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1996 Phys. Scr. 54 56

(http://iopscience.iop.org/1402-4896/54/1/009)

Physica Scripta. Vol. 54, 56–67, 1996

Analysis of the Spectrum of Five Times Ionized Osmium (Os VI)

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Received August 10, 1995; accepted in revised form November 8, 1995

Abstract

The analysis of Os VI has for the even system resulted in the determination of all levels (19) in the $5d^3$ ground configuration and of 14 levels out of 16 theoretically possible levels in the $5d^26s$ configuration. In the odd system all levels (45) of the $5d^26p$ configuration have been found. In the 435–765 Å wavelength region 290 lines belonging to the $5d^3$–$5d^26p$ transition array have been classified, while in the 940–1510 Å wavelength region 87 lines belonging to the $5d^26s$–$5d^26p$ transition array were classified. The analysis was guided by predicted energy level values and transition probabilities calculated by means of a complete set of orthogonal operators.

Calculated energy values, *LS*-compositions and *gA*-values, obtained from the final fitted parameter values using the orthogonal operator approach are given.

1. Introduction and experiment

The spectrum of osmium is observed in the 225–2000 Å wavelength region. Spectrograms were made by means of the 3 m normal incidence spectrograph of the physics department in Antigonish, with a plate factor of 1.38 Å/mm covering the total wavelength region, and by means of the 10.6 m normal incidence spectrograph in Meudon for the low wavelength region, resulting in a plate factor of 0.26 Å/mm. The plates were measured with the automatic comparator of the institute for spectroscopy in Troitsk and reduced to wavelengths by means of impurity lines of O, C, N and Si present in the spectrograms. The accuracy of the wavelengths is about 0.005 Å in the low wavelength region and 0.010 Å in the upper region. For very weak diffuse lines the accuracy might be worse. In the total wavelength region several transition arrays of the type $5d^n$–$5d^{n-1}6p$ and $5d^{n-1}6s$–$5d^{n-1}6p$ belonging to different stages of ionization are located. A start was made of the analyses of Os IV, Os V and Os VI. The analysis of Os VI is presented here. Compared to the others it is relatively simple, due to three facts:

– the configurations themselves ($5d^3$ and $5d^26p$) are simple compared to Os IV ($5d^5$ and $5d^46p$) and Os V ($5d^4$ and $5d^36p$),

– the $5d^3$–$5d^26p$ transitions are located in a relatively isolated wavelength region,

– the VI-spectra are not strongly influenced by configuration interaction.

The reason for starting these spectra is threefold. In the 5d-spectra the magnetic interactions are larger than in the 3d-spectra. The complete orthogonal operator set [1–3] offers the possibility to study these interactions, like 2-particle magnetic effects.

Lines belonging to the spectra of 5d-elements have been identified in the chemically peculiar star χ Lupi [4]. It concerns especially the lower stages of ionization. However, the spectra of the lower stages of ionization are very complex due to overlapping configurations in the even as well as in the odd system. Therefore we started the analyses of spectra of higher stage of ionization to get better understanding of the behaviour of parameters in the spectra of the 5d-elements.

Most spectra of the 5d-elements are thus poorly investigated. For many of these elements, if more than singly ionized, no levels are known.

2. Analysis and calculations

To start the analysis of Os VI calculations of the even and odd energy level values and their eigenvector compositions have been carried out by means of the orthogonal operator approach [1–3]. Starting parameter values were obtained by carrying out *ab-initio* calculations with the program developed by Cowan [5] and Parpia and Grant [6] and by means of comparison of the parameters with values obtained in other 5d-spectra [7–10]. The Cowan program [5] offers the possibility to calculate the mean energies of the configurations and to scale them according to values obtained in other 5d-elements. The MCDF program of Parpia and Grant [6], however, makes it possible to calculate 2-particle magnetic effects. Since no fitted values are known for these two particle magnetic operators in 5d-spectra the *ab-initio* values were used as starting parameter values. In 3d-spectra [11] it turned out to improve the fit tremendously when adding *ab-initio* calculated values for the 2-particle magnetic operators. The energy values and eigenvector compositions derived from these first calculations were used as input for the calculation of transition probabilities. They served as a first guide to start the analysis. Furthermore the analysis was supported by the "package iden" [12, 13]. On the basis of the calculations 290 lines have been classified in the $5d^3$–$5d^26p$ transition array. Out of these seven are doubly classified. All these lines and their classifications are collected in Table I. In the upper wavelength region 87 lines have been classified. They are given in Table II. The two tables show intensity numbers obtained from the automatic comparator in Troitsk, calculated *gA*-values with the power of 10 within brackets, measured wavelength and wavenumber of the transition, the difference between measured and calculated wavenumber and the even and odd level involved in the transition. For the even level the *LS*-notation has been given. However, for the odd levels the level mixing is so strong that for these levels the level energy value and *J*-value is used as label. The E1 transition integrals were calculated based on the MCDF wavefunctions [6]. The values used are 0.9854 for the $5d^3$–$5d^26p$ transitions and -2.2989 for the $5d^26s$–$5d^26p$ transitions. The calculated gA-values are pretty good, however, no factor for the difference in population of the upper levels is taken into account. This means that the same calculated gA-value for a higher lying odd level results in a lower intensity number, due to the lower population of the higher lying level. Assuming a Boltzmann distribution the source temperature is estimated to be about 40000 K.

From the lines in the Tables I and II all levels (19) of the $5d^3$ ground configuration and 14 levels out of the 16 theoretically possible levels in the $5d^26s$ configuration have been identified. They are collected in Table III, together with their calculated values and LS-eigenvector compositions. For completeness also the two levels of the $5d6s^2$ are given. The position of the levels is highly influenced by the estimated value of the mean energy of that configuration. The reader should keep in mind that therefore the accuracy of the calculated values for these two levels is much lower than that for the two other unknown even levels. In Table IV the experimental and calculated values of the $5d^26p$ levels are given. All 45 levels in this configuration were found. In this configuration many main components are below 50%, the lowest even being 20%. This strong mixing is due to the large spin–orbit interaction of the p-electron, mixing levels of the same J-value.

In Tables V and VI the final orthogonal parameter values are given. The orthogonal operator method, we use, is essentially a fitting procedure, like Cowan's program [5], using a set of angular coefficients and radial operators to construct an energy matrix. The final parameter values are derived by diagonalizing the energy matrix and fitting to the experimentally determined level values. The radial operators reflect an electrostatic or magnetic interaction strength. In the orthogonal operator approach, however, the parameters as given by Cowan [5] have been orthogonalized [1, 2], which means that they cover the same space as Cowan's parameters do but that they influence each other as little as possible. Relations between Cowan's most relevant parameters and our orthogonal ones are given here;

