</sup> F°	1-2	J4
			325.452	234 947.1	542 212	3s 3d - 3s 8f	<sup>3</sup> D - <sup>3</sup> F°	2-3	
			325.462	234 956.0	542 212	3s 3d - 3s 8f	<sup>3</sup> D - <sup>3</sup> F°	3-4	
	5	329.318	329.325	127 150.7	430 801.7	3s 3p - 3s 5s	<sup>1</sup> P° - <sup>1</sup> S	1-0	J4
	1w	332.211	332.200	234 941.5	535 965	3s 3d - 3s 8p	<sup>3</sup> D - <sup>3</sup> P°	1-2	J4
			332.206	234 947.1	535 965	3s 3d - 3s 8p	<sup>3</sup> D - <sup>3</sup> P°	2-2	
			332.216	234 956.0	535 965	3s 3d - 3s 8p	<sup>3</sup> D - <sup>3</sup> P°	3-2	
	0	334.490	334.485	193 739.1	492 706.0	3p <sup>2</sup> - 3s 6p	<sup>1</sup> D - <sup>1</sup> P°	2-1	J4
	6w	340.171	340.161	234 941.5	528 920	3s 3d - 3s 7f	<sup>3</sup> D - <sup>3</sup> F°	1-2	J4
			340.167	234 947.1	528 920	3s 3d - 3s 7f	<sup>3</sup> D - <sup>3</sup> F°	2-3	
			340.178	234 956.0	528 920	3s 3d - 3s 7f	<sup>3</sup> D - <sup>3</sup> F°	3-4	

Sv - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	2w	350.101	{ 350.090 350.097 350.108	234 941.5 - 520 582 234 947.1 - 520 582 234 956.0 - 520 582		3s3d-3s7p 3s3d-3s7p 3s3d-3s7p	<sup>3</sup> D- <sup>3</sup> P° <sup>3</sup> D- <sup>3</sup> P° <sup>3</sup> D- <sup>3</sup> P°	1-2 2-2 3-2	J4
	6bl	354.532	354.530	193 739.1 - 475 802.5		3p <sup>2</sup> -3s5f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	0	356.038	356.031	270 700.4 - 551 575		3s3d-3s9f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	8	365.676	{ 365.662 365.670 365.682	234 941.5 - 508 418 234 947.1 - 508 418 234 956.0 - 508 418		3s3d-3s6f 3s3d-3s6f 3s3d-3s6f	<sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F°	1-2 2-3 3-4	J4
	1	367.763	367.763	270 700.4 - 542 615		3s3d-3s8f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	2g, E2	369.411	369.412	0.0 - 270 700.4		3s <sup>2</sup> -3s3d	<sup>1</sup> S- <sup>1</sup> D	0-2	J4
	7	369.742	369.748	127 150.7 - 397 605.2		3s3p-3s4d	<sup>1</sup> P°- <sup>1</sup> D	1-2	J4
	2	386.362	386.359	270 700.4 - 529 527		3s3d-3s7f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	1	391.959	391.959	234 956.0 - 490 084.8		3s3d-3s6p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	0	392.035	392.041	234 947.1 - 490 022.6		3s3d-3s6p	<sup>3</sup> D- <sup>3</sup> P°	2-1	J4
	1	393.409	393.411	193 739.1 - 447 925.9		3p <sup>2</sup> -3s5p	<sup>1</sup> D- <sup>1</sup> F°	2-1	J4
	3	417.623	417.621	270 700.4 - 510 152		3s3d-3s6f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	12	418.451	{ 418.437 418.446 418.456	234 941.5 - 473 926.0 234 947.1 - 473 926.5 234 956.0 - 473 929.5		3s3d-3s5f 3s3d-3s5f 3s3d-3s5f	<sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F°	1-2 2-3 3-4	J4
	0	420.665	420.667	270 700.4 - 508 418		3s3d-3s6f	<sup>1</sup> D- <sup>3</sup> F°	2-	J4
	9	433.307	433.300	193 739.1 - 424 526.0		3p <sup>2</sup> -3p4s	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	13	437.504	437.501	83 024.0 - 311 595.1		3s3p-3s4s	<sup>3</sup> P°- <sup>3</sup> S	0-1	J4
	14	438.210	{ 438.204 438.209	193 739.1 - 421 943.4 83 393.5 - 311 595.1		3p <sup>2</sup> -3p4s 3s3p-3s4s	<sup>1</sup> D- <sup>3</sup> P° <sup>3</sup> P°- <sup>3</sup> S	2-2 1-1	J4
	15	439.675	439.677	84 155.2 - 311 595.1		3s3p-3s4s	<sup>3</sup> P°- <sup>3</sup> S	2-1	J4
	5	439.904	439.913	193 739.1 - 421 056.8		3p <sup>2</sup> -3p4s	<sup>1</sup> D- <sup>3</sup> P°	2-1	J4
	6	445.940	445.939	193 739.1 - 417 984.9		3p <sup>2</sup> -3s4f	<sup>3</sup> P- <sup>1</sup> F°	2-3	J4
	8	451.325	451.319	200 370.6 - 421 943.4		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	1-2	J4
	7	452.306	452.305	199 967.2 - 421 056.8		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	0-1	J4
	8	452.904	452.904	201 146.0 - 421 943.4		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	2-2	J4
	6bl	453.134	453.132	200 370.6 - 421 056.8		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	1-1	J4
	6	453.778	453.779	200 370.6 - 420 742.2		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	1-0	J4
	6	454.735	454.730	201 146.0 - 421 056.8		3p <sup>2</sup> -3p4s	<sup>3</sup> P- <sup>3</sup> P°	2-1	J4
	1	470.415	470.420	235 350.0 - 447 925.9		3p <sup>2</sup> -3s5p	<sup>1</sup> S- <sup>1</sup> P°	0-1	J4
	5	474.966	474.964	234 956.0 - 445 498.1		3s3d-3s5p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	4	475.277	475.277	234 947.1 - 445 350.5		3s3d-3s5p	<sup>3</sup> D- <sup>3</sup> P°	2-1	J4
	3	475.373	475.371	234 941.5 - 445 303.7		3s3d-3s5p	<sup>3</sup> D- <sup>3</sup> P°	1-0	J4
	5	487.562	487.562	270 700.4 - 475 802.5		3s3d-3s5f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	2g, E2	516.154	516.158	0.0 - 193 739.1		3s <sup>2</sup> -3p <sup>2</sup>	<sup>1</sup> S- <sup>1</sup> D	0-2	J4
	12	518.255	518.249	127 150.7 - 320 108.0		3s3p-3s4s	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	6	528.603	528.608	235 350.0 - 424 526.0		3p <sup>2</sup> -3p4s	<sup>1</sup> S- <sup>1</sup> P°	0-1	J4
	4	533.880	533.883	83 393.5 - 270 700.4		3s3p-3s3d	<sup>3</sup> P°- <sup>1</sup> D	1-2	J4
	2	536.072	536.063	84 155.2 - 270 700.4		3s3p-3s3d	<sup>3</sup> P°- <sup>1</sup> D	2-2	J4
	0	538.467	538.483	235 350.0 - 421 056.8		3p <sup>2</sup> -3p4s	<sup>1</sup> S- <sup>3</sup> P°	0-1	J4
	2w	546.369	{ 546.362 546.374	234 956.0 - 417 984.9 349 478.3 - 532 503		3s3d-3s4f 3s4p-3s8s	<sup>3</sup> D- <sup>1</sup> F° <sup>3</sup> P°- <sup>3</sup> S	3-3 2-1	J4
	0	563.857	563.831	349 122.2 - 526 480.3		3s4p-3s7d	<sup>3</sup> P°- <sup>3</sup> D	0-1	J4
	0	563.911	563.911	349 161.1 - 526 494.1		3s4p-3s7d	<sup>3</sup> P°- <sup>3</sup> D	1-2	J4
	4	564.253	564.253	270 700.4 - 447 925.9		3s3d-3s5p	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	1	564.897	564.897	349 478.3 - 526 501.7		3s4p-3s7d	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	13	568.298	{ 568.285 568.295 568.304	234 941.5 - 410 909.6 234 947.1 - 410 912.1 234 956.0 - 410 918.1		3s3d-3s4f 3s3d-3s4f 3s3d-3s4f	<sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F° <sup>3</sup> D- <sup>3</sup> F°	1-2 2-3 3-4	J4
	15	577.621	577.624?	193 739.1 - 366 862.0?		3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4

S v - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	0w	605.834	605.837	349 534.4	514 595.2	3s4p-3s7s	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	2w	629.040	629.040	345 338.2	504 310.5	3p3d-3s6d	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	0	630.549	630.545	345 712.8	504 305.7	3p3d-3s6d	<sup>3</sup> P°- <sup>3</sup> D	1-2	J4
	10bl	641.86	641.868	193 739.1	349 534.4	3p <sup>2</sup> -3s4p	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	6	643.410	643.410	193 739.1	349 161.1	3p <sup>2</sup> -3s4p	<sup>1</sup> D- <sup>3</sup> P°	2-1	J4
	2	648.205	648.210	193 739.1	348 010.2	3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>3</sup> D°	2-2	J4
	2	648.923	648.921	193 739.1	347 841.1	3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>3</sup> D°	2-1	J4
	0	649.471	649.478	397 605.2	551 575	3s4d-3s9f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	4	650.085	650.087	270 700.4	424 526.0	3s3d-3p4s	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	15	658.252	658.252	83 024.0	234 941.5	3s3p-3s3d	<sup>3</sup> P°- <sup>3</sup> D	0-1	J4
	16	659.833	659.833	83 393.5	234 947.1	3s3p-3s3d	<sup>3</sup> P°- <sup>3</sup> D	1-2	J4
	18	663.131	663.126	84 155.2	234 956.0	3s3p-3s3d	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	1bl	665.07	665.086	270 700.4	421 056.8	3s3d-3p4s	<sup>1</sup> D- <sup>3</sup> P°	2-1	J4
	8	676.254	676.252	199 967.2	347 841.1	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	0-1	J4
	10	677.329	677.325	200 370.6	348 010.2	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	1-2	J4
	11	678.096	678.102	200 370.6	347 841.1	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	1-1	J4
	10	678.960	678.958	270 700.4	417 984.9	3s3d-3s4f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	10	680.330	680.339	201 146.0	348 131.5	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	2-3	J4
	12bl	680.937	680.901	201 146.0	348 010.2	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	2-2	J4
	5	681.678	681.686	201 146.0	347 841.1	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> D°	2-1	J4
	3	686.130	686.127	199 967.2	345 712.8	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	0-1	J4
	7	686.899	686.896	200 370.6	345 953.0	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	1-0	J4
	7	688.029	688.031	200 370.6	345 712.8	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	1-1	J4
	9	689.810	689.809	200 370.6	345 338.2	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	1-2	J4
	7	691.722	691.722	201 146.0	345 712.8	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	2-1	J4
	9	693.515	693.519	201 146.0	345 338.2	3p <sup>2</sup> -3p3d	<sup>3</sup> P- <sup>3</sup> P°	2-2	J4
	18	696.627	696.623	127 150.7	270 700.4	3s3p-3s3d	<sup>1</sup> P°- <sup>1</sup> D	1-2	J4
	3	705.340	705.342	328 454.3	470 229.4	3p3d-3s5d	<sup>1</sup> D°- <sup>1</sup> D	2-2	J4
	1	714.772	714.774	396 060.6	535 965	3s4d-3s8p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	3	736.092	736.093	349 534.4	485 386.8	3s4p-3s6s	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	12	742.303	742.307	193 739.1	328 454.3	3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>1</sup> D°	2-2	J4
	3	743.325	743.321	349 122.2	483 653.6	3s4p-3s6s	<sup>3</sup> P°- <sup>3</sup> S	0-1	J4
	4	743.536	743.536	349 161.1	483 653.6	3s4p-3s6s	<sup>3</sup> P°- <sup>3</sup> S	1-1	J4
	5	745.293	745.294	349 478.3	483 653.6	3s4p-3s6s	<sup>3</sup> P°- <sup>3</sup> S	2-1	J4
	0w	746.815	746.809	311 595.1	445 498.1	3s4s-3s5p	<sup>3</sup> S- <sup>3</sup> P°	1-2	J4
	1	758.014	758.025	397 605.2	529 527	3s4d-3s7f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	2	758.899	758.903	328 454.3	460 223.4	3p3d-3p4p	<sup>1</sup> D°- <sup>1</sup> D	2-2	J4
	0	770.371	770.367	193 739.1	323 547.3	3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>3</sup> F°	2-3	J4
	3	771.325	771.323	323 547.3	453 194.7	3p3d-3p4p	<sup>3</sup> F°- <sup>3</sup> D	3-3	J4
	4	772.835	772.836	193 739.1	323 132.6	3p <sup>2</sup> -3p3d	<sup>1</sup> D- <sup>3</sup> F°	2-2	J4
	2	773.304	773.310	323 132.6	452 446.8	3p3d-3p4p	<sup>3</sup> F°- <sup>3</sup> D	2-2	J4
	8bl	774.47	774.506	324 080.1	453 194.7	3p3d-3p4p	<sup>3</sup> F°- <sup>3</sup> D	4-3	J4
	8bl	775.47	775.487	323 132.6	452 083.8	3p3d-3p4p	<sup>3</sup> F°- <sup>3</sup> D	2-1	J4
	6	775.797	775.798	323 547.3	452 446.8	3p3d-3p4p	<sup>3</sup> F°- <sup>3</sup> D	3-2	J4
	17g	786.470	786.468	0.0	127 150.7	3s <sup>2</sup> -3s3p	<sup>1</sup> S- <sup>1</sup> P°	0-1	J4
	1	802.935	802.939	396 039.5	520 582	3s4d-3s7p	<sup>3</sup> D- <sup>3</sup> P°	2-2	J4
	2	803.078	803.075	396 060.6	520 582	3s4d-3s7p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	0w	810.599	810.603	349 161.1	472 526.1	3s4p-3p4p	<sup>3</sup> P°- <sup>1</sup> S	1-0	J4
	1	813.063	813.063	349 534.4	472 526.1	3s4p-3p4p	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	3	822.119	822.117	328 454.3	450 091.5	3p3d-3p4p	<sup>1</sup> D°- <sup>1</sup> P	2-1	J4
	1	828.541	828.535	349 534.4	470 229.4	3s4p-3s5d	<sup>1</sup> P°- <sup>1</sup> D	1-2	J4
	1	842.778	842.788	349 478.3	468 132.1	3s4p-3s5d	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	1	843.580	843.579	349 534.4	468 076.9	3s4p-3s5d	<sup>1</sup> P°- <sup>3</sup> D	1-2	J4
	15	849.238	849.239	83 393.5	201 146.0	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-2	J4
	14	852.176	852.176	83 024.0	200 370.6	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	0-1	J4

S v - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	17	854.773	854.768	84 155.2	201 146.0	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	2-2	J4
	16	854.865	854.868	83 393.5	200 370.6	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-1	J4
	15	857.829	857.826	83 393.5	199 967.2	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-0	J4
	15	860.471	860.471	84 155.2	200 370.6	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>3</sup> P	2-1	J4
	6	872.689	872.697	234 947.1	349 534.4	3s3d-3s4p	<sup>3</sup> D- <sup>1</sup> P°	2-1	J4
	2	872.947	872.939	345 338.2	459 893.7	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> S	2-1	J4
	9	873.191	873.192	234 956.0	349 478.3	3s3d-3s4p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	8	875.552	875.549	234 947.1	349 161.1	3s3d-3s4p	<sup>3</sup> D- <sup>3</sup> P°	2-1	J4
	7w	875.802	875.776	235 350.0	349 534.4	3p <sup>2</sup> -3s4p	<sup>1</sup> S- <sup>1</sup> P°	0-1	J4
			875.803	345 712.8	459 893.7	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> S	1-1	
			875.805	234 941.5	349 122.2	3s3d-3s4p	<sup>3</sup> D- <sup>3</sup> P°	1-0	
	0	877.656	877.650	345 953.0	459 893.7	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> S	0-1	J4
	2	878.641	878.649	235 350.0	349 161.1	3p <sup>2</sup> -3s4p	<sup>1</sup> S- <sup>3</sup> P°	0-1	J4
	10	883.589	883.583	234 956.0	348 131.5	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> D°	3-3	J4
	4	884.151	884.152	345 338.2	458 440.9	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> P	2-2	J4
	9	884.466	884.462	234 947.1	348 010.2	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> D°	2-2	J4
	7	885.745	885.743	234 941.5	347 841.1	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> D°	1-1	J4
	0	887.092	887.090	345 712.8	458 440.9	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> P	1-2	J4
	1	888.288	888.294	345 338.2	457 913.5	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> P	2-1	J4
	3	888.518	888.519	397 605.2	510 152	3s4d-3s6f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	3w	890.017	890.017	396 060.6	508 418	3s4d-3s6f	<sup>3</sup> D- <sup>3</sup> F°	3-4	J4
	0w	893.203	893.172	345 953.0	457 913.5	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> P	0-1	J4
			893.234	345 712.8	457 665.5	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> P	1-0	
	5	900.806	900.808	234 941.5	345 953.0	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> P°	1-0	J4
	8w	902.806	902.807	234 947.1	345 712.8	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> P°	2-1	J4
	1w	903.042	903.076	349 161.1	459 893.7	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> S	1-1	J4
	3	903.433	903.432	349 534.4	460 223.4	3s4p-3p4p	<sup>1</sup> P°- <sup>1</sup> D	1-2	J4
	2	904.162	904.161	347 841.1	458 440.9	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	1-2	J4
	1	905.536	905.545	348 010.2	458 440.9	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	2-2	J4
	1	905.663	905.671	349 478.3	459 893.7	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> S	2-1	J4
	10	905.944	905.943	234 956.0	345 338.2	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	9w	906.236	906.221	311 595.1	421 943.4	3s4s-3p4s	<sup>3</sup> S- <sup>3</sup> P°	1-2	J4
			906.244	83 393.5	193 739.1	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>1</sup> D	1-2	
	2bl	906.53	906.541	348 131.5	458 440.9	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	3-2	J4
	1	908.471	908.493	347 841.1	457 913.5	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	1-1	J4
	1	909.874	909.891	348 010.2	457 913.5	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	2-1	J4
	m		910.544	347 841.1	457 665.5	3p3d-3p4p	<sup>3</sup> D°- <sup>3</sup> P	1-0	J4
	9	912.543	912.543	84 155.2	193 739.1	3s3p-3p <sup>2</sup>	<sup>3</sup> P°- <sup>1</sup> D	2-2	J4
	4	913.531	913.562	311 595.1	421 056.8	3s4s-3p4s	<sup>3</sup> S- <sup>3</sup> P°	1-1	J4
	1	915.081	915.082	349 161.1	458 440.9	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> P	1-2	J4
	3	916.188	916.195	311 595.1	420 742.2	3s4s-3p4s	<sup>3</sup> S- <sup>3</sup> P°	1-0	J4
	2	917.747	917.746	349 478.3	458 440.9	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> P	2-2	J4
	m		919.191	349 122.2	457 913.5	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> P	0-1	J4
	0	921.618	921.622	349 161.1	457 665.5	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> P	1-0	J4
	3	922.212	922.210	349 478.3	457 913.5	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> P	2-1	J4
	13	924.221	924.220	127 150.7	235 350.0	3s3p-3p <sup>2</sup>	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	0	927.677	927.675	127 150.7	234 947.1	3s3p-3s3d	<sup>1</sup> P°- <sup>3</sup> D	1-2	J4
	0	951.785	951.808	348 131.5	453 194.7	3p3d-3p4p	<sup>3</sup> P°- <sup>3</sup> D	3-3	J4
	3	957.690	957.689	320 108.0	424 526.0	3s4s-3p4s	<sup>1</sup> S- <sup>1</sup> P°	0-1	J4
	4	964.169	964.168	349 478.3	453 194.7	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	4	968.194	968.188	349 161.1	452 446.8	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	1-2	J4



S v - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	3w	971.190	{ 971.171 971.236	349 478.3	- 452 446.8	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	2-2	J4
	1	971.616	971.603	349 122.2	- 452 083.8	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	0-1	J4
	1	990.781	990.782	349 161.1	- 452 083.8	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	1-1	J4
	2	994.458	994.460	349 161.1	- 450 091.5	3s4p-3p4p	<sup>3</sup> P°- <sup>3</sup> D	1-1	J4
				349 534.4	- 450 091.5	3s4p-3p4p	<sup>1</sup> P°- <sup>1</sup> P	1-1	J4
	7	1039.917	1039.916?	270 700.4	- 366 862.0?	3s3d-3p3d	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	0	1051.524	1051.516	397 605.2	- 492 706.0	3s4d-3s6p	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	1	1063.555	1063.556	396 060.6	- 490 084.8	3s4d-3s6p	<sup>3</sup> D- <sup>3</sup> P°	3-2	J4
	0	1064.022	1064.021	396 039.5	- 490 022.6	3s4d-3s6p	<sup>3</sup> D- <sup>3</sup> P°	2-1	J4
	2	1071.113	1071.106?	366 862.0	- 460 223.4?	3p3d-3p4p	<sup>1</sup> F°- <sup>1</sup> D	3-2	J4
	10	1122.042	1122.031	234 956.0	- 324 080.1	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> F°	3-4	J4
	10	1128.067	1128.066	234 947.1	- 323 547.3	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> F°	2-3	J4
	6	1128.776	1128.779	234 956.0	- 323 547.3	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> F°	3-3	J4
	9	1133.902	1133.901	234 941.5	- 323 132.6	3s3d-3p3d	<sup>3</sup> D- <sup>3</sup> F°	1-2	J4
	g, M2		1188.281	0.0	- 84 155.2	3s <sup>2</sup> -3s3p	<sup>1</sup> S- <sup>3</sup> P°	0-2	
	8g	1199.134	1199.134	0.0	- 83 393.5	3s <sup>2</sup> -3s3p	<sup>1</sup> S- <sup>3</sup> P°	0-1	J4
	6	1230.507	1230.507	349 534.4	- 430 801.7	3s4p-3s5s	<sup>1</sup> P°- <sup>1</sup> S	1-0	J4
	3	1260.763	1260.767	349 122.2	- 428 439.0	3s4p-3p5s	<sup>3</sup> P°- <sup>3</sup> S	0-1	J4
	4	1261.381	1261.380	349 101.1	- 428 439.0	3s4p-3p5s	<sup>3</sup> F°- <sup>3</sup> S	1-1	J4
	7	1266.453	1266.453	349 478.3	- 428 439.0	3s4p-3p5s	<sup>3</sup> P°- <sup>3</sup> S	2-1	J4
	9	1268.493	1268.488	270 700.4	- 349 534.4	3s3d-3s4p	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4
	7	1274.520	1274.523	270 700.4	- 349 161.1	3s3d-3s4p	<sup>1</sup> D- <sup>3</sup> P°	2-1	J4
	5	1278.814	1278.817	397 605.2	- 475 802.5	3s4d-3s5f	<sup>1</sup> D- <sup>1</sup> F°	2-3	J4
	2	1283.689	1283.689	396 025.5	- 473 926.0	3s4d-3s5f	<sup>3</sup> D- <sup>3</sup> F°	1-2	J4
	4	1283.911	1283.911	396 039.5	- 473 926.5	3s4d-3s5f	<sup>3</sup> D- <sup>3</sup> F°	2-3	J4
	6	1284.210	1284.210	396 060.6	- 473 929.5	3s4d-3s5f	<sup>3</sup> D- <sup>3</sup> F°	3-4	J4
	5	1351.435	1351.437	127 150.7	- 201 146.0	3s3p-3p <sup>2</sup>	<sup>1</sup> P°- <sup>3</sup> P	1-2	J4
	6	1365.749	1365.749	127 150.7	- 200 370.6	3s3p-3p <sup>2</sup>	<sup>1</sup> P°- <sup>3</sup> P	1-1	J4
	1w	1371.614	1371.612	323 132.6	- 396 039.5	3p3d-3s4d	<sup>3</sup> F°- <sup>3</sup> D	2-2	J4
	1w	1371.883	1371.876	323 132.6	- 396 025.5	3p3d-3s4d	<sup>3</sup> F°- <sup>3</sup> D	2-1	J4
	1w	1379.069	1379.057	323 547.3	- 396 060.6	3p3d-3s4d	<sup>3</sup> F°- <sup>3</sup> D	3-3	J4
	2w	1379.432	1379.459	323 547.3	- 396 039.5	3p3d-3s4d	<sup>3</sup> F°- <sup>3</sup> D	3-2	J4
	2w	1389.254	1389.265	324 080.1	- 396 060.6	3p3d-3s4d	<sup>3</sup> F°- <sup>3</sup> D	4-3	J4
	18	1501.760	1501.763	127 150.7	- 193 739.1	3s3p-3p <sup>2</sup>	<sup>1</sup> P°- <sup>1</sup> D	1-2	J4
	7w	1572.231	{ 1572.238 1572.241	410 918.1	- 474 521.7	3s4f-3s5g	<sup>3</sup> F°- <sup>3</sup> G	4-5	J4
				410 912.1	- 474 515.6	3s4f-3s5g	<sup>3</sup> F°- <sup>3</sup> G	3-4	
	5	1572.377	1572.384	410 909.6	- 474 507.3	3s4f-3s5g	<sup>3</sup> F°- <sup>3</sup> G	2-3	J4
	0	1695.120	1695.122	445 303.7	- 504 296.5	3s5p-3s6d	<sup>3</sup> P°- <sup>3</sup> D	0-1	J4
	0	1696.202	1696.203	445 350.5	- 504 305.7	3s5p-3s6d	<sup>3</sup> P°- <sup>3</sup> D	1-2	J4
	0	1700.321	1700.322	445 498.1	- 504 310.5	3s5p-3s6d	<sup>3</sup> P°- <sup>3</sup> D	2-3	J4
	6	1731.483	1731.485	270 700.4	- 328 454.3	3s3d-3p3d	<sup>1</sup> D- <sup>1</sup> D°	2-2	J4
	4	1770.162	1770.165	417 984.9	- 474 476.8	3s4f-3s5g	<sup>1</sup> F°- <sup>1</sup> G	3-4	J4
	3	1914.080	1914.077	417 984.9	- 470 229.4	3s4f-3s5d	<sup>1</sup> F°- <sup>1</sup> D	3-2	J4
	1	1987.250	1987.254	397 605.2	- 447 925.9	3s4d-3s5p	<sup>1</sup> D- <sup>1</sup> P°	2-1	J4

