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Analysis of the Fourth Spectrum of Tungsten (W IV)

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Abstract

The spectrum of triply ionized tungsten (W IV) was produced in a sliding-spark discharge and recorded photographically on the NBS 10.7 m normal-incidence vacuum spectrograph in the 600–2600 Å spectral region. The analysis has established all 37 levels of the $5d^3$, $5d^26s$ and $5d6s^2$ even configurations and all 68 levels of the $5d^26p$ and $5d6s6p$ odd configurations. A total of 774 lines have been classified as transitions between these levels. Comparison of observed level values with those calculated in a least-squares fit shows an rms deviation of $\pm 50 \text{ cm}^{-1}$ for the even configurations and $\pm 250 \text{ cm}^{-1}$ for the odd ones.

1. Introduction

To our knowledge, no previous attempts have been made to analyze the spectrum of triply ionized tungsten. The ground configuration of this ion is $5d^3$ and the other low, even configurations are $5d^26s$ and $5d6s^2$. The lowest odd configurations are $5d^26p$ and $5d6s6p$. In the analysis of a spectrum, one usually makes use of information available in isoelectronic and/or isoionic spectra. The adjacent isoelectronic spectra, Ta III and Re V, are completely unknown. Among the fourth spectra of the platinum group, only the analysis of Ta [1], with a ground configuration of $5d^2$, could provide relevant information.

2. Observations

A sliding-spark discharge with a quartz spacer was used to produce tungsten spectra. Peak currents of approximately 50, 200 and 500 A gave excellent separation of W III, W IV and W V. It was found necessary to use He at approximately 20 Torr in order to maintain the discharge. A water-cooled copper hollow cathode, containing small pieces of germanium and silicon, was operated at 500 mA with He at 2 Torr to produce lines of Cu II, Ge I, Ge II, Si I and Si II which were used as standards [2]. The spectra were recorded photographically between 600 and 2600 Å on the 10.7 m normal-incidence vacuum spectrograph at NBS. The estimated uncertainty in the measurements is $\pm 0.005 \text{ Å}$.

Approximately 1000 lines were identified as belonging to W IV and over 4000 as W III. An analysis of the W III data is underway. Analysis of those lines with W IV discharge characteristics has led to the classification of 774 lines. Seventeen of these are doubly classified, giving 791 transitions between the 37 even and 68 odd levels that were identified. Table I gives the wavelength, intensity, wavenumber, difference between the observed and calculated wavelengths, and classification of each of these lines.

3. Analysis

All of the predicted levels of the $5d^3$, $5d^26s$, $5d6s^2$, $5d^26p$ and $5d6s6p$ configurations have been determined. Hartree-Fock (HF) calculations were performed for the Slater and spin-orbit integrals of each of the configurations and for the relevant configuration interaction parameters. Comparison of the level structures predicted by parametric calculations and the repeating intervals found among the strong lines enabled the analysis to proceed. Tables II and III give the relevant information about the even and odd levels of triply ionized tungsten. Included for each level in the tables are the configuration, term, J value, the level value and its uncertainty and the number of observed transitions to or from the level. The notation used to distinguish the various levels (e.g. $a, b, c, \dots, z, y, x, \dots$) follows the recommendation of Russell et al [3]. The “1” and “2” in the terms a^2D2 and b^2D1 refer to the seniority numbers of the terms and are designated in the notation of Nielson and Koster [4].

Figure 1 shows the energy range occupied by all of the presently known configurations. The only overlap between the $5d^3$ and the $5d^26s$ even configurations occurs between the highest term of $5d^3$, 2D1 , and the lowest term of $5d^26s$, 4F . This can be seen more clearly in Figure 2 which shows the energy levels of the three even configurations connected in LS -coupling terms.

The radial parameters derived by least-squares fitting (LSF) of the calculated to the experimental levels are given in Tables IV and V for the even and odd configurations, respectively. The table also includes the HF values and the LSF to HF ratios. These ratios are very similar to those found for triply ionized tantalum [1]. Table VI shows this similarity.

Fig. 1. Schematic diagram of the low configurations of W IV.

* National Bureau of Standards, Washington, DC. Atomic & Plasma Radiation Division.

Fig. 2. Even levels of W IV. The $5d^26s$ terms include the $5d^2$ parent term.

The even configurations, $5d^3$ and $5d^26s$, show good LS coupling with about 75% overall purity. Except for the $5d^3$ level at 18519 cm^{-1} and the $5d^26s$ level at 46087 cm^{-1} , all of the even levels have been given LS names corresponding to the largest eigenvector component. Table II includes the difference between the observed level value and that calculated in the least-squares fit, o-c, and the leading eigenvector percentage(s) in LS coupling. The mean deviation between the calculated and observed even levels is $\pm 50\text{ cm}^{-1}$.

The only overlap between the two odd configurations occurs

between the $5d^2(1S)6p\ ^2P$ and the $5d(^2D)6s6p(^3P)\ ^4F$ and 4D terms. In calculating the odd configurations, several coupling schemes were considered. Neither LS nor J_1j coupling are pure, in $5d^26p$ the mean purity being 49% and 63% respectively. LS designations for these levels have been chosen for simplicity but many of the levels show large eigenvector mixtures in this coupling. The names given to the levels of $J = 3/2$ 100449, of $J = 5/2$ 98691 and 115317, of $J = 7/2$ 106730, 108872 and 111515, and of $J = 9/2$ 104263 are not those of the largest eigenvector components. The compositions are very sensitive to small variations in the parameter values.

In the $5d6s6p$ configuration, only the levels $J = 3/2$ 157726 and $J = 5/2$ 149758 have not been given the names of the largest eigenvector components. This configuration has an $S-L$ coupling purity of about 69%. Table III includes the difference between the observed and calculated value and the leading LS percentage(s) for each of the odd levels. The mean deviation between the calculated and observed odd levels is $\pm 250\text{ cm}^{-1}$ with configuration interaction included in the calculation.

The exchange integral, $G^1(sp)$, is very large emphasizing that the coupling between the $6s$ and $6p$ electrons is very strong. The best description of the $5d6s6p$ configuration is then given by $5d(^2D)\ 6s6p\ (^1,^3P)$. The strong LS character of the intermediate 1P and 3P terms was noticed by Shenstone [5] in his analysis of Cu I. Martin and Sugar [6] found that this was also true for Zn II, Ag I and Cd II. Johansson [7] also mentions this for the $3d^54s4p$ configuration in Fe II. This appears to be confirmed in W IV $5d6s6p$ by observed intensity relations shown in Table VII.