$$O_2 = (50/63)(1/\sqrt{140}) * (F^2 + F^4),$$

$$O_2' = (10/7)(1/\sqrt{140}) * F^2 - (50/63)(1/\sqrt{140}) * F^4,$$

$$O_2 + O_2' = (20/9\sqrt{140}) * F^2,$$

$$C_{ds} = (1/10)\sqrt{3} * G^2(ds),$$

$$C_1(dp) = (1/\sqrt{28})((4/5) * F^2 - (7/15) * G^1 - (3/35) * G^3),$$

$$C_2(dp) = (1/\sqrt{231})((14/5) * G^1 + (81/70)G^3),$$

$$C_3(dp) = (1/\sqrt{2068})((47/5)G^1 - (141/35)G^3).$$

The magnetic operators ζ_d and ζ_p and the effective 3-particle effective operators $T1$ and $T2$ are the same as in Cowan's procedure. The behaviour of being as independent as possible of the orthogonal operators offers the opportunity to introduce new operators, such as 3-particle ($T3$, $T4$ and T_{dds}) and 4-particle electrostatic or 2-particle magnetic ($A_c \ldots A_0$) operators [2, 3], to improve the fit without loosing stability in the fitting procedure. These smaller effects can be obtained by fitting after firstly having fitted the more important parameters and keeping them then fixed at their obtained values. In the Tables V and VI the fitted parameter values are given together with the calculated parameter values, derived by using Cowan's [5] programs as well as by using MCDF [6], and their scaling factors. The 2-particle magnetic dd-effects as well as the electrostatic spin–orbit effect A_{mso} and the spin–spin effect A_{ss} can be obtained from the MCDF [6] calculation also by fitting to the pure *ab-initio* level values given in that calculation. The parametric calculations were carried out including the full interaction with the 6s-electron in the even as well as in the odd system. It is not necessary to introduce this interaction in VI-spectra to improve the description [3] but the interactions influence the value of T_{dds} and A_{mso} [3], and E_α and E_β, which as effective operators take for instance into account the effect of d^2–l^2 interactions from far lying configurations. Adding the interaction explicitly was done to obtain comparable and therewith extrapolatable results going to lower ionization stages where a single configuration approach is not proper. The interaction integrals are fixed at values of 82% of the calculated values. This scaling factor is the average of the scaling factors for the strong electrostatic operators (O_2, O_2', C_{ds}).

The same situation is true for the odd system. However, for the 5d6s6p and the $6s^26p$ configurations, in which no levels are known, only the relevant operators were used to create a structure that could influence the $5d^26p$ system. In the 5d6s6p configuration the E_{av} was scaled relative to the E_{av} of the $5d^26p$ configuration by the same factor as obtained for the $5d^26s$ configuration relative to the $5d^3$ configuration. The strong configuration interactions are scale by the same factor as in the even system. In the $5d^26p$ configuration the $A_c \ldots A_0$ parameters were fixed at the values obtained in the $5d^3$ configuration. The $Sd.Lp$ and $Sp.Ld$ represent spin–other–orbit interactions, while the $Zp2pp' \ldots Zp3dd'$ stand for Electrostatic spin–orbit interaction for the dp-pair. This means that they describe an electrostatic interaction up to a virtual higher configuration and then a magnetic interaction down, thereby connecting levels of different multiplicity and different L-values, but of course equal J-values. Since no experience on the values of these parameters in 5d-elements is present only those parameters which were expected to be the most important ones where fitted. Neglecting the Zp-parameters raised the mean error by a factor of 2. Many other parameters like th 3-particle electrostatic parameters of the $Tddp$ type were neglected thusfar. A reliable determination of these parameters is only possible when much more data for 5d-elements exist.

In both, the even and odd, systems the calculated values (Cowan and MCDF) agree very well. Largest deviations between the two methods appear for the ζ parameters. For ζ_d the fitted value is always in between the two *ab-initio* calculated values, while for ζ_p the MCDF values are closer to the fitted values. Extended iso-electronic or iso-ionic studies are not yet possible due to the lack of data in neighbouring spectra. However, the complete analysis of Os VI offered a good jumping off board to tackle Os V and Os IV, which are in progress now.

Acknowledgements

We thank the Dutch Organization for Scientific Research (NWO) for supporting our collaboration with the group in Troitsk. One of us (Y.N.J.) is thankful to the Natural Sciences and Engineering Research Council of Canada for the financial support.

We are thankful to the NATO for the support of the International Scientific collaboration.

The work was also partly supported by the Russian Fund of Fundamental Research (project 93-02-14284).

We thank M. Benharrous for technical assistance in making spectrograms at the 10.6 m spectrograph in Meudon.

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Table I. *Classified lines in the $5d^3$–$5d^26p$ transition array of Os VI*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^3$-level	$5d^26p$-level
8	5.92 (7)	438.720	227 935.8	0.2	$^4F_{3/2}$	227 935.6 (5/2)
24	6.81 (8)	455.577	219 502.0	1.6	$^4F_{3/2}$	219 500.4 (3/2)
39	1.50 (9)	459.160	217 788.8	3.2	$^2_3D_{5/2}$	252 203.4 (3/2)
7	2.18 (8)	461.913	216 491.2	−0.4	$^4F_{7/2}$	227 935.6 (5/2)
40	9.24 (8)	466.531	214 348.0	0.5	$^4F_{5/2}$	220 744.9 (5/2)
8	1.68 (8)	469.251	213 105.5	2.5	$^4F_{5/2}$	219 500.4 (3/2)
15	2.51 (8)	471.499	212 089.6	3.0	$^4F_{3/2}$	212 086.5 (1/2)
54	1.85 (9)	471.694	212 002.0	1.2	$^2P_{3/2}$	252 203.4 (3/2)
34	6.93 (8)	472.510	211 635.9	1.2	$^4F_{3/2}$	211 634.7 (3/2)
14	6.13 (8)	473.616	211 141.7	1.0	$^4F_{9/2}$	225 818.9 (7/2)
15	5.17 (8)	474.010	210 965.8	1.3	$^4F_{5/2}$	217 361.9 (3/2)
6	7.38 (7)	475.490	210 309.6	2.4	$^4F_{5/2}$	216 704.6 (7/2)
23	1.04 (9)	475.625	210 249.8	0.9	$^2G_{7/2}$	233 168.5 (5/2)
32	8.45 (8)	476.191	209 999.7	0.0	$^4F_{5/2}$	216 397.1 (5/2)
18	4.11 (8)	477.151	209 577.2	2.4	$^4P_{3/2}$	224 004.9 (1/2)
56	2.11 (9)	477.779	209 301.6	0.8	$^4F_{7/2}$	220 744.9 (5/2)
20	4.87 (8)	479.981	208 341.6	1.6	$^4P_{5/2}$	233 168.5 (5/2)
5	1.17 (8)	482.493	207 256.8	2.9	$^4F_{9/2}$	221 932.2 (9/2)
15	3.77 (8)	486.120	205 710.7	−1.1	$^4F_{3/2}$	205 711.8 (3/2)
25	1.27 (9)	487.005	205 336.8	0.1	$^2G_{7/2}$	228 256.2 (7/2)
88	2.47 (9)	487.180	205 263.0	2.5	$^4F_{7/2}$	216 704.6 (7/2)
18	5.42 (8)	487.241	205 237.1	−0.2	$^4F_{5/2}$	211 634.7 (3/2)
12	4.86 (8)	487.643	205 068.1	−2.1	$^4P_{3/2}$	219 500.4 (3/2)
66	3.09 (9)	487.767	205 015.9	−0.1	$^2G_{7/2}$	227 935.6 (5/2)
93	1.63 (9)	487.916	204 953.5	0.5	$^4F_{7/2}$	216 397.1 (5/2)
24	2.33 (8)	488.470	204 720.8	−0.1	$^4F_{3/2}$	204 720.9 (5/2)
106	4.59 (9)	489.648	204 228.3	0.5	$^2H_{9/2}$	228 256.2 (7/2)
37	2.06 (9)	490.375	203 925.4	−0.1	$^4F_{7/2}$	215 369.6 (9/2)
43	1.74 (9)	491.577	203 426.9	−0.8	$^4P_{5/2}$	228 256.2 (7/2)
16	9.54 (8)	492.275	203 138.4	−0.4	$^2P_{1/2}$	231 998.6 (3/2)
23	9.62 (8)	492.355	203 105.7	−1.5	$^4P_{5/2}$	227 935.6 (5/2)
11	2.86 (8)	492.775	202 932.2	0.5	$^4P_{3/2}$	217 361.9 (3/2)
15	9.64 (8)	492.857	202 898.4	−0.9	$^2G_{7/2}$	225 818.9 (7/2)
65	2.89 (9)	494.335	202 291.9	−0.3	$^2H_{9/2}$	226 320.5 (11/2)
170	5.47 (9)	494.985	202 026.2	−0.1	$^4F_{9/2}$	216 704.6 (7/2)
36	1.29 (9)	495.131	201 966.7	−0.2	$^4P_{3/2}$	216 397.1 (5/2)
26	1.16 (9)	495.562	201 791.0	0.4	$^2H_{9/2}$	225 818.9 (7/2)
50	1.62 (9)	497.635	200 950.6	−1.4	$^4F_{5/2}$	207 349.5 (3/2)
32	1.14 (9)	497.671	200 936.1	−0.4	$^4F_{5/2}$	207 333.9 (5/2)
119	4.96 (9)	498.279	200 690.9	−0.4	$^4F_{9/2}$	215 369.6 (9/2)
17	8.30 (8)	498.536	200 587.2	−2.4	$^4P_{1/2}$	217 361.9 (3/2)
38	1.16 (9)	499.892	200 043.2	1.6	$^2_3D_{3/2}$	227 935.6 (5/2)
22	1.03 (9)	500.108	199 956.7	−0.6	$^4P_{3/2}$	214 387.4 (5/2)
45	1.41 (9)	500.511	199 796.0	0.0	$^4F_{5/2}$	206 193.4 (7/2)
17	7.77 (8)	502.478	199 013.9	1.2	$^2G_{7/2}$	221 932.2 (9/2)
28	1.87 (9)	503.144	198 750.4	−0.3	$^2_3D_{5/2}$	233 168.5 (5/2)
14	2.91 (8)	504.230	198 322.2	−1.4	$^4F_{5/2}$	204 720.9 (5/2)
73	2.62 (9)	504.684	198 143.8	−0.5	$^4F_{3/2}$	198 144.3 (1/2)