S V - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
1		2027.328	2027.292	2027.945	396 039.5	- 445 350.5	3s4d - 3s5p	<sup>3</sup> D - <sup>3</sup> P°	2-1	J4
1		2028.648	2028.642	2029.295	396 025.5	- 445 303.7	3s4d - 3s5p	<sup>3</sup> D - <sup>3</sup> P°	1-0	J4
12		2079.575	2079.602	2080.265	349 534.4	- 397 605.2	3s4p - 3s4d	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
2		2082.668	2082.666	2083.329	424 526.0	- 472 526.1	3p4s - 3p4p	<sup>1</sup> P° - <sup>1</sup> S	1-0	J4
0		2113.204	2113.228	2113.897	420 742.2	- 468 048.2	3p4s - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
<i>m</i>			2126.078	2126.750	421 056.8	- 468 076.9	3p4s - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	1-2	J4
11		2131.374	2131.373	2132.046	349 122.2	- 396 025.5	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
13		2132.499	2132.506	2133.179	349 161.1	- 396 039.5	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	1-2	J4
10		2133.140	2133.143	2133.816	349 161.1	- 396 025.5	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	1-1	J4
17bl		2146.052	2146.062	2146.738	349 478.3	- 396 060.6	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	2-3	J4
12		2147.032	2147.035	2147.711	349 478.3	- 396 039.5	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	2-2	J4
9		2147.682	2147.681	2148.357	349 478.3	- 396 025.5	3s4p - 3s4d	<sup>3</sup> P° - <sup>3</sup> D	2-1	J4
0		2150.275	2150.273	2150.949	349 534.4	- 396 025.5	3s4p - 3s4d	<sup>1</sup> P° - <sup>3</sup> D	1-1	J4
1		2164.353	2164.352	2165.032	421 943.4	- 468 132.1	3p4s - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	2-3	J4
4		2364.637	2364.652	2365.375	410 918.1	- 453 194.7	3s4f - 3p4p	<sup>3</sup> F° - <sup>3</sup> D	4-3	J4
3		2366.769	2366.785	2367.508	417 984.9	- 460 223.4	3s4f - 3p4p	<sup>1</sup> F° - <sup>1</sup> D	3-2	J4
1		2504.112	2504.092	2504.847	470 229.4	- 510 152	3s5d - 3s6f	<sup>1</sup> D - <sup>1</sup> F°	2-3	J4
4w		2553.422	2553.414	2554.181	420 742.2	- 459 893.7	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> S	0-1	J4
4w		2574.110	2574.100	2574.871	421 056.8	- 459 893.7	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> S	1-1	J4
13		2638.905	2638.906	2639.693	311 595.1	- 349 478.3	3s4s - 3s4p	<sup>3</sup> S - <sup>3</sup> P°	1-2	J4
11		2661.184	2661.190	2661.982	311 595.1	- 349 161.1	3s4s - 3s4p	<sup>3</sup> S - <sup>3</sup> P°	1-1	J4
10		2663.955	2663.949	2664.741	311 595.1	- 349 122.2	3s4s - 3s4p	<sup>3</sup> S - <sup>3</sup> P°	1-0	J4
1		2689.435	2689.449	2690.248	420 742.2	- 457 913.5	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> P	0-1	J4
4		2739.100	2739.103	2739.914	421 943.4	- 458 440.9	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-2	J4
0		2779.286	2779.267	2780.087	421 943.4	- 457 913.5	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> P	2-1	J4
7		2800.493	2800.499	2801.324	424 526.0	- 460 223.4	3p4s - 3p4p	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
4		2886.905	2886.906	2887.753	474 476.8	- 509 105.8	3s5g - 3s6h	<sup>1</sup> G - <sup>1</sup> H°	4-	J4
3w		2889.451	2889.451	2890.299	474 507.3	- 509 105.8	3s5g - 3s6h	<sup>3</sup> G - <sup>3</sup> H°	3-4	J4
4w		2890.146	2890.145	2890.992	474 515.6	- 509 105.8	3s5g - 3s6h	<sup>3</sup> C - <sup>3</sup> H°	4-	J4
5w		2890.651	2890.655	2891.502	474 521.7	- 509 105.8	3s5g - 3s6h	<sup>3</sup> G - <sup>3</sup> H°	5-	J4
1w		2983.618	2983.652	2984.522	509 105.8	- 542 612	3s6h - 3s8i	H° - I		J4
5bl		3185.1	3184.807	3185.728	421 056.8	- 452 446.8	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-2	J4
3		3189.733	3189.725	3190.648	420 742.2	- 452 083.8	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
8		3198.939	3198.942	3199.867	421 943.4	- 453 194.7	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-3	J4
2w		3221.997	3222.069	3222.999	421 056.8	- 452 083.8	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> D	1-1	J4
7		3251.834	3251.814?	3252.752	366 862.0	- 397 605.2?	3p3d - 3s4d	<sup>1</sup> F° - <sup>1</sup> D	3-2	J4
3		3277.379	3277.379	3278.323	421 943.4	- 452 446.8	3p4s - 3p4p	<sup>3</sup> P° - <sup>3</sup> D	2-2	J4
11		3397.347	3397.334	3398.309	320 108.0	- 349 534.4	3s4s - 3s4p	<sup>1</sup> S - <sup>1</sup> P°	0-1	J4
1		3713.555	3713.549	3714.600	397 605.2	- 424 526.0	3s4d - 3p4s	<sup>1</sup> D - <sup>1</sup> F°	2-1	J4
1w		3862.624	3862.475	3863.570	396 060.6	- 421 943.4	3s4d - 3p4s	<sup>3</sup> D - <sup>3</sup> P°	3-2	J4
7w		3910.406	3910.414	3911.521	424 526.0	- 450 091.5	3p4s - 3p4p	<sup>1</sup> P° - <sup>1</sup> P	1-1	J4
0		3995.975	3996.104	3997.294	396 039.5	- 421 056.8	3s4d - 3p4s	<sup>3</sup> D - <sup>3</sup> P°	2-1	J4
0w		4044.689	4044.705	4045.848	396 025.5	- 420 742.2	3s4d - 3p4s	<sup>3</sup> D - <sup>3</sup> P°	1-0	J4
0		4395.440	4395.433	4396.667	445 303.7	- 468 048.2	3s5p - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	0-1	J4
1		4398.934	4398.933	4400.169	445 350.5	- 468 076.9	3s5p - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	1-2	J4
1		4416.885	4416.892	4418.132	445 498.1	- 468 132.1	3s5p - 3s5d	<sup>3</sup> P° - <sup>3</sup> D	2-3	J4
3		4447.822	4447.823	4449.071	470 229.4	- 492 706.0	3s5d - 3s6p	<sup>1</sup> D - <sup>1</sup> P°	2-1	J4
5bl		4482.5	4482.344	4483.601	447 925.9	- 470 229.4	3s5p - 3s5d	<sup>1</sup> P° - <sup>1</sup> D	1-2	J4
1		4553.980	4553.972	4555.248	468 132.1	- 490 084.8	3s5d - 3s6p	<sup>3</sup> D - <sup>3</sup> P°	3-2	J4
			4553.993	4555.269	468 048.2	- 490 000.8	3s5d - 3s6p	<sup>3</sup> D - <sup>3</sup> P°	1-0	
0		4555.418	4555.424	4556.701	468 076.9	- 490 022.6	3s5d - 3s6p	<sup>3</sup> D - <sup>3</sup> P°	2-1	J4
8		4905.459	4905.474	4906.844	397 605.2	- 417 984.9	3s4d - 3s4f	<sup>1</sup> D - <sup>1</sup> F°	2-3	J4
4w		4906.861	4906.846	4908.216	509 105.8	- 529 479.8	3s6h - 3s7i	H° - I		J4
0		5860.356	5860.350	5861.974	428 439.0	- 445 498.1	3p5s - 3s5p	<sup>3</sup> S - <sup>3</sup> P°	1-2	J4
0		5911.507	5911.498	5913.136	428 439.0	- 445 350.5	3p5s - 3s5p	<sup>3</sup> S - <sup>3</sup> P°	1-1	J4

S v - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wave-length (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	0	6716.726	6716.725	6718.579	396 025.5	- 410 909.6	3s 4d - 3s 4f	<sup>3</sup> D - <sup>3</sup> F <sup>o</sup>	1-2	J4
	0	6721.922	6721.918	6723.774	396 039.5	- 410 912.1	3s 4d - 3s 4f	<sup>3</sup> D - <sup>3</sup> F <sup>o</sup>	2-3	J4
	1	6728.756	6728.750	6730.607	396 060.6	- 410 918.1	3s 4d - 3s 4f	<sup>3</sup> D - <sup>3</sup> F <sup>o</sup>	3-4	J4

## S VI

Na I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 3s^2 S_{1/2}$ Ionization energy  $710\,194.7 \pm 3.0 \text{ cm}^{-1}$  ( $88.0530 \pm 0.0004 \text{ eV}$ )

The blended features observed by Westerlind *et al.* [W2] in the 75 Å region give an experimental position for the excited-core system of  $2p^5 3s 3p$ ,  $3p^2$ , and  $3s 3d$  terms relative to the  $2p^6 3s^2 S_{1/2}$  ground level: the energy-level classifications and the estimated uncertainty of  $0.05 \text{ Å}$  yield a value of  $-2500 \pm 900 \text{ cm}^{-1}$  for the "x" correction given with the excited-core levels in MZM90. Although we have here applied this new correction to the excited-core levels given in MZM90, a (new) unknown correction  $x$  is added to the new values because the uncertainty of  $\pm 900 \text{ cm}^{-1}$  is still much greater than the relative errors of these levels within the excited-core system [J6]. Three  $2p^5 3s 3d$  levels from [W2] that were not located in [J6] are given here to the nearest  $100 \text{ cm}^{-1}$ , their uncertainty being of the order of  $\pm 900 \text{ cm}^{-1}$  relative to all the known levels. The four transitions given by [W2] as classifying the strong feature at 75.63 Å are listed here, but we fol-

low those authors in leaving the  $2p^5 3s (^1P^\circ) 3p^2 D$  and  $^2P$  upper terms unevaluated.

A number of S VI lines arising from high angular-momentum terms extending up to  $10k$  have been observed in beam-foil studies (1285–5290 Å) [D4]. These lines were measured to the nearest Å unit only, and have been omitted here. Relatively accurate wavelengths for such transitions can now be predicted from core-polarization formulae for S VI.

## References

- D4 Dynefors, B. I., and Martinson, I. [1978], *Phys. Scr.* 17, 123–129.  
 J5 Joelsson, I., Zetterberg, P. O., and Magnusson, C. E. [1979], *Phys. Scr.* 20, 145–150.  
 J6 Jupén, C., Engström, L., Hutton, R., Reistad, N., and Westerlind, M. [1990], *Phys. Scr.* 42, 44–50.  
 W2 Westerlind, M., Engström, L., Jupén, C., and Bengtsson, P. [1991], *Phys. Scr.* 44, 582–586.

## S VI

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
20	74.18	74.18	74.18	247 422.5	– 1 595 500	$3d-2p^5 3s (^1P^\circ) 3d$	$^2D-^2D^\circ$	$3/2-5/2$	W2
			74.18	247 455.0	– 1 595 500	$3d-2p^5 3s (^1P^\circ) 3d$	$^2D-^2D^\circ$	$5/2-5/2$	
26	74.42	74.42	74.42	247 455.0	– 1 591 200	$3d-2p^5 3s (^1P^\circ) 3d$	$^2D-^2F^\circ$	$5/2-7/2$	W2
			74.42	247 422.5	– 1 591 200	$3d-2p^5 3s (^1P^\circ) 3d$	$^2D-^2F^\circ$	$3/2-5/2$	
28	74.85	74.85	74.85	247 422.5	– 1 583 500	$3d-2p^5 3s (^3P^\circ) 3d$	$^2D-^4D^\circ$	$3/2-5/2$	W2
			74.85	247 455.0	– 1 583 500	$3d-2p^5 3s (^3P^\circ) 3d$	$^2D-^4D^\circ$	$5/2-7/2$	
29	75.34	75.13	75.13	247 422.5	– 1 578 524.4+x	$3d-2p^5 3s (^3P^\circ) 3d$	$^2D-^4F^\circ$	$3/2-3/2$	W2
			75.25	247 422.5	– 1 576 285.8+x	$3d-2p^5 3s (^3P^\circ) 3d$	$^2D-^4F^\circ$	$3/2-5/2$	
			75.37	247 455.0	– 1 574 292.3+x	$3d-2p^5 3s (^3P^\circ) 3d$	$^2D-^4F^\circ$	$5/2-7/2$	
147	75.63	105 873.6	105 873.6	–	–	$3p-2p^5 3s (^1P^\circ) 3p$	$^2P^\circ-^2P$	$1/2-3/2$	W2
			107 137.7	–	–	$3p-2p^5 3s (^1P^\circ) 3p$	$^2P^\circ-^2P$	$3/2-3/2$	
			107 137.7	–	–	$3p-2p^5 3s (^1P^\circ) 3p$	$^2P^\circ-^2D$	$3/2-5/2$	
			105 873.6	–	–	$3p-2p^5 3s (^1P^\circ) 3p$	$^2P^\circ-^2D$	$1/2-3/2$	
			105 873.6	–	–	$3p-2p^5 3s (^1P^\circ) 3p$	$^2P^\circ-^2D$	$1/2-3/2$	
63	76.12	76.07	76.07	105 873.6	– 1 420 385.2+x	$3p-2p^5 3s (^3P^\circ) 3p$	$^2P^\circ-^4P$	$1/2-3/2$	W2
			76.15	107 137.7	– 1 420 385.2+x	$3p-2p^5 3s (^3P^\circ) 3p$	$^2P^\circ-^4P$	$3/2-3/2$	
			76.22	107 137.7	– 1 419 195.4+x	$3p-2p^5 3s (^3P^\circ) 3p$	$^2P^\circ-^4P$	$3/2-5/2$	
11	76.50	76.50	105 873.6	– 1 413 120.3+x	$3p-2p^5 3s (^3P^\circ) 3p$	$^2P^\circ-^4D$	$1/2-3/2$	W2	
10	76.69	76.69	107 137.7	– 1 411 080.3+x	$3p-2p^5 3s (^3P^\circ) 3p$	$^2P^\circ-^4D$	$3/2-5/2$	W2	
20g	152.285	152.282	0.0	–	[656 675]	$3s-3p$	$^2S-^2P^\circ$	$1/2-$	J5
30g	155.857	155.865	0.0	–	[641 580]	$3s-3p$	$^2S-^2P^\circ$	$1/2-1/2$	J5
30g	161.495	161.494	0.0	–	619 218.4	$3s-7p$	$^2S-^2P^\circ$	$1/2-3/2$	J5
			0.0	–	619 142.9	$3s-7p$	$^2S-^2P^\circ$	$1/2-1/2$	
40g	171.331	171.328	0.0	–	583 674.1	$3s-6p$	$^2S-^2P^\circ$	$1/2-3/2$	J5
			0.0	–	583 551.3	$3s-6p$	$^2S-^2P^\circ$	$1/2-1/2$	

S VI - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	5	180.355	180.353	105 873.6	660 341	3p-9d	2P°-2D	1/2-3/2	J5
	10	180.759	180.765	107 137.7	660 341	3p-9d	2P°-2D	3/2-	J5
	20	184.824	184.823	105 873.6	646 931	3p-8d	2P°-2D	1/2-3/2	J5
	30	185.256	185.256	107 137.7	646 931	3p-8d	2P°-2D	3/2-	J5
	5	188.030	188.028	105 873.6	637 709	3p-8s	2P°-2S	1/2-1/2	J5
	5	188.476	188.476	107 137.7	637 709	3p-8s	2P°-2S	3/2-1/2	J5
	60g	191.480	191.479	0.0	522 249.5	3s-5p	2S-2P°	1/2-3/2	J5
	40g	191.561	191.560	0.0	522 029.1	3s-5p	2S-2P°	1/2-1/2	J5
	30	191.786	191.786	105 873.6	627 287	3p-7d	2P°-2D	1/2-3/2	J5
	40	192.253	192.252	107 137.7	627 287	3p-7d	2P°-2D	3/2-	J5
	5	197.112	197.112	105 873.6	613 198.8	3p-7s	2P°-2S	1/2-1/2	J5
	10	197.606	197.605	107 137.7	613 198.8	3p-7s	2P°-2S	3/2-1/2	J5
	40	203.673	203.675	105 873.6	596 853.0	3p-6d	2P°-2D	1/2-3/2	J5
	50	204.196	{204.197	107 137.7	596 861.3	3p-6d	2P°-2D	3/2-5/2	J5
			{204.200	107 137.7	596 853.0	3p-6d	2P°-2D	3/2-3/2	
	20	213.737	213.737	105 873.6	573 737.7	3p-6s	2P°-2S	1/2-1/2	J5
	30	214.316	214.316	107 137.7	573 737.7	3p-6s	2P°-2S	3/2-1/2	J5
	80	227.187	227.183	105 873.6	546 047.6	3p-5d	2P°-2D	1/2-3/2	J5
	120	227.834	{227.831	107 137.7	546 058.6	3p-5d	2P°-2D	3/2-5/2	J5
			{227.837	107 137.7	546 047.6	3p-5d	2P°-2D	3/2-3/2	
	5w	236.304	{236.293	247 422.5	670 626	3d-10f	2D-2F°	3/2-5/2	J5
			{236.311	247 455.0	670 626	3d-10f	2D-2F°	5/2-7/2	
	10w	241.613	{241.602	247 422.5	661 327	3d-9f	2D-2F°	3/2-5/2	J5
			{241.621	247 455.0	661 327	3d-9f	2D-2F°	5/2-7/2	
	130g	248.986	248.987	0.0	401 627.1	3s-4p	2S-2P°	1/2-3/2	J5
	120g	249.273	249.271	0.0	401 169.2	3s-4p	2S-2P°	1/2-1/2	J5
	20	249.440	{249.426	247 422.5	648 343.2	3d-8f	2D-2F°	3/2-5/2	J5
			{249.446	247 455.0	648 343.2	3d-8f	2D-2F°	5/2-7/2	
	60	251.112	251.112	105 873.6	504 102.4	3p-5s	2P°-2S	1/2-1/2	J5
	80	251.912	251.912	107 137.7	504 102.4	3p-5s	2P°-2S	3/2-1/2	J5
	30	261.816	{261.802	247 422.5	629 390.3	3d-7f	2D-2F°	3/2-5/2	J5
			{261.824	247 455.0	629 390.3	3d-7f	2D-2F°	5/2-7/2	
	5	268.989	268.988	247 455.0	619 218.4	3d-7p	2D-2P°	5/2-3/2	J5
	5	269.026	269.019	247 422.5	619 142.9	3d-7p	2D-2P°	3/2-1/2	J5
	60	283.489	{283.473	247 422.5	600 189.4	3d-6f	2D-2F°	3/2-1/2	J5
			{283.499	247 455.0	600 189.4	3d-6f	2D-2F°	5/2-7/2	
	100	289.082	289.082	105 873.6	451 796.8	3p-4d	2P°-2D	1/2-3/2	J5
	140	290.130	{290.127	107 137.7	451 813.8	3p-4d	2P°-2D	3/2-5/2	J5
			{290.142	107 137.7	451 796.8	3p-4d	2P°-2D	3/2-3/2	
	10	297.416	{297.396	247 422.5	583 674.1	3d-6p	2D-2P°	3/2-3/2	J5
			{297.425	247 455.0	583 674.1	3d-6p	2D-2P°	5/2-3/2	
	10	297.499	297.505	247 422.5	583 551.3	3d-6p	2D-2P°	3/2-1/2	J5
	120	328.605	{328.583	247 422.5	551 759.6	3d-5f	2D-2F°	3/2-5/2	J5
			{328.618	247 455.0	551 759.6	3d-5f	2D-2F°	5/2-7/2	
	40	363.892	{363.865	247 422.5	522 249.5	3d-5p	2D-2P°	3/2-3/2	J5
			{363.908	247 455.0	522 249.5	3d-5p	2D-2P°	5/2-3/2	
	30	364.157	364.157	247 422.5	522 029.1	3d-5p	2D-2P°	3/2-1/2	J5
	160	388.930	388.931	105 873.6	362 988.8	3p-4s	2P°-2S	1/2-1/2	J5
	180	390.854	390.852	107 137.7	362 988.8	3p-4s	2P°-2S	3/2-1/2	J5
	30g, E2	404.137	{404.114	0.0	247 455.0	3s-3d	2S-2D	1/2-5/2	J5
			{404.167	0.0	247 422.5	3s-3d	2S-2D	1/2-3/2	

S VI - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.	
		Observed	Calculated	Lower	Upper					
	30	453.134	453.134	362 988.8	-	583 674.1	4s - 6p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	J5
	20w	453.408	453.386	362 988.8	-	583 551.3	4s - 6p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	J5
	160	464.667	464.624	247 422.5	-	462 650.1	3d - 4f	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	J5
			464.695	247 455.0	-	462 650.1	3d - 4f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 5/2	
	5w	508.810	508.786	451 796.8	-	648 343.2	4d - 8f	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	J5
			508.830	451 813.8	-	648 343.2	4d - 8f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	
	10	511.028	511.029	401 169.2	-	596 853.0	4p - 6d	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	J5
	20	512.217	512.205	401 627.1	-	596 861.3	4p - 6d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	J5
			512.227	401 627.1	-	596 853.0	4p - 6d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	
	20w	563.115	563.084	451 796.8	-	629 390.3	4d - 7f	<sup>2</sup> D - <sup>2</sup> F°	3/2 - 5/2	J5
			563.138	451 813.8	-	629 390.3	4d - 7f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	
	100	576.43	576.43	1 396 900.0+x	-	1 570 381.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴S - ⁴P°	3/2 - 5/2	J6
	20w	579.480	579.480	401 169.2	-	573 737.7	4p - 6s	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	J5
	40bl	580.9	581.022	401 627.1	-	573 737.7	4p - 6s	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	J5
	85	583.74	583.74	1 396 900.0+x	-	1 568 209.1+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴S - ⁴P°	3/2 - 3/2	J6
	40	587.74	587.74	1 396 900.0+x	-	1 567 043.3+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴S - ⁴P°	3/2 - 1/2	J6
	30	604.58	604.58	1 413 120.3+x	-	1 578 524.4+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	3/2 - 3/2	J6
	35	605.29	605.31	1 411 080.3+x	-	1 576 284.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	5/2 - 5/2	J6
	150	612.70	612.70	1 411 080.3+x	-	1 574 292.3+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	5/2 - 7/2	J6
	70	612.90	612.88	1 413 120.3+x	-	1 576 284.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	3/2 - 5/2	J6
	45	613.16	613.16	1 415 434.8+x	-	1 578 524.4+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	1/2 - 3/2	J6
	380bl	614.07	614.06	1 409 630.9+x	-	1 572 481.4+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴F°	7/2 - 9/2	J6
	40	622.08	622.08	1 409 630.9+x	-	1 570 381.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> 3s(³P°)3d	⁴D - ⁴P°	7/2 - 5/2	J6
	m		627.901	362 988.8	-	522 249.5	4s - 5p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	J5
	30	628.773	628.771	362 988.8	-	522 029.1	4s - 5p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	J5
	40	648.489	648.489	247 422.5	-	401 627.1	3d - 4p	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 3/2	J5
	60	648.626	648.626	247 455.0	-	401 627.1	3d - 4p	<sup>2</sup> D - <sup>2</sup> P°	5/2 - 3/2	J5
	50	650.420	650.420	247 422.5	-	401 169.2	3d - 4p	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 1/2	J5
	20bl	673.933	673.888	451 796.8	-	600 189.4	4d - 6f	<sup>2</sup> D - <sup>2</sup> P°	3/2 - 5/2	J5
			673.965	451 813.8	-	600 189.4	4d - 6f	<sup>2</sup> D - <sup>2</sup> F°	5/2 - 7/2	
	70bl	690.236	690.234	401 169.2	-	546 047.6	4p - 5d	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	J5
	50bl	692.368	692.370	401 627.1	-	546 058.6	4p - 5d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	J5
	120	706.474	706.470	105 873.6	-	247 422.5	3p - 3d	<sup>2</sup> P° - <sup>2</sup> D	1/2 - 3/2	J5
	130	712.670	712.670	107 137.7	-	247 455.0	3p - 3d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 5/2	J5
	100	712.831	712.836	107 137.7	-	247 422.5	3p - 3d	<sup>2</sup> P° - <sup>2</sup> D	3/2 - 3/2	J5
	110bl	725.854	725.854	462 650.1	-	600 418.8	4f - 6g	<sup>2</sup> F° - <sup>2</sup> G		J5
	50bl	745.119	745.094	462 650.1	-	596 861.3	4f - 6d	<sup>2</sup> F° - <sup>2</sup> D	7/2 - 5/2	J5
			745.140	462 650.1	-	596 853.0	4f - 6d	<sup>2</sup> F° - <sup>2</sup> D	5/2 - 3/2	
	240	769.93	769.93	1 396 900.0+x	-	1 526 781.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴S - ⁴P°	3/2 - 5/2	J6
	40	771.30	771.32	1 409 630.9+x	-	1 539 279.2+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	7/2 - 5/2	J6
	300bl	780.04	780.04	1 411 080.3+x	-	1 539 279.2+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	5/2 - 5/2	J6
	450bl	781.38	781.36	1 409 630.9+x	-	1 537 612.7+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	7/2 - 7/2	J6
	145	790.32	790.31	1 411 080.3+x	-	1 537 612.7+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	5/2 - 7/2	J6
	170	792.64	792.65	1 413 120.3+x	-	1 539 279.2+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	3/2 - 5/2	J6
	40	800.61	800.61	1 415 434.8+x	-	1 540 339.6+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴D°	1/2 - 3/2	J6
	85	832.78	832.75	1 419 195.4+x	-	1 539 279.2+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴P - ⁴D°	5/2 - 5/2	J6
	30	833.65	833.65	1 420 385.2+x	-	1 540 339.6+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴P - ⁴D°	3/2 - 3/2	J6
	70	844.44	844.47	1 419 195.4+x	-	1 537 612.7+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴P - ⁴D°	5/2 - 7/2	J6
	60	846.57	846.57	1 422 215.9+x	-	1 540 339.6+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴P - ⁴D°	1/2 - 3/2	J6
	220	853.60	853.60	1 409 630.9+x	-	1 526 781.8+x	2p <sup>5</sup> 3s(³P°)3p - 2p <sup>5</sup> (²P°)3p²(³P)	⁴D - ⁴P°	7/2 - 5/2	J6
	170g	933.376	933.378	0.0	-	107 137.7	3s - 3p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	J5

S VI - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
150g	5	944.525	944.523	0.0	- 105 873.6	3s - 3p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 1/2	J5
		971.510	971.504	401 169.2	- 504 102.4	4p - 5s	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> S	1/2 - 1/2	J5
	10	975.834	975.845	401 627.1	- 504 102.4	4p - 5s	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> S	3/2 - 1/2	J5
		60bl	1000.472	1000.372	451 796.8	- 551 759.6	4d - 5f	<sup>2</sup> D - <sup>2</sup> F <sup>o</sup>	3/2 - 5/2
1000.542	451 813.8			- 551 759.6	4d - 5f	<sup>2</sup> D - <sup>2</sup> F <sup>o</sup>	5/2 - 7/2		
60w		1117.756	1117.757	462 650.1	- 552 115.0	4f - 5g	<sup>2</sup> F <sup>o</sup> - <sup>2</sup> G		J5
		1290.	1291.176	552 115.0	- 629 563.8	5g - 7h	<sup>2</sup> G - <sup>2</sup> H <sup>o</sup>		D4
10		1419.381	1419.392	451 796.8	- 522 249.5	4d - 5p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 3/2	J5
30w		1419.738	1419.735	451 813.8	- 522 249.5	4d - 5p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 3/2	J5
20w		1423.845	1423.846	451 796.8	- 522 029.1	4d - 5p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	J5
50		1975.206	1975.207	401 169.2	- 451 796.8	4p - 4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	1/2 - 3/2	J5
70		1992.559	1992.560	401 627.1	- 451 813.8	4p - 4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 5/2	J5
50bl		1993.237	1993.235	401 627.1	- 451 796.8	4p - 4d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	J5

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
10		2054.45	2054.45	2055.11	551 759.6	- 600 418.8	5f - 6g	<sup>2</sup> F <sup>o</sup> - <sup>2</sup> G		J5
40w		2068.28	2068.28	2068.94	552 115.0	- 600 448.9	5g - 6h	<sup>2</sup> G - <sup>2</sup> H <sup>o</sup>		J5
		2079.	2079.45	2080.11	552 115.0	- 600 189.4	5g - 6f	<sup>2</sup> G - <sup>2</sup> F <sup>o</sup>		D4
80		2587.33	2587.33	2588.11	362 988.8	- 401 627.1	4s - 4p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 3/2	J5
70		2618.38	2618.36	2619.14	362 988.8	- 401 169.2	4s - 4p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 1/2	J5
20bl		2657.	2657.69	2658.48	546 058.6	- 583 674.1	5d - 6p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	5/2 - 3/2	J5
10w		2665.6	2665.61	2666.40	546 047.6	- 583 551.3	5d - 6p	<sup>2</sup> D - <sup>2</sup> P <sup>o</sup>	3/2 - 1/2	J5
20w		3430.14	3430.14	3431.12	600 418.8	- 629 563.8	6g - 7h	<sup>2</sup> G - <sup>2</sup> H <sup>o</sup>		J5
30w		3432.97	3432.96	3433.95	600 448.9	- 629 569.9	6h - 7i	<sup>2</sup> H <sup>o</sup> - <sup>2</sup> I		J5
70bl		4162.28	4162.28	4163.46	522 029.1	- 546 047.6	5p - 5d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	1/2 - 3/2	J5
120		4198.90	4198.89	4200.07	522 249.5	- 546 058.6	5p - 5d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 5/2	J5
50		4200.83	4200.83	4202.02	522 249.5	- 546 047.6	5p - 5d	<sup>2</sup> P <sup>o</sup> - <sup>2</sup> D	3/2 - 3/2	J5
m			5508.99	5510.52	504 102.4	- 522 249.5	5s - 5p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 3/2	J5
5		5576.71	5576.72	5578.27	504 102.4	- 522 029.1	5s - 5p	<sup>2</sup> S - <sup>2</sup> P <sup>o</sup>	1/2 - 1/2	J5

## S VII

Ne I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^6 \ ^1S_0$ Ionization energy  $2\ 266\ 000 \pm 100\ \text{cm}^{-1}$  ( $280.948 \pm 0.012\ \text{eV}$ )

Jupén [J9] has classified four lines observed near 600 Å in beam-foil spectra as belonging to the  $2p^4 3s 3p - 2p^4 3s 3d$  double-excitation transition array. The four lines involve six levels, three of the lines comprising one four-level system and the fourth (strongest) line a separate system. No values for the levels are given here, the connections of these systems to the single-excitation system being unavailable.