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Table I. *Classified lines of W IV*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
2658.039	60D	37610.53	-.006	$b^4P_{3/2} - z^4G_{5/2}^0$
2628.534	1H	38032.68	-.001	$c^2D_{3/2} - z^4F_{3/2}^0$
2594.231	20	38535.54	.000	$b^2P_{3/2} - y^4D_{5/2}^0$
2575.621	1	38813.96	.001	$a^2S_{1/2} - z^2P_{3/2}^0$
2574.190	200	38835.54	-.001	$b^2P_{1/2} - z^4D_{1/2}^0$
2550.102	900	39202.35	.005	$b^4P_{5/2} - z^4G_{5/2}^0$
2545.595	2	39271.76	-.012	$b^2P_{3/2} - z^4D_{3/2}^0$
2505.193	0	39905.06	.000	$d^2D_{3/2} - x^2F_{5/2}^0$
2498.157	200	40017.44	.002	$b^2F_{7/2} - z^4G_{7/2}^0$
2491.942	5	40117.24	.004	$a^2S_{1/2} - z^2P_{1/2}^0$
2484.401	500	40239.00	.000	$b^2P_{1/2} - z^2D_{3/2}^0$
2464.982	300	40555.98	.002	$b^2F_{5/2} - z^4F_{3/2}^0$
2458.937	100	40655.68	.003	$b^2G_{7/2} - z^4G_{9/2}^0$
2412.781	1	41433.35	-.008	$a^2S_{1/2} - x^2D_{3/2}^0$
2400.391	200	41647.20	.002	$b^2P_{1/2} - z^2S_{1/2}^0$
2397.528	500	41696.93	.006	$b^2F_{7/2} - z^4F_{5/2}^0$
2381.467	500	41978.12	.005	$b^2G_{9/2} - z^4G_{9/2}^0$
2380.042	40	42003.25	.008	$b^2D_{5/2} - z^4G_{5/2}^0$
2376.076	500	42073.35	.004	$b^2P_{3/2} - z^2F_{5/2}^0$
2364.676	10H	42276.17	.003	$c^2D_{5/2} - z^4D_{5/2}^0$
2343.137	500	42664.76	.006	$c^2D_{3/2} - z^4F_{5/2}^0$
2300.701	100	43451.63	.001	$c^2D_{5/2} - z^2D_{3/2}^0$
2297.688	500	43508.61	.003	$b^2F_{5/2} - z^4G_{7/2}^0$
2282.116	200	43805.46	.003	$b^4P_{5/2} - z^4F_{3/2}^0$
2276.850	10H	43906.77	.003	$c^2D_{5/2} - z^4F_{7/2}^0$
2270.245	80	44034.50	-.006	$c^2D_{5/2} - y^2D_{3/2}^0$
2268.424	60H	44069.84	.003	$a^2S_{1/2} - y^2P_{1/2}^0$
2259.630	10H	44241.34	.002	$b^2P_{3/2} - y^4D_{3/2}^0$
2255.396	300	44324.38	-.001	$b^2P_{1/2} - z^4D_{3/2}^0$
2252.767	2	44376.10	.001	$b^4P_{1/2} - z^4F_{3/2}^0$
2246.748	200	44494.98	.006	$b^2G_{7/2} - z^2F_{7/2}^0$
2212.274	200	45188.28	-.002	$b^2F_{5/2} - z^4F_{5/2}^0$
2211.633	50	45201.37	.000	$b^2P_{3/2} - z^4S_{3/2}^0$
2174.297	200	45977.46	.002	$b^2P_{3/2} - y^2F_{5/2}^0$
2170.234	30H	46063.53	-.001	$d^2D_{5/2} - y^4F_{7/2}^0$
2166.095	40	46151.54	.000	$b^2D_{3/2} - z^4F_{3/2}^0$
2164.479	10	46186.00	-.001	$d^2D_{3/2} - x^2P_{1/2}^0$
2163.819	900	46200.08	-.003	$b^2F_{7/2} - z^4G_{9/2}^0$
2161.004	10B	46260.26	.000	$b^4F_{7/2} - z^4G_{5/2}^0$
2152.084	100	46451.98	.005	$c^2D_{5/2} - z^2F_{7/2}^0$
2145.094	30	46603.33	-.001	$c^2D_{3/2} - z^4D_{1/2}^0$
2144.951	60	46606.43	.001	$b^2D_{5/2} - z^4F_{3/2}^0$
2137.992	500	46758.12	.002	$b^4P_{5/2} - z^4G_{7/2}^0$
2134.649	300	46831.33	.001	$c^2D_{3/2} - z^4D_{5/2}^0$
2133.990	10	46845.80	-.003	$b^4P_{3/2} - z^4F_{5/2}^0$
2131.934	5	46890.97	-.005	$b^2G_{7/2} - z^4F_{9/2}^0$
2105.550	20	47478.47	-.001	$d^2D_{5/2} - x^2P_{3/2}^0$
2104.861	900B	47494.01	.005	$b^2F_{7/2} - z^4F_{9/2}^0$
2102.957	40	47537.01	.000	$c^2D_{5/2} - z^4D_{3/2}^0$
2082.382	100	48006.64	.006	$c^2D_{3/2} - z^2D_{3/2}^0$
2074.877	30	48180.26	-.001	$b^2P_{3/2} - z^4P_{1/2}^0$
2073.454	500	48213.32	.001	$b^2G_{9/2} - z^4F_{9/2}^0$
2067.260	300	48357.76	.004	$b^2G_{7/2} - z^2G_{5/2}^0$
2066.227	500D	48381.94	-.003	$b^2G_{7/2} - z^2F_{5/2}^0$
2063.848	500	48437.70	.001	$b^4P_{5/2} - z^4F_{5/2}^0$
2057.400	3	48589.49	.001	$c^2D_{3/2} - y^2D_{3/2}^0$
2046.340	50H	48852.06	.003	$b^2P_{3/2} - z^4P_{3/2}^0$
2042.665	30H	48939.94	.002	$b^2P_{3/2} - y^2D_{5/2}^0$
2023.020	300	49415.12	-.004	$c^2D_{3/2} - z^2S_{1/2}^0$
2017.145	300	49559.02	.003	$b^2D_{5/2} - z^4G_{7/2}^0$
2014.618	100	49621.2	.005	$b^4F_{9/2} - z^4G_{7/2}^0$
2012.216	200	49680.4	-.002	$b^2G_{9/2} - z^2G_{7/2}^0$
1998.421	100	50039.5	-.005	$b^2F_{7/2} - z^2F_{7/2}^0$
1992.181	900	50196.2	-.002	$b^4F_{5/2} - z^4G_{3/2}^0$
1980.220	100	50499.4	-.001	$b^2G_{7/2} - y^2G_{7/2}^0$
1979.017	100	50530.1	.001	$b^2F_{5/2} - z^2D_{3/2}^0$
1961.352	2	50985.2	.003	$b^2F_{5/2} - z^4F_{7/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavelength (cm ⁻¹)	O-C (Å)	Classification
1960.318	10	51012.1	.003	$b^4P_{3/2} - z^4D_{5/2}^0$
1956.454	10	51112.9	.000	$b^2F_{5/2} - y^2D_{3/2}^0$
1951.640	60	51239.0	-.011	$b^2D_{5/2} - z^4F_{5/2}^0$
1947.189	15	51356.1	.001	$c^2D_{3/2} - y^4D_{3/2}^0$
1929.684	60	51822.0	-.002	$b^2G_{9/2} - y^2G_{7/2}^0$
1927.521	80	51880.1	.000	$c^2D_{3/2} - y^4D_{1/2}^0$
1919.672	10	52092.2	.004	$b^2G_{7/2} - z^2H_{9/2}^0$
1916.162	10	52187.7	-.004	$c^2D_{3/2} - z^4D_{3/2}^0$
1912.559	1B	52286.0	-.001	$b^4P_{3/2} - z^2D_{3/2}^0$
1907.116	50	52435.2	-.001	$b^2G_{7/2} - y^2F_{5/2}^0$
1906.355	100	52456.1	-.011	$b^2F_{7/2} - z^4F_{9/2}^0$
1901.225	900	52597.7	.011	$c^2D_{5/2} - y^2G_{7/2}^0$
1900.987	50	52604.2	-.003	$b^4F_{3/2} - z^4G_{5/2}^0$
1895.004	10	52770.3	-.002	$b^4P_{5/2} - z^4D_{5/2}^0$
1888.687	200	52946.8	.001	$b^4P_{3/2} - z^4D_{3/2}^0$
1885.217	10	53044.3	-.002	$b^2P_{3/2} - z^2P_{1/2}^0$
1881.728	20	53142.6	-.001	$b^2G_{7/2} - y^4D_{7/2}^0$
1879.601	100	53202.8	-.003	$b^2G_{9/2} - z^2H_{9/2}^0$
1870.317	100	53466.9	-.002	$c^2D_{5/2} - z^4S_{3/2}^0$
1868.086	15	53530.7	-.005	$b^2F_{5/2} - z^2F_{7/2}^0$
1865.815	60	53595.9	.000	$b^4P_{3/2} - z^2S_{1/2}^0$
1858.182	800	53816.0	-.002	$b^4F_{7/2} - z^4G_{7/2}^0$
1855.997	60	53879.4	.002	$b^2F_{5/2} - y^4D_{5/2}^0$
1855.213	60	53902.2	.000	$b^2F_{7/2} - z^2G_{7/2}^0$
1854.391	50	53926.1	.004	$b^2F_{7/2} - z^2F_{5/2}^0$
1843.839	2	54234.7	.005	$b^4P_{5/2} - z^4F_{7/2}^0$
1843.559	30	54242.9	.001	$c^2D_{5/2} - y^2F_{5/2}^0$
1839.933	2	54349.8	.015	$b^4P_{1/2} - z^2D_{3/2}^0$
1839.514	100	54362.2	.006	$b^4P_{5/2} - y^2D_{5/2}^0$
1836.041	50	54465.0	.003	$b^2G_{9/2} - y^4D_{7/2}^0$
1830.986	2	54615.4	.004	$b^2F_{5/2} - z^4D_{3/2}^0$
1824.848	300	54799.1	.007	$b^4F_{5/2} - z^4F_{5/2}^0$
1820.411	60B	54932.7	.011	$b^4P_{1/2} - y^2D_{3/2}^0$
1801.947	500	55495.5	.001	$b^4F_{7/2} - z^4F_{5/2}^0$
1800.605	50	55536.9	.002	$b^4P_{3/2} - y^4D_{5/2}^0$
1793.715	2	55750.2	.001	$a^2S_{1/2} - x^2P_{1/2}^0$
1791.987	1000	55804.0	-.003	$b^4F_{9/2} - z^4G_{7/2}^0$
1785.626	5	56002.8	.002	$b^4P_{3/2} - y^4D_{1/2}^0$
1784.319	2	56043.8	-.002	$b^2F_{7/2} - y^2G_{7/2}^0$
1777.052	80	56273.0	.001	$b^4P_{3/2} - z^4D_{3/2}^0$
1767.391	20	56580.6	.000	$b^2D_{5/2} - z^2D_{3/2}^0$
1761.182	60	56780.0	.001	$b^4P_{5/2} - z^2F_{7/2}^0$
1754.475	25	56997.1	-.009	$b^2P_{3/2} - y^2P_{1/2}^0$
1752.833	100	57050.5	-.003	$b^2G_{7/2} - z^2G_{9/2}^0$
1752.476	2	57062.1	-.006	$c^2D_{3/2} - y^4D_{3/2}^0$
1751.365	300	57098.3	-.011	$b^4F_{9/2} - z^4F_{3/2}^0$
1750.422	50	57129.1	-.004	$b^4P_{5/2} - y^4D_{5/2}^0$
1749.364	1	57163.6	-.010	$b^2D_{5/2} - y^2D_{3/2}^0$
1748.227	200	57200.8	-.005	$b^4F_{3/2} - z^4F_{3/2}^0$
1748.082	10	57205.6	-.004	$c^2D_{5/2} - y^2D_{5/2}^0$
1743.593	150	57352.8	-.015	$a^2F_{5/2} - z^4G_{5/2}^0$
1742.358	30	57393.5	-.004	$b^2F_{5/2} - z^2G_{7/2}^0$
1741.625	150	57417.6	-.009	$b^2F_{5/2} - z^2F_{5/2}^0$
1741.415	50	57424.6	-.001	$b^2F_{7/2} - z^2H_{9/2}^0$
1731.969	10	57737.8	.004	$b^2G_{7/2} - z^2D_{7/2}^0$
1731.535	1000	57752.2	-.009	$b^4F_{5/2} - z^4G_{7/2}^0$
1728.156	50	57865.1	-.005	$b^4P_{5/2} - z^4D_{5/2}^0$
1721.259	15	58097.0	.000	$b^2P_{1/2} - z^2P_{1/2}^0$
1719.231	40	58165.5	-.003	$b^4P_{1/2} - y^4D_{1/2}^0$
1713.126	50	58372.8	.002	$b^2G_{9/2} - z^2G_{9/2}^0$
1711.285	25	58435.6	-.001	$b^4P_{1/2} - z^4D_{3/2}^0$
1708.351	50	58536.0	.000	$b^2P_{3/2} - x^2D_{5/2}^0$