Table I. *Continued*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^3$-level	$5d^26p$-level
19	1.62 (9)	505.302	197 901.5	−2.3	$^2H_{9/2}$	221 932.2 (9/2)
10	5.56 (8)	505.501	197 823.7	−1.6	$^2G_{7/2}$	220 744.9 (5/2)
25	1.57 (9)	506.123	197 580.5	−0.4	$^2_3D_{5/2}$	231 998.6 (3/2)
6	1.05 (8)	507.079	197 207.8	3.3	$^4P_{3/2}$	211 634.7 (3/2)
40	1.88 (9)	508.462	196 671.6	−0.9	$^4F_{5/2}$	203 069.9 (7/2)
8	3.84 (8)	509.134	196 412.0	0.1	$^2P_{3/2}$	236 614.5 (1/2)
6	5.02 (8)	509.800	196 155.5	2.7	$^4F_{3/2}$	196 152.8 (5/2)
106	5.07 (9)	509.914	196 111.4	0.5	$^2_3D_{3/2}$	224 004.9 (1/2)
19	1.23 (9)	510.425	195 915.2	−1.2	$^4P_{5/2}$	220 744.9 (5/2)
81	3.12 (9)	510.492	195 889.5	−0.3	$^4F_{7/2}$	207 333.9 (5/2)
46	1.30 (9)	510.947	195 715.1	−1.0	$^4F_{3/2}$	195 716.1 (3/2)
287	7.58 (9)	511.593	195 468.1	0.3	$^4F_{9/2}$	210 146.1 (11/2)
106	4.14 (9)	512.354	195 177.6	−0.1	$^4F_{9/2}$	209 856.0 (7/2)
18	6.08 (8)	512.442	195 144.1	−1.0	$^2P_{1/2}$	224 004.9 (1/2)
6	3.53 (8)	512.534	195 109.1	−2.1	$^4F_{7/2}$	206 555.3 (9/2)
180	5.88 (9)	513.482	194 749.0	−0.3	$^4F_{7/2}$	206 193.4 (7/2)
19	1.37 (9)	513.684	194 672.0	0.1	$^4P_{5/2}$	219 500.4 (3/2)
22	7.14 (8)	514.766	194 263.0	−0.2	$^4F_{3/2}$	194 263.2 (3/2)
433	3.68 (10)	515.025	194 165.2	0.5	$^2H_{11/2}$	226 320.5 (11/2)
8	8.05 (8)	516.033	193 786.0	1.0	$^2G_{7/2}$	216 704.6 (7/2)
147	9.78 (9)	516.617	193 566.9	−0.8	$^2F_{5/2}$	233 168.5 (5/2)
92	5.03 (9)	516.749	193 517.6	−0.3	$^2D_{5/2}$	227 935.6 (5/2)
35	7.75 (8)	516.858	193 476.9	−0.6	$^2G_{7/2}$	216 397.1 (5/2)
17	8.19 (8)	517.396	193 275.7	−1.1	$^4F_{7/2}$	204 720.9 (5/2)
13	1.83 (9)	518.539	192 849.4	−1.5	$^2_3D_{3/2}$	220 744.9 (5/2)
10	1.05 (9)	518.885	192 721.1	−0.3	$^2F_{7/2}$	233 168.5 (5/2)
32	2.99 (9)	519.756	192 397.8	0.0	$^2F_{5/2}$	231 998.6 (3/2)
13	2.94 (9)	520.051	192 288.8	−3.8	$^2_1D_{3/2}$	252 203.4 (3/2)
102	2.39 (9)	520.597	192 087.2	−0.7	$^4F_{3/2}$	192 087.9 (1/2)
342	9.25 (9)	521.169	191 876.2	−0.8	$^4F_{9/2}$	206 555.3 (9/2)
	7.75 (9)			0.1	$^4P_{5/2}$	216 704.6 (7/2)
92	9.33 (9)	521.386	191 796.5	0.4	$^2P_{3/2}$	231 998.6 (3/2)
93	3.43 (9)	521.858	191 623.2	−2.6	$^4F_{7/2}$	203 069.9 (7/2)
348	1.52 (10)	522.008	191 568.1	−0.5	$^4P_{5/2}$	216 397.1 (5/2)
161	1.58 (9)	522.152	191 515.2	−1.7	$^4F_{3/2}$	191 516.9 (5/2)
	4.72 (9)			0.1	$^4F_{9/2}$	206 193.4 (7/2)
52	2.68 (9)	522.282	191 467.5	−0.3	$^2G_{7/2}$	214 387.4 (5/2)
22	2.44 (9)	522.466	191 400.2	−1.0	$^2_3D_{5/2}$	225 818.9 (7/2)
75	4.24 (9)	522.631	191 339.7	−1.5	$^2H_{9/2}$	215 369.6 (9/2)
106	8.76 (9)	522.911	191 237.2	0.4	$^2G_{9/2}$	228 256.2 (7/2)
163	1.96 (10)	523.020	191 197.4	−0.8	$^2_1D_{5/2}$	252 203.4 (3/2)
6	9.85 (8)	523.232	191 119.8	0.6	$^2P_{1/2}$	219 979.0 (1/2)
29	9.88 (8)	523.595	190 987.4	−0.4	$^4F_{3/2}$	190 987.8 (3/2)
12	7.18 (8)	524.721	190 577.5	0.5	$^4P_{1/2}$	207 349.5 (3/2)
70	2.62 (9)	525.512	190 290.8	0.0	$^4P_{3/2}$	204 720.9 (5/2)
106	8.41 (9)	526.939	189 775.3	−1.0	$^2H_{11/2}$	221 932.2 (9/2)
10	3.78 (8)	526.999	189 753.8	−1.6	$^4F_{5/2}$	196 152.8 (5/2)
327	1.06 (10)	528.211	189 318.4	−0.3	$^4F_{5/2}$	195 716.1 (3/2)
36	1.32 (9)	529.270	188 939.3	−0.1	$^4P_{1/2}$	205 711.8 (3/2)
455	7.41 (10)	529.661	188 800.1	0.6	$^2G_{9/2}$	225 818.9 (7/2)
11	7.44 (8)	530.070	188 654.4	−1.0	$^2F_{5/2}$	228 256.2 (7/2)
7	2.38 (8)	530.507	188 498.8	−3.3	$^2P_{1/2}$	217 361.9 (3/2)
117	5.01 (9)	530.811	188 391.0	−0.5	$^4F_{9/2}$	203 069.9 (7/2)
51	4.72 (9)	530.969	188 335.0	0.2	$^2F_{5/2}$	227 935.6 (5/2)
329	1.06 (10)	532.296	187 865.5	−0.3	$^4F_{5/2}$	194 263.2 (3/2)
233	1.63 (10)	532.456	187 808.9	−0.2	$^2F_{7/2}$	228 256.2 (7/2)
31	2.54 (9)	532.675	187 731.8	−1.2	$^2P_{3/2}$	227 935.6 (5/2)
407	1.92 (10)	533.093	187 584.6	−0.4	$^4F_{9/2}$	202 263.2 (9/2)
69	6.54 (9)	533.367	187 488.0	−0.5	$^2F_{7/2}$	227 935.6 (5/2)
375	1.24 (10)	535.179	186 853.3	−0.7	$^4F_{3/2}$	186 854.0 (1/2)
373	1.95 (10)	535.318	186 804.9	−1.4	$^4P_{5/2}$	211 634.7 (3/2)
40	2.36 (9)	536.215	186 492.5	−0.9	$^2_3D_{3/2}$	214 387.4 (5/2)
6	9.75 (8)	536.691	186 327.1	0.0	$^2_3D_{5/2}$	220 744.9 (5/2)
16	2.29 (8)	537.011	186 215.9	−2.2	$^2F_{5/2}$	225 818.9 (7/2)
38	1.51 (9)	537.119	186 178.6	0.4	$^4F_{5/2}$	192 575.6 (7/2)
50	2.17 (9)	537.294	186 117.9	0.2	$^2H_{9/2}$	210 146.1 (11/2)
620	6.29 (10)	538.138	185 825.9	−1.7	$^2H_{9/2}$	209 856.0 (7/2)
118	4.59 (9)	538.532	185 690.1	0.2	$^4F_{7/2}$	197 134.0 (7/2)
8	9.34 (8)	539.465	185 368.9	−3.0	$^2F_{7/2}$	225 818.9 (7/2)
396	1.56 (10)	540.191	185 119.8	0.3	$^4F_{5/2}$	191 516.9 (5/2)