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## S VII

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	10g	46.212	46.212	0	– 2 163 940	$2p^6 - 2p^5(^2P_{1/2}^o)7d$	$^1S - ^2[^3/2]^o$	0–1	F2
	50g	47.098	47.098	0	– 2 123 230	$2p^6 - 2p^5(^2P_{1/2}^o)6d$	$^1S - ^2[^3/2]^o$	0–1	F2
	50g	47.307	47.307	0	– 2 113 850	$2p^6 - 2p^5(^2P_{3/2}^o)6d$	$^1S - ^2[^3/2]^o$	0–1	F2
	150g	48.647	48.647	0	– 2 055 630	$2p^6 - 2p^5(^2P_{1/2}^o)5d$	$^1S - ^2[^3/2]^o$	0–1	F2
	100g	48.874	48.874	0	– 2 046 080	$2p^6 - 2p^5(^2P_{3/2}^o)5d$	$^1S - ^2[^3/2]^o$	0–1	F2
	70g	50.027	50.027	0	– 1 998 920	$2p^6 - 2p^5(^2P_{3/2}^o)5s$	$^1S - ^2[^3/2]^o$	0–1	F2
	350g	51.807	51.807	0	– 1 930 240	$2p^6 - 2p^5(^2P_{1/2}^o)4d$	$^1S - ^2[^3/2]^o$	0–1	F2
	200g	52.097	52.097	0	– 1 919 500	$2p^6 - 2p^5(^2P_{3/2}^o)4d$	$^1S - ^2[^3/2]^o$	0–1	F2
	100g	52.334	52.334	0	– 1 910 800	$2p^6 - 2p^5(^2P_{3/2}^o)4d$	$^1S - ^2[^1/2]^o$	0–1	F3
	100g	54.652	54.652	0	– 1 829 760	$2p^6 - 2p^5(^2P_{1/2}^o)4s$	$^1S - ^2[^1/2]^o$	0–1	F2
	100g	54.938	54.938	0	– 1 820 230	$2p^6 - 2p^5(^2P_{3/2}^o)4s$	$^1S - ^2[^3/2]^o$	0–1	F2
	1000g	60.161	60.161	0	– 1 662 194	$2p^6 - 2p^5 3d$	$^1S - ^1P^o$	0–1	F2
	750g	60.804	60.805	0	– 1 644 599	$2p^6 - 2p^5 3d$	$^1S - ^3D^o$	0–1	F2
	200g	61.547	61.547	0	– 1 624 773	$2p^6 - 2p^5 3d$	$^1S - ^3P^o$	0–1	F2
	1000g	72.029	72.029	0	– 1 388 339	$2p^6 - 2p^5 3s$	$^1S - ^1P^o$	0–1	F2
	1000g	72.663	72.663	0	– 1 376 207	$2p^6 - 2p^5 3s$	$^1S - ^3P^o$	0–1	F2
	200	330.145	330.146	1 624 773	– 1 927 669	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3P^o - ^2[^3/2]$	1–2	J3
	200	330.304	330.304	1 624 773	– 1 927 524	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3P^o - ^2[^3/2]$	1–1	J3
	400	331.645	331.641	1 627 260	– 1 928 791	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3P^o - ^2[^5/2]$	2–3	J3
	10	333.737	333.724	1 630 083	– 1 929 732	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3P^o - ^2[^7/2]$	4–4	J3
	800	335.113	335.113	1 630 083	– 1 928 490	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3P^o - ^2[^9/2]$	4–5	J3
	100	335.905	335.913	1 631 989	– 1 929 685	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3F^o - ^2[^7/2]$	3–3	J3
	600	337.214	337.189	1 631 989	– 1 928 559	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3F^o - ^2[^9/2]$	3–4	J3
	800	339.700	339.700?	1 644 674	– 1 939 051?	$2p^5 3d - 2p^5(^2P_{1/2}^o)4f$	$^1D^o - ^2[^7/2]$	2–3	J3
	600	341.090	341.090	1 645 921	– 1 939 099	$2p^5 3d - 2p^5(^2P_{1/2}^o)4f$	$^3D^o - ^2[^7/2]$	3–4	J3
	500	342.026	342.027	1 646 576	– 1 938 951	$2p^5 3d - 2p^5(^2P_{1/2}^o)4f$	$^3D^o - ^2[^5/2]$	2–3	J3
	600	342.698	342.681	1 637 915	– 1 929 732	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^1F^o - ^2[^7/2]$	3–4	J3
	5	344.037	344.064	1 637 915	– 1 928 559	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^1F^o - ^2[^9/2]$	3–4	J3
	10	350.873	350.864	1 644 674	– 1 929 685	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^1D^o - ^2[^7/2]$	2–3	J3
	100	351.611	351.611	1 644 599	– 1 929 004	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3D^o - ^2[^5/2]$	1–2	J3
	5	352.31	352.347	1 645 921	– 1 929 732	$2p^5 3d - 2p^5(^2P_{1/2}^o)4f$	$^3D^o - ^2[^7/2]$	3–4	J3
	5	354.335	354.340	1 646 576	– 1 928 791	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^3D^o - ^2[^5/2]$	2–3	J3
	100	361.149	361.149	1 662 194	– 1 939 088	$2p^5 3d - 2p^5(^2P_{1/2}^o)4f$	$^1P^o - ^2[^5/2]$	1–2	J3
	10w	374.73	374.799	1 662 194	– 1 929 004	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^1P^o - ^2[^5/2]$	1–2	J3
	10w	376.60	376.683	1 662 194	– 1 927 669	$2p^5 3d - 2p^5(^2P_{3/2}^o)4f$	$^1P^o - ^2[^3/2]$	1–2	J3



S VII - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	50	594.08				$2p^4(^3P)3s3p(^3P^o) - 2p^4(^3P)3s3d(^3D)$	$^5D^o - ^5F$	4-5	J9
	10	595.58				$2p^4(^3P)3s3p(^3P^o) - 2p^4(^3P)3s3d(^3D)$	$^5P^o - ^5D$	3-3	J9
	25	597.70				$2p^4(^3P)3s3p(^3P^o) - 2p^4(^3P)3s3d(^3D)$	$^5P^o - ^5D$	3-4	J9
	10	600.80				$2p^4(^3P)3s3p(^3P^o) - 2p^4(^3P)3s3d(^3D)$	$^5P^o - ^5D$	2-3	J9
	50	601.16	601.16	1 495 849	- 1 662 194	$2p^53p - 2p^53d$	$^1P - ^1P^o$	1-1	K2
100bl		608.39	608.39	1 388 339	- 1 552 707	$2p^53s - 2p^53p$	$^1P^o - ^1S$	1-0	K2
20		617.62	617.63	1 500 286	- 1 662 194	$2p^53p - 2p^53d$	$^3P - ^1P^o$	1-1	K2
170		623.49	623.53	1 466 883	- 1 627 260	$2p^53p - 2p^53d$	$^3S - ^3P^o$	1-2	K2
80		633.35	633.35	1 466 883	- 1 624 773	$2p^53p - 2p^53d$	$^3S - ^3P^o$	1-1	K2
20		638.0	638.0	1 466 883	- 1 623 623	$2p^53p - 2p^53d$	$^3S - ^3P^o$	1-0	K2
	40	638.66	638.65	1 488 019	- 1 644 599	$2p^53p - 2p^53d$	$^3D - ^3D^o$	1-1	K2
	20	646.21	646.20	1 483 165	- 1 637 915	$2p^53p - 2p^53d$	$^3D - ^1F^o$	3-3	K2
230bl		649.0	649.01	1 492 496	- 1 646 576	$2p^53p - 2p^53d$	$^3P - ^3D^o$	2-2	K2
250		662.65	662.65	1 484 428	- 1 635 337	$2p^53p - 2p^53d$	$^3D - ^3F^o$	2-2	K2
300		671.93	671.93	1 495 849	- 1 644 674	$2p^53p - 2p^53d$	$^1P - ^1D^o$	1-2	K2
			671.93	1 483 165	- 1 631 989	$2p^53p - 2p^53d$	$^3D - ^3F^o$	3-3	
400		677.69	677.69	1 484 428	- 1 631 989	$2p^53p - 2p^53d$	$^3D - ^3F^o$	2-3	K2
300bl		678.80	678.80	1 488 019	- 1 635 337	$2p^53p - 2p^53d$	$^3D - ^3F^o$	1-2	K2
650		680.65	680.65	1 483 165	- 1 630 083	$2p^53p - 2p^53d$	$^3D - ^3F^o$	3-4	K2
620		680.95	680.95	1 499 068	- 1 645 921	$2p^53p - 2p^53d$	$^1D - ^3D^o$	2-3	K2
160		683.59	683.57	1 500 286	- 1 646 576	$2p^53p - 2p^53d$	$^3P - ^3D^o$	1-2	K2
100		685.07	685.08	1 498 631	- 1 644 599	$2p^53p - 2p^53d$	$^3P - ^3D^o$	0-1	K2
200bl		686.85	686.78	1 499 068	- 1 644 674	$2p^53p - 2p^53d$	$^1D - ^1D^o$	2-2	K2
350		687.67	687.67	1 492 496	- 1 637 915	$2p^53p - 2p^53d$	$^3P - ^1F^o$	2-3	K2
10		693.98	693.99	1 483 165	- 1 627 260	$2p^53p - 2p^53d$	$^3D - ^3P^o$	3-2	K2
200		742.04	742.04	1 492 496	- 1 627 260	$2p^53p - 2p^53d$	$^3P - ^3P^o$	2-2	K2
m			780.08	1 499 068	- 1 627 260	$2p^53p - 2p^53d$	$^1D - ^3P^o$	2-2	K2
50		785.64	785.64	1 371 784	- 1 499 068	$2p^53s - 2p^53p$	$^3P^o - ^1D$	2-2	K2
		793.0	792.76	1 498 631	- 1 624 773	$2p^53p - 2p^53d$	$^3P - ^3P^o$	0-1	G2
100		816.81	816.83	1 376 207	- 1 498 631	$2p^53s - 2p^53p$	$^3P^o - ^3P$	1-0	K2
150		828.43	828.42	1 371 784	- 1 492 496	$2p^53s - 2p^53p$	$^3P^o - ^3P$	2-2	K2
120bl		844.05	844.02	1 381 805	- 1 500 286	$2p^53s - 2p^53p$	$^3P^o - ^3P$	0-1	K2
60		859.93	859.93	1 376 207	- 1 492 496	$2p^53s - 2p^53p$	$^3P^o - ^3P$	1-2	K2
		876.83	876.85	1 381 805	- 1 495 849	$2p^53s - 2p^53p$	$^3P^o - ^1P$	0-1	G5
200		887.74	887.75	1 371 784	- 1 484 428	$2p^53s - 2p^53p$	$^3P^o - ^3D$	2-2	K2
80		893.24	893.28	1 388 339	- 1 500 286	$2p^53s - 2p^53p$	$^1P^o - ^3P$	1-1	K2
70		894.35	894.36	1 376 207	- 1 488 019	$2p^53s - 2p^53p$	$^3P^o - ^3D$	1-1	K2
270		897.82	897.82	1 371 784	- 1 483 165	$2p^53s - 2p^53p$	$^3P^o - ^3D$	2-3	K2
280bl		903.13	903.11	1 388 339	- 1 499 068	$2p^53s - 2p^53p$	$^1P^o - ^1D$	1-2	K2
10		913.35	913.35	1 552 707	- 1 662 194	$2p^53p - 2p^53d$	$^1S - ^1P^o$	0-1	K2
340		924.06	924.04	1 376 207	- 1 484 428	$2p^53s - 2p^53p$	$^3P^o - ^3D$	1-2	K2
10		930.2	930.15	1 388 339	- 1 495 849	$2p^53s - 2p^53p$	$^1P^o - ^1P$	1-1	K2
50		960.05	960.09	1 388 339	- 1 492 496	$2p^53s - 2p^53p$	$^1P^o - ^3P$	1-2	K2
80bl		1051.57	1051.54	1 371 784	- 1 466 883	$2p^53s - 2p^53p$	$^3P^o - ^3S$	2-1	K2
		1102.70	1102.83	1 376 207	- 1 466 883	$2p^53s - 2p^53p$	$^3P^o - ^3S$	1-1	G5

## S VIII

## F I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^5 \ ^2P_{3/2}$ Ionization energy  $2\ 651\ 500\ \text{cm}^{-1}$  (328.74 eV)

In the region below 65 Å, we have quoted the observed wavelengths for several lines from [C1] instead of [F2]; the values from [C1] agree better with relevant level separations derived from the longer-wavelength observations [T2] or otherwise appear more accurate [MZM90].

Some 40 lines from 664 to 973 Å were classified as  $2s^2 2p^4 3s - 3p$  and  $2s^2 2p^4 3p - 3d$  transitions in [T2]. The separations of a number of levels of these configurations as given in [T2], however, disagree with the corresponding observed wavenumbers in [T2] by amounts greatly exceeding the estimated experimental errors. We have reevaluated some of these levels. Transitions involving a number of  $2s^2 2p^4 3p$  and  $3d$  levels in [T2] and [MZM90]

have been tentatively omitted, pending analysis of extended observations [T2].

*Note added in proof:* An extended analysis of S VIII was completed too late for inclusion here [Bengtsson, P., Jupén, C., Engström, L., Westerlind, M., and Redfors, A. 1992, submitted to Phys. Scr.]

## References

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## S VIII

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	50g	45.292	45.292?	0	- 2 207 900?	$2s^2 2p^5 - 2s^2 2p^4(^3P^o)4d$	$2P^o - ^2D$	$3/2 - 5/2$	F2, C1
	70g	47.519	47.519?	0	- 2 104 420?	$2s^2 2p^5 - 2s^2 2p^4(^3P^o)4s$	$2P^o - ^2P$	$3/2 - 3/2$	C1
	50g	47.746	47.748?	10 085	- 2 104 420?	$2s^2 2p^5 - 2s^2 2p^4(^3P^o)4s$	$2P^o - ^2P$	$1/2 - 3/2$	C1
	100g	51.227	51.227	0	- 1 952 100	$2s^2 2p^5 - 2s^2 2p^4(^1S)3d$	$2P^o - ^2D$	$3/2 - 5/2$	F2
	70g	51.470	51.470	10 085	- 1 952 960	$2s^2 2p^5 - 2s^2 2p^4(^1S)3d$	$2P^o - ^2D$	$1/2 - 3/2$	F2
	20g	52.681	52.681	0	- 1 898 220	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2D$	$3/2 - 3/2$	F2
	20g	52.702	52.703	0	- 1 897 440	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2P$	$3/2 - 1/2$	F2
	300g	52.756	52.756	0	- 1 895 520	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2D$	$3/2 - 5/2$	F2
	300g	52.789	52.790	0	- 1 894 310	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2P$	$3/2 - 3/2$	F2
	100g	52.854	52.854	0	- 1 891 990	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2F$	$3/2 - 5/2$	F2
	350g	52.958	52.955	0	- 1 888 410	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2S$	$3/2 - 1/2$	F2
			52.962	10 085	- 1 898 220	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2D$	$1/2 - 3/2$	
	70g	52.985	52.984	10 085	- 1 897 440	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2P$	$1/2 - 1/2$	F2
	50g	53.073	53.072	10 085	- 1 894 310	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2P$	$1/2 - 3/2$	F2
	30g	53.239	53.239	10 085	- 1 888 410	$2s^2 2p^5 - 2s^2 2p^4(^1D)3d$	$2P^o - ^2S$	$1/2 - 1/2$	F2
	500g	54.118	54.118	0	- 1 847 810	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^2D$	$3/2 - 5/2$	F2
	100g	54.266	54.267	0	- 1 842 750	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^2D$	$3/2 - 3/2$	F2
	20g	54.370	54.368	0	- 1 839 316	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^2F$	$3/2 - 5/2$	F2
	100g	54.385	54.385?	10 085	- 1 848 830?	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^2P$	$1/2 - 3/2$	F2
	150g	54.424	54.424?	0	- 1 837 420?	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^4P$	$3/2 - 5/2$	F2
	20g	54.501	54.501	0	- 1 834 830	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^4P$	$3/2 - 3/2$	F2
	50g	54.566	54.565	10 085	- 1 842 750	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^2D$	$1/2 - 3/2$	F2
	50g	54.604	54.604	0	- 1 831 370	$2s^2 2p^5 - 2s^2 2p^4(^3P)3d$	$2P^o - ^4F$	$3/2 - 5/2$	F2
	70g	59.236	59.236	0	- 1 688 150	$2s^2 2p^5 - 2s^2 2p^4(^1S)3s$	$2P^o - ^2S$	$3/2 - 1/2$	F2
	20g	59.593	59.592	10 085	- 1 688 150	$2s^2 2p^5 - 2s^2 2p^4(^1S)3s$	$2P^o - ^2S$	$1/2 - 1/2$	F2
	500g	61.600	61.600	0	- 1 623 380	$2s^2 2p^5 - 2s^2 2p^4(^1D)3s$	$2P^o - ^2D$	$3/2 - 5/2$	F2
	250g	61.978	61.978	10 085	- 1 623 560	$2s^2 2p^5 - 2s^2 2p^4(^1D)3s$	$2P^o - ^2D$	$1/2 - 3/2$	F2
	50g	63.026	63.028	0	- 1 586 600	$2s^2 2p^5 - 2s^2 2p^4(^3P)3s$	$2P^o - ^2P$	$3/2 - 1/2$	F2
	500g	63.304	63.304	0	- 1 579 680	$2s^2 2p^5 - 2s^2 2p^4(^3P)3s$	$2P^o - ^2P$	$3/2 - 3/2$	F2
	100g	63.431	63.431	10 085	- 1 586 600	$2s^2 2p^5 - 2s^2 2p^4(^3P)3s$	$2P^o - ^2P$	$1/2 - 1/2$	F2

S VIII - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	50g	63.711	63.711	10 085	- 1 579 680	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>2</sup> P	1/2 - 3/2	F2
	250g	63.886	63.887	0	- 1 565 254	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>4</sup> P	3/2 - 3/2	F2
	50g	64.132	64.129	0	- 1 559 345	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>4</sup> P	3/2 - 5/2	C1
	100g	64.152	64.152	10 085	- 1 568 872	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>4</sup> P	1/2 - 1/2	C1
	20g	64.303	64.302	10 085	- 1 565 254	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>4</sup> P	1/2 - 3/2	C1
	20	64.874	64.874	503 644	- 2 045 090	2s 2p <sup>6</sup> - 2s 2p <sup>5</sup> ( <sup>3</sup> P°)3s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 1/2	F2
	50	65.149	65.149	503 644	- 2 038 590	2s 2p <sup>6</sup> - 2s 2p <sup>5</sup> ( <sup>3</sup> P°)3s	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	F2
	50g	198.550	198.553	0	- 503 644	2s <sup>2</sup> 2p <sup>5</sup> - 2s 2p <sup>6</sup>	<sup>2</sup> P° - <sup>2</sup> S	3/2 - 1/2	R1
	50g	202.605	202.610	10 085	- 503 644	2s <sup>2</sup> 2p <sup>5</sup> - 2s 2p <sup>6</sup>	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	R1
	200bl	671.98	671.81	1 663 533	- 1 812 384	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>4</sup> P° - <sup>4</sup> D	5/2 - 7/2	T2
	140	675.32	675.32	1 679 967	- 1 828 045	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>4</sup> D° - <sup>4</sup> F	5/2 - 7/2	T2
	200	676.30	676.30	1 677 006	- 1 824 869	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>4</sup> D° - <sup>4</sup> F	7/2 - 9/2	T2
	100	686.90	686.90	1 688 748	- 1 834 330	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>2</sup> D° - <sup>2</sup> F	5/2 - 7/2	T2
	30	698.68	698.68	1 696 189	- 1 839 316	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>2</sup> D° - <sup>2</sup> F	3/2 - 5/2	T2
	30	719.36	719.36	1 559 345	- 1 698 357	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> S°	5/2 - 3/2	T2
	30	738.67	738.67	1 677 006	- 1 812 384	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3d	<sup>4</sup> D° - <sup>4</sup> D	7/2 - 7/2	T2
	30	751.30	751.30	1 565 254	- 1 698 357	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> S°	3/2 - 3/2	T2
	20	772.29	772.29	1 568 872	- 1 698 357	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> S°	1/2 - 3/2	T2
	50	847.72	847.72	1 565 254	- 1 683 217	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 3/2	T2
	130	849.90	849.90	1 559 345	- 1 677 006	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> D°	5/2 - 7/2	T2
	30	863.38	863.38	1 568 872	- 1 684 696	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 1/2	T2
	70	871.74	871.74	1 565 254	- 1 679 967	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> D°	3/2 - 5/2	T2
	20	874.54	874.55	1 568 872	- 1 683 217	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> D°	1/2 - 3/2	T2
	40	912.50	912.50	1 586 600	- 1 696 189	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>2</sup> P - <sup>2</sup> D°	1/2 - 3/2	T2
	70	916.86	916.86	1 579 680	- 1 688 748	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>2</sup> P - <sup>2</sup> D°	3/2 - 5/2	T2
	60	959.80	959.80	1 559 345	- 1 663 533	2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3s - 2s <sup>2</sup> 2p <sup>4</sup> ( <sup>3</sup> P)3p	<sup>4</sup> P - <sup>4</sup> P°	5/2 - 5/2	T2

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wave-length (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	M1		9913.	9916.	0	- 10 085	2s <sup>2</sup> 2p <sup>5</sup> - 2s <sup>2</sup> 2p <sup>5</sup>	<sup>2</sup> P° - <sup>2</sup> P°	3/2 - 1/2	

## S IX

## O I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^4 \ ^3P_2$ Ionization energy  $3\ 061\ 300 \pm 1\ 500\ \text{cm}^{-1}$  ( $379.55 \pm 0.19\ \text{eV}$ )

The strong line at  $47.43\ \text{\AA}$  is probably due mainly to one or both of the transitions from the  $2s^2 2p^3(^2P^\circ)3d\ ^1F_3^\circ$  and  $(^2D^\circ)3d\ ^3D_3^\circ$  levels. Pending further analysis we list both levels as tentative.

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## S IX

Mult. No.	Rel. Int.	Vac. Wavelength ( $\text{\AA}$ )		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	250g	38.882	38.882?	0.0	– 2 571 880?	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)4d$	$^3P - ^3P^\circ$	2–2	F3
	250g	38.966	38.966?	0.0	– 2 566 340?	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)4d$	$^3P - ^3D^\circ$	2–3	F3
	50g	40.171	40.171?	0.0	– 2 489 360?	$2s^2 2p^4 - 2s^2 2p^3(^4S^\circ)4d$	$^3P - ^3D^\circ$	2–3	F3
	50g	46.136	46.157?	0.0	– 2 166 530?	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^1F^\circ$	2–3	F3
	250g	46.373	46.373	0.0	– 2 156 430	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3D^\circ$	2–3	F2
	150g	46.413	46.413	0.0	– 2 154 580	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3D^\circ$	2–2	F2
	150g	46.549	46.549	7 985	– 2 156 260	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3D^\circ$	1–1	F4
	250g	46.585	46.585	7 985	– 2 154 580	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3D^\circ$	1–2	F2
			46.585	0.0	– 2 146 600	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	2–2	
	150g	46.624	46.624	0.0	– 2 144 800	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	2–1	F2
	50g	46.760	46.759	7 985	– 2 146 600	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	1–2	F4
	100g	46.799	46.799	7 985	– 2 144 800	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	1–1	F4
	100g	46.843	46.843	7 985	– 2 142 780	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	1–0	F4
			46.845	0.0	– 2 134 710	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^1F^\circ$	2–3	
			46.857	10 648	– 2 144 800	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^3P - ^3P^\circ$	0–1	
	50	46.906	46.906?	58 293.9	– 2 190 220?	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^1D - ^1P^\circ$	2–1	F4
	250g	47.047	47.047	0.0	– 2 125 530	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3S^\circ$	2–1	F4
	200g	47.188	47.185	0.0	– 2 119 330	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3P^\circ$	2–1	F2
	300g	47.249	47.249	0.0	– 2 116 450	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3P^\circ$	2–2	F2
	50g	47.360	47.363	7 985	– 2 119 330	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3P^\circ$	1–1	F4
	450g	47.433	47.423	10 648	– 2 119 330	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3P^\circ$	0–1	F2
			47.433?	0.0	– 2 108 240?	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3D^\circ$	2–3	
			47.433	58 293.9	– 2 166 530	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^1D - ^1F^\circ$	2–3	
	250	47.518	47.518	58 293.9	– 2 162 760	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^1D - ^1D^\circ$	2–2	F2
	200g	47.616	47.616	7 985	– 2 108 120	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3D^\circ$	1–2	F2
	50g	47.740	47.740	10 648	– 2 105 330	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^3P - ^3D^\circ$	0–1	F4
	400	48.160	48.160	58 293.9	– 2 134 710	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^1D - ^1F^\circ$	2–3	F2
	200	48.367	48.367?	122 700	– 2 190 220?	$2s^2 2p^4 - 2s^2 2p^3(^2P^\circ)3d$	$^1S - ^1P^\circ$	0–1	F4
	250	48.564	48.564	58 293.9	– 2 117 430	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^1D - ^1D^\circ$	2–2	F2
	100	48.766	48.766	58 293.9	– 2 108 900	$2s^2 2p^4 - 2s^2 2p^3(^2D^\circ)3d$	$^1D - ^1P^\circ$	2–1	F4

S IX - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	300g	49.119	49.119	0.0	2 035 870	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P- <sup>3</sup> D°	2-3	F2
	250g	49.328	49.328	7 985	2 035 230	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P- <sup>3</sup> D°	1-2	F2
	150g	49.390	49.390	10 648	2 035 350	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3d	<sup>3</sup> P- <sup>3</sup> D°	0-1	F4
	300g	52.859	52.859	0.0	1 891 830	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> P°)3s	<sup>3</sup> P- <sup>3</sup> P°	2-2	F4
	450	54.175	54.171	58 293.9	1 904 300	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> P°)3s	<sup>1</sup> D- <sup>1</sup> P°	2-1	F4
			54.175	0.0	1 845 870	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> D°)3s	<sup>3</sup> P- <sup>3</sup> D°	2-3	
	200g	54.431	54.431	7 985	1 845 170	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> D°)3s	<sup>3</sup> P- <sup>3</sup> D°	1-2	F4
	50g	54.516	54.516	10 648	1 844 970	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> D°)3s	<sup>3</sup> P- <sup>3</sup> D°	0-1	F4
	250	55.540	55.540	58 293.9	1 858 800	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> D°)3s	<sup>1</sup> D- <sup>1</sup> D°	2-2	F2
	200g	56.081	56.081	0.0	1 783 150	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3s	<sup>3</sup> P- <sup>3</sup> S°	2-1	F2
	150	56.125	56.129	122 700	1 904 300	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>2</sup> P°)3s	<sup>1</sup> S- <sup>1</sup> P°	0-1	F2
	150g	56.332	56.333	7 985	1 783 150	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3s	<sup>3</sup> P- <sup>3</sup> S°	1-1	F2
	50g	56.418	56.417	10 648	1 783 150	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>3</sup> ( <sup>4</sup> S°)3s	<sup>3</sup> P- <sup>3</sup> S°	0-1	F4
	g		162.318	0.0	616 073	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>1</sup> P°	2-1	
	450	179.29	179.282	58 293.9	616 073	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>1</sup> D- <sup>1</sup> P°	2-1	K3,D1
	250bl	202.65	202.686	122 700	616 073	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>1</sup> S- <sup>1</sup> P°	0-1	F7
	100g	221.27	221.241	0.0	451 995	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	2-1	K3,D1
	100g	223.29	223.262	7 985	455 890	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-0	K3,D1
	450g	224.77	224.726	0.0	444 987	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	2-2	K3
	50g	225.25	225.220	7 985	451 995	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-1	K3,D1
	100g	226.62	226.579	10 648	451 995	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	0-1	K3,D1
	100g	228.87	228.832	7 985	444 987	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-2	K3,D1
		236.34	236.325	616 073	1 039 219	2s <sup>2</sup> 2p <sup>5</sup> -2p <sup>6</sup>	<sup>1</sup> P°- <sup>1</sup> S	1-0	P1
			258.603	58 293.9	444 987	2s <sup>2</sup> 2p <sup>4</sup> -2s2p <sup>5</sup>	<sup>1</sup> D- <sup>3</sup> P°	2-2	
	M1		871.73	7 985	122 700	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>4</sup>	<sup>3</sup> P- <sup>1</sup> S	1-0	
	M1	1715.445	1715.445	0.0	58 293.9	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>4</sup>	<sup>3</sup> P- <sup>1</sup> D	2-2	F5,S2
	M1		1987.72	7 985	58 293.9	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>4</sup>	<sup>3</sup> P- <sup>1</sup> D	1-2	

Mult. No.	Rel. Int.	Wavenumber (cm <sup>-1</sup> )		Vacuum Wave-length (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	M1		7985.	12523	0.0	7 985	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>4</sup>	<sup>3</sup> P- <sup>3</sup> P	2-1	
	M1		2663.	3.755 μm	7 985	10 648	2s <sup>2</sup> 2p <sup>4</sup> -2s <sup>2</sup> 2p <sup>4</sup>	<sup>3</sup> P- <sup>3</sup> P	1-0	

## S x

N I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^3 \ ^4S_{3/2}$ Ionization energy  $3\ 609\ 000 \pm 2\ 500\ \text{cm}^{-1}$  ( $447.5 \pm 0.3\ \text{eV}$ )