1703.957	50	58686.9	.000	$b^2F_{7/2} - y^4D_{7/2}^0$
1700.742	200	58797.9	.006	$c^2D_{3/2} - y^2F_{5/2}^0$
1697.732	35	58902.1	.002	$c^2D_{5/2} - z^4P_{5/2}^0$
1693.183	20	59060.4	.001	$b^2G_{9/2} - z^4D_{7/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1683.141	50	59412.7	.006	$b^2P_{1/2}-x^2D_{3/2}^0$
1682.611	150	59431.4	.001	$b^4F_{5/2}-z^4F_{5/2}^0$
1679.688	50	59534.9	.001	$b^2F_{5/2}-y^2G_{7/2}^0$
1678.389	25	59580.9	.002	$b^2D_{5/2}-z^2F_{7/2}^0$
1678.274	10	59585.0	.008	$b^2F_{5/2}-y^4D_{3/2}^0$
1676.638	100	59643.2	.002	$b^4F_{9/2}-z^2F_{7/2}^0$
1676.112	50	59661.9	.004	$b^4F_{7/2}-z^4D_{5/2}^0$
1675.182	25	59695.0	-.003	$c^2D_{5/2}-z^4D_{7/2}^0$
1666.707	500	59998.5	.000	$b^4F_{7/2}-z^4G_{9/2}^0$
1651.658	50	60545.2	.002	$b^2F_{5/2}-z^4S_{3/2}^0$
1648.999	200	60642.9	.000	$b^4P_{5/2}-z^2G_{7/2}^0$
1648.348	30	60666.8	.001	$b^4P_{5/2}-z^2F_{5/2}^0$
1647.264	45	60706.7	-.006	$b^2G_{7/2}-z^2D_{5/2}^0$
1644.933	100	60792.7	-.001	$b^2F_{7/2}-y^2D_{5/2}^0$
1632.849	40	61242.6	.004	$b^4P_{3/2}-y^4D_{3/2}^0$
1631.516	200	61292.7	-.001	$b^4F_{7/2}-z^4F_{7/2}^0$
1630.746	250	61321.6	-.005	$b^2F_{5/2}-y^2F_{5/2}^0$
			-.004	$b^2G_{7/2}-y^2G_{9/2}^0$
1628.773	100	61395.9	-.005	$b^2P_{3/2}-y^2P_{3/2}^0$
1614.060	50	61955.6	-.004	$a^2F_{5/2}-z^4F_{3/2}^0$
1611.893	250	62038.9	.004	$b^4F_{9/2}-z^4F_{9/2}^0$
1611.613	35	62049.6	-.001	$b^2P_{1/2}-y^2P_{1/2}^0$
1608.282	100	62178.2	-.001	$b^2F_{5/2}-y^4D_{7/2}^0$
1607.644	40	62202.8	-.001	$b^4P_{3/2}-z^4S_{3/2}^0$
1602.657	30	62396.4	-.003	$b^2P_{3/2}-x^2F_{5/2}^0$
1599.394	100	62523.7	-.002	$a^2D_{5/2}-z^4G_{5/2}^0$
1579.573	300	62594.9	-.007	$b^2F_{7/2}-z^2G_{9/2}^0$
1596.317	200	62644.2	-.005	$b^2G_{9/2}-y^2G_{9/2}^0$
1595.825	100	62663.5	.000	$c^2D_{5/2}-z^2D_{5/2}^0$
1592.746	200	62784.6	-.006	$b^4P_{5/2}-y^2G_{7/2}^0$
1591.471	150	62834.9	-.004	$b^4P_{5/2}-y^4D_{3/2}^0$
1586.980	40	63012.8	.003	$b^2D_{3/2}-z^2F_{5/2}^0$
1580.490	100	63271.5	.000	$b^2G_{7/2}-y^2F_{7/2}^0$
1580.219	50	63282.4	-.004	$b^2F_{7/2}-z^4D_{7/2}^0$
1577.148	50	63405.6	-.005	$b^4P_{1/2}-y^4D_{3/2}^0$
1575.857	20	63457.5	-.006	$c^2D_{3/2}-z^4P_{5/2}^0$
1575.600	40	63467.9	-.002	$b^2D_{5/2}-z^2F_{5/2}^0$
1572.377	300	63598.0	.000	$b^4F_{5/2}-z^4D_{5/2}^0$
1566.463	100	63838.1	-.005	$b^4F_{7/2}-z^2F_{7/2}^0$
1557.952	100	64186.8	-.001	$b^4F_{7/2}-y^4D_{5/2}^0$
1555.596	50	64284.0	-.003	$b^2F_{5/2}-y^2D_{5/2}^0$
1551.987	150	64433.5	.001	$a^2F_{7/2}-z^4G_{7/2}^0$
1548.905	150	64561.7	-.007	$c^2D_{3/2}-z^2P_{3/2}^0$
1548.682	50	64571.0	-.003	$b^4P_{5/2}-y^2F_{5/2}^0$
1548.089	50	64595.8	-.004	$a^2S_{1/2}-x^2P_{3/2}^0$
1543.841	4	64773.5	-.003	$b^4F_{5/2}-z^2D_{3/2}^0$
1542.151	10	64844.5	-.002	$b^2G_{7/2}-x^2D_{5/2}^0$
1534.172	100	65181.7	-.002	$b^4P_{3/2}-z^4P_{1/2}^0$
1533.066	450	65228.8	-.006	$c^2D_{5/2}-y^2F_{7/2}^0$
			-.004	$b^4F_{5/2}-z^4F_{7/2}^0$
1530.081	100	65356.0	.003	$b^4F_{5/2}-y^2D_{5/2}^0$
1528.405	50	65427.7	-.002	$b^4P_{5/2}-y^4D_{7/2}^0$
1525.885	150	65535.7	-.002	$b^2G_{7/2}-x^2F_{7/2}^0$
1523.561	30	65635.7	.001	$b^2D_{5/2}-y^4D_{3/2}^0$
1523.285	100	65647.6	-.001	$b^4F_{9/2}-y^2G_{7/2}^0$
1520.418	150	65771.4	-.002	$b^4F_{3/2}-z^4D_{1/2}^0$
1519.813	1000	65797.6	-.005	$b^2G_{9/2}-z^2H_{11/2}^0$
1518.518	50	65853.7	-.003	$b^4P_{3/2}-z^4P_{3/2}^0$
1518.257	100	65865.0	-.005	$c^2D_{3/2}-z^2P_{1/2}^0$
1516.497	50	65941.4	-.001	$b^4P_{3/2}-y^2D_{5/2}^0$
1515.932	1000	65966.0	-.003	$b^4F_{9/2}-z^4G_{11/2}^0$
1515.595	25	65980.7	.000	$b^2F_{5/2}-z^4P_{5/2}^0$
1515.162	500	65999.5	-.004	$b^4F_{3/2}-z^4D_{5/2}^0$
1512.556	50	66113.3	-.002	$a^2F_{7/2}-z^4F_{5/2}^0$
1509.806	500	66233.7	.000	$b^4F_{7/2}-z^4F_{9/2}^0$
1509.416	50	66250.8	.000	$b^2F_{7/2}-z^2D_{5/2}^0$
1501.780	30	66587.6	.000	$a^2F_{5/2}-z^4F_{5/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1497.604	300	66773.3	.001	$b^2F_{5/2}-z^4D_{7/2}^0$
1496.973	50	66801.5	-.002	$c^2D_{5/2}-x^2D_{5/2}^0$
1495.704	250	66858.1	.000	$b^2G_{9/2}-x^2F_{7/2}^0$
1495.532	100	66865.8	-.001	$b^2F_{7/2}-y^2G_{9/2}^0$
1491.903	300	67028.5	-.003	$b^4F_{9/2}-z^2H_{9/2}^0$
1490.651	25	67084.8	.001	$b^2F_{5/2}-z^2P_{3/2}^0$
1489.721	35	67126.7	.001	$a^2D_{5/2}-z^4F_{3/2}^0$
1488.653	250	67174.8	-.001	$b^4F_{3/2}-z^2D_{3/2}^0$
1487.682	100	67218.7	-.001	$c^2D_{3/2}-z^2D_{5/2}^0$
1481.644	25	67492.6	.002	$c^2D_{5/2}-x^2F_{7/2}^0$
1480.747	50	67533.5	-.002	$b^4P_{5/2}-y^2D_{5/2}^0$
1478.455	350	67638.2	.000	$b^4P_{3/2}-z^4P_{5/2}^0$
1477.089	250	67700.7	-.001	$b^4F_{7/2}-z^2G_{7/2}^0$
1476.570	100	67724.5	.003	$b^4F_{7/2}-z^2F_{5/2}^0$
1475.851	250	67757.5	.000	$b^4F_{3/2}-y^2D_{3/2}^0$
1475.490	350	67774.1	-.005	$b^4F_{5/2}-z^2F_{7/2}^0$
1470.235	200	68016.3	-.004	$b^4P_{1/2}-z^2P_{3/2}^0$
1468.424	350	68100.2	-.003	$a^4P_{5/2}-z^4G_{5/2}^0$
1467.939	200	68122.7	.000	$b^4F_{5/2}-y^4D_{5/2}^0$
1464.327	150	68290.8	.000	$b^4F_{9/2}-y^4D_{7/2}^0$
1458.088	100	68583.0	.001	$b^4F_{3/2}-z^2S_{1/2}^0$
1455.503	200	68704.8	-.001	$b^2G_{7/2}-x^2F_{5/2}^0$
1453.156	30	68815.7	.002	$b^2F_{7/2}-y^2F_{7/2}^0$
1452.249	50	68858.7	.001	$b^4F_{5/2}-z^4D_{3/2}^0$
1444.456	100	69230.2	-.001	$b^4P_{5/2}-z^4P_{5/2}^0$
1431.797	100	69842.3	-.001	$b^4F_{7/2}-y^2G_{7/2}^0$
1428.101	150	70023.1	-.004	$b^4P_{5/2}-z^4D_{5/2}^0$
1427.975	50	70029.2	-.004	$a^2G_{7/2}-z^4G_{5/2}^0$
1427.640	15	70045.7	.000	$b^4P_{3/2}-z^2P_{1/2}^0$
1426.951	50	70079.5	-.003	$a^2D_{5/2}-z^4G_{5/2}^0$
1421.781	5	70334.3	.000	$b^4F_{5/2}-z^2P_{3/2}^0$
			.001	$b^2D_{5/2}-y^2D_{5/2}^0$
1420.678	100	70388.9	-.005	$b^2F_{7/2}-x^2D_{5/2}^0$
1417.953	100	70524.2	-.002	$b^4F_{3/2}-y^4D_{5/2}^0$
1416.102	100	70616.4	-.005	$a^2F_{7/2}-z^4G_{9/2}^0$
1415.192	100	70661.8	-.002	$c^2D_{5/2}-x^2F_{5/2}^0$
1413.340	100	70754.4	-.005	$a^2F_{5/2}-z^4D_{5/2}^0$
1410.338	200D	70905.0	-.001	$b^4P_{1/2}-z^2P_{3/2}^0$
1408.649	500H	70990.0	-.001	$b^4F_{3/2}-y^4D_{1/2}^0$
1406.864	50	71080.1	-.002	$b^2F_{7/2}-x^2F_{7/2}^0$
1404.036	200H	71223.2	-.004	$b^4F_{7/2}-z^2H_{9/2}^0$
1403.312	40	71260.0	.003	$b^4F_{3/2}-z^4D_{3/2}^0$
1401.413	20	71356.6	.000	$c^2D_{3/2}-x^2D_{5/2}^0$
1401.314	200	71361.6	-.001	$b^4P_{3/2}-x^2D_{5/2}^0$
1401.069	100	71374.1	.000	$a^2D_{3/2}-z^4F_{3/2}^0$
1400.568	600	71399.6	-.002	$b^4P_{3/2}-z^2D_{5/2}^0$
1398.036	200H	71528.9	-.012	$a^2P_{1/2}-z^4F_{3/2}^0$
1397.115	10	71576.1	.002	$b^2D_{3/2}-z^4P_{5/2}^0$
1396.088	200	71628.7	.000	$b^4F_{7/2}-y^2F_{5/2}^0$
1395.935	200	71636.6	.001	$b^4F_{5/2}-z^2G_{9/2}^0$
1395.466	400H	71660.6	-.001	$b^4F_{5/2}-z^2F_{5/2}^0$
1393.553	100B	71759.0	-.002	$a^2D_{5/2}-z^4F_{5/2}^0$
1390.611	400D	71910.8	-.012	$a^2F_{7/2}-z^4F_{7/2}^0$
1390.249	100	71929.6	.000	$a^2F_{5/2}-z^2D_{3/2}^0$
1388.278	80D	72031.7	-.011	$b^2D_{5/2}-z^4P_{5/2}^0$
1385.070	400	72198.5	.000	$b^4F_{9/2}-z^2G_{9/2}^0$
1384.883	80	72208.3	.000	$b^4P_{1/2}-z^2P_{1/2}^0$
1382.992	100	72307.0	.000	$b^2F_{5/2}-y^2F_{5/2}^0$
1381.505	200	72384.8	-.002	$a^2F_{5/2}-z^4F_{7/2}^0$
1379.578	600H	72485.9	-.009	$b^4F_{7/2}-y^4D_{7/2}^0$
1379.074	50	72512.4	-.003	$a^2F_{5/2}-y^2D_{3/2}^0$
1375.888	50	72680.3	.000	$b^2D_{3/2}-z^2P_{3/2}^0$
1373.174	80	72824.0	-.003	$b^2D_{5/2}-z^4D_{7/2}^0$
1372.007	200D	72885.9	.002	$b^4F_{9/2}-z^4D_{7/2}^0$
1370.741	80	72953.2	.006	$b^4P_{5/2}-x^2D_{3/2}^0$
1370.012	200	72992.1	-.011	$b^4P_{5/2}-z^2D_{5/2}^0$