Table I. *Continued*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^3$-level	$5d^26p$-level
19	2.80 (9)	540.457	185 028.6	1.1	$^4P_{5/2}$	209 856.0 (7/2)
419	4.35 (10)	540.795	184 912.9	0.2	$^2G_{9/2}$	221 932.2 (9/2)
452	4.69 (10)	541.393	184 708.8	0.1	$^4F_{7/2}$	196 152.8 (5/2)
317	1.17 (10)	541.741	184 590.0	−0.4	$^4F_{5/2}$	190 987.8 (3/2)
448	4.84 (10)	542.260	184 413.5	−0.8	$^2G_{7/2}$	207 333.9 (5/2)
71	4.86 (9)	542.911	184 192.1	−0.4	$^2_3D_{3/2}$	212 086.5 (1/2)
69	2.11 (9)	543.383	184 032.2	−0.8	$^4F_{3/2}$	184 033.0 (5/2)
31	4.27 (9)	544.063	183 802.1	−0.2	$^2P_{3/2}$	224 004.9 (1/2)
5	2.79 (8)	544.249	183 739.3	−1.4	$^2_3D_{3/2}$	211 634.7 (3/2)
31	1.72 (9)	544.324	183 714.1	0.0	$^4P_{3/2}$	198 144.3 (1/2)
12	1.60 (9)	544.555	183 636.2	0.4	$^2G_{7/2}$	206 555.3 (9/2)
127	1.47 (9)	545.629	183 274.9	1.0	$^2G_{7/2}$	206 193.4 (7/2)
100	8.59 (9)	545.771	183 227.1	0.4	$^2P_{1/2}$	212 086.5 (1/2)
512	1.11 (11)	545.809	183 214.3	0.5	$^2H_{11/2}$	215 369.6 (9/2)
267	2.11 (10)	546.616	182 943.9	−0.2	$^2_3D_{5/2}$	217 361.9 (3/2)
10	1.12 (9)	547.126	182 773.4	−1.5	$^2P_{1/2}$	211 634.7 (3/2)
420	3.71 (10)	547.863	182 527.3	0.4	$^2H_{9/2}$	206 555.3 (9/2)
446	5.15 (10)	548.078	182 455.8	0.2	$^4F_{9/2}$	197 134.0 (7/2)
24	3.46 (9)	548.589	182 285.8	−1.1	$^2_3D_{5/2}$	216 704.6 (7/2)
323	2.29 (10)	548.954	182 164.5	−0.5	$^2H_{9/2}$	206 193.4 (7/2)
45	1.89 (9)	549.515	181 978.8	−0.5	$^2_3D_{5/2}$	216 397.1 (5/2)
52	4.10 (9)	550.051	181 801.3	0.0	$^2G_{7/2}$	204 720.9 (5/2)
12	1.60 (9)	550.291	181 722.2	−0.5	$^4P_{3/2}$	196 152.8 (5/2)
40	6.04 (9)	551.011	181 484.5	−0.7	$^2F_{7/2}$	221 932.2 (9/2)
168	6.75 (9)	551.358	181 370.3	−1.6	$^4P_{1/2}$	198 144.3 (1/2)
	1.87 (9)			5.4	$^4P_{5/2}$	206 193.4 (7/2)
154	8.01 (9)	551.616	181 285.6	−0.4	$^4P_{3/2}$	195 716.1 (3/2)
453	3.20 (10)	552.086	181 131.3	−0.2	$^4F_{7/2}$	192 575.6 (7/2)
37	3.96 (9)	552.843	180 883.3	0.0	$^4P_{5/2}$	205 711.8 (3/2)
52	6.35 (9)	553.893	180 540.2	−2.1	$^2P_{3/2}$	220 744.9 (5/2)
466	6.13 (10)	554.642	180 296.6	−1.3	$^2F_{7/2}$	220 744.9 (5/2)
483	3.53 (10)	555.091	180 150.7	0.4	$^2G_{7/2}$	203 069.9 (7/2)
60	1.17 (9)	555.333	180 072.0	−0.8	$^4F_{7/2}$	191 516.9 (5/2)
258	1.82 (10)	555.652	179 968.8	−0.9	$^2_3D_{5/2}$	214 387.4 (5/2)
304	2.58 (10)	555.870	179 898.3	−1.3	$^2F_{5/2}$	219 500.4 (3/2)
266	1.15 (10)	556.072	179 832.9	−0.1	$^4P_{3/2}$	194 263.2 (3/2)
193	1.24 (10)	556.247	179 776.3	−0.1	$^2P_{3/2}$	219 979.0 (1/2)
148	1.10 (10)	556.528	179 685.3	0.2	$^2G_{9/2}$	216 704.6 (7/2)
263	1.34 (10)	557.245	179 454.1	−1.3	$^2_3D_{3/2}$	207 349.5 (3/2)
325	9.00 (9)	557.294	179 438.5	0.0	$^4F_{7/2}$	190 882.5 (9/2)
64	3.03 (9)	557.590	179 343.2	−0.4	$^2G_{7/2}$	202 263.2 (9/2)
24	2.54 (9)	557.732	179 297.4	−0.4	$^2P_{3/2}$	219 500.4 (3/2)
35	9.36 (8)	558.528	179 042.0	0.5	$^2H_{9/2}$	203 069.9 (7/2)
85	6.08 (9)	558.833	178 944.3	0.6	$^4P_{1/2}$	195 716.1 (3/2)
102	5.13 (9)	560.257	178 489.6	−0.1	$^2P_{1/2}$	207 349.5 (3/2)
47	6.98 (9)	560.695	178 350.0	−0.2	$^2G_{9/2}$	215 369.6 (9/2)
63	1.79 (9)	561.057	178 234.9	0.1	$^2H_{9/2}$	202 263.2 (9/2)
89	3.10 (9)	561.828	177 990.5	0.3	$^2H_{11/2}$	210 146.1 (11/2)
246	6.52 (9)	562.123	177 897.1	−0.2	$^4F_{9/2}$	192 575.6 (7/2)
259	1.40 (10)	562.374	177 817.6	−0.2	$^2_3D_{3/2}$	205 711.8 (3/2)
90	8.77 (9)	562.550	177 762.0	0.8	$^2F_{5/2}$	217 361.9 (3/2)
234	7.52 (9)	562.880	177 657.7	−0.1	$^4P_{3/2}$	192 087.9 (1/2)
502	2.00 (10)	562.950	177 635.8	0.1	$^4F_{5/2}$	184 033.0 (5/2)
42	2.93 (9)	563.407	177 491.6	0.8	$^4P_{1/2}$	194 263.2 (3/2)
27	6.84 (8)	564.282	177 216.3	−0.6	$^2_3D_{5/2}$	211 634.7 (3/2)
32	3.97 (9)	564.465	177 158.9	−0.4	$^2P_{3/2}$	217 361.9 (3/2)
64	2.09 (9)	564.695	177 086.7	−0.1	$^4P_{3/2}$	191 516.9 (5/2)
134	6.96 (9)	565.448	176 850.9	−1.1	$^2P_{1/2}$	205 711.8 (3/2)
250	8.81 (9)	565.524	176 827.0	0.1	$^2_3D_{3/2}$	204 720.9 (5/2)
8	2.10 (8)	565.625	176 795.4	−0.9	$^2F_{5/2}$	216 397.1 (5/2)
145	1.78 (10)	565.919	176 703.8	0.1	$^2_1D_{3/2}$	236 614.5 (1/2)
73	3.43 (9)	566.387	176 557.7	0.1	$^4P_{3/2}$	190 987.8 (3/2)
307	1.92 (10)	567.352	176 257.5	0.0	$^2F_{7/2}$	216 704.6 (7/2)
499	2.58 (10)	567.522	176 204.6	0.4	$^4F_{9/2}$	190 882.5 (9/2)
391	8.53 (9)	567.916	176 082.3	0.1	$^4F_{5/2}$	182 479.5 (7/2)
20	1.27 (9)	568.343	175 950.0	0.0	$^2F_{7/2}$	216 397.1 (5/2)
446	2.42 (10)	568.698	175 840.1	0.3	$^4F_{3/2}$	175 839.8 (3/2)
75	5.50 (9)	570.000	175 438.5	0.3	$^2_3D_{5/2}$	209 856.0 (7/2)
15	7.71 (8)	570.398	175 316.0	0.5	$^4P_{1/2}$	192 087.9 (1/2)
6	2.21 (9)	571.674	174 924.9	2.4	$^2F_{7/2}$	215 369.6 (9/2)