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## S x

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	20g,bl	34.310	34.310?	0	– 2 914 600?	$2s^2 2p^3 - 2s^2 2p^2(^3P)4d$	$4S^\circ - ^4P$	$3/2 - 5/2$	F3
	30g	41.357	41.357?	0	– 2 417 970?	$2s^2 2p^3 - 2s^2 2p^3(^6S^\circ)3p$	$4S^\circ - ^4P$	$3/2 - 5/2$	F3
	10	42.005	42.005?	378 458	– 2 759 130?	$2s^2 2p^4 - 2s^2 2p^3(^3P^\circ)3d$	$4P - ^4D^\circ$	$5/2 - 7/2$	F3
	60g	42.485	42.485	0	– 2 353 770	$2s^2 2p^3 - 2s^2 2p^2(^1P)3d$	$4S^\circ - ^4P$	$3/2 - 1/2$	F3
	70g	42.495	42.495	0	– 2 353 220	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$4S^\circ - ^4P$	$3/2 - 3/2$	F3
	70g	42.543	42.543	0	– 2 350 560	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$4S^\circ - ^4P$	$3/2 - 5/2$	F3
	30g	42.676	42.681	0	– 2 342 990	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$4S^\circ - ^2F$	$3/2 - 5/2$	C2
	30g	42.712	42.713?	0	– 2 341 200?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$4S^\circ - ^2P$	$3/2 - 1/2$	C2
	10bl	42.831	42.838?	83 594.9	– 2 417 970?	$2s^2 2p^3 - 2s^2 2p^3(^6S^\circ)3p$	$2D^\circ - ^4P$	$5/2 - 5/2$	C2
	30	42.916	42.916	82 442.3	– 2 412 550	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2D^\circ - ^2F$	$3/2 - 5/2$	C2
		42.937	42.938	83 594.9	– 2 412 550	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2D^\circ - ^2F$	$5/2 - 5/2$	K4
	50bl	43.002	43.002	83 594.9	– 2 409 070	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2D^\circ - ^2F$	$5/2 - 7/2$	F3
	50	43.263	43.263?	378 458	– 2 689 900?	$2s^2 2p^4 - 2s^2 2p^3(^3D^\circ)3d$	$4P - ^4D^\circ$	$5/2 - 7/2$	F3
	30	43.550	{ 43.548? 43.549?	83 594.9	– 2 379 900?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2D^\circ - ^2D$	$5/2 - 5/2$	C2
				82 442.3	– 2 378 700?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2D^\circ - ^2D$	$3/2 - 3/2$	
	100	43.786	43.788	128 804	– 2 412 550	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2P^\circ - ^2F$	$3/2 - 5/2$	C2
	30bl	43.852	{ 43.847 43.854	126 975	– 2 407 650	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2P^\circ - ^2D?$	$1/2 - 3/2$	F3
				128 804	– 2 409 100	$2s^2 2p^3 - 2s^2 2p^2(^1D)3d$	$2P^\circ - ^2D?$	$3/2 - 5/2$	
	40	44.094	44.094	83 594.9	– 2 351 480	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2D^\circ - ^2F$	$5/2 - 7/2$	F3
	20	44.237	44.237	82 442.3	– 2 342 990	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2D^\circ - ^2F$	$3/2 - 5/2$	F3
	30	44.413	{ 44.410? 44.423?	126 975	– 2 378 700?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2P^\circ - ^2D$	$1/2 - 3/2$	C2
				128 804	– 2 379 900?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2P^\circ - ^2D$	$3/2 - 5/2$	
	20	45.161	45.163?	126 975	– 2 341 200?	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2P^\circ - ^2P$	$1/2 - 1/2$	C2
	10	45.406	45.406	128 804	– 2 331 160	$2s^2 2p^3 - 2s^2 2p^2(^3P)3d$	$2P^\circ - ^2P$	$3/2 - 3/2$	F3
	50	45.997	45.997	378 458	– 2 552 510	$2s^2 2p^4 - 2s^2 2p^3(^5S^\circ)3d$	$4P - ^4D^\circ$	$5/2 - 7/2$	F3
	50	46.298	46.298	385 362	– 2 545 280	$2s^2 2p^4 - 2s^2 2p^3(^5S^\circ)3d$	$4P - ^4D^\circ$	$3/2 - 5/2$	F3
	20	46.430	46.430	388 883	– 2 542 660	$2s^2 2p^4 - 2s^2 2p^3(^5S^\circ)3d$	$4P - ^4D^\circ$	$1/2 - 3/2$	F3
	30g	47.654	47.654	0	– 2 098 440	$2s^2 2p^3 - 2s^2 2p^2(^3P)3s$	$4S^\circ - ^4P$	$3/2 - 5/2$	F2
	20g	47.792	47.792	0	– 2 092 400	$2s^2 2p^3 - 2s^2 2p^2(^3P)3s$	$4S^\circ - ^4P$	$3/2 - 3/2$	F3
	30g	47.905	47.905	0	– 2 087 460	$2s^2 2p^3 - 2s^2 2p^2(^3P)3s$	$4S^\circ - ^4P$	$3/2 - 1/2$	F3
	40	48.129	48.130	82 442.3	– 2 160 140	$2s^2 2p^3 - 2s^2 2p^2(^1D)3s$	$2D^\circ - ^2D$	$3/2 - 5/2$	F3
	40	48.157	{ 48.150? 48.157	82 442.3	– 2 159 280?	$2s^2 2p^3 - 2s^2 2p^2(^1D)3s$	$2D^\circ - ^2D$	$3/2 - 3/2$	F3
				83 594.9	– 2 160 140	$2s^2 2p^3 - 2s^2 2p^2(^1D)3s$	$2D^\circ - ^2D$	$5/2 - 5/2$	
	40	49.095	49.094	83 594.9	– 2 120 500	$2s^2 2p^3 - 2s^2 2p^2(^3P)3s$	$2D^\circ - ^2P$	$5/2 - 3/2$	C2
	40	49.214	{ 49.205? 49.229	126 975	– 2 159 280?	$2s^2 2p^3 - 2s^2 2p^2(^1D)3s$	$2P^\circ - ^2D$	$1/2 - 3/2$	C2
				128 804	– 2 160 140	$2s^2 2p^3 - 2s^2 2p^2(^1D)3s$	$2P^\circ - ^2D$	$3/2 - 5/2$	

S x - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
		49.249	49.245	82 442.3	- 2 113 100	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>2</sup> ( <sup>3</sup> P)3s	<sup>2</sup> D° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	C2
	10	50.161	50.162	126 975	- 2 120 500	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>2</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>2</sup> P	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	C2
	20	50.208	50.208	128 804	- 2 120 500	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>2</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	C2
	10	50.345	50.349	126 975	- 2 113 100	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>2</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>2</sup> P	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	K4
	40	50.397	50.396	128 804	- 2 113 100	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>2</sup> ( <sup>3</sup> P)3s	<sup>2</sup> P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	F3
			157.011	0	- 636 898	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
			164.262	0	- 608 784	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>2</sup> S	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	
	100	177.55	177.551	82 442.3	- 645 660	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	D2,K3
	80	180.36	180.357	82 442.3	- 636 898	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	D2,K3
	100	180.73	180.733	83 594.9	- 636 898	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>2</sup> P	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	D2,K3
	70	189.99	189.991	82 442.3	- 608 784	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>2</sup> S	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	P1
			192.041	0	- 520 723	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>2</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	70	192.81	192.795	126 975	- 645 660	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> P	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	P1
	90	193.49	193.477	128 804	- 645 660	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	D2,P1
	70	196.12	196.108	126 975	- 636 898	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> P	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	P1
	90	196.82	196.814	128 804	- 636 898	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	D2,K3
	90	207.55	207.551	126 975	- 608 784	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> S	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	D2,P1,F7
			207.620	520 723	- 1 002 372	2s2p <sup>4</sup> -2p <sup>5</sup>	<sup>2</sup> D - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	
	90	208.34	208.342	128 804	- 608 784	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> S	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	D2,P1
		212.60	212.592	520 864	- 991 249	2s2p <sup>4</sup> -2p <sup>5</sup>	<sup>2</sup> D - <sup>2</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	F7
	100	228.17	228.164	82 442.3	- 520 723	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>2</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	D2,F9
	100	228.69	228.692	83 594.9	- 520 864	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>2</sup> D	<sup>5</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	D2,F9
	60	254.00	253.970	126 975	- 520 723	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> D	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	D2,P1
	100	255.08	255.063	128 804	- 520 864	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> P° - <sup>2</sup> D	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	D2,K3
	100g	257.14	257.147	0	- 388 883	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>4</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	D2,K3,F9
	100g	259.52	259.496	0	- 385 362	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>4</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	F9,D2,K3
			261.462	608 784	- 991 249	2s2p <sup>4</sup> -2p <sup>5</sup>	<sup>2</sup> S - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	100g	264.24	264.230	0	- 378 458	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>4</sup> S° - <sup>4</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	D2,F9
			280.34	645 660	- 1 002 372	2s2p <sup>4</sup> -2p <sup>5</sup>	<sup>2</sup> P - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	
			282.206	636 898	- 991 249	2s2p <sup>4</sup> -2p <sup>5</sup>	<sup>2</sup> P - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
			337.820	82 442.3	- 378 458	2s <sup>2</sup> 2p <sup>3</sup> -2s2p <sup>4</sup>	<sup>2</sup> D° - <sup>4</sup> P	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	
	M1	1196.25	1196.245	0	- 83 594.9	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>4</sup> S° - <sup>2</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	F5,S2
	M1	1212.98	1212.970	0	- 82 442.3	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>4</sup> S° - <sup>2</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	F5,S2

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	M1		2156.28	2156.95	82 442.3	- 128 804	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>2</sup> D° - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	M1		2211.25	2211.94	83 594.9	- 128 804	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>2</sup> D° - <sup>2</sup> P°	<sup>5</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	M1		2244.84	2245.54	82 442.3	- 126 975	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>2</sup> D° - <sup>2</sup> P°	<sup>3</sup> / <sub>2</sub> - <sup>1</sup> / <sub>2</sub>	
			Wavenumber (cm <sup>-1</sup> )		μm					
			Observed	Calculated						
	M1		1829.	5.47	126 975	- 128 804	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>2</sup> P° - <sup>2</sup> P°	<sup>1</sup> / <sub>2</sub> - <sup>3</sup> / <sub>2</sub>	
	M1		1152.6	8.676	82 442.3	- 83 594.9	2s <sup>2</sup> 2p <sup>3</sup> -2s <sup>2</sup> 2p <sup>3</sup>	<sup>2</sup> D° - <sup>2</sup> D°	<sup>3</sup> / <sub>2</sub> - <sup>5</sup> / <sub>2</sub>	

## S xi

## C I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^2 \ ^3P_0$ Ionization energy  $4\ 071\ 300 \pm 3\ 000\ \text{cm}^{-1}$  ( $504.8 \pm 0.4\ \text{eV}$ )

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## S xi

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	30g,bl	30.973	30.950?	12 388.1	– 3 243 450?	$2s^2 2p^2 - 2s^2 2p\ 4d$	$^3P - ^1F^\circ$	2–3	F3
	70g	31.054	31.054?	12 388.1	– 3 232 600?	$2s^2 2p^2 - 2s^2 2p\ 4d$	$^3P - ^3D^\circ$	2–3	F3
	40bl	31.483	31.483?	67 146.3	– 3 243 450?	$2s^2 2p^2 - 2s^2 2p\ 4d$	$^1D - ^1F^\circ$	2–3	F3
	20	36.659	36.659?	67 146.3	– 2 795 000?	$2s^2 2p^2 - 2s^2 2p^2(^2D)3p$	$^1D - ^1F^\circ$	2–3	F3
	10	36.733	36.733?	67 146.3	– 2 789 500?	$2s^2 2p^2 - 2s^2 2p^2(^2D)3p$	$^1D - ^1D^\circ$	2–2	F3
	30g	37.773	37.773	12 388.1	– 2 659 800	$2s^2 2p^2 - 2s^2 2p^2(^4P)3p$	$^3P - ^3D^\circ$	2–3	F3
	20g	38.433	38.428?	5 208.0	– 2 607 500?	$2s^2 2p^2 - 2s^2 2p^2(^4P)3p$	$^3P -$	1–	F3
	10g	38.528	38.534?	12 388.1	– 2 607 500?	$2s^2 2p^2 - 2s^2 2p^2(^4P)3p$	$^3P -$	2–	F3
	50bl	38.966	38.966?	186 251 + x	– 2 752 600 + x?	$2s^2 2p^3 - 2s^2 2p^2(^4P)3d$	$^5S^\circ - ^5P$	2–	F3
	50bl	39.049	39.049	186 251 + x	– 2 747 150 + x	$2s^2 2p^3 - 2s^2 2p^2(^4P)3d$	$^5S^\circ - ^5P$	2–3	F3
	50g	39.110	39.110	5 208.0	– 2 562 100	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^3P^\circ$	1–1	F3
	60g,bl	39.240	39.240	0	– 2 548 420	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^3D^\circ$	0–1	F3
			39.240	12 388.1	– 2 560 810	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^3P^\circ$	2–2	
	60g	39.300	39.300	5 208.0	– 2 549 740	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^3D^\circ$	1–2	F3
	70g	39.323	39.323	12 388.1	– 2 555 430	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^3D^\circ$	2–3	F3
	30g,bl	39.572	39.572	5 208.0	– 2 532 260	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^3P - ^1D^\circ$	1–2	F3
			39.572	355 350	– 2 882 400	$2s^2 2p^3 - 2s^2 2p^2(^2D)3d$	$^3D^\circ - ^3F$	3–4	
	50	39.648	39.645?	67 146.3	– 2 589 510?	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^1D - ^1P^\circ$	2–1	F3
			39.648	67 146.3	– 2 589 340	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^1D - ^1F^\circ$	2–3	
	30bl	39.717	39.717	535 220	– 3 053 050	$2s^2 2p^3 - 2s^2 2p^2(^2P)3d$	$^3S^\circ - ^3P$	1–2	F3
	40	40.566	40.566	67 146.3	– 2 532 260	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^1D - ^1D^\circ$	2–2	F3
	40bl	40.707	40.707?	132 929	– 2 589 510?	$2s^2 2p^2 - 2s^2 2p\ 3d$	$^1S - ^1P^\circ$	0–1	F3
	20	40.911	40.909	355 350	– 2 799 800	$2s^2 2p^3 - 2s^2 2p^2(^2P)3d$	$^3D^\circ - ^3D$	3–3	F3
	40	41.386	41.386	355 350	– 2 771 600	$2s^2 2p^3 - 2s^2 2p^2(^4P)3d$	$^3D^\circ - ^3F$	3–4	F3
	30	41.474	41.474	355 076	– 2 766 200	$2s^2 2p^3 - 2s^2 2p^2(^4P)3d$	$^3D^\circ - ^3F$	2–3	F3
	30	41.543	41.543	355 364	– 2 762 500	$2s^2 2p^3 - 2s^2 2p^2(^4P)3d$	$^3D^\circ - ^3F$	1–2	F3
	10	41.829	41.829	530 177	– 2 920 850	$2s^2 2p^3 - 2s^2 2p^2(^2D)3d$	$^1D^\circ - ^1D$	2–2	F3
	10bl	41.970	41.975	417 419	– 2 799 800	$2s^2 2p^3 - 2s^2 2p^2(^2P)3d$	$^3P^\circ - ^3D$	2–3	F3
	30	42.342	42.342	530 177	– 2 891 900	$2s^2 2p^3 - 2s^2 2p^2(^2D)3d$	$^1D^\circ - ^1F$	2–3	F3
	30	42.751	42.751	186 251 + x	– 2 525 380 + x	$2s^2 2p^3 - 2s^2 2p^2(^4P)3s$	$^5S^\circ - ^5P$	2–3	F3
	10bl	42.865	42.865	186 251 + x	– 2 519 160 + x	$2s^2 2p^3 - 2s^2 2p^2(^4P)3s$	$^5S^\circ - ^5P$	2–2	F3
	60g	43.123	43.123	12 388.1	– 2 331 340	$2s^2 2p^2 - 2s^2 2p\ 3s$	$^3P - ^3P^\circ$	2–2	F6
	50g,bl	43.330	43.330	12 388.1	– 2 320 260	$2s^2 2p^2 - 2s^2 2p\ 3s$	$^3P - ^3P^\circ$	2–1	F3
	40	43.900	43.900	67 146.3	– 2 345 060	$2s^2 2p^2 - 2s^2 2p\ 3s$	$^1D - ^1P^\circ$	2–1	F3
	10	43.998	43.998?	417 419	– 2 690 250?	$2s^2 2p^3 - 2s^2 2p^2(^2D)3s$	$^3P^\circ - ^3D$	2–3	F3



S XI - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
30		44.734	44.734?	355 350	- 2 590 790?	2s2p <sup>3</sup> -2s2p <sup>2</sup> ( <sup>4</sup> P)3s	<sup>3</sup> D°- <sup>3</sup> P	3-2	F3
20		45.205	45.205	132 929	- 2 345 060	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p3s	<sup>1</sup> S- <sup>1</sup> P°	0-1	F3
200g		186.84	186.84	0	- 535 220	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> S°	0-1	D2,P1
225g		188.68	188.67	5 208.0	- 535 220	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> S°	1-1	D2,P1
250		190.36	190.36	67 146.3	- 592 480	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>1</sup> D- <sup>1</sup> P°	2-1	D2,P1
250g		191.26	191.27	12 388.1	- 535 220	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> S°	2-1	D2,P1
			193.13	12 388.1	- 530 177	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>1</sup> D°	2-2	
			194.89	355 350	- 868 462	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>1</sup> D	3-2	
125		213.55	213.55	355 364	- 823 645	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	1-0	P1
125		214.85	214.84	355 076	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	2-1	P1
100		214.98	214.98	355 364	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	1-1	P1
250		215.95	215.97	67 146.3	- 530 177	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>1</sup> D- <sup>1</sup> D°	2-2	D2,P1
200		217.63	217.60	132 929	- 592 480	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>1</sup> S- <sup>1</sup> P°	0-1	P1
125		218.99	219.00	355 076	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	2-2	P1
200		219.13	219.13	355 350	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	3-2	P1
			219.14	355 364	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> D°- <sup>3</sup> P	1-2	
			221.48	535 220	- [986 736]	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> S°- <sup>1</sup> S	1-0	
150g		239.81	239.82	0	- 416 986	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	0-1	D2,P1
125g		242.57	242.59	5 208.0	- 417 419	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-2	D2,P1
175g		242.84	242.85	5 208.0	- 416 986	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-1	F9
			242.87	5 208.0	- 416 947	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	1-0	
75		245.94	245.91	416 986	- 823 645	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-0	P1
200g		246.90	246.89	12 388.1	- 417 419	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	2-2	D2,P1
250g,bl		247.15	247.16	12 388.1	- 416 986	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> P°	2-1	D2,F9
			247.78	416 947	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	0-1	
75		247.83	247.80	416 986	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-1	P1
75		248.09	248.07	417 419	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	2-1	P1
50		253.36	253.35	416 986	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	1-2	P1
150		253.62	253.62	417 419	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> P°- <sup>3</sup> P	2-2	P1
			253.64?	592 480	- [986 736]?	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>1</sup> P°- <sup>1</sup> S	1-0	
175g		281.40	281.40	0	- 355 364	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	0-1	P1
250g		285.58	285.59	5 208.0	- 355 364	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	1-1	P1
200g		285.83	285.82	5 208.0	- 355 076	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	1-2	P1
			291.57	12 388.1	- 355 364	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	2-1	
200g		291.58	291.58	12 388.1	- 355 350	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	2-3	P1,F9
0g		291.83	291.81	12 388.1	- 355 076	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>3</sup> D°	2-2	P1
200		295.63	295.61	530 177	- 868 462	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>1</sup> D°- <sup>1</sup> D	2-2	P1
			346.77	535 220	- 823 645	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> S°- <sup>3</sup> P	1-0	F8
0		350.50	350.49	535 220	- 820 531	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> S°- <sup>3</sup> P	1-1	P1
			361.69	535 220	- 811 702	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>3</sup> S°- <sup>3</sup> P	1-2	
0		362.34	362.34	592 480	- 868 462	2s2p <sup>3</sup> -2p <sup>4</sup>	<sup>1</sup> P°- <sup>1</sup> D	1-2	P1
			552.4	5 208.0	- 186 251+x	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>5</sup> S°	1-2	
			575.2	12 388.1	- 186 251+x	2s <sup>2</sup> 2p <sup>2</sup> -2s2p <sup>3</sup>	<sup>3</sup> P- <sup>5</sup> S°	2-2	
M1			782.96	5 208.0	- 132 929	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p <sup>2</sup>	<sup>3</sup> P- <sup>1</sup> S	1-0	
M1		1614.51	1614.51	5 208.0	- 67 146.3	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p <sup>2</sup>	<sup>3</sup> P- <sup>1</sup> D	1-2	F5,S2
M1		1826.22	1826.21	12 388.1	- 67 146.3	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p <sup>2</sup>	<sup>3</sup> P- <sup>1</sup> D	2-2	F5,S2

Mult. No.	Rel. Int.	Wavenumber (cm <sup>-1</sup> )		Vacuum Wave-length (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
M1			7180.1	13927.	5 208.0	- 12 388.1	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p <sup>2</sup>	<sup>3</sup> P- <sup>3</sup> P	1-2	
M1			5208.0	19201.	0	- 5 208.0	2s <sup>2</sup> 2p <sup>2</sup> -2s <sup>2</sup> 2p <sup>2</sup>	<sup>3</sup> P- <sup>3</sup> P	0-1	

## S XII

## B I isoelectronic sequence

Ground state  $1s^2 2s^2 2p^2 P_{1/2}^o$ Ionization energy  $4\,552\,500 \pm 1\,500\text{ cm}^{-1}$  ( $564.44 \pm 0.19\text{ eV}$ )

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## S XII

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	10g	23.72	23.73?	13 135.3	- 4 228 000?	$2s^2 2p - 2s^2 7d$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	30g,bl	24.42	24.42?	13 135.3	- 4 108 000?	$2s^2 2p - 2s^2 6d$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	20g	25.57	25.57	0.0	- 3 911 000	$2s^2 2p - 2s^2 5d$	$2P^o - ^2D$	$1/2 - 3/2$	F3
	30g	25.65	25.66	13 135.3	- 3 911 000	$2s^2 2p - 2s^2 5d$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	10g	26.89	26.89	13 135.3	- 3 702 000	$2s^2 2p - 2s^2 p(^3P^o)4p$	$^2P^o - ^2D$	$3/2 - 5/2$	F3
	30	27.89	{ 27.884? 27.886?	346 700	- 3 933 000?	$2s^2 2p^2 - 2s^2 p(^1P^o)4d$	$^2D - ^2F^o$	$3/2 - 5/2$	F3
	20	28.18	28.18?	347 005	- 3 933 000?	$2s^2 2p^2 - 2s^2 p(^1P^o)4d$	$^2D - ^2F^o$	$5/2 - 7/2$	F3
	30g	28.22	28.22	205 425+x	- 3 754 000+x?	$2s^2 2p^2 - 2s^2 p(^3P^o)4d$	$^4P - ^4D^o$	$5/2 - 7/2$	F3
	50g	28.33	28.33	0.0	- 3 543 300	$2s^2 2p - 2s^2 4d$	$2P^o - ^2D$	$1/2 - 3/2$	F3
				13 135.3	- 3 543 300	$2s^2 2p - 2s^2 4d$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	20	29.20	29.20	947 005	- 3 771 700	$2s^2 2p^2 - 2s^2 p(^3P^o)4d$	$^2D - ^2F^o$	$5/2 - 7/2$	F3
	10	29.24	29.24	346 700	- 3 766 700	$2s^2 2p^2 - 2s^2 p(^3P^o)4d$	$^2D - ^2F^o$	$3/2 - 5/2$	F3
	10g	32.674	32.669	0.0	- 3 061 000	$2s^2 2p - 2s^2 p(^1P^o)3p$	$2P^o - ^2D$	$1/2 - 3/2$	F3
	10g,bl	32.801	32.810	13 135.3	- 3 061 000	$2s^2 2p - 2s^2 p(^1P^o)3p$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	10g,bl	34.132	34.132?	0.0	- 2 929 800?	$2s^2 2p - 2s^2 p(^3P^o)3p$	$2P^o - ^2S$	$1/2 - 1/2$	F3
	20g	34.533	34.533	0.0	- 2 895 800	$2s^2 2p - 2s^2 p(^3P^o)3p$	$2P^o - ^2D$	$1/2 - 3/2$	F3
	30g	34.586	34.586	13 135.3	- 2 904 500	$2s^2 2p - 2s^2 p(^3P^o)3p$	$2P^o - ^2D$	$3/2 - 5/2$	F3
	30g	35.203	35.203	0.0	- 2 840 700	$2s^2 2p - 2s^2 p(^3P^o)3p$	$^3P^o - ^3P$	$1/2 - 1/2$	F3
	30g	35.275	35.275	13 135.3	- 2 848 000	$2s^2 2p - 2s^2 p(^3P^o)3p$	$2P^o - ^2P$	$3/2 - 3/2$	F3
	40	35.955	{ 35.952 35.956	346 700	- 3 128 200	$2s^2 2p^2 - 2s^2 p(^1P^o)3d$	$^2D - ^2F^o$	$3/2 - 5/2$	F3
				347 005	- 3 128 200	$2s^2 2p^2 - 2s^2 p(^1P^o)3d$	$^2D - ^2F^o$	$5/2 - 7/2$	F3
	30	36.124	36.124	198 675+x	- 2 966 900+x	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^4P - ^4P^o$	$3/2 - 3/2$	F3
	40bl	36.253	{ 36.253 36.253	193 882+x	- 2 952 300+x	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^4P - ^4D^o$	$1/2 - 3/2$	F3
				205 425+x	- 2 963 800+x	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^4P - ^4P^o$	$5/2 - 5/2$	F3
	40bl	36.335	{ 36.335 36.336	205 425+x	- 2 957 600+x	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^4P - ^4D^o$	$5/2 - 7/2$	F3
				198 675+x	- 2 950 800+x	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^4P - ^4D^o$	$3/2 - 5/2$	F3
	80g	36.398	36.398	0.0	- 2 747 400	$2s^2 2p - 2s^2 3d$	$2P^o - ^2D$	$1/2 - 3/2$	F3
	20g	36.563	36.564	13 135.3	- 2 748 100	$2s^2 2p - 2s^2 3d$	$^2P^o - ^2D$	$3/2 - 5/2$	F3
	10	37.463	37.463	471 430	- 3 140 700	$2s^2 2p^2 - 2s^2 p(^1P^o)3d$	$^2P - ^2D^o$	$3/2 - 5/2$	F3
	60	37.603	37.603	347 005	- 3 006 400	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^2D - ^2F^o$	$5/2 - 7/2$	F3
	40	37.714	37.715	346 700	- 2 998 200	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^2D - ^2F^o$	$3/2 - 5/2$	F3
	40	38.320	38.320	347 005	- 2 956 600	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^2D - ^2D^o$	$5/2 - 5/2$	F3
	10	38.824	{ 38.819? 38.824	198 675+x	- 2 774 700+x?	$2s^2 2p^2 - 2s^2 p(^3P^o)3s$	$^4P - ^4P^o$	$3/2 - 3/2$	F3
				439 580	- 3 015 300	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^2S - ^2P^o$	$1/2 - 1/2$	F3
	50bl	38.882	38.881	439 580	- 3 011 500	$2s^2 2p^2 - 2s^2 p(^3P^o)3d$	$^2S - ^2P^o$	$1/2 - 1/2$	F3
	20	38.921	38.921?	205 425+x	- 2 774 700+x?	$2s^2 2p^2 - 2s^2 p(^3P^o)3s$	$^4P - ^4P^o$	$5/2 - 5/2$	F3
			203.57	198 675+x	- 689 910	$2s^2 2p^2 - 2p^3$	$^4P - ^2D^o$	$3/2 - 3/2$	
			206.16	205 425+x	- 690 480	$2s^2 2p^2 - 2p^3$	$^4P - ^2D^o$	$5/2 - 5/2$	
	60g	212.12	212.12	0.0	- 471 430	$2s^2 2p - 2s^2 2p^2$	$2P^o - ^2P$	$1/2 - 3/2$	F8,P1
	60g	215.17	215.17	0.0	- 464 755	$2s^2 2p - 2s^2 2p^2$	$2P^o - ^2P$	$1/2 - 1/2$	F8,P1
	100g	218.21	218.20	13 135.3	- 471 430	$2s^2 2p - 2s^2 2p^2$	$2P^o - ^2P$	$3/2 - 3/2$	F8,P1

S XII — Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	70g	221.43	221.43	13 135.3	— 464 755	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> P	3/2-1/2	F8,P1
	60g	227.50	227.49	0.0	— 439 580	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> S	1/2-1/2	F8,P1
			233.043	346 700	— 775 805	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>3</sup> D- <sup>3</sup> P°	3/2-3/2	
		233.216	233.209	347 005	— 775 805	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> P°	5/2-3/2	F8
		234.024	234.017	346 700	— 774 020	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> P°	3/2-1/2	F8
	30g	234.48	234.50	13 135.3	— 439 580	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> S	3/2-1/2	F8,P1
	70	240.284	240.273	193 882+x	— 610 075+x	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>4</sup> P- <sup>4</sup> S°	1/2-3/2	F8
	80	243.094	243.072	198 675+x	— 610 075+x	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>4</sup> P- <sup>4</sup> S°	3/2-3/2	F8
	100bl	247.145	247.127	205 425+x	— 610 075+x	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>4</sup> P- <sup>4</sup> S°	5/2-3/2	F8
	70g	288.416	288.434	0.0	— 346 700	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> D	1/2-3/2	F8
			290.88	346 700	— 690 480	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> D°	3/2-5/2	
		291.142	291.142	347 005	— 690 480	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> D°	5/2-5/2	F8
		291.372	291.367	346 700	— 689 910	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> D°	3/2-3/2	F8
			291.63	347 005	— 689 910	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> D- <sup>2</sup> D°	5/2-3/2	
			297.42	439 580	— 775 805	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> S- <sup>2</sup> P°	1/2-3/2	
			299.01	439 580	— 774 020	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> S- <sup>2</sup> P°	1/2-1/2	
	70g	299.536	299.518	13 135.3	— 347 005	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> D	3/2-5/2	F8
	g		299.79	13 135.3	— 346 700	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>2</sup> D	3/2-3/2	
			321.49	464 755	— 775 805	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> P°	1/2-3/2	
		323.18	323.35	464 755	— 774 020	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> P°	1/2-1/2	F10
		328.39	328.54	471 430	— 775 805	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> P°	3/2-3/2	F10
			330.48	471 430	— 774 020	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> P°	3/2-1/2	
			399.47	439 580	— 689 910	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> S- <sup>2</sup> D°	1/2-3/2	
		444.16	444.14	464 755	— 689 910	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> D°	1/2-3/2	F10
		456.55	456.52	471 430	— 690 480	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> D°	3/2-5/2	F10
			457.71	471 430	— 689 910	2s2p <sup>2</sup> -2p <sup>3</sup>	<sup>2</sup> P- <sup>2</sup> D°	3/2-3/2	
	g		503.3	0.0	— 198 675+x	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>4</sup> P	1/2-3/2	
	g		515.8	0.0	— 193 882+x	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>4</sup> P	1/2-1/2	
	g		520.0	13 135.3	— 205 425+x	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>4</sup> P	3/2-5/2	
	g		539.0	13 135.3	— 198 675+x	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>4</sup> P	3/2-3/2	
	g		553.3	13 135.3	— 193 882+x	2s <sup>2</sup> 2p-2s2p <sup>2</sup>	<sup>2</sup> P°- <sup>4</sup> P	3/2-1/2	

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
	M1	7611.0	7611.0	7613.1	0.0	— 13 135.3	2s <sup>2</sup> 2p-2s <sup>2</sup> 2p	<sup>2</sup> P°- <sup>2</sup> P°	1/2-3/2	J7

## S XIII

Be I isoelectronic sequence

Ground state  $1s^2 2s^2 \ ^1S_0$ Ionization energy  $5\ 260\ 000\ \text{cm}^{-1}$  (652.2 eV)

The feature observed in beam-foil spectra at  $1126.41 \pm 0.15\ \text{\AA}$  is an unresolved blend of lines belonging to the  $2s7i - 2s8k$  array [S6]. The positions of these configurations relative to the S XIV  $2s\ ^2S_{1/2}$  limit can be calculated or estimated but, lacking a more accurate value for the limit, we have here omitted any estimated values for the  $2s7i$  and  $2s8k$  energies.