Table I. Continued

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1364.336	100B	73295.7	.003	$a^2P_{3/2} - z^4D_{5/2}^0$
1356.792	1	73703.3	-.004	$c^2D_{5/2} - y^4F_{3/2}^0$
1356.299	30	73730.1	-.002	$b^2P_{1/2} - x^2P_{1/2}^0$
1354.484	400	73828.9	-.005	$b^4F_{5/2} - y^4D_{3/2}^0$
1353.545	500D	73880.1	-.003	$b^2F_{5/2} - x^2D_{5/2}^0$
1351.643	100	73984.0	-.007	$b^2D_{3/2} - z^2P_{1/2}^0$
1351.383	3	73998.3	.000	$b^4P_{3/2} - y^2P_{1/2}^0$
1350.219	40	74062.1	-.001	$b^4F_{3/2} - z^2F_{5/2}^0$
1347.407	50	74216.6	-.006	$c^2D_{3/2} - y^2P_{3/2}^0$
1346.819	80	74249.0	.000	$b^2F_{7/2} - x^2F_{5/2}^0$
1343.080	50	74455.7	-.004	$a^2F_{7/2} - z^2F_{7/2}^0$
1341.000	50	74571.2	-.001	$b^2F_{5/2} - x^2F_{7/2}^0$
1340.638	200	74591.4	-.002	$b^4F_{7/2} - y^2D_{5/2}^0$
1338.695	20	74699.6	-.004	$a^2P_{3/2} - z^2D_{3/2}^0$
1337.765	10	74751.5	-.005	$b^2P_{1/2} - x^4D_{1/2}^0$
1337.104	20	74788.5	.001	$b^4F_{5/2} - z^4S_{5/2}^0$
1336.823	20	74804.2	.003	$a^2F_{7/2} - y^4D_{5/2}^0$
1334.574	200	74930.3	-.005	$a^2F_{5/2} - z^2F_{5/2}^0$
1334.532	300	74932.6	-.007	$a^2G_{9/2} - z^4G_{9/2}^0$
1332.100	300	75069.4	-.002	$a^4P_{3/2} - z^4G_{5/2}^0$
1330.005	100	75187.7	.003	$d^2D_{5/2} - v^2D_{5/2}^0$
1329.499	200	75216.3	.009	$c^2D_{3/2} - x^2F_{5/2}^0$
1328.391	200	75279.0	-.003	$a^2F_{5/2} - y^4D_{5/2}^0$
1328.333	50	75282.3	-.004	$a^2P_{3/2} - y^2D_{3/2}^0$
1328.031	50	75299.4	.002	$b^2D_{3/2} - x^2D_{3/2}^0$
1327.359	50	75337.6	-.001	$b^2D_{3/2} - z^2D_{5/2}^0$
1323.847	20	75537.4	-.001	$b^4P_{3/2} - x^2D_{5/2}^0$
1323.515	10	75556.4	.002	$b^4P_{5/2} - y^2F_{7/2}^0$
1323.370	50	75564.7	.001	$b^4F_{5/2} - y^2F_{5/2}^0$
1321.772	50	75656.0	-.003	$a^4P_{5/2} - z^4G_{7/2}^0$
1320.053	100	75754.5	.000	$b^2D_{5/2} - x^2D_{3/2}^0$
1319.398	100B	75792.1	.005	$b^2D_{5/2} - z^2D_{5/2}^0$
1317.081	100	75925.5	-.001	$a^2D_{5/2} - z^4D_{5/2}^0$
1315.679	20	76006.4	-.002	$a^2D_{3/2} - z^4F_{5/2}^0$
1315.534	50	76014.8	.003	$a^2F_{5/2} - z^4D_{3/2}^0$
1313.929	50D	76107.6	.000	$a^2P_{3/2} - z^2S_{5/2}^0$
1313.014	20	76160.6	.003	$b^4P_{1/2} - y^2P_{1/2}^0$
1312.282	100H	76203.1	.002	$d^2D_{3/2} - v^2F_{5/2}^0$
1311.883	20B	76226.3	.000	$a^2G_{9/2} - z^4F_{7/2}^0$
1311.824	50	76229.7	.003	$b^4F_{3/2} - y^4D_{3/2}^0$
1310.825	10	76287.8	.003	$b^4F_{7/2} - z^4P_{5/2}^0$
1309.520	50D	76363.9	.000	$d^2D_{3/2} - v^2D_{3/2}^0$
1309.020	10	76393.0	.003	$b^4F_{7/2} - z^2G_{9/2}^0$
1308.537	10	76421.2	.003	$b^4F_{5/2} - y^4D_{7/2}^0$
1307.713	50	76469.4	.004	$b^4F_{9/2} - y^2G_{9/2}^0$
1305.806	100	76581.1	.002	$d^2D_{5/2} - v^2F_{7/2}^0$
1304.783	200	76641.1	-.004	$a^2H_{9/2} - z^4G_{7/2}^0$
1303.107	100B	76739.7	.000	$b^2F_{5/2} - y^2P_{3/2}^0$
1301.992	200	76805.4	-.003	$a^2H_{11/2} - z^4G_{9/2}^0$
1301.214	300	76851.3	-.001	$a^2F_{7/2} - z^4F_{9/2}^0$
1297.342	50	77080.7	.000	$b^4F_{7/2} - z^4D_{7/2}^0$
1297.003	100	77100.8	.000	$a^2D_{5/2} - z^2D_{3/2}^0$
1295.507	10B	77189.9	.001	$b^4F_{3/2} - z^4S_{5/2}^0$
1293.068	200BD	77335.5	-.001	$a^4P_{5/2} - z^4F_{5/2}^0$
1292.486	20	77370.3	-.006	$c^2D_{5/2} - y^4F_{5/2}^0$
1289.946	3	77522.6	-.002	$b^2P_{3/2} - x^2P_{3/2}^0$
1289.393	100	77555.9	.002	$a^2D_{5/2} - z^4F_{7/2}^0$
1288.910	100	77584.9	-.003	$a^2G_{7/2} - z^4G_{7/2}^0$
1287.274	200	77683.5	.000	$a^2D_{5/2} - y^2D_{3/2}^0$
1286.336	5	77740.2	.000	$b^2F_{5/2} - x^2F_{5/2}^0$
1285.003	20	77820.8	-.003	$b^4P_{5/2} - x^2F_{7/2}^0$
1283.103	100	77936.1	.003	$b^2D_{3/2} - y^2P_{1/2}^0$
1282.612	1	77965.9	.003	$b^4F_{3/2} - y^2F_{5/2}^0$
1281.252	5	78048.7	.001	$a^2P_{3/2} - y^4D_{5/2}^0$
1280.079	200	78120.2	-.001	$a^4P_{1/2} - z^4F_{3/2}^0$
1277.819	50	78258.3	-.002	$c^2D_{3/2} - y^4F_{3/2}^0$
1276.842	100B	78318.2	.001	$a^2F_{7/2} - z^2G_{7/2}^0$