Table I. *Continued*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^3$-level	$5d^26p$-level
12	1.27 (9)	572.123	174 787.6	1.0	$^2F_{5/2}$	214 387.4 (5/2)
347	1.59 (10)	573.395	174 399.9	0.4	$^2H_{11/2}$	206 555.3 (9/2)
294	5.67 (9)	574.005	174 214.6	−0.8	$^4P_{1/2}$	190 987.8 (3/2)
	3.14 (9)			0.3	$^2G_{7/2}$	197 134.0 (7/2)
103	6.48 (9)	574.102	174 185.0	0.2	$^2P_{3/2}$	214 387.4 (5/2)
97	7.43 (9)	574.909	173 940.6	0.2	$^2F_{7/2}$	214 387.4 (5/2)
43	6.11 (9)	577.176	173 257.2	−0.5	$^2_1D_{3/2}$	233 168.5 (5/2)
130	5.32 (9)	577.256	173 233.3	0.1	$^2G_{7/2}$	196 152.8 (5/2)
62	6.02 (8)	577.615	173 125.8	−0.8	$^2G_{9/2}$	210 146.1 (11/2)
139	5.05 (9)	577.679	173 106.5	0.9	$^2H_{9/2}$	197 134.0 (7/2)
39	3.00 (9)	578.313	172 916.7	0.5	$^2_3D_{5/2}$	207 333.9 (5/2)
8	3.79 (8)	578.587	172 834.8	−1.8	$^2G_{9/2}$	209 856.0 (7/2)
14	2.86 (8)	579.963	172 424.8	0.9	$^4P_{3/2}$	186 854.0 (1/2)
104	4.37 (9)	580.367	172 304.9	−0.6	$^4P_{5/2}$	197 134.0 (7/2)
196	1.64 (10)	580.846	172 162.8	−0.4	$^2_1D_{5/2}$	233 168.5 (5/2)
40	5.48 (9)	581.097	172 088.3	0.5	$^2_1D_{3/2}$	231 998.6 (3/2)
8	4.96 (8)	581.288	172 031.6	−2.3	$^2F_{5/2}$	211 634.7 (3/2)
104	5.65 (9)	582.154	171 776.0	0.3	$^2_3D_{5/2}$	206 193.4 (7/2)
8	4.16 (8)	583.320	171 432.6	0.5	$^2P_{3/2}$	211 634.7 (3/2)
54	2.91 (9)	583.687	171 324.6	0.2	$^4P_{5/2}$	196 152.8 (5/2)
130	5.84 (9)	583.789	171 294.9	0.9	$^2_3D_{5/2}$	205 711.8 (3/2)
131	2.31 (9)	584.673	171 035.8	0.3	$^4F_{7/2}$	182 479.5 (7/2)
144	1.50 (10)	584.818	170 993.4	0.0	$^2_1D_{5/2}$	231 998.6 (3/2)
135	6.20 (9)	585.178	170 888.2	0.6	$^4P_{5/2}$	195 716.1 (3/2)
366	5.49 (9)	586.602	170 473.4	−0.1	$^4F_{3/2}$	170 473.6 (5/2)
29	1.52 (9)	587.188	170 303.3	0.2	$^2_3D_{5/2}$	204 720.9 (5/2)
6	1.21 (9)	587.361	170 252.9	−2.3	$^2F_{5/2}$	209 856.0 (7/2)
	2.71 (8)			2.6	$^4P_{3/2}$	198 144.3 (1/2)
10	2.23 (8)	587.866	170 106.9	−0.5	$^2H_{11/2}$	202 263.2 (9/2)
25	1.22 (9)	587.954	170 081.4	−0.2	$^4P_{1/2}$	186 854.0 (1/2)
9	3.65 (8)	589.432	169 654.8	−1.2	$^2G_{7/2}$	192 575.6 (7/2)
335	9.25 (9)	589.611	169 603.3	0.4	$^4P_{3/2}$	184 033.0 (5/2)
5	1.35 (8)	590.172	169 442.2	−0.2	$^4F_{5/2}$	175 839.8 (3/2)
13	1.11 (9)	590.286	169 409.4	0.5	$^2F_{7/2}$	209 856.0 (7/2)
71	3.68 (9)	591.104	169 174.8	0.9	$^2G_{9/2}$	206 193.4 (7/2)
17	6.94 (8)	592.931	168 653.8	1.7	$^2_3D_{5/2}$	203 069.9 (7/2)
19	4.86 (8)	593.126	168 598.2	0.9	$^2G_{7/2}$	191 516.9 (5/2)
74	7.05 (9)	595.148	168 025.5	0.7	$^2_1D_{3/2}$	227 935.6 (5/2)
258	3.43 (9)	595.942	167 801.5	0.2	$^4F_{9/2}$	182 479.5 (7/2)
339	1.09 (10)	596.136	167 747.0	−0.1	$^4P_{5/2}$	192 575.6 (7/2)
93	5.75 (9)	596.188	167 732.5	−0.6	$^2F_{5/2}$	207 333.9 (5/2)
163	1.26 (10)	597.903	167 251.2	0.3	$^2_1D_{5/2}$	228 256.2 (7/2)
29	1.92 (9)	599.206	166 887.5	0.6	$^2F_{7/2}$	207 333.9 (5/2)
19	2.76 (8)	599.325	166 854.4	0.2	$^2H_{9/2}$	190 882.5 (9/2)
	2.10 (8)			−1.9	$^2P_{1/2}$	195 716.1 (3/2)
8	3.13 (8)	599.927	166 686.8	−1.6	$^4P_{5/2}$	191 516.9 (5/2)
24	2.49 (9)	600.264	166 593.4	0.8	$^2F_{5/2}$	206 193.4 (7/2)
6	4.69 (8)	601.066	166 371.1	1.9	$^2_3D_{3/2}$	194 263.2 (3/2)
6	4.53 (8)	601.826	166 161.0	1.7	$^4P_{5/2}$	190 987.8 (3/2)
15	5.98 (8)	602.006	166 111.4	0.4	$^2F_{5/2}$	205 711.8 (3/2)
	7.48 (8)			3.1	$^2F_{7/2}$	206 555.3 (9/2)
7	2.65 (8)	602.225	166 050.9	0.4	$^2G_{9/2}$	203 069.9 (7/2)
68	3.17 (9)	603.331	165 746.6	0.2	$^2F_{7/2}$	206 193.4 (7/2)
3	3.05 (8)	604.200	165 508.1	−1.1	$^2P_{3/2}$	205 711.8 (3/2)
15	5.05 (8)	604.580	165 404.0	0.7	$^2P_{1/2}$	194 263.2 (3/2)
7	3.50 (8)	605.160	165 245.6	1.8	$^2G_{9/2}$	202 263.2 (9/2)
13	2.29 (9)	606.743	164 814.5	0.9	$^2_1D_{5/2}$	225 818.9 (7/2)
114	3.45 (9)	607.834	164 518.6	0.2	$^2P_{3/2}$	204 720.9 (5/2)
102	3.18 (9)	608.738	164 274.3	0.5	$^2F_{7/2}$	204 720.9 (5/2)
11	2.07 (7)	609.038	164 193.3	−0.7	$^2_3D_{3/2}$	192 087.9 (1/2)
12	1.14 (9)	609.409	164 093.3	−0.8	$^2_1D_{3/2}$	224 004.9 (1/2)
32	8.33 (8)	611.164	163 622.3	−0.6	$^2_3D_{3/2}$	191 516.9 (5/2)
232	7.21 (9)	611.734	163 469.6	0.6	$^2F_{5/2}$	203 069.9 (7/2)
21	7.62 (8)	612.637	163 228.7	0.6	$^2P_{1/2}$	192 087.9 (1/2)
7	2.22 (7)	614.914	162 624.4	1.6	$^2F_{7/2}$	203 069.9 (7/2)
72	1.14 (9)	616.793	162 128.8	0.8	$^2P_{1/2}$	190 987.8 (3/2)
44	1.61 (9)	617.982	161 817.0	0.8	$^2F_{7/2}$	202 263.2 (9/2)
85	1.50 (9)	619.542	161 409.5	−0.1	$^4P_{3/2}$	175 839.8 (3/2)
17	1.73 (9)	621.766	160 832.3	−1.8	$^2_1D_{3/2}$	220 744.9 (5/2)
40	1.51 (9)	624.732	160 068.7	0.5	$^2_1D_{3/2}$	219 979.0 (1/2)