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## S XIII

Mult. No.	Rel. Int.	Vac. Wavelength ( $\text{\AA}$ )		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	<i>J</i> Values	Ref.
		Observed	Calculated	Lower	Upper				
	10	23.24	23.24?	213 182	– 4 516 500?	$2s2p - 2s5d$	$^3P^o - ^3D$	2–3	F3
	30bl	24.42	24.42?	213 182	– 4 308 000?	$2s2p - 2p4p$	$^3P^o - ^3D$	2–3	F3
	40g	24.59	24.59	0	– 4 066 700	$2s^2 - 2s4p$	$^1S - ^1P^o$	0–1	F3
	40	25.76	25.76	203 474	– 4 085 500	$2s2p - 2s4d$	$^3P^o - ^3D$	1–2	F3
	30	25.83	25.82	213 182	– 4 085 500	$2s2p - 2s4d$	$^3P^o - ^3D$	2–3	F3
	10	26.24	26.23	213 182	– 4 024 900	$2s2p - 2s4s$	$^3P^o - ^3S$	2–1	F3
	20	26.34	26.34	528 796	– 4 325 000	$2p^2 - 2p4d$	$^3P - ^3D^o$	1–2	F3
	30	26.36	26.36	536 856	– 4 331 000	$2p^2 - 2p4d$	$^3P - ^3D^o$	2–3	F3
	10	26.71	26.71?	589 449	– 4 333 500?	$2p^2 - 2p4d$	$^1D - ^1F^o$	2–3	F3
	30	26.99	26.99	389 583	– 4 095 000	$2s2p - 2s4d$	$^1P^o - ^1D$	1–2	F3
	30	31.652	31.652	213 182	– 3 372 500	$2s2p - 2p3p$	$^3P^o - ^3P$	2–2	F3
	10	31.722	31.720	203 474	– 3 356 100	$2s2p - 2p3p$	$^3P^o - ^3S$	1–1	F3
			31.722?	213 182	– 3 365 600?	$2s2p - 2p3p$	$^3P^o - ^3P$	2–1	
	20	31.818	31.818	213 182	– 3 356 100	$2s2p - 2p3p$	$^3P^o - ^3S$	2–1	F3
	50	31.944	31.944	213 182	– 3 343 700	$2s2p - 2p3p$	$^3P^o - ^3D$	2–3	F3
	40g	32.191	32.191	0	– 3 106 500	$2s^2 - 2s3p$	$^1S - ^3P^o$	0–1	F3
			32.193	213 182	– 3 319 400	$2s2p - 2p3p$	$^3P^o - ^1P$	2–1	
	70g	32.242	32.242	0	– 3 101 500	$2s^2 - 2s3p$	$^1S - ^1P^o$	0–1	F3
	10bl	32.801	32.801	389 583	– 3 438 300	$2s2p - 2p3p$	$^1P^o - ^1S$	1–0	F3
	10	33.260	33.260	389 583	– 3 396 200	$2s2p - 2p3p$	$^1P^o - ^1D$	1–2	F3
	40	33.806	33.806	199 181	– 3 157 200	$2s2p - 2s3d$	$^3P^o - ^3D$	0–1	F3
	60	33.852	33.852	203 474	– 3 157 500	$2s2p - 2s3d$	$^3P^o - ^3D$	1–2	F3
	90	33.951	33.951	213 182	– 3 158 600	$2s2p - 2s3d$	$^3P^o - ^3D$	2–3	F3
	10bl	34.132	34.132	389 583	– 3 319 400	$2s2p - 2p3p$	$^1P^o - ^1P$	1–1	F3
	20bl	34.632	34.632	536 856	– 3 424 400	$2p^2 - 2p3d$	$^3P - ^3P^o$	2–2	F3
	20	34.689	34.694	528 796	– 3 411 100	$2p^2 - 2p3d$	$^3P - ^3D^o$	1–2	F3
	20	34.748	34.748	536 856	– 3 414 700	$2p^2 - 2p3d$	$^3P - ^3D^o$	2–3	F3
	10	34.798	34.792	536 856	– 3 411 100	$2p^2 - 2p3d$	$^3P - ^3D^o$	2–2	F3
	10	34.872	34.872	589 449	– 3 457 100	$2p^2 - 2p3d$	$^1D - ^1P^o$	2–1	F3
	30	35.614	35.612	203 474	– 3 011 500	$2s2p - 2s3s$	$^3P^o - ^3S$	1–1	F3
	50	35.667	35.667	389 583	– 3 193 300	$2s2p - 2s3d$	$^1P^o - ^1D$	1–2	F3
	30	35.735	35.736	213 182	– 3 011 500	$2s2p - 2s3s$	$^3P^o - ^3S$	2–1	F3
	50	36.559	36.559	[721 825]	– 3 457 100	$2p^2 - 2p3d$	$^1S - ^1P^o$	0–1	F3
	250g	256.68	256.685	0	– 389 583	$2s^2 - 2s2p$	$^1S - ^1P^o$	0–1	F8,P1
			259.08	203 474	– 589 449	$2s2p - 2p^2$	$^3P^o - ^1D$	1–2	

S XIII - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.	
		Observed	Calculated	Lower	Upper					
			265.77	213 182	-	589 449	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>1</sup> D	2-2	
	75	299.93	299.956	203 474	-	536 856	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	1-2	F8,P1
			300.99	389 583	-	{721 825}	2s2p-2p <sup>2</sup>	<sup>1</sup> P° - <sup>1</sup> S	1-0	
	50	303.38	303.384	199 181	-	528 796	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	0-1	F8,P1
	50	307.39	307.388	203 474	-	528 796	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	1-1	F8,P1
	125	308.94	308.953	213 182	-	536 856	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	2-2	F8,P1
	25	312.73	312.732	203 474	-	523 237	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	1-0	F8,P1
	50	316.85	316.843	213 182	-	528 796	2s2p-2p <sup>2</sup>	<sup>3</sup> P° - <sup>3</sup> P	2-1	F8,P1
	<i>g</i>	491.46	491.46	0	-	203 474	2s <sup>2</sup> -2s2p	<sup>1</sup> S - <sup>3</sup> P°	0-1	D3,W1
		500.42	500.34	389 583	-	589 449	2s2p-2p <sup>2</sup>	<sup>1</sup> P° - <sup>1</sup> D	1-2	F8
		1126.41					2s7i-2s8k	I-K°		S6

## S XIV

Li I isoelectronic sequence

Ground state  $1s^2 2s^2 S_{1/2}$ Ionization energy  $5\,702\,400 \pm 600 \text{ cm}^{-1}$  ( $707.01 \pm 0.08 \text{ eV}$ )

The positions of the  $1s^2 5s$ ,  $5d$ , and  $5f$  levels have been estimated by using the methods of Edlén [1979].

We have listed predicted wavelengths for lines of the  $1s^2 2s^2 2p^4 P^\circ - 1s^2 2p^2 4P$  multiplet ( $399 - 428 \text{ \AA}$ ); such transitions have been observed in other spectra of the Li sequence.

We derived the levels of the excited-core configurations of the type  $1s^2 l^3 l'$  using theoretically calculated wavelengths of Vainshtein and Safronova [1980] with estimated corrections for QED and some smaller contributions not included in their calculations. The levels were also adjusted for consistency with the values of the  $1s^2 2l$  or  $1s^2 3l$  levels given here. Most of the calculated wavelengths involving  $1s^2 2l^3 l'$  levels given here are for transitions that contribute to features observed in the  $4.3$  to  $5.05 \text{ \AA}$  range [B6,A2]. Vainshtein and Safronova's table of calculated wavelengths includes transitions from additional levels of such configurations.

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## S XIV

Mult. No.	Rel. Int.	Vac. Wavelength ( $\text{\AA}$ )		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	$J$ Values	Ref.
		Observed	Calculated	Lower	Upper				
	14g	4.3581	{ 4.3570 4.3578	0	{ [22 951 600] [22 947 400]	$1s^2 2s - 1s 2s (^1S) 3p$ $1s^2 2s - 1s 2s (^3S) 3p$	$^2S - ^2P^\circ$ $^2S - ^2P^\circ$	$1/2 - 3/2$ $1/2 - 1/2$	B6
	17	4.3761	{ 4.3712 4.3723 4.3723 4.3741 4.3751 4.3752 4.3789	224 366	{ - [23 101 500] - [23 095 400] - [23 095 400] - [23 101 500] - [23 096 000] - [23 095 400] - [23 061 100]	$1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^1P^\circ) 3p$ $1s^2 2p - 1s 2p (^3P^\circ) 3p$	$^2P^\circ - ^2P$ $^2P^\circ - ^2D$ $^2P^\circ - ^2P$ $^2P^\circ - ^2P$ $^2P^\circ - ^2D$ $^2P^\circ - ^2D$ $^2P^\circ - ^2S$	$1/2 - 3/2$ $1/2 - 3/2$ $1/2 - 1/2$ $3/2 - 3/2$ $3/2 - 5/2$ $3/2 - 3/2$ $1/2 - 1/2$	B6
	29g	4.3826	{ 4.3814 4.3816 4.3818	0	{ [22 823 800] [22 822 700] [23 061 100]	$1s^2 2s - 1s 2s (^3S) 3p$ $1s^2 2s - 1s 2s (^3S) 3p$ $1s^2 2p - 1s 2p (^3P^\circ) 3p$	$^2S - ^2P^\circ$ $^2S - ^2P^\circ$ $^2P^\circ - ^2S$	$1/2 - 1/2$ $1/2 - 3/2$ $3/2 - 1/2$	B6
	91	4.3886	{ 4.3869 4.3876 4.3877 4.3898 4.3905	224 366	{ - [23 019 500] - [23 015 900] - [23 030 400] - [23 010 500] - [23 015 900]	$1s^2 2p - 1s 2p (^3P^\circ) 3p$ $1s^2 2p - 1s 2s (^1S) 3d$ $1s^2 2p - 1s 2p (^3P^\circ) 3p$ $1s^2 2p - 1s 2p (^3P^\circ) 3p$ $1s^2 2p - 1s 2s (^1S) 3d$	$^2P^\circ - ^2D$ $^2P^\circ - ^2D$ $^2P^\circ - ^2D$ $^2P^\circ - ^2D$ $^2P^\circ - ^2D$	$1/2 - 3/2$ $3/2 - 5/2$ $3/2 - 3/2$ $3/2 - 5/2$	B6
	10	4.3961	4.3974	224 366	- [22 965 100]	$1s^2 2p - 1s 2p (^3P^\circ) 3p$	$^2P^\circ - ^2P$	$1/2 - 1/2$	B6
	10	4.4003	4.4005	239 429	- [22 964 100]	$1s^2 2p - 1s 2p (^3P^\circ) 3p$	$^2P^\circ - ^2P$	$3/2 - 3/2$	B6
	6	4.4133	{ 4.4108 4.4138	224 366	{ - [22 896 000] - [22 895 600]	$1s^2 2p - 1s 2s (^3S) 3d$ $1s^2 2p - 1s 2s (^3S) 3d$	$^2P^\circ - ^2D$ $^2P^\circ - ^2D$	$1/2 - 3/2$ $3/2 - 5/2$	B6
		5.0472	{ 5.0461 5.0466 5.0467 5.0471 5.0471 5.0481	3 220 100	{ - [23 037 400] - [23 035 400] - [23 101 500] - [23 095 400] - [23 095 400] - [23 096 000]	$1s^2 3s - 1s 2p (^1P^\circ) 3s$ $1s^2 3s - 1s 2p (^1P^\circ) 3s$ $1s^2 3p - 1s 2p (^1P^\circ) 3p$ $1s^2 3p - 1s 2p (^1P^\circ) 3p$ $1s^2 3p - 1s 2p (^1P^\circ) 3p$ $1s^2 3p - 1s 2p (^1P^\circ) 3p$	$^2S - ^2P^\circ$ $^2S - ^2P^\circ$ $^2P^\circ - ^2P$ $^2P^\circ - ^2P$ $^2P^\circ - ^2D$ $^2P^\circ - ^2D$	$1/2 - 1/2$ $1/2 - 3/2$ $3/2 - 3/2$ $1/2 - 1/2$ $1/2 - 3/2$ $3/2 - 5/2$	A2

S XIV - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.		
		Observed	Calculated	Lower	Upper						
g		5.0569	5.0582	224 366	- [19 994 200]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2S	1/2 - 1/2	A2		
		5.0611	5.0621	239 429	- [19 994 200]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2S	3/2 - 3/2	A2		
		5.0652	5.0657	0	- [19 740 800]	1s <sup>2</sup> 2s - 1s(2S)2s2p(1P <sup>o</sup> )	2S - 2P <sup>o</sup>	1/2 - 3/2	A2		
			5.0667	0	- [19 736 800]	1s <sup>2</sup> 2s - 1s(2S)2s2p(1P <sup>o</sup> )	2S - 2P <sup>o</sup>	1/2 - 1/2			
		5.0865	5.0855	0	- [19 663 900]	1s <sup>2</sup> 2s - 1s(2S)2s2p(3P <sup>o</sup> )	2S - 2P <sup>o</sup>	1/2 - 3/2	A2		
			5.0875	0	- [19 656 100]	1s <sup>2</sup> 2s - 1s(2S)2s2p(3P <sup>o</sup> )	2S - 2P <sup>o</sup>	1/2 - 1/2			
		5.0907	5.0917	224 366	- [19 864 000]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2P	1/2 - 1/2	A2		
			5.0919	239 429	- [19 878 500]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2P	3/2 - 3/2			
		5.0968	5.0982	224 366	- [19 839 000]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2D	1/2 - 3/2	A2		
		5.1014	5.1024	239 429	- [19 838 200]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 2D	3/2 - 5/2	A2		
5.1284	5.1290	224 366	- [19 721 300]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 4P	1/2 - 1/2	A2				
	5.1293	239 429	- [19 735 300]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 4P	3/2 - 5/2					
	5.1312	239 429	- [19 727 900]	1s <sup>2</sup> 2p - 1s2p <sup>2</sup>	2p <sup>o</sup> - 4P	3/2 - 3/2					
	5.1323	0	- [19 484 500]	1s <sup>2</sup> 2s - 1s(2S)2s2p(3P <sup>o</sup> )	2S - 4P <sup>o</sup>	1/2 - 3/2					
30g	22.98	21.660		224 366	- [4 841 120]	1s <sup>2</sup> 2p - 1s <sup>2</sup> 5d	2p <sup>o</sup> - 2D	1/2 - 3/2			
		21.730		239 429	- [4 841 420]	1s <sup>2</sup> 2p - 1s <sup>2</sup> 5d	2p <sup>o</sup> - 2D	3/2 - 5/2			
		21.748		224 366	- [4 822 550]	1s <sup>2</sup> 2p - 1s <sup>2</sup> 5s	2p <sup>o</sup> - 2S	1/2 - 1/2			
		21.819		239 429	- [4 822 550]	1s <sup>2</sup> 2p - 1s <sup>2</sup> 5s	2p <sup>o</sup> - 2S	3/2 - 1/2			
		23.005	23.005	0	- 4 346 860	1s <sup>2</sup> 2s - 1s <sup>2</sup> 4p	2S - 2P <sup>o</sup>	1/2 - 3/2	F3		
			23.015	0	- 4 344 980	1s <sup>2</sup> 2s - 1s <sup>2</sup> 4p	2S - 2P <sup>o</sup>	1/2 - 1/2			
		24.28	24.285	239 429	- 4 357 210	1s <sup>2</sup> 2p - 1s <sup>2</sup> 4d	2p <sup>o</sup> - 2D	3/2 - 5/2	F3		
		24.42	24.418	224 366	- 4 319 700	1s <sup>2</sup> 2p - 1s <sup>2</sup> 4s	2p <sup>o</sup> - 2S	1/2 - 1/2	F3		
		30g	30.427	30.427		239 429	- 4 319 700	1s <sup>2</sup> 2p - 1s <sup>2</sup> 4s	2p <sup>o</sup> - 2S	3/2 - 1/2	
				30.427		0	- 3 286 550	1s <sup>2</sup> 2s - 1s <sup>2</sup> 3p	2S - 2P <sup>o</sup>	1/2 - 3/2	F6,B1,G3
20g	30.469	30.469	0	- 3 282 020	1s <sup>2</sup> 2s - 1s <sup>2</sup> 3p	2S - 2P <sup>o</sup>	1/2 - 1/2	F6,B1,G3			
50	32.410	32.416	224 366	- 3 309 260	1s <sup>2</sup> 2p - 1s <sup>2</sup> 3d	2p <sup>o</sup> - 2D	1/2 - 3/2	F6,B1			
90	32.564	32.560	239 429	- 3 310 680	1s <sup>2</sup> 2p - 1s <sup>2</sup> 3d	2p <sup>o</sup> - 2D	3/2 - 5/2	F6,B1			
10	33.384	33.381	224 366	- 3 220 100	1s <sup>2</sup> 2p - 1s <sup>2</sup> 3s	2p <sup>o</sup> - 2S	1/2 - 1/2	B1			
30	33.546	33.549		239 429	- 3 220 100	1s <sup>2</sup> 2p - 1s <sup>2</sup> 3s	2p <sup>o</sup> - 2S	3/2 - 1/2	B1		
		64.140		3 282 020	- [4 841 120]	1s <sup>2</sup> 3p - 1s <sup>2</sup> 5d	2p <sup>o</sup> - 2D	1/2 - 3/2			
10		64.314		3 286 550	- [4 841 420]	1s <sup>2</sup> 3p - 1s <sup>2</sup> 5d	2p <sup>o</sup> - 2D	3/2 - 5/2			
		65.254		3 309 260	- [4 841 730]	1s <sup>2</sup> 3d - 1s <sup>2</sup> 5f	2D - 2F <sup>o</sup>	3/2 - 5/2			
		65.308		3 310 680	- [4 841 880]	1s <sup>2</sup> 3d - 1s <sup>2</sup> 5f	2D - 2F <sup>o</sup>	5/2 - 7/2			
		88.744	88.750	3 220 100	- 4 346 860	1s <sup>2</sup> 3s - 1s <sup>2</sup> 4p	2S - 2P <sup>o</sup>	1/2 - 3/2	B1		
		88.884	88.898	3 220 100	- 4 344 980	1s <sup>2</sup> 3s - 1s <sup>2</sup> 4p	2S - 2P <sup>o</sup>	1/2 - 1/2	B1		
		93.062	93.062	3 282 020	- 4 356 570	1s <sup>2</sup> 3p - 1s <sup>2</sup> 4d	2p <sup>o</sup> - 2D	1/2 - 3/2	B1		
		93.394	93.400	3 286 550	- 4 357 210	1s <sup>2</sup> 3p - 1s <sup>2</sup> 4d	2p <sup>o</sup> - 2D	3/2 - 5/2	B1		
		95.386	95.386	3 309 260	- 4 357 630	1s <sup>2</sup> 3d - 1s <sup>2</sup> 4f	2D - 2F <sup>o</sup>	3/2 - 5/2	B1		
		40	95.488	95.488		3 310 680	- 4 357 930	1s <sup>2</sup> 3d - 1s <sup>2</sup> 4f	2D - 2F <sup>o</sup>	5/2 - 7/2	B1
				96.369		3 282 020	- 4 319 700	1s <sup>2</sup> 3p - 1s <sup>2</sup> 4s	2p <sup>o</sup> - 2S	1/2 - 1/2	
300g		96.791		3 286 550	- 4 319 700	1s <sup>2</sup> 3p - 1s <sup>2</sup> 4s	2p <sup>o</sup> - 2S	3/2 - 1/2			
		398.7		[19 484 500]	- [19 735 300]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	3/2 - 5/2			
		404.0		[19 480 400]	- [19 727 900]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	1/2 - 3/2			
		410.8		[19 484 500]	- [19 727 900]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	3/2 - 3/2			
		415.1		[19 494 400]	- [19 735 300]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	5/2 - 5/2			
		417.66	415.1	[19 480 400]	- [19 721 300]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	1/2 - 1/2			
			417.66	0	- 239 429	1s <sup>2</sup> 2s - 1s <sup>2</sup> 2p	2S - 2P <sup>o</sup>	1/2 - 3/2	W2,S3,D3		
		422.3	422.3	[19 484 500]	- [19 721 300]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	3/2 - 1/2			
			428.3	[19 494 400]	- [19 727 900]	1s(2S)2s2p(3P <sup>o</sup> ) - 1s2p <sup>2</sup>	4P <sup>o</sup> - 4P	5/2 - 3/2			
		300g	445.70	445.70	0	- 224 366	1s <sup>2</sup> 2s - 1s <sup>2</sup> 2p	2S - 2P <sup>o</sup>	1/2 - 1/2	W2,S3,D3	

## S xv

He I isoelectronic sequence

Ground state  $1s^2 \ ^1S_0$ Ionization energy  $26\ 001\ 513 \pm 400\ \text{cm}^{-1}$  ( $3223.78 \pm 0.05\ \text{eV}$ )

The calculated wavelengths for the  $1s^2 \ ^1S_0 - 1s2p \ ^1P_1^o$ ,  $^3P_1^o$  resonance lines near  $5.0\ \text{\AA}$  are probably accurate within about  $0.00010\ \text{\AA}$  [MZM90]; the estimated uncertainties of the experimental values are about  $0.0002\ \text{\AA}$ . The calculated wavelengths for transitions from other upper  $1snl$  levels have estimated uncertainties from one to several units in the last decimal place.

We have included calculated wavelengths for a number of transitions from doubly-excited  $2s2p$  and  $2p^2$  upper levels; these transitions give rise to the most prominent of the S xv "satellite" features near the S xvi resonance doublet at  $4.73\ \text{\AA}$ . Satellite transitions involving still higher S xv  $2nl'$  configurations with  $n \geq 3$  would lie nearer the S xvi doublet and affect its structure and shape as observed in some sources [B7].

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## S xv

Mult. No.	Rel. Int.	Vac. Wavelength ( $\text{\AA}$ )		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	<i>J</i> Values	Ref.
		Observed	Calculated	Lower	Upper				
	10 <i>g</i>		3.8828	0	[25 754 601]	$1s^2 - 1s10p$	$^1S - ^1P^o$	0–1	
	15 <i>g</i>		3.8916	0	[25 696 685]	$1s^2 - 1s9p$	$^1S - ^1P^o$	0–1	
	20 <i>g</i>		3.9039	0	[25 615 718]	$1s^2 - 1s8p$	$^1S - ^1P^o$	0–1	
	25 <i>g</i>		3.9219	0	[25 497 627]	$1s^2 - 1s7p$	$^1S - ^1P^o$	0–1	
	35 <i>g</i>	3.9493	3.9501	0	[25 315 693]	$1s^2 - 1s6p$	$^1S - ^1P^o$	0–1	A2
	50 <i>g</i>	3.9983	3.9978	0	[25 014 007]	$1s^2 - 1s5p$	$^1S - ^1P^o$	0–1	A2
	2 <i>g</i>		3.9988	0	[25 007 798]	$1s^2 - 1s5p$	$^1S - ^3P^o$	0–1	
	100 <i>g</i>	4.0892	4.0885	0	[24 458 842]	$1s^2 - 1s4p$	$^1S - ^1P^o$	0–1	A2
	5 <i>g</i>		4.0906	0	[24 446 570]	$1s^2 - 1s4p$	$^1S - ^3P^o$	0–1	
	400 <i>g</i>	4.2999	4.2991	0	[23 260 416]	$1s^2 - 1s3p$	$^1S - ^1P^o$	0–1	A2, B8
	20 <i>g</i>	4.3055	4.3047	0	[23 230 551]	$1s^2 - 1s3p$	$^1S - ^3P^o$	0–1	B8
			4.7410	[19 846 285]	[40 939 100]	$1s2p - 2p^2$	$^1P^o - ^1S$	1–0	
	8	4.7594	4.7612	[19 745 473]	[40 748 400]	$1s2s - 2s2p$	$^1S - ^1P^o$	0–1	B7
	15	4.7734	4.7705	[19 602 076]	[40 564 200]	$1s2s - 2s2p$	$^3S - ^3P^o$	1–2	B7
			4.7710	[19 737 521]	[40 684 300]	$1s2p - 2p^2$	$^3P^o - ^3P$	1–2	
			4.7742	[19 602 076]	[40 548 200]	$1s2s - 2s2p$	$^3S - ^3P^o$	1–1	
			4.7756	[19 602 076]	[40 541 800]	$1s2s - 2s2p$	$^3S - ^3P^o$	1–0	
			4.7761	[19 734 314]	[40 671 900]	$1s2p - 2p^2$	$^3P^o - ^3P$	0–1	
			4.7768	[19 737 521]	[40 671 900]	$1s2p - 2p^2$	$^3P^o - ^3P$	1–1	
			4.7770	[19 750 573]	[40 684 300]	$1s2p - 2p^2$	$^3P^o - ^3P$	2–2	
			4.7787	[19 737 521]	[40 663 600]	$1s2p - 2p^2$	$^3P^o - ^3P$	1–0	
			4.7798	[19 750 573]	[40 671 900]	$1s2p - 2p^2$	$^3P^o - ^3P$	2–1	
	27	4.7840	4.7849	[19 846 285]	[40 745 200]	$1s2p - 2p^2$	$^1P^o - ^1D$	1–2	B7
			4.7989	[19 846 285]	[40 684 300]	$1s2p - 2p^2$	$^1P^o - ^3P$	1–2	
			4.8071	[19 745 473]	[40 548 200]	$1s2s - 2s2p$	$^1S - ^3P^o$	0–1	