Table I. Continued

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1276.453	200B	78342.1	.003	$a^2F_{7/2} - z^2F_{5/2}^0$
1275.561	0	78396.9	.004	$b^4P_{3/2} - y^2P_{3/2}^0$
1274.873	0	78439.2	.002	$b^4F_{5/2} - z^4P_{3/2}^0$
1273.447	50	78527.0	.003	$b^4F_{5/2} - y^2D_{3/2}^0$
1273.151	100	78545.3	.001	$a^4F_{7/2} - z^4G_{5/2}^0$
1269.286	20	78784.5	.004	$a^2P_{3/2} - z^4D_{3/2}^0$
1269.155	100	78792.6	.003	$a^2F_{5/2} - z^2G_{5/2}^0$
1268.765	100	78816.8	-.001	$a^2F_{5/2} - z^2F_{5/2}^0$
1261.605	5	79264.1	.004	$a^2G_{7/2} - z^4F_{5/2}^0$
1259.485	0	79397.5	.003	$b^4P_{3/2} - x^2F_{5/2}^0$
1258.253	100B	79475.3	.002	$b^2D_{3/2} - x^2D_{5/2}^0$
1255.924	0H	79622.7	.006	$b^4F_{9/2} - z^2H_{11/2}^0$
1255.144	300	79672.1	.004	$a^4P_{3/2} - z^4F_{3/2}^0$
1251.095	200	79930.0	.005	$b^2D_{5/2} - x^2D_{5/2}^0$
1250.867	50B	79944.6	.002	$a^2D_{3/2} - z^4D_{1/2}^0$
1250.176	5	79988.7	.006	$b^4P_{5/2} - y^2P_{3/2}^0$
1249.236	1	80048.9	.006	$b^4F_{7/2} - z^2D_{5/2}^0$
1249.049	50	80060.9	.002	$d^2D_{5/2} - v^2P_{3/2}^0$
1248.464	50B	80098.4	.008	$a^2P_{1/2} - z^4D_{1/2}^0$
1248.426	50B	80100.9	.006	$a^2D_{5/2} - z^2F_{7/2}^0$
1248.154	10	80118.3	-.003	$a^2S_{1/2} - w^2P_{3/2}^0$
1247.374	50	80168.4	.006	$b^4F_{3/2} - z^4P_{1/2}^0$
1247.308	100B	80172.7	.001	$a^2D_{3/2} - z^4D_{5/2}^0$
1246.519	20	80223.4	.008	$b^4F_{5/2} - z^4P_{5/2}^0$
1242.856	200	80459.8	.000	$a^2F_{7/2} - y^2G_{7/2}^0$
1241.314	20	80559.8	-.001	$b^4P_{1/2} - y^2P_{3/2}^0$
1240.360	300	80621.8	-.002	$b^2D_{5/2} - x^2F_{7/2}^0$
1239.711	50	80664.0	.005	$b^4F_{7/2} - y^2G_{9/2}^0$
1239.408	50	80683.7	.002	$b^4F_{9/2} - x^2F_{7/2}^0$
1237.002	50	80840.6	.001	$b^4F_{3/2} - z^2P_{3/2}^0$
1236.271	10	80888.4	-.001	$b^2P_{3/2} - y^4P_{3/2}^0$
1235.568	300	80934.4	-.002	$a^2F_{5/2} - y^2G_{7/2}^0$
1235.226	100	80956.8	.006	$b^2F_{7/2} - y^4F_{5/2}^0$
1234.805	50	80984.4	.004	$a^2F_{5/2} - y^4D_{3/2}^0$
1234.725	100	80989.7	.000	$b^4P_{5/2} - x^2F_{5/2}^0$
1232.023	200	81167.3	.001	$a^2G_{9/2} - z^4F_{9/2}^0$
1231.740	50	81186.0	.003	$a^2D_{5/2} - z^4D_{3/2}^0$
1229.279	100	81348.5	-.005	$a^2D_{3/2} - z^2D_{3/2}^0$
1227.029	20	81497.7	.001	$c^2D_{3/2} - x^2P_{1/2}^0$
1226.958	200	81502.4	-.008	$a^4P_{5/2} - z^4D_{5/2}^0$
			.001	$a^2P_{1/2} - z^2D_{3/2}^0$
1225.690	300H	81586.7	-.002	$a^2P_{3/2} - z^2F_{5/2}^0$
1225.563	100	81595.2	.003	$d^2D_{3/2} - v^2P_{1/2}^0$
1223.208	20	81752.2	.004	$a^4F_{5/2} - z^4G_{5/2}^0$
1221.894	100B	81840.2	.007	$a^2F_{7/2} - z^2H_{9/2}^0$
1220.628	10	81925.0	.000	$c^2D_{3/2} - y^4F_{5/2}^0$
1220.547	50	81930.5	.006	$a^2D_{3/2} - y^2D_{3/2}^0$
			.004	$b^2G_{7/2} - x^4D_{5/2}^0$
1220.342	50	81944.2	.007	$a^2F_{5/2} - z^4S_{3/2}^0$
1218.242	100	82085.5	-.005	$a^2P_{1/2} - y^2D_{3/2}^0$
1215.857	100H	82246.5	-.003	$a^2F_{7/2} - y^2F_{5/2}^0$
1214.545	100	82335.4	-.003	$b^2D_{3/2} - y^2P_{3/2}^0$
1213.021	20	82438.8	.004	$b^4P_{3/2} - y^4F_{5/2}^0$
1211.018	50	82575.2	.002	$b^2P_{1/2} - x^2P_{3/2}^0$
1210.290	10	82624.8	.007	$b^4F_{3/2} - z^4P_{5/2}^0$
1210.154	100	82634.1	.004	$a^2G_{9/2} - z^2G_{7/2}^0$
1209.519	100	82677.5	-.003	$a^4P_{5/2} - z^2D_{3/2}^0$
1208.885	200	82720.9	.000	$a^2F_{5/2} - y^2F_{5/2}^0$
1207.871	200	82790.3	-.003	$b^2D_{5/2} - y^2P_{5/2}^0$
1207.386	100	82823.6	-.002	$a^2H_{9/2} - z^4G_{9/2}^0$
1206.120	100	82910.5	.002	$a^2P_{1/2} - z^2S_{5/2}^0$
1204.235	100	83040.3	.001	$a^2H_{11/2} - z^4F_{9/2}^0$
1203.325	50	83103.1	.000	$a^2F_{7/2} - y^4D_{7/2}^0$
1202.898	300	83132.6	-.001	$a^4P_{5/2} - z^4F_{7/2}^0$
1201.058	50	83259.9	.002	$a^4P_{5/2} - y^2D_{3/2}^0$
1199.961	200	83336.0	-.005	$b^2D_{3/2} - x^2F_{5/2}^0$
1198.598	5	83430.8	.000	$a^2G_{7/2} - z^4D_{5/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1196.495	50	83577.4	.001	$a^2F_{5/2} - y^4D_{7/2}^0$
1196.321	200	83589.6	-.004	$a^4F_{9/2} - z^4G_{7/2}^0$
1194.325	50	83729.3	.002	$b^4F_{3/2} - z^2P_{3/2}^0$
1194.190	50	83738.8	-.004	$b^2G_{9/2} - y^4F_{7/2}^0$
1193.788	3	83767.0	.005	$a^2G_{7/2} - z^4G_{9/2}^0$
1193.447	200	83790.9	-.004	$b^2D_{5/2} - x^2F_{5/2}^0$
1191.870	50	83901.8	-.004	$c^2D_{5/2} - x^4D_{5/2}^0$
1191.231	10	83946.8	.008	$b^4F_{5/2} - x^2D_{5/2}^0$
1190.982	200H	83964.3	-.004	$a^2D_{5/2} - z^2G_{7/2}^0$
1190.643	200	83988.2	-.003	$a^2D_{5/2} - z^2F_{5/2}^0$
1188.813	100	84117.5	.000	$a^2H_{9/2} - z^4F_{7/2}^0$
1187.831	0	84187.1	.002	$b^4F_{7/2} - x^2D_{5/2}^0$
1186.169	300H	84305.0	-.006	$a^4P_{3/2} - z^4F_{5/2}^0$
1185.214	3	84372.9	.001	$c^2D_{5/2} - y^4F_{7/2}^0$
1180.671	300	84697.6	-.001	$a^2D_{3/2} - y^4D_{5/2}^0$
1180.437	3	84714.4	.002	$a^2P_{3/2} - z^4S_{3/2}^0$
1179.579	200	84776.0	-.001	$a^2G_{9/2} - y^2G_{7/2}^0$
1178.163	5	84877.9	.008	$b^4F_{7/2} - x^2F_{7/2}^0$
1175.620	100D	85061.5	-.001	$a^2G_{7/2} - z^4F_{7/2}^0$
1175.166	200	85094.4	-.001	$a^2G_{9/2} - z^4G_{11/2}^0$
1174.216	50	85163.2	.002	$a^2D_{3/2} - y^4D_{1/2}^0$
1173.590	100	85208.6	.003	$a^2F_{7/2} - y^2D_{5/2}^0$
1172.469	800	85290.1	-.002	$a^4F_{3/2} - z^4G_{5/2}^0$
1172.092	5	85317.5	.001	$a^2P_{1/2} - y^4D_{1/2}^0$
1170.501	10	85433.5	.000	$a^2D_{3/2} - z^4D_{3/2}^0$
1169.718	100	85490.7	.000	$a^2P_{3/2} - y^2F_{5/2}^0$
1168.391	50	85587.8	.000	$a^2P_{1/2} - z^4D_{3/2}^0$
1167.169	300H	85677.4	.005	$a^4P_{5/2} - z^2F_{7/2}^0$
1165.668	1	85787.7	.003	$c^2D_{5/2} - x^2P_{3/2}^0$
1163.767	5	85927.9	.004	$a^2S_{1/2} - v^2D_{3/2}^0$
1163.588	10	85941.1	.001	$b^2P_{1/2} - y^4P_{3/2}^0$
1162.430	200	86026.7	-.001	$a^4P_{5/2} - y^4D_{5/2}^0$
1161.426	100B	86101.1	.000	$a^4F_{7/2} - z^4G_{7/2}^0$
1161.362	500	86105.8	{ -.003	$a^2D_{5/2} - y^2G_{7/2}^0$
			{ -.002	$b^4P_{3/2} - y^4F_{5/2}^0$
1160.677	10	86156.6	{ -.009	$a^2D_{5/2} - y^4D_{3/2}^0$
			{ -.002	$a^2G_{9/2} - z^2H_{9/2}^0$
1158.001	20H	86355.7	-.002	$a^4F_{5/2} - z^4F_{3/2}^0$
1153.894	100	86663.1	-.004	$a^2H_{9/2} - z^2F_{7/2}^0$
1153.523	100	86690.9	-.002	$a^4P_{1/2} - z^4D_{1/2}^0$
1152.567	100	86762.9	-.003	$a^4P_{5/2} - z^4D_{3/2}^0$
1151.652	0	86831.8	.003	$b^2D_{5/2} - y^4F_{3/2}^0$
1150.674	50	86905.6	.000	$a^2F_{7/2} - z^4P_{5/2}^0$
1149.860	50	86967.1	.002	$a^2H_{11/2} - z^4G_{11/2}^0$
1149.287	3H	87010.5	.004	$a^2F_{7/2} - z^2G_{9/2}^0$
1147.892	500	87116.2	-.003	$a^2D_{5/2} - z^4S_{3/2}^0$
1143.914	50	87419.2	.000	$a^2G_{9/2} - y^4D_{7/2}^0$
1143.004	3	87488.8	.000	$b^2F_{7/2} - x^4D_{5/2}^0$
1141.462	100	87606.9	-.003	$a^2G_{7/2} - z^2F_{7/2}^0$
1141.371	1H	87613.9	.000	$d^2D_{3/2} - v^2P_{3/2}^0$
1140.335	10HB	87693.5	-.002	$a^2P_{3/2} - z^4P_{1/2}^0$
1140.268	500	87698.7	-.005	$a^2F_{7/2} - z^4D_{7/2}^0$
1138.422	5	87840.9	.004	$b^4P_{1/2} - x^2P_{1/2}^0$
1137.758	100	87892.2	-.001	$a^2D_{5/2} - y^2F_{5/2}^0$
1136.934	100	87955.9	-.003	$a^2G_{7/2} - y^4D_{5/2}^0$
1135.980	100	88029.7	.000	$a^2H_{11/2} - z^2H_{9/2}^0$
1135.143	500	88094.6	-.005	$a^4P_{1/2} - z^2D_{3/2}^0$
1134.778	2	88123.0	.002	$b^4F_{5/2} - x^2D_{5/2}^0$
1134.138	2	88172.7	.001	$a^2F_{5/2} - z^4D_{7/2}^0$
1133.329	100	88235.6	-.003	$a^2D_{3/2} - z^2F_{5/2}^0$
1133.237	20	88242.8	.003	$a^4P_{3/2} - z^4D_{1/2}^0$
1131.664	30	88365.5	-.002	$a^2P_{3/2} - z^4P_{3/2}^0$
1130.539	300H	88453.4	-.003	$a^2P_{3/2} - y^2D_{5/2}^0$
1130.310	100H	88471.3	-.002	$a^4P_{3/2} - z^4D_{5/2}^0$
1130.146	50	88484.1	.001	$a^2F_{5/2} - z^2P_{3/2}^0$
1127.691	20	88676.8	.003	$a^4P_{1/2} - y^2D_{3/2}^0$
1127.777	5	88748.7	.001	$a^2D_{5/2} - y^4D_{7/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1122.859	30	89058.4	.002	$a^2H_{9/2} - z^4F_{9/2}^0$
1121.633	10H	89155.7	-.002	$b^2G_{9/2} - x^4D_{7/2}^0$
1119.710	500	89308.8	-.008	$a^4F_{5/2} - z^4G_{7/2}^0$
1117.286	20	89502.6	-.001	$a^4P_{1/2} - z^2S_{1/2}^0$
1116.813	5	89540.5	.000	$a^4P_{5/2} - z^2G_{7/2}^0$
1116.512	1	89564.6	-.002	$a^4P_{5/2} - z^2F_{5/2}^0$
1115.863	100	89616.7	-.001	$b^2D_{3/2} - x^2P_{1/2}^0$
1115.491	50	89646.6	-.001	$a^4P_{3/2} - z^2D_{3/2}^0$
1113.934	500	89771.9	-.001	$a^4F_{9/2} - z^4G_{9/2}^0$
1113.704	10	89790.5	-.004	$c^2D_{5/2} - x^4D_{7/2}^0$
1112.430	500	89893.3	-.003	$a^4F_{3/2} - z^4F_{3/2}^0$
1111.081	30	90002.4	.000	$a^2G_{7/2} - z^4F_{9/2}^0$
1109.263	20	90149.9	-.001	$a^4P_{3/2} - z^4P_{3/2}^0$
1108.284	500	90229.6	-.004	$a^4P_{3/2} - y^2D_{3/2}^0$
1107.341	50	90306.4	-.002	$b^4P_{1/2} - x^4D_{3/2}^0$
1106.990	1	90335.1	-.005	$c^2D_{5/2} - w^2D_{9/2}^0$
1106.892	2	90343.1	.000	$c^2D_{3/2} - x^2P_{3/2}^0$
1106.149	100	90403.7	-.005	$a^2D_{3/2} - y^4D_{3/2}^0$
1104.997	0	90498.0	.011	$b^2D_{5/2} - y^4F_{5/2}^0$
1104.659	100	90525.7	-.001	$a^2H_{9/2} - z^2G_{7/2}^0$
1104.269	100H	90557.6	-.001	$a^2P_{1/2} - y^4D_{3/2}^0$
1103.293	20	90637.8	.002	$b^2D_{3/2} - x^4D_{1/2}^0$
1102.937	300	90667.0	-.001	$a^2F_{7/2} - z^2D_{5/2}^0$
1102.471	5	90705.3	-.001	$b^2F_{7/2} - w^2D_{5/2}^0$
1101.725	50	90766.8	.000	$a^2D_{5/2} - z^4P_{3/2}^0$
1100.660	300	90854.6	.000	$a^2D_{5/2} - y^2D_{5/2}^0$
1099.143	5H	90980.0	.000	$b^2F_{5/2} - x^4D_{5/2}^0$
1099.046	800	90988.0	-.003	$a^4F_{5/2} - z^4F_{5/2}^0$
1098.239	200	91054.9	-.001	$a^4P_{3/2} - z^2S_{1/2}^0$
1098.110	30	91065.6	.005	$a^4F_{9/2} - z^4F_{7/2}^0$
1097.651	300	91103.6	-.002	$a^2F_{5/2} - x^2D_{3/2}^0$
1097.203	2	91140.8	.007	$a^2F_{5/2} - z^2D_{5/2}^0$
1095.844	100	91253.9	.002	$a^2P_{3/2} - z^2P_{3/2}^0$
1095.511	50	91281.6	.004	$a^2F_{7/2} - y^2G_{9/2}^0$
1094.970	200	91326.7	.002	$a^2G_{9/2} - z^2G_{9/2}^0$
1094.527	400	91363.7	-.004	$a^2D_{3/2} - z^4S_{3/2}^0$
1094.262	20	91385.8	.000	$b^2G_{7/2} - y^4P_{5/2}^0$
1093.477	2	91451.4	.001	$b^2F_{5/2} - y^4F_{7/2}^0$
1093.259	800	91469.6	-.002	$a^2G_{7/2} - z^2G_{7/2}^0$
1092.973	200	91493.6	-.001	$a^2G_{7/2} - z^2F_{5/2}^0$
1092.687	100	91517.5	.001	$a^2P_{1/2} - z^4S_{3/2}^0$
1090.833	3	91673.1	.000	$c^2D_{3/2} - w^2D_{5/2}^0$
1090.132	3	91732.0	.005	$a^4P_{5/2} - y^4D_{3/2}^0$
1088.026	50B	91909.6	-.001	$a^4P_{1/2} - y^4D_{1/2}^0$
1087.582	20D	91947.1	.001	$a^4F_{7/2} - z^4D_{5/2}^0$
1086.786	100	92014.4	.000	$a^2G_{9/2} - z^4D_{7/2}^0$
1084.838	50	92179.7	-.001	$a^4P_{1/2} - z^4D_{3/2}^0$
1083.616	300	92283.6	.000	$a^4F_{7/2} - z^4G_{9/2}^0$
1080.484	40H	92551.1	.003	$a^2D_{5/2} - z^4P_{5/2}^0$
1080.410	100H	92557.5	-.001	$a^2P_{3/2} - z^2P_{1/2}^0$
1079.478	50	92637.4	.001	$b^4P_{3/2} - x^4D_{5/2}^0$
1079.135	2	92666.8	.004	$a^2H_{9/2} - y^2G_{7/2}^0$
1078.839	60	92692.2	.003	$a^4P_{5/2} - z^4S_{3/2}^0$
1076.824	0	92865.7	.009	$b^2F_{5/2} - x^2P_{3/2}^0$
1075.439	40	92985.3	.002	$a^2H_{9/2} - z^4G_{11/2}^0$
1074.748	3	93045.1	.000	$b^2P_{3/2} - w^2P_{3/2}^0$
1072.963	800	93199.9	.000	$a^2H_{11/2} - z^2G_{9/2}^0$
1072.597	50	93231.7	.003	$a^2F_{7/2} - y^2F_{7/2}^0$
1071.314	30	93343.3	{ -.006	$c^2D_{5/2} - y^4P_{5/2}^0$
			{ -.009	$a^2D_{5/2} - z^4D_{7/2}^0$
1070.989	5	93371.6	.004	$b^2G_{9/2} - y^4F_{9/2}^0$
1070.932	0	93376.6	.009	$b^2F_{7/2} - x^4D_{7/2}^0$
1070.847	0	93384.0	.003	$b^4F_{3/2} - y^2P_{3/2}^0$
1069.959	5	93461.5	.002	$a^4P_{3/2} - y^4D_{1/2}^0$
1068.628	500	93577.9	-.002	$a^4F_{7/2} - z^4F_{7/2}^0$
1068.247	500	93611.3	{ -.003	$a^2G_{7/2} - y^2G_{7/2}^0$
			{ -.001	$a^4F_{9/2} - z^2F_{7/2}^0$