Table I. *Continued*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^3$-level	$5d^26p$-level
69	2.99 (9)	626.020	159 739.4	−0.2	${}^2_1D_{5/2}$	220 744.9 (5/2)
22	1.90 (9)	626.604	159 590.3	0.7	${}^2_1D_{3/2}$	219 500.4 (3/2)
46	5.70 (8)	626.728	159 558.9	−1.0	${}^2G_{7/2}$	182 479.5 (7/2)
57	9.60 (8)	628.126	159 203.7	−0.8	${}^4P_{5/2}$	184 033.0 (5/2)
26	4.94 (8)	628.665	159 067.3	−0.1	${}^4P_{1/2}$	175 839.8 (3/2)
13	1.80 (8)	628.813	159 029.9	0.4	${}^4F_{7/2}$	170 473.6 (5/2)
8	9.95 (7)	629.096	158 958.2	−1.8	${}^2D_{3/2}$	186 854.0 (1/2)
140	1.99 (9)	630.014	158 726.5	−0.2	${}^2H_{11/2}$	190 882.5 (9/2)
10	8.89 (8)	630.939	158 494.1	−1.0	${}^2_1D_{5/2}$	219 500.4 (3/2)
86	8.73 (8)	631.109	158 451.3	0.1	${}^2H_{9/2}$	182 479.5 (7/2)
12	2.68 (8)	632.927	157 996.0	1.8	${}^2P_{1/2}$	186 854.0 (1/2)
5	9.00 (7)	634.307	157 652.4	1.4	${}^4P_{5/2}$	182 479.5 (7/2)
20	4.29 (8)	634.787	157 533.2	0.0	${}^2F_{5/2}$	197 134.0 (7/2)
7	2.38 (8)	635.136	157 446.6	−4.5	${}^2_1D_{3/2}$	217 361.9 (3/2)
17	4.30 (8)	636.534	157 100.8	1.7	${}^2_3D_{5/2}$	191 516.9 (5/2)
21	1.00 (9)	638.219	156 685.9	−1.0	${}^2F_{7/2}$	197 134.0 (7/2)
25	6.99 (8)	638.698	156 568.5	−1.5	${}^2_3D_{5/2}$	190 987.8 (3/2)
45	1.75 (9)	638.764	156 552.3	0.2	${}^2F_{5/2}$	196 152.8 (5/2)
7	3.37 (8)	639.568	156 355.5	−1.1	${}^2_1D_{5/2}$	217 361.9 (3/2)
44	1.24 (9)	640.549	156 116.2	0.9	${}^2F_{5/2}$	195 716.1 (3/2)
91	5.24 (8)	640.848	156 043.2	−0.3	${}^4P_{3/2}$	170 473.6 (5/2)
18	2.28 (8)	646.570	154 662.2	−0.2	${}^2F_{5/2}$	194 263.2 (3/2)
8	1.61 (8)	647.344	154 477.5	0.9	${}^2_1D_{3/2}$	214 387.4 (5/2)
8	5.68 (7)	649.097	154 060.1	−0.5	${}^2P_{3/2}$	194 263.2 (3/2)
37	7.84 (8)	649.931	153 862.4	−0.7	${}^2G_{9/2}$	190 882.5 (9/2)
183	6.26 (8)	653.699	152 975.6 S	0.8	${}^2F_{5/2}$	192 575.6 (7/2)
597	8.90 (8)	657.331	152 130.3 SIV	1.7	${}^2F_{7/2}$	192 575.6 (7/2)
13	4.02 (8)	658.393	151 885.0	−0.4	${}^2P_{3/2}$	192 087.9 (1/2)
4	8.71 (7)	661.943	151 070.5	0.6	${}^2F_{7/2}$	191 516.9 (5/2)
37	4.77 (8)	664.738	150 435.1	−0.4	${}^2F_{7/2}$	190 882.5 (9/2)
25	4.64 (8)	668.385	149 614.4	−0.9	${}^2_3D_{5/2}$	184 033.0 (5/2)
9	1.85 (8)	675.399	148 060.6	−1.1	${}^2_3D_{5/2}$	182 479.5 (7/2)
6	5.27 (7)	686.606	145 643.9	−1.2	${}^4P_{5/2}$	170 473.6 (5/2)
13	1.07 (8)	695.257	143 831.8	1.3	${}^2P_{3/2}$	184 033.0 (5/2)
9	1.61 (8)	696.443	143 586.9	0.9	${}^2F_{7/2}$	184 033.0 (5/2)
41	2.94 (8)	701.360	142 580.1	0.5	${}^2_3D_{3/2}$	170 473.6 (5/2)
67	3.13 (8)	704.066	142 032.2	−0.2	${}^2F_{7/2}$	182 479.5 (7/2)
7	2.53 (8)	764.104	130 872.2	−0.6	${}^2F_{5/2}$	170 473.6 (5/2)
4	6.94 (7)	823.207	121 476.1	1.8	${}^2_1D_{5/2}$	182 479.5 (7/2)