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S xv - Continued

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
1000g g, M2		5.03866	4.8390	[19 846 285]	- [40 511 800]	1s2p-2s <sup>2</sup>	<sup>1</sup> P°- <sup>1</sup> S	1-0	S4, A3
			5.03873	0	- [19 846 285]	1s <sup>2</sup> -1s2p	<sup>1</sup> S- <sup>1</sup> P°	0-1	
		5.06314	0	- [19 750 573]	1s <sup>2</sup> -1s2p	<sup>1</sup> S- <sup>3</sup> P°	0-2		
		5.0667	5.06649	0	- [19 737 521]	1s <sup>2</sup> -1s2p	<sup>1</sup> S- <sup>3</sup> P°	0-1	
50g g, M1		5.0667	5.10150	0	- [19 602 076]	1s <sup>2</sup> -1s2s	<sup>1</sup> S- <sup>3</sup> S	0-1	S4
			20.635	[19 602 076]	- [24 448 199]	1s2s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-2	
			20.642	[19 602 076]	- [24 446 570]	1s2s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-1	
			20.644	[19 602 076]	- [24 446 163]	1s2s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-0	
			21.177	[19 734 314]	- [24 456 527]	1s2p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	0-1	
			21.191	[19 737 521]	- [24 456 527]	1s2p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	1-2	
			21.216	[19 745 473]	- [24 458 842]	1s2s-1s4p	<sup>1</sup> S- <sup>1</sup> P°	0-1	
			21.247	[19 750 573]	- [24 457 176]	1s2p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	2-3	
			21.686	[19 846 285]	- [24 457 576]	1s2p-1s4d	<sup>1</sup> P°- <sup>1</sup> D	1-2	
			27.530	[19 602 076]	- [23 234 429]	1s2s-1s3p	<sup>3</sup> S- <sup>3</sup> P°	1-2	
			27.560	[19 602 076]	- [23 230 551]	1s2s-1s3p	<sup>3</sup> S- <sup>3</sup> P°	1-1	
			27.567	[19 602 076]	- [23 229 571]	1s2s-1s3p	<sup>3</sup> S- <sup>3</sup> P°	1-0	
			28.407	[19 734 314]	- [23 254 611]	1s2p-1s3d	<sup>3</sup> P°- <sup>3</sup> D	0-1	
			28.432	[19 737 521]	- [23 254 645]	1s2p-1s3d	<sup>3</sup> P°- <sup>3</sup> D	1-2	
			28.450	[19 745 473]	- [23 260 416]	1s2s-1s3p	<sup>1</sup> S- <sup>1</sup> P°	0-1	
			28.526	[19 750 573]	- [23 256 165]	1s2p-1s3d	<sup>3</sup> P°- <sup>3</sup> D	2-3	
			28.911	[19 734 314]	- [23 193 163]	1s2p-1s3s	<sup>3</sup> P°- <sup>3</sup> S	0-1	
			28.938	[19 737 521]	- [23 193 163]	1s2p-1s3s	<sup>3</sup> P°- <sup>3</sup> S	1-1	
			29.048	[19 750 573]	- [23 193 163]	1s2p-1s3s	<sup>3</sup> P°- <sup>3</sup> S	2-1	
			29.318	[19 846 285]	- [23 257 195]	1s2p-1s3d	<sup>1</sup> P°- <sup>1</sup> D	1-2	
			29.544	[19 846 285]	- [23 231 087]	1s2p-1s3s	<sup>1</sup> P°- <sup>1</sup> S	1-0	
			48.52	[23 254 611]	- [25 315 445]	1s3d-1s6f	<sup>3</sup> D- <sup>3</sup> F°	1-2	
			48.52	[23 254 645]	- [25 315 445]	1s3d-1s6f	<sup>3</sup> D- <sup>3</sup> F°	2-3	
			48.56	[23 256 165]	- [25 315 445]	1s3d-1s6f	<sup>3</sup> D- <sup>3</sup> F°	3-4	
			48.58	[23 257 195]	- [25 315 445]	1s3d-1s6f	<sup>1</sup> D- <sup>1</sup> F°	2-3	
			56.86	[23 254 611]	- [25 013 562]	1s3d-1s5f	<sup>3</sup> D- <sup>3</sup> F°	1-2	
			56.85	[23 254 645]	- [25 013 562]	1s3d-1s5f	<sup>3</sup> D- <sup>3</sup> F°	2-3	
			56.90	[23 256 165]	- [25 013 562]	1s3d-1s5f	<sup>3</sup> D- <sup>3</sup> F°	3-4	
			56.94	[23 257 195]	- [25 013 562]	1s3d-1s5f	<sup>1</sup> D- <sup>1</sup> F°	2-3	
			79.68	[23 193 163]	- [24 448 199]	1s3s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-2	
			79.78	[23 193 163]	- [24 446 570]	1s3s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-1	
			79.81	[23 193 163]	- [24 446 163]	1s3s-1s4p	<sup>3</sup> S- <sup>3</sup> P°	1-0	
			81.45	[23 231 087]	- [24 458 842]	1s3s-1s4p	<sup>1</sup> S- <sup>1</sup> P°	0-1	
			81.50	[23 229 571]	- [24 456 527]	1s3p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	0-1	
			81.57	[23 230 551]	- [24 456 527]	1s3p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	1-2	
			81.78	[23 234 429]	- [24 457 176]	1s3p-1s4d	<sup>3</sup> P°- <sup>3</sup> D	2-3	
			83.11	[23 254 611]	- [24 457 889]	1s3d-1s4f	<sup>3</sup> D- <sup>3</sup> F°	1-2	
			83.11	[23 254 645]	- [24 457 889]	1s3d-1s4f	<sup>3</sup> D- <sup>3</sup> F°	2-3	
			83.21	[23 256 165]	- [24 457 889]	1s3d-1s4f	<sup>3</sup> D- <sup>3</sup> F°	3-4	
			83.29	[23 257 195]	- [24 457 889]	1s3d-1s4f	<sup>1</sup> D- <sup>1</sup> F°	2-3	
			83.53	[23 260 416]	- [24 457 576]	1s3p-1s4d	<sup>1</sup> P°- <sup>1</sup> D	1-2	
			116.60	[24 457 889]	- [25 315 534]	1s4f-1s6g	F°-G		
			179.91	[24 457 889]	- [25 013 723]	1s4f-1s5g	F°-G		
			331.16	[25 013 562]	- [25 315 534]	1s5f-1s6g	F°-G		
			331.27	[25 013 723]	- [25 315 589]	1s5g-1s6h	G-H°		
			409.49	[19 602 076]	- [19 846 285]	1s2s-1s2p	<sup>3</sup> S- <sup>1</sup> P°	1-1	
		673.43	673.41	[19 602 076]	- [19 750 573]	1s2s-1s2p	<sup>3</sup> S- <sup>3</sup> P°	1-2	D5
			738.31	[19 602 076]	- [19 737 521]	1s2s-1s2p	<sup>3</sup> S- <sup>3</sup> P°	1-1	
		756.44	756.21	[19 602 076]	- [19 734 314]	1s2s-1s2p	<sup>3</sup> S- <sup>3</sup> P°	1-0	D5
			991.95	[19 745 473]	- [19 846 285]	1s2s-1s2p	<sup>1</sup> S- <sup>1</sup> P°	0-1	

## S xvi

H I isoelectronic sequence

Ground state  $1s^2S_{1/2}$ Ionization energy  $28\,182\,526 \pm 4\text{ cm}^{-1}$  ( $3494.1892 \pm 0.0010\text{ eV}$ )

The calculated wavelengths have estimated uncertainties in the range from less than unity to a few units in the last decimal place.

## References

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## S xvi

Mult. No.	Rel. Int.	Vac. Wavelength (Å)		Levels ( $\text{cm}^{-1}$ )		Configurations	Terms	J Values	Ref.
		Observed	Calculated	Lower	Upper				
	20g		3.695797	0	[27 057 763]	1s-5p	$^2S-^2P^{\circ}$	$1/2-3/2$	
	10g		3.696008	0	[27 056 215]	1s-5p	$^2S-^2P^{\circ}$	$1/2-1/2$	
	40g		3.784311	0	[26 424 890]	1s-4p	$^2S-^2P^{\circ}$	$1/2-3/2$	
	20g		3.784744	0	[26 421 866]	1s-4p	$^2S-^2P^{\circ}$	$1/2-1/2$	
	130g		3.990802	0	[25 057 620]	1s-3p	$^2S-^2P^{\circ}$	$1/2-3/2$	
	70g		3.991944	0	[25 050 449]	1s-3p	$^2S-^2P^{\circ}$	$1/2-1/2$	
	1000g	4.7276	4.727351	0	[21 153 494.8]	1s-2p	$^2S-^2P^{\circ}$	$1/2-3/2$	S4,A2
	500g	4.7335	4.732764	0	[21 129 300.4]	1s-2p	$^2S-^2P^{\circ}$	$1/2-1/2$	S4,A2
			16.86779	[21 129 300.4]	[27 057 760]	2p-5d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			16.87019	[21 130 146.8]	[27 057 763]	2s-5p	$^2S-^2P^{\circ}$	$1/2-3/2$	
			16.87459	[21 130 146.8]	[27 056 215]	2s-5p	$^2S-^2P^{\circ}$	$1/2-1/2$	
			16.93543	[21 153 494.8]	[27 058 274]	2p-5d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			18.88366	[21 129 300.4]	[26 424 885]	2p-4d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			18.88666	[21 130 146.8]	[26 424 890]	2s-4p	$^2S-^2P^{\circ}$	$1/2-3/2$	
			18.89745	[21 130 146.8]	[26 421 866]	2s-4p	$^2S-^2P^{\circ}$	$1/2-1/2$	
			18.96672	[21 153 494.8]	[26 425 887]	2p-4d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			25.45626	[21 129 300.4]	[25 057 607]	2p-3d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			25.46166	[21 130 146.8]	[25 057 620]	2s-3p	$^2S-^2P^{\circ}$	$1/2-3/2$	
			25.50824	[21 130 146.8]	[25 050 449]	2s-3p	$^2S-^2P^{\circ}$	$1/2-1/2$	
			25.59845	[21 153 494.8]	[25 059 982]	2p-3d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			49.8179	[25 050 449]	[27 057 760]	3p-5d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			49.8241	[25 050 703]	[27 057 763]	3s-5p	$^2S-^2P^{\circ}$	$1/2-3/2$	
			49.8626	[25 050 703]	[27 056 215]	3s-5p	$^2S-^2P^{\circ}$	$1/2-1/2$	
			49.9834	[25 057 607]	[27 058 273]	3d-5f	$^2D-^2F^{\circ}$	$3/2-5/2$	
			49.9837	[25 057 620]	[27 058 274]	3p-5d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			50.0364	[25 059 982]	[27 058 529]	3d-5f	$^2D-^2F^{\circ}$	$5/2-7/2$	
			72.7571	[25 050 449]	[26 424 885]	3p-4d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			72.7703	[25 050 703]	[26 424 890]	3s-4p	$^2S-^2P^{\circ}$	$1/2-3/2$	
			72.9308	[25 050 703]	[26 421 866]	3s-4p	$^2S-^2P^{\circ}$	$1/2-1/2$	
			73.0846	[25 057 607]	[26 425 885]	3d-4f	$^2D-^2F^{\circ}$	$3/2-5/2$	
			73.0852	[25 057 620]	[26 425 887]	3p-4d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			73.1849	[25 059 982]	[26 426 385]	3d-4f	$^2D-^2F^{\circ}$	$5/2-7/2$	
			157.259	[26 421 866]	[27 057 760]	4p-5d	$^2P^{\circ}-^2D$	$1/2-3/2$	
			157.881	[26 424 885]	[27 058 273]	4d-5f	$^2D-^2F^{\circ}$	$3/2-5/2$	
			157.882	[26 424 890]	[27 058 274]	4p-5d	$^2P^{\circ}-^2D$	$3/2-5/2$	
			158.067	{[26 425 887]	{[27 058 529]	4d-5f	$^2D-^2F^{\circ}$	$5/2-7/2$	
				{[26 425 885]	{[27 058 528]	4f-5g	$^2F^{\circ}-^2G$	$5/2-7/2$	
			158.154	[26 426 385]	[27 058 682]	4f-5g	$^2F^{\circ}-^2G$	$7/2-9/2$	

S XVI - Continued

Mult. No.	Rel. Int.	Air Wavelength (Å)		Vacuum Wavelength (Å)	Levels (cm <sup>-1</sup> )		Configurations	Terms	J Values	Ref.
		Observed	Calculated		Lower	Upper				
		4281.1	4281.8	4283.0	[21 130 146.8]	- [21 153 494.8]	2s-2p	<sup>2</sup> S - <sup>2</sup> P°	1/2 - 3/2	G4
		Wavenumber (cm <sup>-1</sup> )		μm						
		Observed	Calculated							
			846.4	11.815	[21 129 300.4]	- [21 130 146.8]	2p-2s	<sup>2</sup> P° - <sup>2</sup> S	1/2 - 1/2	

## 3. Finding List for S I through S III

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
Vacuum			647.299	1	II	727.689	1	II	840.831	9	II
			647.449	1	II	728.685	35g	III	843.830	8	II
440.765	5	III	647.542	8	II	728.805	3	II	844.048	5	II
475.286	7g,w	III	647.657	8bl	II	729.059	3	II	865.864	4	II
476.351	4g	III	652.391	5g	II	729.519	12	III	866.210	7	II
476.405	7g,w	III	652.741	?g	II	729.783	7	II	867.152	6	II
477.035	4g	III	654.34	1bl	III	730.040	9w	III	867.503	4	II
477.386	5g	III	655.084	6	II	730.758	10g	III	875.415	2g	II
478.257	5g	III	655.220	11	II	732.368	10g	III	875.650	1g	II
480.533	5g,w	III	655.360	5	II	732.448	5	II	877.675	3	II
480.968	6g	III	657.998	4	II	733.021	2	III	881.359	1g	II
481.234	4g	III	660.160	4	II	733.328	9bl	III	894.426	6	II
481.712	1g	III	660.809	2bl	II	734.061	3	III	894.799	7	II
482.463	6g,w	III	660.931	8	II	735.238	11g	III	900.28	1	III
482.953	8g	III	662.267	10g	II	736.250	5w	III	901.677	1	III
484.172	6g	III	664.315	9g	II	738.471	9bl,w	III	902.571	4	III
484.564	7g	III	665.519	8g	II	740.898	8	II	906.885	12g	II
484.874	5g	III	669.105	8	II	741.165	10	II	910.484	11g	II
485.255	7g,w	III	669.435	7	II	742.063	7	II	911.734	5	III
485.818	5g	III	669.580	5	II	742.318	7	II	912.735	10g	II
486.140	1g	III	669.808	8	II	744.580	7	II	915.390	9	II
489.627	6g,w	III	677.734	20g	III	744.838	9	II	918.809	8	II
490.803	2g,w	III	678.458	30g	III	745.996	5	II	919.205	6	II
494.511	7g,w	III	679.115	10g	III	746.072	2	II	928.98	10g,a	I
499.988	7	III	680.681	20g	III	746.176	1	II	929.51	10g,a	I
500.444	10	III	680.929	8g	III	746.256	6	II	930.12	10g,a	I
503.510	7	III	680.961	13g	III	746.214	7	II	931.09	20g,a	I
515.931	8	III	681.470	4g	III	746.657	10g	II	932.08	20g,a	I
536.547	5	III	682.879	4g	III	746.420	11g	II	933.53	20g,a	I
542.984	7	III	683.067	4g	III	745.391	4	II	935.19	25g,a	I
547.147	3	III	683.459	5g	III	745.572	8	II	937.421	9	II
558.755	2g	II	683.586	15	III	745.693	12g	II	937.684	10	II
558.924	2g	II	685.380	8g	III	773.459	8	II	937.96	30g,a	I
559.131	2g	II	687.551	7	II	773.643	4	II	940.1	g,a,B	I
560.713	2g	II	687.776	5	II	774.255	5	II	940.6	g,a,B	I
571.156	3g	II	687.992	4	II	774.445	10	II	941.21	30g,a	I
571.364	4g	II	688.884	4	II	785.023	2	II	944.85	25g,a	I
571.779	5g	II	689.110	3	II	785.302	5	II	945.7	g,a,B	I
573.523	4g	II	690.535	5	II	786.615	7	II	946.3	g,a,B	I
573.627	1g	II	690.760	6	II	786.906	8	II	946.45	30g,a	I
573.813	1g	II	691.029	1	II	788.279	4	II	952.48	30g,a	I
574.397	2g	II	691.366	4	II	788.564	1	II	953.6	g,a,B	I
576.057	1g	II	691.514	7	II	788.989	10	III	954.74	40g,a	I
576.978	1g	II	691.639	5	II	796.675	11bl	III	958.32	30g,a	I
588.958	1	II	691.859	7	II	798.953	5	II	965.32	40g,a	I
589.079	1	II	692.370	7	II	799.155	8	II	967.4	g,a,B	I
593.507	8g	II	694.564	6	II	800.037	5bl	II	969.13	40g,a	I
593.835	10g	II	694.714	7	II	804.005	10	II	990.05	40g,a	I
594.475	11g	II	698.731	11g	III	804.313	3	II	993.93	30g,a	I
597.494	5g	II	699.557	3	II	804.411	8	II	994.6	g,a,B	I
597.760	1g	II	699.609	5	II	808.692	6	II	996.007	8	II
599.834	1g	II	699.782	1	II	808.776	7	II	996.98	40g,a	I
600.661	6bl	II	700.151	15g	III	808.896	4	II	1000.4	20g,a,B	I
602.446	5g	II	700.187	5g	III	820.880	3g	III	1000.485	7	II
603.430	4g	II	700.280	20g	III	822.567	4g	III	1000.804	4	II
616.437	1	II	700.664	1	II	822.854	2g	II	1006.093	2	II
616.560	2	II	702.778	35g	III	824.048	7	II	1006.261	2	II
627.390	1	II	705.187	1	II	824.370	6	II	1012.504	50g	III
629.340	1	II	705.617	9	II	824.828	6	III	1014.119	6	II
640.412	12g	II	706.144	1	II	826.586	6	II	1014.449	10	II
640.902	13g	II	707.869	8	II	826.903	9	II	1015.487	25g	III
641.767	15g	II	708.024	5	II	836.002	2	II	1015.573	12g	III
644.488	1	II	710.951	30	III	836.293	9bl	III	1015.783	25g	III
644.623	1	II	714.199	1g	II	836.328	2	II	1018.80	10g,a	I
645.012	1	II	724.289	10g	III	837.255	4	II	1019.09	15g,a	I
645.920	10	II	725.858	25g	III	840.614	7	II	1019.44	15g,a	I

## Finding List for S I through S III - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
1019.537	9	II	1095.58	20g,a	I	1208.850	5g	I	1279.028	4	II
1019.87	20g,a	I	1096.6	g,a,B	I	1211.212	10g	I	1279.489	2	II
1020.41	20g,a	I	1096.602	6	II	1211.38	g,a	I	1280.0991	500g	I
1021.03	30g,a	I	1097.40	45g,a	I	1212.705	1g	I	1283.350	1	II
1021.112	150g	III	1097.81	45g,a	I	1213.99	g,a	I	1284.962	1	II
1021.254c	g	II	1098.02	30g,a	I	1214.295	1g	I	1288.387	1	II
1021.328	150g	III	1099.14	20g,a,B	I	1214.318	20g	I	1295.6526	1600g	I
1021.539	1g	II	1099.96	40g,a	I	1214.641	3g	I	1296.1738	800g	I
1021.76	30g,a	I	1101.26	20g,a,B	I	1214.98	a	I	1300.9066	80	I
1022.73	40g,a	I	1101.975	4	II	1215.45	a,bl	I	1302.3370	1500g	I
1023.91	50g,a	I	1102.360	7	II	1216.425	5g	I	1302.8633	1000g	I
1025.08	45g,a	I	1103.60	g,a,B	I	1217.025	5g	I	1303.1105	1000g	I
1025.45	40g,a	I	1106.	g,a,BB	I	1217.27	g,a	I	1303.4295	1100g	I
1025.95	50g,a	I	1121.760	4	III	1218.51	g	I	1305.8834	1300g	I
1027.46	25g,a	I	1122.413	7	III	1218.571	2g	I	1308.2	a,B	I
1028.	g,a,B	I	1124.396	5	II	1218.595	35g	I	1309.3	a,w	I
1029.98	35g,a	I	1124.978	8	II	1218.95	a	I	1310.1940	1400g	I
1030.18	50a	I	1126.536	5	III	1219.649	1g	I	1313.2493	600g	I
1030.8	g,a,B	I	1126.879	7	III	1220.162	10g	I	1316.5423	3000g	I
1030.890	5	II	1126.497	5	III	1221.753	15g	I	1316.6183	1800g	I
1031.375	6	II	1131.052	7	II	1222.312	2g	I	1323.5153	3500g	I
1033.95	50g,a	I	1131.658	5	II	1222.799	1g	I	1323.5220	400g	I
1034.10	20g,a	I	1135.37	g,a	I	1224.424	1g	I	1326.6432	3000g	I
1034.38	30g,a	I	1138.35	a	I	1224.479	20g	I	1328.104	10	III
1034.67	40g,a	I	1143.07	a	I	1224.544	20g	I	1328.524	8	III
1035.0	g,a,B	I	1143.66	a	I	1224.99	g,a	I	1328.630	4	III
1037.22	35a	I	1149.99	a	I	1226.706	4	II	1333.792	2g	I
1038.29	30g,a	I	1150.82	a	I	1227.089	6g	I	1340.852	1g	I
1038.59	25g,a	I	1154.27	a	I	1227.408	3	II	1343.222	7	III
1038.92	40g,a	I	1154.689	3	III	1227.692	10g	I	1343.592	4	III
1039.46	50g,a	I	1155.389	6	III	1229.608	35g	I	1350.592	6	III
1040.11	40g,a	I	1156.00	85g,a	I	1230.374	2g	I	1351.089	2	III
1040.59	50g,a	I	1156.26	75g,a	I	1230.473	6g	I	1353.790	3	III
1041.6	g,a,B	I	1157.403	10	I	1233.132	1g	I	1356.97	a	I
1043.75	35g,a	I	1161.34	90g,a	I	1233.440	4	II	1361.3040	30	I
1044.88	45g,a	I	1161.57	70g,a	I	1233.922	5g	I	1363.011	3bl	II
1045.75	35g,a	I	1161.72	75g,a	I	1234.157	6	II	1363.0330	60	I
1048.83	40g,a	I	1161.97	a	I	1235.624	20g	I	1363.384	6	II
1049.773	5	II	1162.132	3w	III	1236.261	2	II	1363.902	2	II
1049.82	g,a,w	I	1162.404	6	III	1236.632	7g	I	1373.156	6	III
1050.283	6	II	1163.209	5	III	1238.056	1	II	1381.5521	25000g	I
1050.32	55g,a,w	I	1163.98	60g,a	I	1238.340	10g	I	1385.041	1	I
1050.55	50g,a	I	1166.150	6	III	1238.648	2	II	1385.5100	20000g	I
1051.5	g,a,B	I	1166.526	4	III	1238.999	1	II	1388.4347	45000g	I
1053.222	2	II	1167.30	90g,a,B	I	1239.33	g,a	I	1389.1538	15000g	I
1054.17	g,a,w	I	1168.03	60g,a	I	1241.905	200g	I	1390.726	5	III
1054.81	g,a	I	1170.56	90g,a,B	I	1242.03	g,a	I	1392.5878	25000g	I
1054.93	40g,a	I	1172.51	60g,a,B	I	1247.1600	400g	I	1396.1122	50000g	I
1055.03	40g,a	I	1172.877	1	II	1248.0451	120g	I	1396.556	1w	III
1055.891	1	II	1175.1	g,a,B	I	1250.578	13g	II	1401.5136	1500g	I
1056.91	50g,a,w	I	1176.0	g,a,B	I	1250.8138	50g	I	1402.053	3	III
1059.15	4g,a	I	1179.30	a	I	1253.297	40g	I	1402.473	3	III
1059.53	6g,a	I	1181.59	a	I	1253.3250	300g	I	1408.339	1	III
1061.8	g,a,B	I	1190.206	100g	III	1253.805	15g	II	1408.459	2w	III
1063.33	45g,a	I	1194.061	150g	III	1256.0930	120g	I	1409.3369	2000g	I
1063.60	55g,a	I	1194.457	100g	III	1259.518	10g	II	1412.8726	1500g	I
1064.01	35g,a	I	1195.	g,a,B	I	1262.8596	800g	I	1414.368	1g	I
1065.60	20g,a	I	1200.970	250g	III	1269.2086	500g	I	1415.569	2	III
1065.82	40g,a	I	1201.730	100g	III	1270.270	2	II	1425.0301	8000g	I
1068.08	20g,a	I	1202.120	30g	III	1270.7821	1500g	I	1425.1882	1200g	I
1070.33	40g,a	I	1203.861	4	II	1271.555	1	II	1425.2190	700g	I
1070.5	g,a,B	I	1204.290	12bl	II	1272.0749	200g	I	1433.2800	5000g	I
1077.145	150	III	1204.335	12bl	II	1276.132	3	II	1433.3105	1500g	I
1092.67	70g,a	I	1204.735	4	II	1277.1985	300g	I	1436.9675	2000g	I
1093.05	60g,a	I	1205.565	1g	I	1277.2122	1200g	I	1439.8165	1	I
1094.32	80g,a,B	I	1207.015	3g	I	1277.450	1	II	1444.2967	200g	I

## Finding List for S I through S III - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
1446.481	1	II	1761.277	1	II	Air			2173.004	7	II
1448.2290	2000	I	1764.085	1	II				2176.550	1	II
1471.8320	150	I	1770.121	1	II	2000.514	8	II	2177.233	10	III
1472.5030	8	I	1770.363	1	II	2001.570	6	II	2177.808	4	II
1472.9720	5000g	I	1771.081	1	II	2001.985	10	II	2178.069	8	II
1473.0185	1800g	I	1773.043	1	II	2002.278	9	II	2180.360	4	II
1473.9948	10000g	I	1773.534	1	II	2003.540	7	II	2185.932	5	II
1474.3800	2000g	I	1778.546	1	II	2004.956	1	II	2187.264	11	II
1474.5715	600g	I	1779.245	6	II	2006.367	6	II	2188.513	10	II
1481.6650	3000g	I	1782.2626	500	I	2006.754	8	II	2190.593	9	II
1481.7125	1500g	I	1783.415	1	II	2007.758	5	II	2192.372	9bl	II
1483.0390	7000g	I	1783.580	1	II	2008.375	6	II	2197.167	1	II
1483.2330	2000g	I	1785.861	1	II	2012.401	4	II	2198.090	7	II
1485.6224	2500g	I	1788.787	1	II	2014.658	1	II	2200.267	9	III
1487.1500	4000g	I	1791.607	4	II	2031.710	1	II	2203.773	1	II
1498.850	8	I	1792.513	1	II	2046.942	2	II	2205.627	5	II
1498.942	2	I	1794.604	1	II	2057.764	1	II	2213.800	5	II
1511.037	1	II	1795.319	1	II	2059.854	1	III	2236.766	14	II
1511.216	1	II	1795.967	10	II	2072.030	10	III	2261.631	2	II
1513.892	1	II	1797.837	1	II	2073.184	1	II	2268.866	3	II
1519.912	3	II	1803.897	2w	III	2084.833	11	III	2273.873	1	II
1535.188	1	II	1805.347	1	II	2089.115	19	III	2277.858	1	II
1536.939	1	II	1807.3108	20000g	I	2092.701	1	II	2278.209	7	II
1539.499	1	II	1812.073	1	II	2097.318	19	III	2279.516	5	II
1540.749	1	II	1812.361	1	II	2097.826	14bl,w	III	2280.448	7	II
1540.891	2	II	1820.3426	17500g	I	2109.967	1	II	2281.997	1	II
1541.504	1	II	1822.543	7	II	2111.616	1	II	2283.646	7	III
1546.662	1	II	1822.705	1	II	2113.933	1	II	2284.537	3	II
1547.906	1	II	1824.022	1	II	2116.910	2	II	2297.343	1	II
1550.140	2	II	1826.2451	15000g	I	2118.614	5	II	2299.377	1	II
1577.434	9	III	1828.511	7	II	2119.072	1	II	2301.830	2	II
1583.683	1	I	1829.535	9	II	2119.987	3	II	2302.830	1	II
1592.736	4	I	1831.378	1	II	2122.146	1	II	2304.541	1	II
1600.766	1	II	1834.691	8	II	2122.546	9	II	2306.173	1	II
1633.700	1w	III	1864.324	1	II	2123.342	9	II	2319.048	1	II
1641.085	15	I	1880.134	1	II	2124.345	4	II	2320.155	1	II
1641.296	40	I	1882.647	1	II	2124.618	5bl	II	2332.493	10	II
1645.939	1	II	1900.2863	20000g	I	2125.972	4bl	II	2334.037	5	II
1652.483	1	II	1901.871	3	II	2126.030	4bl	II	2334.746	6	II
1657.828	1w	II	1914.6982	10000g	I	2127.440	2	II	2336.270	12	II
1658.183	1bl	II	1930.819	6bl	II	2128.146	1	II	2357.751	10	II
1659.777	5	II	1936.731	10	II	2129.545	1	II	2359.186	8	III
1661.361	1	II	1944.379	1	II	2133.318	1	II	2361.151	9	II
1664.488	4	II	1950.378	10	II	2136.443	4	II	2362.727	7	II
1666.6875	17500	I	1951.379	1	II	2137.799	1	II	2374.363	1	II
1667.089	3	II	1952.766	1	II	2142.266	4	II	2384.435	1bl	II
1687.5305	15000	I	1955.359	1	II	2142.822	2	II	2405.562	6w	III
1704.986	10	I	1957.989	1	II	2142.915	1	II	2416.050	4	II
1705.115	2	I	1958.239	9	II	2143.336	8	II	2417.930	2	II
1706.360	40	I	1959.094	1	II	2144.054	3	II	2419.632	1	II
1707.132	25	I	1964.399	1	II	2146.072	2	II	2422.897	10	III
1712.736	1	II	1967.687	7	II	2146.569	5	II	2442.581	2w	III
1713.117	2g,w	III	1970.878	11	II	2148.326	5	II	2447.478	3	II
1713.552	3	II	1976.535	8	II	2148.707	3	II	2452.876	1	II
1715.958	1	II	1977.739	1	II	2149.759	1	II	2456.240	3	II
1728.939	4g	III	1981.662	10	II	2152.228	4	II	2458.592	3	II
1751.188	1	II	1983.643	8	II	2159.158	7	II	2460.496	7	III
1752.117	1	II	1985.025	9	II	2160.697	8	II	2462.183	1	II
1753.380	4	II	1991.9369	25	I	2162.111	3	II	2475.417	5	II
1753.758	1	II	1993.231	10	II	2162.352	1	II	2476.334	1	II
1754.331	8	II	1993.847	1	II	2165.275	3	II	2476.725	1	II
1755.193	1w	II	1995.960	1	II	2165.540	7	II	2484.721	1	II
1755.680	1	II	1996.765	8	II	2168.8851	10	I	2487.966	4	II
1757.151	1	II	1997.518	13	II	2169.718	2	II	2489.019	1	II
1759.120	1	II	1998.765	9	II	2170.506	1	II	2489.566	10	III
1760.588	1	II				2171.155	3	II	2490.488	10	III