Table I. Continued

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1067.742	200	93655.6	-.001	$a^2D_{5/2} - z^2P_{3/2}^0$
1067.131	50	93709.2	-.003	$c^2D_{3/2} - y^4P_{3/2}^0$
1066.873	100	93731.9	.000	$a^4P_{3/2} - z^4D_{3/2}^0$
1065.269	10	93873.0	.003	$a^2P_{3/2} - x^2D_{3/2}^0$
1064.838	20H	93911.0	.003	$a^2P_{3/2} - z^2D_{5/2}^0$
1063.286	500	94048.1	-.002	$a^2H_{9/2} - z^2H_{9/2}^0$
1061.610	20	94196.6	-.001	$b^2F_{5/2} - w^2D_{5/2}^0$
1061.240	40	94229.4	.001	$b^4P_{5/2} - x^4D_{5/2}^0$
1060.164	50	94325.0	.003	$a^4P_{5/2} - y^4D_{5/2}^0$
1059.970	50	94342.3	-.001	$a^2D_{3/2} - z^4P_{1/2}^0$
1058.243	100	94496.3	.002	$a^2P_{1/2} - z^4P_{1/2}^0$
1057.919	100	94525.2	.001	$a^4F_{5/2} - z^4F_{5/2}^0$
1055.957	10	94700.8	.002	$b^4P_{5/2} - y^4F_{7/2}^0$
1055.348	0	94755.5	.003	$b^4F_{7/2} - y^4F_{5/2}^0$
1054.802	100	94804.5	.003	$a^2F_{7/2} - x^2D_{5/2}^0$
1053.854	20	94889.8	.000	$c^2D_{3/2} - w^2D_{3/2}^0$
1052.725	20	94991.6	.003	$a^2G_{7/2} - z^2H_{9/2}^0$
1052.474	0	95014.2	-.001	$a^2D_{3/2} - z^4P_{3/2}^0$
1051.511	10B	95101.2	.008	$a^2D_{3/2} - y^2D_{5/2}^0$
1050.920	500	95154.7	-.005	$a^4F_{5/2} - z^4D_{5/2}^0$
1050.772	20	95168.1	.003	$a^2P_{1/2} - z^4P_{3/2}^0$
1049.549	20	95279.0	.003	$a^2F_{5/2} - x^2D_{5/2}^0$
1049.200	500	95310.7	-.004	$a^2H_{9/2} - y^4D_{7/2}^0$
1048.244	300	95397.6	-.001	$a^2G_{7/2} - y^2F_{5/2}^0$
1047.165	100	95495.9	.002	$a^2F_{7/2} - x^2F_{7/2}^0$
1046.044	200	95598.3	-.003	$a^2G_{9/2} - y^2G_{9/2}^0$
1043.256	1H	95853.8	.002	$b^4P_{3/2} - w^2D_{5/2}^0$
1041.988	5	95970.4	.002	$a^2F_{5/2} - x^2F_{7/2}^0$
1041.589	500	96007.2	-.002	$a^4F_{9/2} - z^4F_{9/2}^0$
1040.334	100	96123.0	.000	$a^4F_{7/2} - z^2F_{7/2}^0$
1039.152	50	96232.3	.000	$b^2F_{5/2} - y^4P_{3/2}^0$
1038.917	100	96254.1	.002	$a^2G_{7/2} - y^4D_{7/2}^0$
1038.290	20B	96312.2	.005	$a^2D_{5/2} - z^2D_{5/2}^0$
1038.104	10H	96329.5	.003	$a^4F_{5/2} - z^2D_{3/2}^0$
1037.952	300	96343.6	-.004	$a^4P_{5/2} - z^4P_{3/2}^0$
1036.570	800	96472.0	-.001	$a^4F_{7/2} - y^4D_{5/2}^0$
1036.163	100	96509.9	.001	$a^2P_{3/2} - y^2P_{1/2}^0$
1035.910	100	96533.5	.003	$a^4P_{3/2} - z^2F_{5/2}^0$
1033.221	50	96784.7	.002	$a^4F_{5/2} - z^4F_{7/2}^0$
1032.326	5H	96868.6	.000	$b^2F_{5/2} - x^4D_{7/2}^0$
1031.859	300	96912.5	.000	$a^4F_{5/2} - y^2D_{3/2}^0$
1031.671	100	96930.1	-.001	$b^2F_{7/2} - y^4P_{5/2}^0$
1029.348	5	97148.9	.006	$a^4P_{1/2} - y^4D_{5/2}^0$
1029.040	3	97178.0	.003	$a^2S_{1/2} - v^2P_{3/2}^0$
1026.902	100	97380.3	.002	$b^2G_{7/2} - w^2F_{5/2}^0$
1026.556	1	97413.1	.001	$b^2F_{5/2} - w^2D_{3/2}^0$
1026.419	200	97426.1	.001	$b^4F_{3/2} - y^4F_{5/2}^0$
1026.210	100	97445.9	.000	$b^4P_{5/2} - w^2D_{5/2}^0$
1025.948	200	97470.8	.002	$a^2H_{11/2} - y^2G_{9/2}^0$
1025.137	500	97547.9	.001	$a^2G_{9/2} - y^2F_{7/2}^0$
1024.970	50	97563.8	.003	$b^4F_{9/2} - y^4F_{7/2}^0$
1021.560	20	97889.5	.003	$b^4P_{3/2} - y^4P_{3/2}^0$
1021.476	1	97897.6	.004	$c^2D_{3/2} - y^4P_{5/2}^0$
1019.897	30	98049.1	.000	$a^2P_{3/2} - x^2D_{5/2}^0$
1019.390	5	98097.9	-.001	$b^2P_{1/2} - w^2P_{3/2}^0$
1019.274	20	98109.0	.004	$a^4P_{1/2} - z^4S_{3/2}^0$
1019.082	100	98127.5	.003	$a^4P_{5/2} - z^4P_{5/2}^0$
1018.965	40	98138.8	.003	$a^2F_{5/2} - y^2P_{3/2}^0$
1016.677	100	98359.7	.004	$a^2G_{7/2} - y^2D_{5/2}^0$
1015.604	200	98463.6	.001	$a^4F_{3/2} - z^4D_{1/2}^0$
1015.042	0	98518.1	.007	$a^4F_{7/2} - z^4F_{9/2}^0$
1013.534	1	98664.7	.004	$a^2F_{7/2} - x^2F_{5/2}^0$
1013.254	100	98691.9	{ -.003 -.002	$b^4F_{5/2} - y^4F_{5/2}^0$ $a^4F_{3/2} - z^4D_{5/2}^0$
1012.649	0	98750.9	.005	$a^2G_{9/2} - z^2H_{11/2}^0$
1011.587	2	98854.6	.005	$b^2P_{3/2} - v^2D_{3/2}^0$

Table I. Continued

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
1011.354	30	98877.3	.003	$a^2D_{5/2} - y^2F_{7/2}^0$
1010.957	40B	98916.2	.007	$b^2D_{5/2} - x^2P_{3/2}^0$
1010.914	60B	98920.4	.002	$a^4P_{5/2} - z^4D_{7/2}^0$
1009.384	5	99070.3	.004	$b^4P_{3/2} - w^2D_{3/2}^0$
1008.681	100	99139.4	.002	$a^2F_{5/2} - x^2F_{5/2}^0$
1008.006	5	99205.8	.004	$a^2D_{3/2} - z^2P_{1/2}^0$
1007.889	2	99217.3	.008	$a^2H_{9/2} - z^2G_{9/2}^0$
1007.744	5	99231.6	.004	$a^4P_{5/2} - z^2P_{5/2}^0$
1006.669	80	99337.5	-.001	$c^2D_{5/2} - w^2F_{5/2}^0$
1006.439	0	99360.2	.002	$a^2P_{1/2} - z^2P_{1/2}^0$
1003.860	500	99615.5	.001	$a^4F_{9/2} - y^2G_{7/2}^0$
1003.230	5	99678.0	.010	$a^4F_{5/2} - y^4D_{5/2}^0$
1002.753	50	99725.5	.004	$b^4P_{3/2} - y^4P_{1/2}^0$
1002.091	1	99791.3	.006	$b^2D_{3/2} - w^2D_{5/2}^0$
1001.883	200	99812.1	.001	$a^2G_{9/2} - x^2F_{7/2}^0$
1001.335	100	99866.7	.005	$a^4F_{3/2} - z^2D_{3/2}^0$
1000.953	5	99904.8	.008	$a^2H_{9/2} - z^4D_{7/2}^0$
1000.664	200	99933.6	.003	$a^4F_{9/2} - z^4G_{11/2}^0$
1000.142	80	99985.8	.000	$a^4F_{7/2} - z^2G_{7/2}^0$
999.435	1H	100056.5	.003	$a^2G_{7/2} - z^4P_{5/2}^0$
995.869	50	100414.8	.002	$a^4F_{5/2} - z^4D_{3/2}^0$
995.805	50	100421.3	.000	$b^2F_{5/2} - y^4P_{5/2}^0$
995.519	20	100450.1	{ -.002 .004	$a^4F_{5/2} - y^2D_{3/2}^0$ $a^2D_{5/2} - x^2D_{5/2}^0$
994.435	0	100559.6	.004	$a^2D_{3/2} - z^2D_{5/2}^0$
993.795	200	100624.4	.000	$a^2H_{11/2} - z^2H_{11/2}^0$
993.418	10HB	100662.6	.001	$b^4P_{5/2} - w^2D_{3/2}^0$
992.760	40H	100729.3	.001	$b^4F_{5/2} - x^4D_{3/2}^0$
990.995	5	100908.7	.002	$a^2P_{3/2} - y^2P_{3/2}^0$
990.745	50	100934.1	.000	$b^2G_{9/2} - w^2F_{7/2}^0$
989.187	2	101093.1	-.001	$b^4G_{3/2} - y^4F_{5/2}^0$
987.819	1H	101233.1	.002	$b^4P_{1/2} - w^2D_{3/2}^0$
987.410	30	101275.1	.004	$a^4F_{3/2} - z^2S_{1/2}^0$
987.293	50	101287.1	.002	$b^4F_{7/2} - x^4D_{5/2}^0$
987.073	1H	101309.6	.008	$c^2D_{5/2} - w^2P_{3/2}^0$
983.414	20	101686.6	.005	$b^4F_{3/2} - x^4D_{1/2}^0$
982.716	40	101758.8	.000	$b^4F_{7/2} - y^4F_{7/2}^0$
981.830	0	101850.6	.006	$a^4P_{5/2} - x^2D_{3/2}^0$
981.462	5	101888.8	{ -.004 .003	$b^4P_{1/2} - y^4P_{1/2}^0$ $a^4P_{5/2} - z^2D_{5/2}^0$
979.643	0	102078.0	.007	$b^4P_{3/2} - y^4P_{5/2}^0$
979.169	2	102127.4	-.001	$a^4F_{7/2} - y^2G_{7/2}^0$
977.916	1	102258.3	.005	$a^4F_{9/2} - y^4D_{7/2}^0$
971.580	0	102925.1	-.004	$b^2F_{7/2} - w^2F_{5/2}^0$
971.048	40	102981.5	-.003	$b^4F_{9/2} - x^4D_{7/2}^0$
969.379	10	103158.8	.000	$a^2D_{3/2} - y^2P_{1/2}^0$
969.059	5	103192.9	.000	$a^4F_{5/2} - z^2G_{7/2}^0$
968.836	0	103216.6	{ -.001 .002	$a^4F_{3/2} - y^4D_{5/2}^0$ $a^4F_{5/2} - z^2F_{5/2}^0$
967.961	10	103309.9	.004	$a^2D_{5/2} - y^2P_{3/2}^0$
966.289	0	103488.7	.004	$a^2H_{9/2} - y^2G_{9/2}^0$
966.108	2	103508.1	.000	$a^4F_{7/2} - z^2H_{9/2}^0$
962.334	10	103914.0	-.002	$a^4F_{7/2} - y^2F_{5/2}^0$
961.976	10	103952.7	-.001	$a^4F_{3/2} - z^4D_{3/2}^0$
957.554	0	104432.8	.003	$a^2G_{7/2} - y^2G_{9/2}^0$
956.899	10	104504.2	-.005	$b^4F_{7/2} - w^2D_{5/2}^0$
955.124	1	104698.4	-.005	$a^2D_{3/2} - x^2D_{5/2}^0$
952.351	1	105003.3	-.004	$b^2G_{7/2} - v^2F_{5/2}^0$
951.498	0	105097.4	-.003	$a^4P_{3/2} - z^4P_{5/2}^0$
950.352	0	105224.2	-.008	$b^4F_{5/2} - x^4D_{5/2}^0$
950.275	0	105232.7	-.007	$b^2P_{3/2} - v^2D_{5/2}^0$
948.412	10	105439.4	-.002	$a^2H_{9/2} - y^2F_{7/2}^0$
946.122	1	105694.6	.001	$b^4F_{5/2} - y^4F_{7/2}^0$
944.605	0	105864.4	.011	$c^2D_{3/2} - w^2P_{3/2}^0$
943.156	1H	106027.0	.000	$a^4F_{5/2} - x^2D_{5/2}^0$
941.917	10	106166.5	.001	$a^4F_{9/2} - z^2G_{9/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
940.001	1	106382.9	.002	$a^2G_{7/2}-y^2F_{5/2}^0$
937.710	400	106642.8	-.002	$a^2H_{9/2}-z^2H_{11/2}^0$
937.046	350	106718.3	.000	$a^4P_{5/2}-x^2F_{7/2}^0$
936.730	350	106754.3	.000	$a^4F_{3/2}-z^2F_{5/2}^0$
935.852	500	106854.5	-.004	$a^4F_{3/2}-z^4D_{3/2}^0$
935.665	100	106875.9	.004	$a^4F_{7/2}-y^2D_{5/2}^0$
934.934	50	106959.4	.004	$c^2D_{5/2}-v^2F_{5/2}^0$
933.623	200	107109.6	.001	$b^4F_{5/2}-x^2P_{3/2}^0$
933.522	500	107121.2	-.006	$c^2D_{5/2}-v^2D_{3/2}^0$
932.852	500	107198.1	-.002	$a^4F_{5/2}-y^2F_{5/2}^0$
932.245	300	107267.9	-.005	$b^4F_{3/2}-y^4F_{9/2}^0$
929.735	30	107557.5	.002	$a^4P_{1/2}-x^2D_{3/2}^0$
928.473	500	107703.7	.001	$a^2D_{3/2}-y^2P_{3/2}^0$
928.407	400	107711.4	-.003	$a^2H_{9/2}-x^2F_{7/2}^0$
926.909	100	107885.5	.005	$a^2P_{1/2}-y^2P_{3/2}^0$
926.303	400	107956.0	.001	$a^2F_{5/2}-x^4D_{3/2}^0$
926.121	100	107977.3	.000	$a^2G_{7/2}-x^2D_{5/2}^0$
925.299	50	108073.2	.004	$a^4F_{5/2}-y^4D_{7/2}^0$
924.299	100	108190.1	.002	$b^4P_{3/2}-w^2F_{5/2}^0$
922.600	350	108389.3	.002	$a^2P_{3/2}-x^2P_{1/2}^0$
922.173	50	108439.5	-.003	$b^2F_{5/2}-w^2P_{3/2}^0$
921.164	250	108558.3	.001	$b^4F_{5/2}-w^2D_{5/2}^0$
921.035	500	108573.5	-.001	$a^2F_{3/2}-x^2F_{5/2}^0$
920.659	50	108617.8	-.004	$a^4F_{7/2}-z^4P_{5/2}^0$
920.408	450	108647.5	-.002	$a^2P_{3/2}-y^4F_{5/2}^0$
920.147	350	108678.3	-.002	$b^2F_{5/2}-w^2F_{7/2}^0$
918.946	300	108820.3	-.002	$a^2G_{7/2}-x^2F_{5/2}^0$
918.627	250	108858.1	.000	$a^4F_{7/2}-z^2G_{9/2}^0$
918.386	150	108886.7	.001	$a^4P_{3/2}-x^2D_{3/2}^0$
918.088	200	108922.0	.002	$a^4P_{3/2}-x^2D_{3/2}^0$
916.258	350	109139.6	.003	$a^4P_{3/2}-x^2D_{3/2}^0$
915.656	25	109211.3	-.002	$b^2P_{1/2}-v^2P_{1/2}^0$
914.360	500	109366.1	.003	$a^2P_{3/2}-x^4D_{1/2}^0$
913.144	50	109511.8	-.003	$a^4F_{7/2}-z^4D_{7/2}^0$
910.050	500	109884.1	-.006	$b^4F_{3/2}-x^2P_{3/2}^0$
909.127	200	109995.6	-.014	$a^4F_{3/2}-z^4S_{3/2}^0$
908.219	500	110105.6	.000	$a^4F_{5/2}-z^4P_{3/2}^0$
905.180	15	110475.3	-.004	$b^2P_{3/2}-v^2P_{3/2}^0$
904.584	000	110548.1	.002	$b^4F_{5/2}-y^4P_{3/2}^0$
903.107	200	110728.9	-.007	$b^2F_{7/2}-v^2F_{5/2}^0$
900.745	25	111019.2	-.002	$b^4F_{7/2}-y^4P_{5/2}^0$
899.993	50	111112.0	-.001	$a^2D_{5/2}-y^4F_{5/2}^0$
897.728	400	111392.3	-.001	$b^4F_{5/2}-x^4D_{7/2}^0$
897.207	200	111457.0	.000	$b^4F_{7/2}-y^4F_{9/2}^0$
896.534	500	111540.7	.001	$a^4P_{3/2}-y^2P_{1/2}^0$
896.061	10	111599.5	-.002	$b^2G_{7/2}-v^2D_{3/2}^0$
895.743	500	111639.2	.000	$a^2D_{3/2}-y^4F_{3/2}^0$
895.602	400	111656.7	-.006	$b^4P_{5/2}-w^2P_{3/2}^0$
895.451	250	111675.6	-.002	$b^4F_{5/2}-w^2D_{3/2}^0$
894.610	500	111780.6	.000	$c^2D_{3/2}-v^2D_{3/2}^0$
894.323	200	111816.4	.003	$a^4F_{5/2}-z^4P_{5/2}^0$
893.618	15	111904.6	-.001	$a^2G_{7/2}-x^2F_{5/2}^0$
891.192	150	112209.3	.002	$a^2F_{7/2}-x^4D_{5/2}^0$
890.197	500	112334.7	-.002	$b^4P_{1/2}-w^2P_{3/2}^0$
889.776	500	112387.8	-.002	$a^4F_{7/2}-z^2D_{5/2}^0$
888.314	100	112572.8	-.001	$a^4F_{9/2}-y^2F_{7/2}^0$
886.045	100	112861.1	.001	$a^4F_{5/2}-z^4D_{7/2}^0$
885.863	150	112884.3	.001	$a^4F_{3/2}-z^4P_{1/2}^0$
885.474	400	112933.9	.001	$a^4F_{5/2}-z^2P_{3/2}^0$
884.991	10	112995.5	-.001	$b^2G_{7/2}-v^2F_{7/2}^0$
881.078	250	113497.3	.006	$a^4P_{3/2}-x^2D_{5/2}^0$
880.799	250	113533.3	.000	$c^2D_{5/2}-v^2D_{5/2}^0$
880.351	30	113591.1	.000	$a^4F_{3/2}-z^4P_{3/2}^0$
877.310	50	113984.8	.000	$a^4F_{9/2}-z^2H_{11/2}^0$
			-.002	$b^2D_{3/2}-w^2P_{3/2}^0$