S: line too strong compared to calculated intensity; SIV: blended by SIV; M2 blended by second order.

Table II. *Classified lines in the $5d^26s$–$5d^26p$ transition array of Os VI*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^26s$-level	$5d^26p$-level
32	3.42 (9)	940.059	106 376.3	0.8	(^3F) ${}^4F_{5/2}$	207 349.5 (3/2)
14	2.58 (9)	944.741	105 849.1	0.1	(^3F) ${}^4F_{7/2}$	214 387.4 (5/2)
13	5.00 (9)	958.446	104 335.6	0.5	(^3F) ${}^2F_{7/2}$	227 935.6 (5/2)
13	1.92 (9)	975.001	102 564.0	−0.5	(^3F) ${}^2F_{5/2}$	216 704.6 (7/2)
17	2.36 (9)	977.922	102 257.6	0.6	(^3F) ${}^2F_{5/2}$	216 397.1 (5/2)
120	5.12 (9)	984.931	101 529.9	−0.9	(^3F) ${}^4F_{9/2}$	216 704.6 (7/2)
25	3.89 (9)	986.987	101 318.5	0.8	(^3F) ${}^4F_{7/2}$	209 856.0 (7/2)
69	5.85 (9)	997.955	100 205.0	1.0	(^3F) ${}^4F_{3/2}$	198 144.3 (1/2)
68	1.04 (10)	998.040	100 196.4	0.6	(^3F) ${}^4F_{9/2}$	215 369.6 (9/2)
72	1.58 (10)	998.213	100 179.0	0.4	(^1G) ${}^2G_{7/2}$	233 168.5 (5/2)
6	1.43 (9)	1012.199	98 794.8	−0.7	(^3F) ${}^4F_{7/2}$	207 333.9 (5/2)
23	4.57 (9)	1018.199	98 212.6	0.1	(^3F) ${}^4F_{3/2}$	196 152.8 (5/2)
13	1.66 (9)	1018.614	98 172.6	−0.7	(^3P) ${}^2P_{3/2}$	236 614.5 (1/2)
178	7.59 (9)	1020.229	98 017.2	0.3	(^3F) ${}^4F_{7/2}$	206 555.3 (9/2)
232	1.36 (10)	1021.475	97 897.7	0.4	(^3P) ${}^4P_{3/2}$	216 397.1 (5/2)
22	3.06 (9)	1024.015	97 654.8	−0.2	(^3F) ${}^4F_{7/2}$	206 193.4 (7/2)
18	5.83 (9)	1026.422	97 425.8	−0.5	(^1D) ${}^2D_{3/2}$	220 744.9 (5/2)
152	1.12 (10)	1026.617	97 407.3	0.7	(^1G) ${}^2G_{9/2}$	228 256.2 (7/2)
68	7.92 (9)	1028.050	97 271.5	0.0	(^3P) ${}^4P_{1/2}$	211 634.7 (3/2)
14	7.14 (9)	1029.397	97 144.2	−0.2	(^3F) ${}^2F_{7/2}$	220 744.9 (5/2)
12	2.53 (9)	1034.565	96 659.0	−1.4	(^1D) ${}^2D_{3/2}$	219 979.0 (1/2)
51	5.73 (9)	1035.410	96 580.1	0.1	(^1D) ${}^2D_{5/2}$	228 256.2 (7/2)