## Finding List for S I through S III - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
2496.239	15	III	2670.070	8	II	2871.971	13	III	3369.489	10	III
2499.030	12	III	2670.615	6	II	2877.120	5	II	3370.373	10	III
2503.934	2	II	2673.245	1	II	2880.493	8	II	3371.052	12	II
2505.348	8	II	2673.739	1	II	2881.031	14	III	3371.875	17	II
2508.097	12	III	2675.221	7	II	2886.127	4	II	3372.469	15	II
2509.030	7	II	2679.029	4	II	2896.711	9	III	3385.794	17	II
2509.975	3	II	2679.996	4	II	2904.266	9	III	3387.129	11	III
2516.574	1	II	2680.549	8	III	2909.506	11	III	3387.330	15	II
2518.201	2bl	II	2681.091	2	II	2910.823	12	III	3395.861	14	II
2518.404	7	II	2684.305	4w	III	2922.798	5	II	3413.704	12	II
2519.500	3	II	2686.598	2	II	2925.319	10	III	3464.626	11	II
2534.982	1	II	2688.208	5	II	2926.125	16	III	3497.285	17	III
2541.060	1	II	2688.413	6	II	2931.144	6	II	3499.180	10	III
2544.949	3bl	II	2691.713	10	III	2934.535	13	III	3525.779	9	II
2554.701	5	II	2696.444	2	II	2946.343	1	III	3531.852	14w	II
2555.472	6	III	2702.816	8	III	2948.327	12	III	3546.696	7	II
2559.470	1	II	2709.076	3	III	2950.218	14	III	3549.693	12	III
2564.171	4	III	2709.655	4	II	2952.901	14	III	3567.157	17	II
2564.893	6bl	II	2713.116	5w	II	2957.861	9	II	3584.157	15	II
2574.691	5	II	2713.334	3w	III	2961.823	11	III	3594.439	17	II
2578.820	5	II	2714.302	4bl	II	2964.794	15	III	3595.977	19	II
2581.011	7	II	2716.215	5	II	2976.108	6	II	3596.578	8	II
2584.206	8	II	2717.757	3	II	2985.986	10	III	3600.056	14	II
2585.211	8	II	2718.882	9	III	2997.895	1	III	3613.030	16	II
2587.055	7	II	2719.760	4	II	2998.253	15	II	3616.911	18	II
2587.724	1	II	2721.444	7	III	3004.983	7	II	3622.672	10	III
2588.898	3	II	2724.969	5	II	3008.937	1	III	3625.889	15	II
2589.220	1	II	2726.852	10	III	3015.682	6	II	3631.972	15	III
2593.804	4	III	2727.437	4w	II	3029.982	6	II	3633.358	7	II
2595.606	9	II	2729.817	2	II	3049.246	7	II	3643.452	8	II
2598.240	1	II	2730.290	6	II	3052.500	6w	II	3643.750	8	II
2602.177	1	II	2731.103	11	III	3059.099	9	II	3652.218	12	II
2606.192	4	II	2737.243	4	II	3060.824	11	II	3654.497	17	II
2607.918	2bl,w	III	2740.151	2	II	3066.843	13	II	3656.572	11	III
2608.883	1	II	2741.027	6	III	3074.250	10	II	3661.946	13	III
2609.870	1	II	2745.017	2	II	3076.151	16	II	3663.458	14	II
2612.664	5	II	2748.904	4	II	3081.920	12	II	3669.035	21	II
2613.833	5	II	2750.549	6	II	3090.595	13	II	3669.719	9	II
2618.080	4w	II	2751.995	3	II	3113.304	5	II	3672.122	18	II
2622.382	1w	III	2752.543	4	II	3135.910	1	III	3672.779	13	II
2624.153	1	II	2756.878	12	III	3147.499	17	II	3677.169	10	II
2624.804	2	II	2761.353	4	II	3185.185	5bl	III	3678.130	17w	II
2625.056	8w	II	2763.293	2	II	3214.831	8	II	3680.463	11	II
2628.261	4	III	2766.730	3	II	3231.069	3	III	3688.089	13	II
2629.110	5	II	2771.447	4	II	3233.181	3	III	3688.799	11	II
2629.751	5	II	2774.266	2	II	3233.987	3	III	3696.239	16	II
2634.727	7	II	2775.258	8	III	3247.561	6	III	3708.607	8	II
2636.247	9	II	2781.546	2	II	3253.488	14	II	3709.325	14	III
2636.872	5bl,w	III	2782.258	2	II	3255.367	3	III	3710.405	10	III
2638.160	4	II	2785.470	11	III	3257.868	12	II	3716.799	10	II
2639.086	7	II	2787.721	4	II	3261.562	10	II	3717.722	17	III
2641.675	3	II	2788.015	4	II	3272.220	16	II	3721.60	M1	III
2642.730	1	II	2797.365	4	III	3272.817	11	II	3730.636	15w	II
2643.015	1	III	2799.538	2	II	3284.785	13	II	3735.401	10bl	II
2647.642	5	II	2801.080	5	II	3288.304	10	II	3736.417	10	II
2648.700	4	II	2802.210	6	II	3302.411	10	II	3738.197	12	II
2656.790	2	II	2817.577	11	II	3314.469	18	II	3741.157	14	II
2659.180	12	III	2818.296	8	III	3317.827	8	II	3747.845	13	III
2660.230	2	II	2819.962	4	II	3323.990	10	III	3748.696	14	II
2662.793	1	II	2822.061	9	III	3324.863	12	III	3750.697	12	III
2665.408	10	III	2825.933	13	III	3329.330	14	II	3751.850	1bl,w	III
2665.409	1bl	II	2830.618	8	III	3341.855	16	II	3774.500	10	III
2668.218	4	II	2847.364	9	II	3347.412	16	II	3776.775	10	II
2668.621	4	II	2847.696	9	III	3347.980	8w	II	3778.808	13	III
2669.503	4	II	2856.003	17	III	3367.158	10	III	3780.611	12	II
2669.812	3	II	2863.511	11	III	3368.073	19	II	3782.556	10	II

## Finding List for S I through S III - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
3783.133	18	II	4068.60	M1	II	4464.430	19	II	4925.347	19	II
3792.446	10	II	4076.35	M1	II	4467.716	9	III	4939.045	6	II
3794.650	13	III	4087.791	4	III	4478.419	6	III	4942.466	16	II
3802.608	14	II	4091.170	10	III	4482.484	13	II	4952.191	9	II
3809.637	15	II	4099.143	9	III	4483.429	19	II	4991.974	20	II
3811.740	14	II	4125.291	5	III	4485.445	12	II	4993.497	17	II
3819.863	10bl	II	4142.256	21	II	4486.636	16	II	5006.727	15	II
3830.925	13	II	4145.067	22	II	4492.269	11	II	5009.564	21	II
3831.383	17	II	4146.910	17	II	4495.847	9	II	5011.608	16	II
3831.819	14	III	4150.37	1	I	4497.852	14	II	5014.069	21	II
3837.709	13	III	4152.604	50	I	4499.223	6	III	5027.221	20	II
3838.281	16	III	4153.064	23	II	4508.711	10	II	5032.447	23	II
3839.158	13	II	4157.699	25	I	4509.180	11	II	5039.382	13	II
3842.854	13	II	4162.306	15	II	4518.9	1	II	5046.742	6	II
3845.208	11	II	4162.665	24	II	4524.718	19bl	II	5047.292	18	II
3850.906	17	II	4165.100	14	II	4524.947	21	II	5073.090	7	II
3853.076	16	II	4168.370	18	II	4527.875	6	III	5093.989	4	II
3859.230	12	II	4174.002	19	II	4533.349	10	II	5103.340	19	II
3860.114	15	II	4174.265	21	II	4549.572	17	II	5126.130	13	II
3860.608	18	II	4180.7	1	II	4552.406	18	II	5142.341	18	II
3860.608	13	III	4185.917	14	II	4561.881	15	II	5160.084	13	III
3862.332	9	II	4189.676	18	II	4589.2606	10M1	I	5198.844	11	II
3892.293	18	II	4193.493	15	II	4590.769	8	II	5201.024	20	II
3899.032	4bl,w	III	4213.517	9	II	4591.123	15	II	5201.387	15	II
3899.247	10	III	4217.179	17	II	4595.082	6	II	5212.623	21	II
3901.993	8bl	II	4217.293	13	II	4613.440	9bl	III	5219.322	13	III
3906.951	15	II	4230.952	17	II	4624.116	15	II	5278.10	1	I
3911.310	13	II	4249.873	10	II	4625.28		I	5278.70	2	I
3918.183	10	II	4253.473	19	III	4626.06		I	5278.99	3	I
3920.292	5	III	4255.01	3	II	4629.27		I	5320.732	24	II
3922.618	10	II	4257.379	17	II	4629.80		I	5322.205	7	II
3923.460	20	II	4259.146	16	II	4630.05		I	5345.721	22	II
3924.053	11	II	4267.759	21	II	4631.72		I	5362.703	10	II
3928.537	14	III	4269.724	18	II	4648.170	15	II	5369.618	1w	III
3931.512	13	II	4278.500	18	II	4650.777	19	II	5372.58	1	I
3931.918	17	II	4282.595	18	II	4668.583	17	II	5375.83	1	I
3932.286	17	II	4284.885	17	III	4677.615	9	III	5381.02	2	I
3933.267	21	II	4291.432	14	II	4681.294	13	II	5400.712	15	II
3935.698	10	II	4294.398	22	II	4694.13	10	I	5428.667	23	II
3939.478	11	II	4318.645	18	II	4695.45	8	I	5432.815	25	II
3946.952	14	II	4332.644	15	III	4696.25	6	I	5444.41	1	I
3950.398	11	II	4333.828	13	II	4700.224	14	II	5449.82	1	I
3961.516	12	III	4340.230	14	III	4716.267	20	II	5453.828	27	II
3962.00	1	I	4342.808	11	II	4729.444	14	II	5473.620	23	II
3962.49	1	I	4354.516	14	III	4742.389	12	II	5475.011	11	II
3963.107	16	II	4356.866	11	II	4753.981	8	II	5478.194	10	II
3970.209	9	II	4361.476	16	III	4755.091	16	II	5479.310	6	II
3970.672	14	II	4362.564	8	II	4763.370	14	II	5498.18	2	I
3979.829	17	II	4364.682	12	III	4764.451	10bl	II	5501.54	3	I
3983.722	14	III	4367.063	11	II	4779.094	16	II	5507.01	4	I
3985.921	12	III	4369.927	13	II	4785.935	10	II	5509.718	23	II
3990.913	17	II	4378.541	13	II	4792.012	17	II	5518.732	11	II
3991.530	9	II	4383.533	9	II	4804.120	12	II	5520.400	12	II
3992.156	9	II	4391.818	16	II	4815.549	22	II	5526.253	18	II
3993.502	19	II	4402.841	13	II	4819.575	15w	II	5536.723	10	II
3997.924	10	III	4404.730	12	II	4824.066	16	II	5556.007	18	II
3998.757	18	II	4411.313	14	II	4826.772	13	II	5559.060	10bl	II
4003.874	17	II	4415.37	1	II	4835.848	14	II	5564.976	21	II
4007.773	12	II	4418.782	10	III	4848.976	8	II	5578.889	18	II
4009.361	12	II	4431.007	15	II	4883.672	10	II	5605.24	1	I
4028.750	21	II	4432.372	18	II	4885.648	17	II	5606.151	23	II
4032.779	19	II	4437.655	11	II	4900.513	15	II	5608.69	1	I
4034.01	2	I	4439.826	12	III	4901.265	14	II	5614.39	1	I
4050.075	15	II	4450.712	11	II	4902.440	16	II	5616.639	18	II
4058.681	9	II	4456.388	17	II	4917.212	19	II	5639.972	23	II
4064.404	14	II	4463.579	20	II	4924.115	18	II	5640.333	21	II



## Finding List for S I through S III - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
5643.757	6	II	6536.67	2	I	7923.90	15	I	9237.538	810	I
5645.672	15	II	6537.96	2	I	7927.98	1	I	9372.351	6w	II
5647.033	21	II	6538.57	6	I	7928.656	10	II	9413.46	200	I
5648.354	12	II	6565.054	7	II	7928.82	6	I	9418.735	8	II
5659.985	21	II	6635.089	5w	II	7930.28	8	I	9421.93	200	I
5664.780	20	II	6641.06	3	II	7931.66	10	I	9437.11	200	I
5696.63	2	I	6681.834	12	II	7954.268	9	II	9437.60	50	I
5700.24	4	I	6715.768	6	II	7967.371	17	II	9438.357	9	II
5706.11	6	I	6716.440	E2	II	8007.044	7w	II	9441.880	9	II
5730.531	10	II	6729.438	8	II	8012.113	6	II	9445.03	50	I
5797.504	6	II	6730.815	E2,M1	II	8123.00	4	I	9455.43	100	I
5819.272	19	II	6732.815	6	II	8125.45	3	I	9477.86	70	I
5879.63	1	I	6743.58	6	I	8131.28	5	I	9479.83	20	I
5883.49	1	I	6748.79	8	I	8133.01	2	I	9499.16	25	I
5889.75	2	I	6757.16	10	I	8135.44	4	I	9501.21	20	I
5890.935	4	II	6776.715	10	II	8136.17	3	I	9505.497	8	II
5895.910	4	II	6848.209	7	II	8147.81	5	I	9521.134	9	II
5908.312	11	II	6854.642	8	II	8148.41	5	I	9527.581	10w	II
5912.788	6	II	6879.732	6	II	8149.446	7	II	9530.6c	M1	III
5927.277	4	II	6884.560	7	II	8150.75	2	I	9532.081	6w	II
5932.962	4	II	6957.934	9	II	8153.49	1	I	9536.637	7	II
5940.732	9	II	6962.031	5	II	8155.09	1	I	9563.977	8	II
5951.522	12	II	6981.398	15	II	8155.93	1	I	9633.130	80	I
5959.11	1	I	6992.79	3	I	8163.24	1	I	9649.568	120	I
5961.19	1	I	6993.99	1	I	8169.638	6	II	9672.283	30	I
5996.161	21bl	II	6994.58	4	I	8258.254	13	II	9672.531	25	I
6041.93	3	I	7124.279	9	II	8314.594	18	II	9677.50	1	I
6046.04	5	I	7139.807	12	II	8422.300	10	II	9678.92	1	I
6052.66	10	I	7161.43	4	I	8449.56	5	I	9680.561	35	I
6080.838	5	II	7164.491	10	II	8451.34	2	I	9680.809	50	I
6092.122	9	II	7165.53	1	I	8452.16	5	I	9686.11	2	I
6097.123	6	II	7166.64	2	I	8515.475	8bl	II	9691.604	15	I
6102.277	18	II	7167.76	2	I	8617.15	15	I	9693.686	25	I
6123.383	6	II	7237.007	8	II	8626.63	2	I	9697.408	12	I
6138.940	12	II	7242.44	1	I	8633.23	4	I	9737.457	10	I
6161.84	3	II	7243.05	3	I	8648.52	1	I	9737.707	8	I
6172.77	3	I	7243.74	1	I	8655.19	2	I	9739.609	10	I
6173.61	7	I	7244.75	6	I	8668.49	3	I	9739.869	12	I
6174.97	3	I	7257.107	9	II	8670.22	1	I	9741.961	11	I
6175.82	7	I	7273.20	3	II	8670.65	3	I	9909.699	5	I
6274.306	12	II	7317.155	7	II	8671.36	2	I	9911.85	2	I
6286.351	26	II	7337.660	8	II	8679.00	1	I	9912.156	3	I
6286.956	33	II	7409.46	1	I	8679.65	3	I	9923.60	1	I
6290.865	9	II	7414.35	1	I	8680.46	8	I	9932.359	4	I
6295.207	8	II	7423.68	1	I	8693.24	1	I	9949.830	5	I
6305.483	33	II	7424.14	2	I	8694.00	3	I	9958.859	5	I
6312.06	E2	III	7443.35	5	I	8694.71	10	I	9962.989	3	I
6312.661	29	II	7444.609	6	II	8825.57	1	I	9971.591	2	I
6369.342	17	II	7446.97	1	I	8826.54	1	I	9971.71	1	I
6384.893	27	II	7447.65	1	I	8832.48	1	I	9980.54	1	I
6386.48	6	II	7449.02	2	I	8833.47	1	I	9996.736	2	I
6395.17	2	I	7450.25	3	I	8846.29	1	I			
6395.264	12	II	7509.066	7	II	8847.28	3	I			
6396.08	1	I	7578.909	19	II	8874.53	9	I			
6396.64	3	I	7585.70	1	I	8879.62	1	I			
6397.359	29	II	7590.84	1w	I	8880.70	3	I			
6397.990	27	II	7600.81	2	I	8882.47	5	I			
6403.58	1	I	7629.740	17	II	8884.23	7	I	9978.816	4	I
6408.13	2	I	7679.61	6	I	9035.92	6	I	9967.098	1	I
6413.706	26	II	7686.11	8	I	9036.32	4	I	9966.433	1	I
6415.50	3	I	7696.72	10	I	9036.73	2	I	9965.429	2	I
6418.882	9	III	7725.0461	26E2	I	9038.72	3	I	9965.210	2	I
6455.390	13	II	7890.49	1	I	9039.27	3	I	9963.234	2	I
6521.428	6	II	7891.03	1	I	9068.6c	M1	III	9962.940	1	I
6535.61	2	I	7901.46	1	I	9212.865	1500	I	9718.60c	M1,E2	II
6536.41	4	I	7902.07	2	I	9228.092	1050	I	9686.81c	E2	II
									9671.89c	E2,M1	II
									9640.10c	E2	II

## Finding List for S I through S III - Continued

Wavenumber (cm <sup>-1</sup> )	Int.	Spectrum	Wavenumber (cm <sup>-1</sup> )	Int.	Spectrum	Wavenumber (cm <sup>-1</sup> )	Int.	Spectrum	Wavenumber (cm <sup>-1</sup> )	Int.	Spectrum
9561.769	1850	I	8612.854	4	I	6024.922	6	I	4349.063		I
9560.575	310	I	8577.431	10	I	6023.453	3	I	4107.002	4	I
9558.153	1300	I	8506.955	10	I	5281.378	635	I	4104.959	3	I
9402.037	210	I	8548.46	2	I	5277.223	335	I	4103.413	11	I
9238.608	100M1	I	8029.234	10	I	5275.685	55	I	4102.360	4	I
9125.54	9	I	7987.659	4	I	5273.58	80bl	I	4094.589	21	I
8979.51	13bl	I	7985.938	6	I	5273.23		I	4077.843	7	I
8977.932	18	I	7682.69	5	I	5272.070	5	I	4032.621	3	I
8970.146	25	I	7493.367	8	I	4441.733	115	I	3973.992	2	I
8936.263	16	I	7489.747	6	I	4439.462	185	I	3817.928	5	I
8925.184	5	I	7256.724	12	I	4438.093	115	I	3772.687	6	I
8914.438	28	I	7245.648	160	I	4432.866	280	I	3771.945	9	I
8842.554c	M1	I	7227.740	240	I	4430.655	225	I	3770.689	13	I
8839.94	1	I	7134.532	1	I	4428.386	75	I	3218.174	23	I
8838.50	1	I	7130.911	30	I	4414.958	135	I	3212.137	18	I
8813.45	2	I	6491.708	75	I	4412.746	25	I	3208.470	11	I
8811.907	24	I	6490.147	130	I	4402.584	1250	I	2920.251	2	I
8777.134	265	I	6482.365	210	I	4385.725	70	I	2918.192	6	I
8770.689	30	I	6462.436	95	I	4379.122	5	I	2917.143	12	I
8769.296	85	I	6460.014	35	I	4370.271	1	I	534.39	M1	III
8767.004	150	I	6458.816	145	I	4368.06	26bl	I	396.12	M1	I
8764.766	165	I	6043.325	25	I	4367.817		I	298.69	M1	III
8737.50	4	I	6030.943	4	I	4359.61	2	I	177.585c	M1	I
8675.657	6	I	6027.128	6	I	4355.60	2	I	46.71c	M1	II
8617.017	13	I	6025.734	4	I	4349.43	5bl	I	31.79c	M1	II

4. Finding List for S iv through S xvi

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
Vacuum			[20.644]		xv	32.801	10g,bl	xii	42.543	70g	x
			[21.177]		xv	33.260	10	xiii	42.676	30g	x
[3.695797]	20g	xvi	[21.191]		xv	33.384	10	xiv	42.712	30g	x
[3.696008]	10g	xvi	[21.216]		xv	33.546	30	xiv	42.751	30	xi
[3.784311]	40g	xvi	[21.247]		xv	33.806	40	xiii	42.831	10bl	x
[3.784744]	20g	xvi	21.660c		xiv	33.852	60	xiii	42.865	10bl	xi
[3.8828]	10g	xv	[21.686]		xv	33.951	90	xiii	42.916	30	x
[3.8916]	15g	xv	21.730c		xiv	34.132	10g,bl	xii	42.937		x
[3.9039]	20g	xv	21.748c		xiv	34.132	10bl	xiii	43.002	50bl	x
[3.9219]	25g	xv	21.819c		xiv	34.310	20g,bl	x	43.123	60g	xi
[3.9501]	35g	xv	22.98	30g	xiv	34.533	20g	xii	43.263	50	x
[3.990802]	130g	xvi	23.24	10	xiii	34.586	30g	xii	43.330	50g,bl	xi
[3.991944]	70g	xvi	23.72	10g	xii	34.632	20bl	xiii	43.550	30	x
[3.9978]	50g	xv	24.28	20	xiv	34.689	20	xiii	43.786	100	x
[3.9988]	2g	xv	24.42	30	xiv	34.748	20	xiii	43.852	30bl	x
[4.0885]	100g	xv	24.42	30g,bl	xii	34.798	10	xiii	43.900	40	xi
[4.0906]	5g	xv	24.42	30bl	xiii	34.872	10	xiii	43.998	10	xi
[4.2991]	400g	xv	24.508c		xiv	35.203	30g	xii	44.094	40	x
[4.3047]	20g	xv	24.59	40g	xiii	35.275	30g	xii	44.237	20	x
4.3581	14g	xiv	[25.45626]		xvi	35.614	30	xiii	44.413	30	x
4.3761	17	xiv	[25.46166]		xvi	35.667	50	xiii	44.734	30	xi
4.3826	29g	xiv	[25.50824]		xvi	35.735	30	xiii	45.161	20	x
4.3886	91	xiv	25.57	20g	xii	35.955	40	xii	45.205	20	xi
4.3961	10	xiv	[25.59845]		xvi	36.124	30	xii	45.292	50g	viii
4.4003	10	xiv	25.65	30g	xii	36.253	40bl	xii	45.406	10	x
4.4133	6	xiv	25.76	40	xiii	36.335	40bl	xii	45.997	50	x
[4.727351]	1000g	xvi	25.83	30	xiii	36.398	80g	xii	46.136	50g	ix
[4.732764]	500g	xvi	26.24	10	xiii	36.559	50	xiii	46.212	10g	vii
[4.7410]		xv	26.34	20	xiii	36.563	20g	xii	46.298	50	x
[4.7612]	8	xv	26.36	30	xiii	36.659	20	xi	46.373	250g	ix
[4.7705]		xv	26.71	10	xiii	36.733	10	xi	46.413	150g	ix
[4.7740]		xv	26.89	10g	xii	37.463	10	xii	46.430	20	x
[4.7742]		xv	26.99	30	xiii	37.603	60	xii	46.549	150g	ix
[4.7756]	15	xv	[27.530]		xv	37.714	40	xii	46.585	250g	ix
[4.7761]		xv	[27.560]		xv	37.773	30g	xi	46.624	150g	ix
[4.7768]		xv	[27.567]		xv	38.320	40	xii	46.760	50g	ix
[4.7770]		xv	27.89	30	xii	38.433	20g	xi	46.799	100g	ix
[4.7787]		xv	28.18	20	xii	38.528	10g	xi	46.843	100g	ix
[4.7798]		xv	28.22	30g	xii	38.824	10	xii	46.906	50	ix
[4.7849]	27	xv	28.33	50g	xii	38.882	50bl	xii	47.047	250g	ix
[4.7989]		xv	[28.407]		xv	38.882	250g	ix	47.098	50g	vii
[4.8071]		xv	[28.432]		xv	38.921	20	xii	47.188	200g	ix
[4.8390]		xv	[28.450]		xv	38.966	250g	ix	47.249	300g	ix
[5.03873]	1000g	xv	[28.526]		xv	38.966	50bl	xi	47.307	50g	vii
5.0472		xiv	[28.911]		xv	39.049	50bl	xi	47.360	50g	ix
5.0569		xiv	[28.938]		xv	39.110	50g	xi	47.433	450g	ix
5.0611		xiv	[29.048]		xv	39.240	60g,bl	xi	47.518	250	ix
[5.06314]	g, M2	xv	29.20	20	xii	39.300	60g	xi	47.519	70g	viii
5.0652	g	xv	29.24	10	xii	39.323	70g	xi	47.616	200g	ix
[5.06649]	50g	xv	[29.318]		xv	39.572	30g,bl	xi	47.654	30g	x
5.0865	g	xiv	[29.544]		xv	39.648	50	xi	47.740	50g	ix
5.0907		xiv	30.427	30g	xiv	39.717	30bl	xi	47.746	50g	viii
5.0968		xiv	30.469	20g	xiv	40.171	50g	ix	47.792	20g	x
5.1014		xiv	30.973	30g,bl	xi	40.566	40	xi	47.905	30g	x
[5.10150]	g, M1	xv	31.054	70g	xi	40.707	40bl	xi	48.129	40	x
5.1284		xiv	31.483	40bl	xi	40.911	20	xi	48.157	40	x
[16.86779]		xvi	31.652	30	xiii	41.357	30g	x	48.160	400	ix
[16.87019]		xvi	31.722	10	xiii	41.386	40	xi	48.367	200	ix
[16.87459]		xvi	31.818	20	xiii	41.474	30	xi	[48.52]		xv
[16.93543]		xvi	31.944	50	xiii	41.543	30	xi	[48.52]		xv
[18.88366]		xvi	32.191	40g	xiii	41.829	10	xi	[48.56]		xv
[18.88666]		xvi	32.242	70g	xiii	41.970	10bl	xi	48.564	250	ix
[18.89745]		xvi	32.410	50	xiv	42.005	10	x	[48.58]		xv
[18.96672]		xvi	32.564	90	xiv	42.342	30	xi	48.647	150g	vii
[20.635]		xv	32.674	10g	xii	42.485	60g	x	48.766	100	ix
[20.642]		xv	32.801	10bl	xiii	42.495	70g	x	48.874	100g	vii