Table I. *Continued*

Wavelength (Å)	Int.	Wavenumber (cm ⁻¹)	O-C (Å)	Classification
876.897	300	114038.5	-.001	$b^2F_{5/2}-v^2F_{5/2}^0$
876.748	150	114057.9	.000	$b^4F_{3/2}-w^2D_{3/2}^0$
875.661	500	114199.4	-.004	$b^2F_{5/2}-v^2D_{3/2}^0$
875.223	500	114256.6	-.003	$b^2G_{9/2}-v^2F_{7/2}^0$
873.825	10	114439.4	.000	$b^2D_{5/2}-w^2P_{3/2}^0$
872.109	10	114664.6	.000	$b^4F_{5/2}-y^4P_{5/2}^0$
871.741	50	114713.0	.000	$b^4F_{3/2}-y^4P_{1/2}^0$
871.387	50	114759.6	.002	$b^4F_{9/2}-w^2F_{7/2}^0$
870.393	10	114890.6	.000	$c^2D_{5/2}-v^2F_{7/2}^0$
870.325	300	114899.6	-.001	$a^4F_{7/2}-y^2F_{7/2}^0$
869.616	100	114993.3	.001	$a^2P_{1/2}-x^2P_{1/2}^0$
868.371	50	115158.2	-.002	$b^2P_{1/2}-v^2P_{3/2}^0$
867.171	50	115317.5	.002	$a^4F_{3/2}-z^4P_{5/2}^0$
865.769	300	115504.3	-.005	$a^4F_{5/2}-x^2D_{3/2}^0$
865.490	200	115541.5	.001	$a^4F_{5/2}-z^2D_{5/2}^0$
865.083	20	115595.8	.000	$a^2F_{5/2}-w^2D_{5/2}^0$
863.138	150	115856.3	-.002	$a^4P_{3/2}-y^2P_{3/2}^0$
861.961	30	116014.5	.001	$b^4P_{3/2}-v^2D_{3/2}^0$
858.947	50	116421.6	.001	$a^2P_{1/2}-x^4D_{1/2}^0$
855.751	40	116856.4	.002	$a^4F_{3/2}-z^2P_{3/2}^0$
855.379	30	116907.2	.001	$a^4P_{3/2}-x^2F_{5/2}^0$
854.437	300	117036.1	-.001	$c^2D_{3/2}-v^2P_{1/2}^0$
854.080	400	117085.0	-.003	$a^2P_{3/2}-x^2P_{3/2}^0$
853.717	30	117134.8	-.003	$b^2F_{7/2}-v^2D_{5/2}^0$
852.602	150	117288.0	.000	$b^4P_{1/2}-w^2P_{1/2}^0$
851.434	300	117448.9	-.001	$b^4P_{3/2}-v^2F_{5/2}^0$
844.803	50	118370.8	-.003	$b^4P_{5/2}-v^2D_{3/2}^0$
844.035	400	118478.5	-.002	$c^2D_{5/2}-v^2P_{3/2}^0$
840.658	20	118954.4	-.004	$b^2F_{7/2}-v^2F_{7/2}^0$
840.046	100	119041.1	.000	$b^4F_{7/2}-w^2F_{7/2}^0$
837.259	200	119437.4	.000	$a^4F_{3/2}-x^2D_{3/2}^0$
835.881	200	119634.3	-.002	$a^2D_{3/2}-x^2P_{3/2}^0$
835.564	50	119679.6	-.002	$b^2D_{3/2}-v^2F_{5/2}^0$
834.762	100	119794.6	-.001	$a^4F_{5/2}-x^2D_{5/2}^0$
831.605	50	120249.4	-.001	$b^2D_{3/2}-v^2D_{3/2}^0$
829.355	20	120575.6	.000	$b^2D_{5/2}-v^2D_{3/2}^0$
828.037	40	120767.6	.002	$b^2F_{5/2}-v^2D_{5/2}^0$
822.467	30	121585.4	-.003	$a^2D_{5/2}-w^2D_{5/2}^0$
819.879	30	121969.2	-.001	$a^4P_{1/2}-x^2P_{1/2}^0$
815.616	20	122606.7	.000	$b^2F_{5/2}-v^2F_{7/2}^0$
806.558	20	123983.6	-.001	$a^4P_{1/2}-x^4D_{1/2}^0$
799.832	50	125026.3	.001	$a^2D_{5/2}-w^2D_{3/2}^0$
789.725	200	126626.4	-.002	$b^2D_{3/2}-v^2P_{1/2}^0$
787.087	15	127050.8	.000	$b^2D_{5/2}-v^2D_{5/2}^0$
781.130	100	128019.7	-.003	$a^2D_{3/2}-y^4P_{3/2}^0$
770.483	15	129788.7	.000	$b^2D_{5/2}-v^2F_{7/2}^0$
760.458	50	131499.7	-.002	$b^2F_{5/2}-v^2P_{3/2}^0$
757.675	25	131982.7	-.001	$a^2D_{5/2}-v^2P_{3/2}^0$
740.948	50	134962.2	.001	$a^4P_{3/2}-x^2P_{3/2}^0$
737.473	50	135598.2	.006	$a^2F_{7/2}-v^2F_{5/2}^0$
723.550	20	138207.4	.001	$a^2F_{5/2}-v^2D_{3/2}^0$
718.355	10	139206.9	.001	$a^2P_{3/2}-v^2F_{5/2}^0$
706.714	10	141500.0	.000	$a^2D_{3/2}-w^2P_{3/2}^0$
696.380	10	143599.8	.004	$a^2F_{7/2}-v^2D_{5/2}^0$
690.343	10	144855.5	.000	$a^2P_{3/2}-v^2P_{1/2}^0$
679.598	20	147145.8	.004	$a^2D_{3/2}-v^2F_{5/2}^0$
673.225	5	148538.8	.003	$a^2D_{5/2}-v^2D_{5/2}^0$
			.005	$a^2D_{5/2}-v^2F_{7/2}^0$

Table II. Even levels of triply ionized tungsten (W IV). The level, level uncertainty, and O-C values are given in units of cm^{-1} . The number of transitions to each level is given in the column headed "No."

Config.	Term	<i>J</i>	Level	Unc.	No.	O-C	Leading Percentages	
<i>5d</i> ³	<i>a</i> ⁴ <i>F</i>	3/2	.00	.15	18	−38	86	
		5/2	3537.49	.13	21	−76	96	
		7/2	6744.63	.12	18	−50	92	
		9/2	9256.39	.16	12	18	71	23 ² <i>G</i>
<i>5d</i> ³	<i>a</i> ⁴ <i>P</i>	1/2	11772.92	.14	12	8	58	40 ² <i>P</i>
		3/2	10220.65	.12	19	88	40	39 ² <i>P</i> 8 ² <i>D</i> ₂
		5/2	17189.88	.09	24	109	89	
<i>5d</i> ³	<i>a</i> ² <i>G</i>	7/2	15260.92	.10	22	9	88	
		9/2	24096.03	.12	14	26	51	42 ² <i>H</i>
<i>5d</i> ³	<i>a</i> ² <i>H</i>	9/2	16204.85	.13	16	−21	53	24 ² <i>G</i> 22 ⁴ <i>F</i>
		11/2	22223.06	.16	7	1	100	
<i>5d</i> ³	<i>a</i> ² <i>P</i>	1/2	18364.76	.15	15	−67	54	42 ⁴ <i>P</i>
		3/2	25167.81	.08	26	−13	48	20 ² <i>D</i> ₂ 13 ² <i>D</i> ₁
<i>5d</i> ³	<i>a</i> ² <i>D</i> ₂	3/2	18519.01	.09	25	17	30	47 ⁴ <i>P</i> 10 ² <i>D</i> ₁
		5/2	22766.37	.07	32	70	73	10 ² <i>D</i> ₁
<i>5d</i> ³	<i>a</i> ² <i>F</i>	5/2	27937.63	.07	28	−4	80	9 (³ <i>F</i>) ² <i>F</i>
		7/2	28412.13	.08	26	22	91	
<i>5d</i> ³	<i>b</i> ² <i>D</i> ₁	5/2	43286.60	.06	26	104	74	10 ² <i>D</i> ₂
		3/2	43741.52	.07	18	−49	68	30 ² <i>D</i> ₂
<i>5d</i> ² (³ <i>F</i>)6 <i>s</i>	<i>b</i> ⁴ <i>F</i>	3/2	32692.40	.06	25	47	94	
		5/2	35093.78	.06	32	16	89	
		7/2	39029.73	.05	30	−50	97	
		9/2	43224.40	.07	18	−48	95	
<i>5d</i> ² (³ <i>P</i>)6 <i>s</i>	<i>b</i> ⁴ <i>P</i>	1/2	45516.94	.07	17	50	95	
		3/2	47679.55	.04	32	7	90	
		5/2	46087.55	.04	34	−73	27	30 (¹ <i>D</i>) ² <i>D</i> 26 (³ <i>F</i>) ² <i>F</i>
<i>5d</i> ² (³ <i>F</i>)6 <i>s</i>	<i>b</i> ² <i>F</i>	5/2	49337.04	.03	39	3	46	41 (³ <i>P</i>) ⁴ <i>P</i>
		7/2	52828.24	.04	29	34	63	32 (¹ <i>G</i>) ² <i>G</i>
<i>5d</i> ² (¹ <i>D</i>)6 <i>s</i>	<i>c</i> ² <i>D</i>	3/2	51860.40	.04	30	−47	73	10 (³ <i>P</i>) ² <i>P</i>
		5/2	56415.54	.04	32	75	58	32 (³ <i>P</i>) ⁴ <i>P</i>
<i>5d</i> ² (¹ <i>G</i>)6 <i>s</i>	<i>b</i> ² <i>G</i>	9/2	57050.05	.05	16	−69	94	
		7/2	58372.54	.04	23	52	66	30 (³ <i>F</i>) ² <i>F</i>
<i>5d</i> ² (³ <i>P</i>)6 <i>s</i>	<i>b</i> ² <i>P</i>	1/2	59628.18	.04	14	−39	88	
		3/2	64680.96	.04	19	−21	84	
<i>5d</i> ² (¹ <i>S</i>)6 <i>s</i>	<i>a</i> ² <i>S</i>	1/2	77607.89	.06	9	−39	92	
<i>5d</i> 6 <i>s</i> ²	<i>d</i> ² <i>D</i>	3/2	87172.17	.08	6			
		5/2	94725.05	.10	5			

Table III. Odd levels of triply ionized tungsten (*W IV*). The level and level uncertainty values and the O-C are given in units of cm^{-1} . The number of transitions from each level is given in the column headed "No."