## Finding List for S IV through S XVI - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
49.095	40	x	64.132	50g	viii	185.256	30	vi	227.50	60g	xii
49.119	300g	ix	64.140c		xiv	186.84	200g	xi	227.834	120	vi
49.214	40	x	64.152	100g	viii	187.018	0g	v	228.17	100	x
49.249		x	64.303	20g	viii	188.030	5	vi	228.69	100	x
49.328	250g	ix	64.314c		xiv	188.476	5	vi	228.87	100g	ix
49.390	150g	ix	64.874	20	viii	188.68	225g	xi	232.075	0	v
[49.8179]		xvi	65.149	50	viii	189.99	70	x	232.267	0	v
[49.8241]		xvi	65.254c		xiv	190.36	250	xi	232.676	1	v
[49.8626]		xvi	65.308c		xiv	191.26	250g	xi	233.043c		xii
[49.9834]		xvi	72.029	1000g	vii	191.480	60g	vi	233.216		xii
[49.9837]		xvi	72.663	1000g	vii	191.561	40g	vi	234.024		xii
50.027	70g	vii	[72.7571]		xvi	191.786	30	vi	234.48	30g	xii
[50.0364]		xvi	[72.7703]		xvi	192.041c		x	235.560	5g	v
50.161	10	x	[72.9308]		xvi	192.253	40	vi	236.304	5w	vi
50.208	20	x	[73.0846]		xvi	192.553	1g	v	236.304	0	v
50.345	10	x	[73.0852]		xvi	192.81	70	x	236.34		ix
50.397	40	x	[73.1849]		xvi	193.13c		xi	237.376	0	v
51.227	100g	viii	74.18	20	vi	193.49	90	x	237.489	0g	v
51.470	70g	viii	74.42	26	vi	194.89c		xi	237.578	2	v
51.807	350g	vii	74.85	28	vi	196.12	70	x	238.011	3	v
52.097	200g	vii	75.34	29	vi	196.82	90	x	239.81	150g	xi
52.334	100g	vii	75.63	147	vi	197.112	5	vi	240.284	70	xii
52.681	20g	viii	76.12	63	vi	197.606	10	vi	241.613	10w	vi
52.702	20g	viii	76.50	11	vi	198.550	50g	viii	241.955	0	v
52.756	300g	viii	76.69	10	vi	202.605	50g	viii	242.57	125g	xi
52.789	300g	viii	[79.68]		xv	202.65	250bl	ix	242.84	175g	xi
52.854	100g	viii	[79.78]		xv	202.965	3g	v	243.094	80	xii
52.859	300g	ix	[79.81]		xv	203.57c		xii	245.94	75	xi
52.958	350g	viii	[81.45]		xv	203.673	40	vi	246.90	200g	xi
52.985	70g	viii	[81.50]		xv	204.196	50	vi	247.145	100bl	xii
53.073	50g	viii	[81.57]		xv	206.16c		xii	247.15	250g,bl	xi
53.239	30g	viii	[81.78]		xv	207.55	90	x	247.78c		xi
54.118	500g	viii	[83.11]		xv	208.34	90	x	247.83	75	xi
54.175	450	ix	[83.11]		xv	212.12	60g	xii	248.09	75	xi
54.266	100g	viii	[83.21]		xv	212.60		x	248.986	130g	vi
54.370	20g	viii	[83.29]		xv	213.55	125	xi	249.273	120g	vi
54.385	100g	viii	[83.53]		xv	213.737	20	vi	249.440	20	vi
54.424	150g	viii	88.744	10	xiv	214.316	30	vi	249.606	0	v
54.431	200g	ix	88.884	10	xiv	214.648	0	v	249.837	2	v
54.501	20g	viii	93.062	10	xiv	214.85	125	xi	250.310	3	v
54.516	50g	ix	93.394	10	xiv	214.98	100	xi	251.112	60	vi
54.566	50g	viii	95.386	20	xiv	215.17	60g	xii	251.497	0g,E2	v
54.604	50g	viii	95.488	40	xiv	215.95	250	xi	251.912	80	vi
54.652	100g	vii	96.369c		xiv	216.790	0	v	253.36	50	xi
54.938	100g	vii	96.791c		xiv	217.138	0	v	253.62	150	xi
55.540	250	ix	[116.60]		xv	217.63	200	xi	254.00	60	x
56.081	200g	ix	152.285	20g	vi	218.21	100g	xii	255.08	100	x
56.125	150	ix	155.857	30g	vi	218.781	1w	v	256.68	250g	xiii
56.332	150g	ix	157.011c		x	218.99	125	xi	257.14	100g	x
56.418	50g	ix	[157.259]		xvi	219.13	200	xi	258.109	0	v
[56.85]		xv	[157.881]		xvi	219.14c		xi	258.603c		ix
[56.85]		xv	[157.882]		xvi	219.146	1w	v	259.08c		xiii
[56.90]		xv	[158.067]		xvi	221.27	100g	ix	259.52	100g	x
[56.94]		xv	[158.154]		xvi	221.43	70g	xii	259.724	1	v
59.236	70g	viii	161.495	30g	vi	221.48c		xi	259.954	3	v
59.593	20g	viii	162.318c	g	ix	222.663	0	v	260.455	5	v
60.161	1000g	vii	164.262c		x	223.041	0	v	261.462c		x
60.804	750g	vii	171.331	40g	vi	223.253	6g	v	261.816	30	vi
61.547	200g	vii	177.55	100	x	223.29	100g	ix	264.24	100g	x
61.600	500g	viii	179.29	450	ix	224.77	450g	ix	264.823	2	v
61.978	250g	viii	[179.91]		xv	225.25	50g	ix	265.356	0	v
63.026	50g	viii	180.355	5	vi	225.482	0	v	265.604	1	v
63.304	500g	viii	180.36	80	x	225.680	2	v	265.77c		xiii
63.431	100g	viii	180.73	100	x	226.067	3	v	266.143	4	v
63.711	50g	viii	180.759	10	vi	226.62	100g	ix	266.633	4	v
63.886	250g	viii	184.824	20	vi	227.187	80	vi	266.745	4	v

## Finding List for S IV through S XVI - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
267.009	4	v	316.85	50	xiii	356.038	0	v	450.935	1	iv
267.182	8	v	319.035	3	v	361.149	100	vii	451.325	8	v
267.558	5	v	319.487	8	v	361.69c		xi	452.306	7	v
268.989	5	vi	319.850	12	v	362.34	0	xi	452.904	8	v
269.026	5	vi	320.610	16	v	363.892	40	vi	453.134	6bl	v
270.959	12	v	321.021	6g	iv	364.157	30	vi	453.134	30	vi
271.070	1g	iv	321.49c		xii	365.676	8	v	453.408	20w	vi
271.239	4	v	321.993	5g	iv	367.763	1	v	453.778	6	v
271.335	3g	iv	323.18		xii	368.971	8g	iv	454.735	6	v
271.527	4	v	323.874	2g	iv	369.411	2g, E2	v	456.55		xii
271.792	0	v	324.868	3g	iv	369.742	7	v	457.71c		xii
273.532	1g	iv	325.455	3	v	370.260	9g	iv	460.288	4	iv
273.804	1g	iv	328.39		xii	371.323	1	iv	460.391	8w	iv
274.249	2g	iv	328.605	120	vi	371.923	1	iv	464.667	160	vi
274.522	1g	iv	329.318	5	v	372.271	1w	iv	465.346	2	iv
270.150	2	v	329.653	7g	iv	372.651	2w	iv	465.460	9w	iv
280.34c		x	330.145	200	vii	374.73	10w	vii	470.415	1	v
281.40	175g	xi	330.304	200	vii	376.396	1	iv	473.866	3	iv
282.206c		x	330.48c		xii	376.60	10w	vii	474.966	5	v
283.489	60	vi	330.532	8g	iv	377.202	4	iv	475.277	4	v
285.58	250g	xi	330.691	4g	iv	377.603	3	iv	475.373	3	v
285.83	200g	xi	[331.16]		xv	377.689	5	iv	487.562	5	v
286.094	16g	v	[331.27]		xv	377.877	1	iv	491.46	g	xiii
286.403	12g	v	331.645	400	vii	378.126	1	iv	491.649	8w	iv
288.416	70g	xii	332.088	5g	iv	378.392	2	iv	492.460	4	iv
289.082	100	vi	332.211	1w	v	386.362	2	v	500.42		xiii
289.531	5	v	332.629	7g	iv	388.930	160	vi	501.607	1	iv
289.817	7	v	333.141	4g	iv	390.854	180	vi	503.3c	g	xii
290.130	140	vi	333.737	10	vii	391.555	2g	iv	508.810	5w	vi
290.461	8	v	334.031	1g	iv	391.959	1	v	511.028	10	vi
290.845	1g	iv	334.490	0	v	392.035	0	v	512.217	20	vi
290.88c		xii	335.113	800	vii	393.005	5g	iv	515.8c	g	xii
291.142		xii	335.905	100	vii	393.409	1	v	516.154	2g, E2	v
291.372		xii	336.630	1g	iv	397.569	1	iv	518.255	12	v
291.478	4	v	337.115	1g	iv	[398.7]		xiv	519.379	10	iv
291.57c		xi	337.214	600	vii	399.47c		xii	520.0c	g	xii
291.58	200g	xi	337.820c		x	402.360	2	iv	520.128	10	iv
291.63c		xii	339.700	800	vii	403.117	2	iv	520.852	12	iv
291.656	1g	iv	340.171	6w	v	[404.0]		xiv	521.061	10	iv
291.83	0g	xi	340.749	5g	iv	404.137	30g, E2	vi	522.000	11	iv
293.298	0	v	340.930	5g	iv	406.085	3	iv	522.541	11	iv
294.125	1g	iv	341.090	600	vii	[409.49]		xv	523.135	1	iv
294.286	1g	iv	341.413	5g	iv	[410.8]		xiv	523.513	1	iv
295.63	200	xi	341.787	5g	iv	410.866	1	iv	528.603	6	v
295.921	1g	iv	341.854	4g	iv	412.883	1	iv	530.359	1	iv
297.416	10	vi	342.026	500	vii	[415.1]		xiv	533.880	4	v
297.42c		xii	342.043	3g	iv	[415.1]		xiv	534.379	1	iv
297.499	10	vi	342.521	8g	iv	417.623	3	v	534.540	3w	iv
297.809	1	v	342.698	600	vii	417.66	300g	xiv	534.765	7	iv
299.01c		xii	342.908	4g	iv	418.451	12	v	536.072	2	v
299.536	70g	xii	344.037	5	vii	419.227	4	iv	538.467	0	v
299.79c	g	xii	346.77		xi	419.299	7	iv	539.0c	g	xii
299.93	75	xiii	349.105	1	iv	420.665	0	v	539.107	4	iv
300.231	2	v	350.101	2w	v	[422.3]		xiv	539.107	4	iv
300.327	2g	iv	350.50	0	xi	425.033	3	iv	539.291	3	iv
300.99c		xiii	350.873	10	vii	426.163	4	iv	540.878	1w	iv
301.187	3g	iv	351.611	100	vii	[428.3]		xiv	541.788	5	iv
303.38	50	xiii	352.31	5	vii	433.307	9	v	541.894	1	iv
305.136	1	v	353.051	5	iv	437.504	13	v	542.023	7	iv
307.180	0	v	353.426	4	iv	438.210	14	v	542.317	1	iv
307.39	50	xiii	353.728	6	iv	439.675	15	v	542.412	1	iv
308.94	125	xiii	353.865	3	iv	439.904	5	v	543.921	1	iv
309.651	5	v	354.299	3	iv	444.16		xii	544.732	8w	iv
309.701	2	v	354.335	5	vii	445.339	1	iv	544.868	5	iv
312.73	25	xiii	354.532	6bl	v	445.70	300g	xiv	545.126	9	iv
316.086	4w	v	354.532	6bl	iv	445.940	6	v	546.369	2w	v

## Finding List for S IV through S XVI - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
551.129	18g	IV	641.86	10bl	V	678.80	300bl	VII	745.119	50bl	VI
552.4c		XI	643.410	6	V	678.811	4	IV	745.293	5	V
553.3c	g	XII	643.863	2w	IV	678.960	10	V	746.815	0w	V
554.033	18g	IV	643.950	2	IV	680.330	10	V	747.199	3	IV
554.209	5	IV	644.459	4bl	IV	680.339	10bl	IV	747.707	3	IV
554.972	4w	IV	644.619	4bl	IV	680.65	650	VII	748.030	3	IV
563.115	20w	VI	646.21	20	VII	680.937	12bl	V	748.397	15g	IV
563.857	0	V	648.205	2	V	680.95	620	VII	748.787	3	IV
563.911	4bl	IV	648.489	40	VI	680.961	12bl	IV	749.252	5w	IV
563.911	0	V	648.626	60	VI	681.678	5	V	749.323	3w	IV
564.068	12	IV	648.923	2	V	683.59	160	VII	750.225	16g	IV
564.253	4	V	649.0	230bl	VII	685.07	100	VII	751.030	2w	IV
564.897	1	V	649.471	0	V	686.130	3	V	751.30	30	VIII
565.844	5w	IV	649.706	1	IV	686.85	200bl	VII	751.936	2	IV
568.298	13	V	649.891	1	IV	686.899	7	V	753.762	18g	IV
570.212	5	IV	650.085	4bl	IV	686.90	100	VIII	754.966	1	IV
570.397	7	IV	650.085	4	V	687.097	2	IV	[756.21]		XV
572.244	6	IV	650.420	50	VI	687.266	7bl	IV	758.014	1	V
572.435	4	IV	652.525	11	IV	687.67	350	VII	758.899	2	V
575.2c		XI	652.923	11	IV	687.742	3bl	IV	759.091	1	IV
576.43	100	VI	653.550	11	IV	688.023	7bl	IV	760.836	6	IV
577.621	15	V	653.993	11	IV	688.029	7	V	761.835	6	IV
579.480	20w	VI	654.388	10	IV	688.549	4	IV	764.427	10bl	IV
580.9	40bl	VI	655.549	12	IV	689.024	5w	IV	765.480	6	IV
583.74	85	VI	655.886	11	IV	689.374	7w	IV	766.489	3	IV
584.963	6	IV	656.335	10	IV	689.545	8w	IV	766.941	2	IV
585.558	3	IV	657.328	15g	IV	689.810	9	V	767.261	1	IV
585.721	7	IV	658.252	15	V	690.236	70bl	VI	767.387	2	IV
587.040	2	IV	659.285	4	IV	690.250	7bl	IV	767.541	3	IV
587.74	40	VI	659.833	16	V	690.250	7bl	IV	769.93	240	VI
594.08	50	VII	660.035	9w	IV	690.250	7bl	IV	770.240	1	IV
595.58	10	VII	660.913	10bl	IV	691.722	7	V	770.371	0	V
597.70	25	VII	661.443	17g	IV	692.368	50bl	VI	771.30	40	VI
600.80	10	VII	661.527	11	IV	693.515	9	V	771.325	3	V
601.16	50	VII	662.024	1	IV	693.98	10	VII	772.29	20	VIII
604.58	30	VI	662.430	3	IV	696.627	18	V	772.835	4	V
605.29	35	VI	662.65	250	VII	698.68	30	VIII	773.304	2	V
605.834	0w	V	663.131	18	V	705.340	3	V	774.47	8bl	V
608.39	100bl	VII	663.696	11	IV	706.474	120	VI	774.679	9	IV
611.098	14	IV	664.826	10	IV	706.474	13bl	IV	775.47	8bl	V
611.268	5	IV	665.07	1bl	V	707.346	10	IV	775.797	6	V
611.767	16	IV	666.113	11	IV	712.670	130	VI	777.399	4w	IV
612.70	150	VI	667.661	5	IV	712.831	100	VI	778.530	1	IV
612.90	70	VI	671.031	3	IV	713.365	2w	IV	778.584	3w	IV
613.16	45	VI	671.93	300	VII	714.772	1	V	780.04	300bl	VI
614.07	380bl	VI	671.98	200bl	VIII	715.129	3	IV	780.08c	m	VII
617.62	20	VII	672.749	4	IV	716.647	12	IV	780.679	4	IV
618.109	1w	IV	672.958	6	IV	716.814	4	IV	780.961	1	IV
622.08	40	VI	673.272	2	IV	716.877	4	IV	781.38	450bl	VI
623.49	170	VII	[673.41]		XV	717.055	13	IV	782.125	3	IV
624.138	2	IV	673.496	2	IV	717.910	1w	IV	782.96c	MI	XI
624.277	1	IV	673.605	3	IV	719.36	30	VIII	784.025	6	IV
627.901c	m	VI	673.933	20bl	VI	725.592	2	IV	784.370	5	IV
628.053	12	IV	674.197	3	IV	725.854	110bl	VI	785.64	50	VII
628.107	12	IV	674.468	6	IV	726.897	2w	IV	786.470	17g	V
628.773	30	VI	674.902	10bl	IV	728.899	3	IV	786.911	6bl	IV
629.040	2w	V	675.32	140	VIII	729.069	2bl	IV	790.231	10	IV
630.549	0	V	676.008	8	IV	732.131	5w	IV	790.32	145	VI
633.35	80	VII	676.254	8	V	736.092	3	V	790.534	9	IV
633.581	2	IV	676.30	200	VIII	[738.31]		XV	792.64	170	VI
633.775	1	IV	677.329	10	V	738.67	30	VIII	793.0		VII
634.586	2	IV	677.69	400	VII	742.04	200	VII	796.497	10	IV
637.553	4	IV	677.746	12bl	IV	742.303	12	V	796.675	11bl	IV
637.728	3	IV	677.987	2	IV	743.325	3	V	797.140	12	IV
638.0	20	VII	678.082	11bl	IV	743.536	4	V	797.646	8w	IV
638.66	40	VII	678.096	11	V	744.904	16g	IV	798.270	11	IV

## Finding List for S IV through S XVI - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
798.723	3	IV	883.589	10	V	959.80	60	VIII	1218.085	1w	IV
798.846	3	IV	884.151	4	V	960.05	50	VII	1220.471	2w	IV
798.965	4bl	IV	884.466	9	V	962.955	1	IV	1220.899	1	IV
800.466	13	IV	885.745	7	V	964.169	4	V	1226.703	2bl	IV
800.61	40	VI	887.092	0	V	964.581	1	IV	1226.868	3	IV
802.530	3	IV	887.74	200	VII	968.194	4	V	1227.529	7w	IV
802.916	2bl	IV	888.068	3	IV	971.190	3w	V	1229.110	3w	IV
802.935	1	V	888.288	1	V	971.510	5	VI	1229.414	1w	IV
803.078	3bl	IV	888.518	3	V	971.616	1	V	1230.507	6	V
803.078	2	V	889.045	5	IV	975.834	10	VI	1231.486	1	IV
803.609	1w	IV	890.017	3w	V	990.781	1	V	1231.658	1w	IV
803.697	1	IV	890.540	5	IV	[991.95]		XV	1248.345	6	IV
803.980	12	IV	890.657	5	IV	994.458	2	V	1251.653	8	IV
809.659	16g	IV	890.904	8	IV	999.787	5	IV	1258.173	8	IV
810.599	0w	V	892.050	4	IV	1000.472	60bl	VI	1260.763	3	V
813.063	1	V	892.729	4	IV	1006.097	3bl	IV	1261.381	4	V
815.945	15g	IV	893.203	0w	V	1006.403	5	IV	1261.523	3	IV
816.81	100	VII	893.24	80	VII	1020.551	1	IV	1263.114	1	IV
822.119	3	V	893.524	4	IV	1022.761	1	IV	1266.453	7	V
828.43	150	VII	894.35	70	VII	1026.757	1	IV	1267.388	4	IV
828.541	1	V	894.804	6bl	IV	1026.849	1	IV	1268.493	9	V
832.78	85	VI	896.077	2	IV	1039.917	7	V	1274.520	7	V
833.65	30	VI	897.82	270	VII	1051.524	0	V	1278.814	5	V
835.970	6bl	IV	900.806	5	V	1051.57	80bl	VII	1283.689	2	V
836.293	9bl	IV	902.806	8w	V	1062.656	15g	IV	1283.911	4	V
837.440	10	IV	903.042	1w	V	1063.555	1	V	1284.210	6	V
838.189	2	IV	903.13	280bl	VII	1064.022	0	V	1286.050	7	IV
838.291	6	IV	903.433	3	V	1071.113	2	V	1286.221	3	IV
838.644	1	IV	904.162	2	V	1072.962	16g	IV	1290.		VI
842.513	4	IV	905.536	1	V	1073.508	12g	IV	1294.592	7	IV
842.778	1	V	905.663	1	V	1088.212	4	IV	1295.837	4	IV
843.580	1	V	905.944	10	V	1091.180	4	IV	1296.491	5	IV
844.05	120bl	VII	906.236	9w	V	1093.041	3w	IV	1296.659	8	IV
844.44	70	VI	906.53	2bl	V	1094.191	3w	IV	1300.718	7	IV
845.083	2	IV	908.471	1	V	1095.310	1w	IV	1304.177	4	IV
845.409	3w	IV	909.874	1	V	1098.357	6	IV	1319.036	6	IV
846.57	60	VI	910.544c	m	V	1098.917	11	IV	1324.117	3	IV
847.72	50	VIII	912.50	40	VIII	1099.472	10	IV	1334.961	4	IV
849.238	15	V	912.543	9	V	1100.040	7	IV	1335.109	3	IV
849.90	130	VIII	913.35	10	VII	1102.70		VII	1338.621	3	IV
852.176	14	V	913.531	4	V	1107.733	4	IV	1351.435	5	V
852.719	10	IV	915.081	1	V	1108.449	5	IV	1359.162	1	IV
853.124	10	IV	916.188	3	V	1109.832	4	IV	1361.081	3	IV
853.60	220	VI	916.86	70	VIII	1110.885	5	IV	1362.531	8	IV
854.773	17	V	917.747	2	V	1111.044	3	IV	1365.192	4	IV
854.865	16	V	919.191c	m	V	1111.246	2	IV	1365.749	6	V
857.829	15	V	921.618	0	V	1112.724	3	IV	1366.921	7	IV
858.898	4	IV	922.212	3	V	1113.204	7	IV	1368.843	8	IV
859.93	60	VII	923.750	1	IV	1114.149	1w	IV	1370.585	6	IV
860.471	15	V	924.06	340	VII	1117.161	4w	IV	1371.614	1w	V
862.364	1	IV	924.221	13	V	1117.756	60w	VI	1371.883	1w	V
863.38	30	VIII	927.312	1	IV	1117.934	2w	IV	1379.069	1w	V
864.623	1	IV	927.677	0	V	1118.823	1w	IV	1379.432	2w	V
871.73c	M1	IX	928.110	4	IV	1122.042	10	V	1389.254	2w	V
871.74	70	VIII	930.114	3	IV	1126.41		XIII	1398.045	1g	IV
872.689	6	V	930.2	10	VII	1128.667	10	V	1400.895	1	IV
872.947	2	V	933.376	170g	VI	1128.776	6	V	1403.553	1	IV
873.191	9	V	939.951	1	IV	1133.902	9	V	1404.808	3g	IV
874.54	20	VIII	944.525	150g	VI	1138.076	2	IV	1406.009	6g	IV
875.552	8	V	946.887	4	IV	1138.210	8	IV	1413.023	1	IV
875.802	7w	V	946.985	1	IV	1141.619	1w	IV	1416.063	5	IV
876.83		VII	948.185	5	IV	1188.281c	g, M2	V	1419.381	10	VI
877.656	0	V	949.104	1	IV	1193.566	1	IV	1419.738	30w	VI
878.377	1	IV	950.191	1	IV	1196.25	M1	X	1421.654	1	IV
878.641	2	V	951.785	0	V	1199.134	8g	V	1423.845	6gl	IV
883.042	1w	IV	957.690	3	V	1212.98	M1	X	1423.845	20w	VI

## Finding List for S iv through S xvi - Continued

Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum	Wavelength (Å)	Int.	Spectrum
1424.467	2w	iv	1826.22	M1	xi	2294.381	5	iv	2711.881	4	iv
1431.070	1	iv	1847.258	1w	iv	2300.117	2w	iv	2724.467	3w	iv
1435.445	7	iv	1863.016	1	iv	2305.195	2	iv	2736.503	2	iv
1442.977	4	iv	1884.833	1	iv	2305.615	1	iv	2737.543	7w	iv
1445.141	6w	iv	1897.182	1	iv	2309.438	4	iv	2739.100	4	v
1446.767	5	iv	1908.942	2	iv	2310.955	4	iv	2756.117	5	iv
1448.710	4	iv	1911.680	1	iv	2319.902	1	iv	2759.531	1	iv
1450.886	3	iv	1914.080	3	v	2323.469	1	iv	2761.751	1	iv
1458.764	1	iv	1916.487	1	iv	2325.630	5	iv	2771.951	5w	iv
1471.304	3w	iv	1944.180	10	iv	2327.874	1w	iv	2772.730	3w	iv
1480.690	2	iv	1964.542	10	iv	2330.666	6w	iv	2779.286	0	v
1482.189	1	iv	1968.140	5	iv	2334.965	6	iv	2782.790	1	iv
1501.760	18	v	1975.206	50	vi	2335.721	4w	iv	2797.806	3	iv
1521.150	1	iv	1987.250	1	v	2342.624	4	iv	2800.493	7	v
1534.089	2w	iv	1987.72c	M1	ix	2345.583	4	iv	2831.892	10	iv
1534.935	1	iv	1992.559	70	vi	2357.966	4	iv	2837.575	1	iv
1546.695	1	iv	1993.237	50bl	vi	2364.637	4	v	2870.261	2	iv
1572.231	7w	v	Air			2365.890	8	iv	2886.905	4	v
1572.377	5	v				2366.769	3	v	2889.451	3w	v
1614.51	M1	xi	2027.328	1	v	2376.048	2	iv	2890.146	4w	v
1620.966	4w	iv	2028.648	1	v	2386.952	17	iv	2890.651	5w	v
1623.588	2	iv	2054.45	10	vi	2396.416	2	iv	2892.483	10	iv
1623.946	10	iv	2068.28	40w	vi	2397.726	1	iv	2898.092	10	iv
1624.814	1w	iv	2079.		vi	2398.802	19	iv	2914.607	5	iv
1629.143	9	iv	2079.575	12	v	2399.018	6	iv	2927.862	10	iv
1629.780	2	iv	2082.668	2	v	2401.582	2	iv	2944.729	10	iv
1630.692	1	iv	2099.363	1	iv	2409.972	6w	iv	2945.303	13	iv
1631.073	1w	iv	2100.682	1	iv	2419.674	11	iv	2955.266	1	iv
1634.761	1	iv	2113.204	0	v	2431.594	13	iv	2959.631	1w	iv
1635.667	1w	iv	2114.900	1	iv	2433.513	1	iv	2967.127	1	iv
1637.769	5	iv	2126.078c	m	v	2434.610	12bl	iv	2981.984	17	iv
1638.408	1	iv	2129.359	2	iv	2436.035	10	iv	2983.618	1w	v
1653.168	4	iv	2129.508	1bl	iv	2445.788	1	iv	3028.066	3	iv
1656.093	3	iv	2131.374	11	v	2457.835	1w	iv	3029.320	12	iv
1668.617	1	iv	2132.499	13	v	2462.651	16	iv	3036.607	11	iv
1675.919	1w	iv	2133.140	10	v	2463.770	2w	iv	3037.859	3	iv
1676.332	3w	iv	2142.014	1	iv	2495.233	3w	iv	3050.832	1	iv
1676.617	2	iv	2146.052	17bl	v	2504.112	1	v	3071.440	5	iv
1686.821	4	iv	2147.032	12	v	2515.312	4	iv	3092.699	4	iv
1687.945	7	iv	2147.682	9	v	2515.579	5	iv	3097.271	19	iv
1688.245	3	iv	2150.275	0	v	2522.481	4	iv	3100.997	1	iv
1688.629	8	iv	2156.28c	M1	x	2534.831	1bl	iv	3117.605	18	iv
1690.479	8	iv	2164.353	1	v	2543.908	1	iv	3123.908	1	iv
1695.120	0	v	2179.439	7	iv	2549.634	10	iv	3185.1	5bl	v
1696.202	0	v	2192.501	7	iv	2551.864	1	iv	3189.733	3	v
1697.007	5w	iv	2211.25c	M1	x	2553.422	4w	v	3198.939	8	v
1697.584	2	iv	2224.910	5	iv	2569.928	6	iv	3217.793	1	iv
1700.321	0	v	2234.061	7w	iv	2572.693	1	iv	3218.521	3	iv
1701.576	2	iv	2244.84c	M1	x	2574.110	4w	v	3221.997	2w	v
1708.525	1	iv	2245.729	1	iv	2574.332	5w	iv	3224.427	7	iv
1715.445	M1	ix	2248.437	9	iv	2578.994	10	iv	3243.983	2w	iv
1731.483	6	v	2250.836	8w	iv	2582.922	6	iv	3251.834	7	v
1738.955	5	iv	2262.223	8	iv	2587.33	80	vi	3277.379	3	v
1745.340	7	iv	2264.971	5	iv	2590.079	1w	iv	3292.236	9	iv
1748.847	3	iv	2270.063	1	iv	2594.852	10	iv	3300.638	9	iv
1761.715	6	iv	2270.286	12	iv	2607.068	9	iv	3301.245	8	iv
1762.966	2	iv	2270.524	1	iv	2611.086	2	iv	3308.747	11	iv
1770.162	4	v	2271.002	9	iv	2618.38	70	vi	3316.948	11	iv
1773.706	1	iv	2271.298	8	iv	2635.353	5	iv	3330.731	9	iv
1774.169	1	iv	2273.837	4bl	iv	2638.905	13	v	3340.360	10	iv
1779.871	1	iv	2276.944	5	iv	2657.	20bl	vi	3341.456	11	iv
1782.267	6bl	iv	2280.074	4	iv	2661.184	11	v	3343.495	2	iv
1786.983	7	iv	2283.924	10	iv	2663.955	10	v	3343.957	10	iv
1787.179	7	iv	2286.161	2	iv	2665.6	10w	vi	3355.134	3	iv
1804.937	2w	iv	2286.573	4	iv	2678.438	9	iv	3363.113	12	iv
1808.127	1	iv	2287.508	2	iv	2689.435	1	v	3369.074	1	iv