Config.	Term	<i>J</i>	Level	Unc.	No.	O-C	Leading Percentages		
$5d^2(^3F)6p$	z^4G	5/2	85289.99	.05	13	−333	64	$19(^3F)^2F$	$11(^1D)^2F$
		7/2	92845.71	.05	15	−55	77	$10(^3F)^2F$	
		9/2	99028.26	.06	12	185	51	$19(^3F)^4F$	$16(^3F)^2G$
		11/2	109190.30	.17	5	37	94		
$5d^2(^3F)6p$	z^4F	3/2	89893.06	.04	16	464	49	$33(^3F)^2D$	
		5/2	94525.28	.05	17	−255	42	$21(^3F)^2D$	$17(^3F)^4D$
		7/2	100322.36	.06	17	8	43	$22(^3F)^4D$	$10(^3F)^2F$
		9/2	105263.40	.06	12	0	19	$49(^3F)^4G$	$16(^3F)^2G$
$5d^2(^3P)6p$	z^4D	1/2	98463.71	.06	10	264	43	$21(^3P)^2S$	$11(^3F)^4D$
		3/2	103952.54	.05	19	−8	40	$17(^3P)^4S$	$11(^3P)^2P$
		5/2	98691.76	.05	16	−215	14	$30(^3F)^4F$	$23(^3F)^4G$
		7/2	116110.43	.07	18	355	40	$15(^3F)^2F$	$12(^1D)^2F$
$5d^2(^1D)6p$	z^2D	3/2	99867.18	.04	18	−379	27	$19(^3P)^4D$	$17(^3F)^2D$
		5/2	119079.04	.09	18	−430	37	$30(^3P)^4P$	$13(^3P)^2D$
$5d^2(^3F)6p$	y^2D	3/2	100449.92	.06	19	−252	15	$36(^3F)^4F$	$24(^3F)^4D$
		5/2	113620.96	.07	15	102	31	$25(^3P)^4D$	$18(^3F)^4D$
$5d^2(^3P)6p$	z^2S	1/2	101275.42	.06	9	−99	39	$27(^3P)^4P$	$22(^3P)^4D$
$5d^2(^3F)6p$	z^2F	7/2	102867.63	.06	17	152	26	$26(^3F)^2G$	$23(^3F)^4D$
		5/2	106754.40	.06	20	−283	32	$17(^3F)^4D$	$12(^3F)^2D$
$5d^2(^3F)6p$	y^4D	1/2	103682.37	.08	8	−201	62	$22(^3P)^4D$	
		3/2	108922.34	.07	16	−19	53	$22(^3F)^2D$	$14(^3P)^4D$
		5/2	103216.51	.05	17	326	24	$18(^1D)^2F$	$17(^3F)^2F$
		7/2	111515.16	.07	17	−211	32	$33(^1G)^2G$	$16(^3F)^2G$
$5d^2(^3F)6p$	z^2G	7/2	106730.40	.06	16	−165	29	$38(^3F)^4F$	$15(^1G)^2G$
		9/2	115422.93	.10	11	241	67	$20(^3F)^4F$	
$5d^2(^1G)6p$	y^2G	7/2	108871.96	.07	16	−238	15	$29(^1D)^2F$	$20(^1G)^2F$
		9/2	119694.03	.12	10	−32	57	$37(^1G)^2H$	
$5d^2(^3P)6p$	z^4S	3/2	109882.34	.07	14	−180	43	$19(^1D)^2D$	$11(^3P)^4P$
$5d^2(^1G)6p$	z^2H	9/2	110252.75	.08	11	227	48	$37(^3F)^4F$	$14(^1G)^2G$
		11/2	122847.40	.20	6	460	94		
$5d^2(^1D)6p$	y^2F	5/2	110658.47	.06	16	375	37	$19(^3P)^4D$	$15(^3F)^4D$
		7/2	121644.05	.10	12	−47	45	$41(^3P)^4D$	
$5d^2(^3P)6p$	z^4P	1/2	112861.20	.10	7	49	41	$31(^1D)^2P$	$16(^3P)^2S$
		3/2	113533.11	.09	12	366	47	$17(^1D)^2P$	$9(^3P)^4S$
		5/2	115317.71	.09	19	243	28	$31(^1D)^2D$	$25(^3P)^4D$
$5d^2(^1D)6p$	z^2P	3/2	116421.86	.07	13	688	25	$24(^3P)^4P$	$19(^1D)^2D$
		1/2	117725.20	.07	10	−104	40	$24(^3P)^4P$	$16(^3P)^2S$
$5d^2(^3P)6p$	x^2D	3/2	119041.11	.10	14	−420	50	$21(^3P)^2P$	$9(^3P)^4S$
		5/2	123216.93	.08	20	564	43	$26(^3P)^4P$	$13(^1G)^2F$
$5d^2(^3P)6p$	y^2P	1/2	121677.79	.09	9	−96	57	$20(^1S)^2P$	$12(^3P)^4D$
		3/2	126076.70	.11	16	−417	48	$17(^3P)^2D$	$12(^1D)^2D$
$5d^2(^1G)6p$	x^2F	7/2	123908.20	.09	15	−562	60	$24(^1G)^2G$	
		5/2	127077.24	.07	16	−88	79	$8(^3F)^2D$	
$5d^2(^1S)6p$	x^2P	1/2	133358.14	.09	9	139	68	$21(^3P)^2P$	
		3/2	142203.49	.10	13	−74	86		
$5d(^2D)6s6p(^3P)$	y^4F	3/2	130118.60	.17	6	−333	79	$7(^3P)^2D$	
		5/2	133785.47	.18	11	49	71	$10(^3P)^2D$	
		7/2	140788.56	.11	8	118	73	21^4D	
		9/2	150422.0	.4	3	−19	100		
$5d(^2D)6s6p(^3P)$	x^4D	1/2	134379.44	.23	6	295	82		
		3/2	135823.21	.29	3	−56	67	11^4P	$8(^3P)^2P$
		5/2	140317.03	.16	9	−204	59	25^4P	
		7/2	146205.65	.25	6	−109	64	23^4F	
$5d(^2D)6s6p(^3P)$	w^2D	5/2	143533.47	.17	10	−108	38	25^4F	21^4D
		3/2	146750.22	.19	9	102	58	24^4P	
$5d(^2D)6s6p(^3P)$	y^4P	1/2	147405.37	.37	3	167	92		
		3/2	145569.33	.18	7	−71	42	22^4D	$19(^3P)^2P$
		5/2	149758.30	.22	8	235	36	$46(^3P)^2F$	

Table III. Continued

Config.	Term	<i>J</i>	Level	Unc.	No.	O-C	Leading Percentages		
$5d(^2D)6s6p(^3P)$	w^2F	5/2	155752.99	.28	4	99	36	$26(^3P)^2D$	24^4P
		7/2	157984.23	.31	4	-94	84		
$5d(^2D)6s6p(^3P)$	w^2P	3/2	157726.00	.21	12	236	31	$41(^1P)^2D$	19^4P
		1/2	162651.8	.7	1	8	73	$16(^1P)^2P$	
$5d(^2D)6s6p(^1P)$	v^2F	5/2	163375.42	.22	10	109	86		
		7/2	171306.23	.22	8	17	93		
$5d(^2D)6s6p(^1P)$	v^2D	3/2	163536.02	.18	11	-233	50	$36(^3P)^2P$	
		5/2	169912.91	.23	9	67	79	$7(^3P)^2F$	
$5d(^2D)6s6p(^1P)$	v^2P	1/2	168767.50	.27	5	103	79	$20(^3P)^2P$	
		3/2	174786.10	.20	7	-222	94		

Table IV. Least-squares fitted (LSF) and Hartree-Fock (HF) parameter values and their ratios for the $5d^3 + 5d^26s$ configurations of W^{+3}

Config.	Parameter	Value		LSF/HF
		LSF	HF	
$5d^3$	$F^2(dd)$	47530(147)	60671	0.78
	$F^4(dd)$	29988(454)	40278	0.74
	ξ_d	2720(13)	2910	0.93
	α	25(4)		
	β	-90(57)		
$5d^26s$	$F^2(dd)$	48930(196)	62828	0.78
	$F^4(dd)$	28980(466)	41882	0.69
	$G^2(ds)$	17375(200)	15719	1.10
	ξ_d	2920(15)	3129	0.93
	α	40(4)		
	β	460(49)		
C.I.	$R^2(dd, ds)$	21000(455)	18438	1.14

Table V. Least-squares fitted (LSF) and Hartree-Fock (HF) parameter values and their ratios for the $5d^26p + 5d6s6p$ configurations of W^{+3}

Config.	Parameter	Value		LSF/HF
		LSF	HF	
$5d^26p$	$F^2(dd)$	48125(1030)	63209	0.76
	$F^4(dd)$	27531(2600)	42169	0.65
	$F^2(dp)$	18375(560)	24906	0.74
	$G^1(dp)$	8625(225)	9809	0.88
	$G^3(dp)$	2042(735)	8556	0.24
	ξ_d	3020(48)	3163	0.95
	ξ_p	8065(112)	5124	1.51
	α	65(22)		
	β	445(263)		
$5d6s6p$	$F^2(dp)$	22925(735)	26393	0.87
	$G^1(sp)$	29340(312)	45266	0.65
	$G^2(ds)$	20250(1020)	15705	1.29
	$G^1(dp)$	9825(525)	10051	0.97
	$G^3(dp)$	6533(980)	8943	0.73
	ξ_d	3250(76)	3378	0.96
	ξ_p	8850(174)	5905	1.50
	$R^1(dp, ps)$	17940(2710)	24351	0.74
C.I.	$R^2(dp, sp)$	12185(1990)	15631	0.78
	$R^2(dd, ds)$	5460(4240)	18075	0.30

Table VI. Comparison of least-squares fit to Hartree-Fock (LSF/HF) ratios for parameters of the known configurations in W^{+3} and Ta^{+3}

Parameter	W^{+3}		Ta^{+3}	
	Config.	LSF/HF	Config.	LSF/HF ^a
$F^2(dd)$	$5d^3$	0.78	$5d^2$	0.79
$F^4(dd)$		0.74		0.75
ξ_d		0.93		0.92
$G^2(ds)$	$5d^26s$	1.10	$5d6s$	1.05
ξ_d		0.93		0.89
$R^2(dd, ds)$		1.14		1.15
$F^2(dp)$	$5d^26p$	0.74	$5d6p$	0.78
$G^1(dp)$		0.88		0.88
$G^3(dp)$		0.24		0.40
ξ_d	$5d6s6p$	0.95	$6s6p$	0.95
ξ_p		1.51		1.53
$G^1(sp)$		0.65		0.64
ξ_p	C.I.	1.50	C.I.	1.45
$R^1(dp, ps)$		0.74		0.56
$R^2(dp, ps)$		0.78		0.66

^a Data taken from Ref. 1.Table VII. Transition array of the doublet levels of the $5d6s6p$ configuration with the $^2D_{3/2, 5/2}$ of the $5d6s^2$ configuration

		$5d(^2D)6s^2(^1S)^2D$	
		3/2	5/2
$5d(^2D)6s6p(^1P)^2F$	5/2	100	—
	7/2	—	100
	2D 3/2	50	—
	5/2	—	100
	2P 1/2	100	—
$5d(^2D)6s6p(^3P)^2F$	3/2	—	50
	5/2	—	—
	7/2	—	—
	2D 3/2	—	—
	5/2	—	—
2P	1/2	—	—
	3/2	—	—