Table II. *Continued*

Int	gA (s^{-1})	λ (Å)	σ (cm^{-1})	diff	$5d^26s$-level	$5d^26p$-level
86	8.38 (9)	1038.184	96322.0	−0.8	(^{3}F) $^4F_{3/2}$	194263.2 (3/2)
41	6.62 (9)	1038.864	96259.0	−0.5	(^{1}D) $^2D_{5/2}$	227935.6 (5/2)
39	2.03 (9)	1039.709	96180.8	−0.6	(^{1}D) $^2D_{3/2}$	219500.0 (3/2)
	1.03 (9)			−1.8	(^{3}F) $^4F_{7/2}$	204720.9 (5/2)
319	1.50 (10)	1039.943	96159.1	−1.0	(^{3}F) $^4F_{5/2}$	197134.0 (7/2)
384	3.76 (10)	1047.439	95471.0	0.0	(^{1}G) $^2G_{9/2}$	226320.5 (11/2)
66	8.33 (9)	1049.695	95265.8	−0.5	(^{1}G) $^2G_{7/2}$	228256.2 (7/2)
102	5.68 (9)	1050.652	95179.0	0.1	(^{3}F) $^4F_{5/2}$	196152.8 (5/2)
508	3.67 (10)	1052.939	94972.2	−0.1	(^{3}F) $^4F_{9/2}$	210146.1 (11/2)
10	2.76 (9)	1053.231	94946.0	0.2	(^{1}G) $^2G_{7/2}$	227935.6 (5/2)
33	1.19 (10)	1054.694	94814.2	−0.4	(^{1}S) $^2S_{1/2}$	252203.4 (3/2)
9	3.27 (9)	1055.665	94727.0	−0.3	(^{3}P) $^2P_{3/2}$	233168.5 (5/2)
15	3.45 (9)	1056.151	94683.4	1.2	(^{3}F) $^4F_{9/2}$	209856.0 (7/2)
41	4.83 (9)	1057.849	94531.5	0.0	(^{3}F) $^4F_{7/2}$	203069.9 (7/2)
145	1.73 (10)	1062.219	94142.5	−0.2	(^{1}D) $^2D_{5/2}$	225818.9 (7/2)
58	7.33 (9)	1063.333	94043.9	0.6	(^{1}D) $^2D_{3/2}$	217361.9 (3/2)
406	1.89 (10)	1066.956	93724.6	−0.2	(^{3}F) $^4F_{7/2}$	202263.2 (9/2)
30	3.35 (9)	1068.531	93586.4	−0.2	(^{3}P) $^4P_{3/2}$	212086.5 (1/2)
100	3.82 (9)	1068.647	93576.3	−0.3	(^{3}F) $^4F_{3/2}$	191516.9 (5/2)
64	1.14 (10)	1068.864	93557.3	−0.2	(^{3}P) $^2P_{3/2}$	231998.6 (3/2)
64	1.14 (10)	1068.864	93557.3	−0.2	(^{3}P) $^2P_{3/2}$	231998.6 (3/2)
13	1.38 (9)	1071.936	93289.2	−0.1	(^{3}F) $^4F_{5/2}$	194263.2 (3/2)
57	6.03 (9)	1072.848	93209.8	0.4	(^{3}F) $^2F_{5/2}$	207349.5 (3/2)
73	4.71 (9)	1074.069	93103.9	−0.2	(^{3}F) $^2F_{7/2}$	216704.6 (7/2)
6	1.02 (9)	1075.424	92986.6	0.3	(^{3}P) $^4P_{1/2}$	207349.5 (3/2)
22	5.01 (9)	1077.246	92829.3	0.3	(^{1}G) $^2G_{7/2}$	225818.9 (7/2)
165	1.03 (10)	1086.336	92052.5	−0.8	(^{3}F) $^2F_{5/2}$	206193.4 (7/2)
161	1.51 (10)	1089.694	91768.9	−0.2	(^{3}F) $^2F_{7/2}$	215369.6 (9/2)
38	4.90 (9)	1094.314	91381.5	0.0	(^{3}F) $^4F_{9/2}$	206555.3 (9/2)
228	1.06 (10)	1097.911	91082.1 M2	−0.5	(^{1}G) $^2G_{9/2}$	221932.2 (9/2)
11	2.76 (9)	1098.083	91067.8	−1.0	(^{1}D) $^2D_{3/2}$	214387.4 (5/2)
8	1.21 (8)	1098.651	91020.7	1.1	(^{3}F) $^4F_{9/2}$	206193.4 (7/2)
36	5.17 (9)	1101.487	90786.4	−0.5	(^{3}F) $^2F_{7/2}$	214387.4 (5/2)
40	3.66 (9)	1103.982	90581.2	0.4	(^{3}F) $^2F_{5/2}$	204720.9 (5/2)
40	2.37 (9)	1104.445	90543.2	0.2	(^{3}F) $^4F_{5/2}$	191516.9 (5/2)
13	3.30 (8)	1110.936	90014.2	0.3	(^{3}F) $^4F_{5/2}$	190987.8 (3/2)
18	3.87 (9)	1117.393	89494.0	−0.4	(^{3}P) $^2P_{3/2}$	227935.6 (5/2)
12	3.43 (9)	1122.731	89068.5	−0.2	(^{1}D) $^2D_{5/2}$	220744.9 (5/2)
140	1.32 (10)	1124.334	88941.5	−0.8	(^{1}G) $^2G_{7/2}$	221932.2 (9/2)
12	1.46 (9)	1124.487	88929.4	−0.4	(^{3}F) $^2F_{5/2}$	203069.9 (7/2)
7	1.19 (9)	1126.533	88767.9	0.0	(^{1}D) $^2D_{3/2}$	212086.5 (1/2)
9	1.03 (9)	1141.380	87613.3	−1.2	(^{3}F) $^4F_{7/2}$	196152.8 (5/2)
9	1.46 (9)	1183.150	84520.1	0.1	(^{1}G) $^2G_{9/2}$	215369.6 (9/2)
24	2.18 (9)	1213.899	82379.2	−0.5	(^{1}G) $^2G_{7/2}$	215369.6 (9/2)
32	2.42 (9)	1214.431	82343.1	−1.1	(^{3}F) $^4F_{7/2}$	190882.5 (9/2)
244	4.16 (9)	1226.917	81505.1	−0.5	(^{3}F) $^4F_{5/2}$	182479.5 (7/2)
17	2.39 (9)	1262.213	79226.0	0.3	(^{1}S) $^2S_{1/2}$	236614.5 (1/2)
38	1.81 (9)	1283.719	77898.7	−0.8	(^{3}F) $^4F_{3/2}$	175839.8 (3/2)
127	7.47 (9)	1291.962	77401.7	−0.1	(^{3}F) $^4F_{9/2}$	192575.6 (7/2)
11	1.17 (9)	1292.383	77376.4	−0.4	(^{3}F) $^2F_{5/2}$	191516.9 (5/2)
156	7.74 (9)	1320.854	75708.6	−0.1	(^{3}F) $^4F_{9/2}$	190882.5 (9/2)
93	5.16 (9)	1324.610	75493.9	−0.7	(^{3}F) $^4F_{7/2}$	184033.0 (5/2)
24	4.16 (9)	1350.694	74036.0	0.4	(^{1}D) $^2D_{5/2}$	205711.8 (3/2)
127	4.72 (9)	1352.428	73941.1	−0.1	(^{3}F) $^4F_{7/2}$	182479.5 (7/2)
10	1.62 (9)	1366.055	73203.5	0.0	(^{1}G) $^2G_{7/2}$	206193.4 (7/2)
189	4.51 (9)	1378.678	72533.2	−0.1	(^{3}F) $^4F_{3/2}$	170473.6 (5/2)
9	1.00 (9)	1381.265	72397.4	−0.1	(^{1}D) $^2D_{3/2}$	195716.1 (3/2)
104	3.10 (9)	1384.686	72218.5 M2	−1.7	(^{1}G) $^2G_{9/2}$	203069.9 (7/2)
359	2.55 (9)	1400.295	71413.5 M2	−0.1	(^{1}G) $^2G_{9/2}$	202263.2 (9/2)
28	2.05 (9)	1426.942	70079.9	0.0	(^{1}G) $^2G_{7/2}$	203069.9 (7/2)
36	1.80 (9)	1430.758	69893.0	0.1	(^{3}F) $^2F_{5/2}$	184033.0 (5/2)
9	8.52 (8)	1443.568	69272.8	−0.5	(^{1}G) $^2G_{7/2}$	202263.2 (9/2)
45	2.53 (9)	1449.783	68975.8	0.7	(^{3}F) $^2F_{7/2}$	192575.6 (7/2)
27	1.11 (9)	1451.520	68893.3	0.6	(^{3}P) $^2P_{3/2}$	207333.9 (5/2)
148	2.16 (9)	1463.294	68339.0	−0.5	(^{3}F) $^2F_{5/2}$	182479.5 (7/2)
38	1.14 (9)	1466.297	68199.0	0.7	(^{1}D) $^2D_{3/2}$	191516.9 (5/2)
146	3.57 (9)	1486.275	67282.3	0.3	(^{3}F) $^2F_{7/2}$	190882.5 (9/2)

S: line too strong compared to calculated intensity; SIV: blended by SIV; M2 blended by second order.

Table III. *Experimental and calculated energy values in the* $(5d^3 + 5d^26s + 5d6s^2)$ *complex of Os VI*

E (Obs)	*E* (Calc)	diff	*LS*-composition
$J = 1/2$			
157388.9	157387.7	1.2	90% 2 | ^{1}S) ^{2}S + 5% 2 | ^{3}P) ^{2}P + 5% 2 | ^{3}P) ^{4}P
—	129205.1	—	91% 2 | ^{3}P) ^{2}P + 5% 2 | ^{3}P) ^{4}P + 3% 2 | ^{1}S) ^{2}S
114363.2	114380.6	−17.4	90% 2 | ^{3}P) ^{4}P + 7% 2 | ^{1}S) ^{2}D + 3% 2 | ^{3}P) ^{2}P
28859.8	28881.9	−22.1	68% 1 | ^{2}P + 32% 1 | ^{4}P + 1% 2 | ^{3}P) ^{2}P
16772.4	16763.4	9.0	68% 1 | ^{4}P + 31% 1 | ^{2}P
$J = 3/2$			
—	222472.3	—	99% 3 | ^{2}D) ^{2}D
138441.2	138433.4	7.8	76% 2 | ^{3}P) ^{2}P + 20% 2 | ^{1}D) ^{2}D + 2% 2 | ^{3}P) ^{4}P
123318.6	123343.5	−24.9	59% 2 | ^{1}D) ^{2}D + 22% 2 | ^{3}P) ^{2}P + 12% 2 | ^{3}P) ^{4}P
118499.8	118495.8	4.0	86% 2 | ^{3}P) ^{4}P + 12% 2 | ^{1}D) ^{2}D + 2% 2 | ^{3}F) ^{4}F
97940.4	97914.6	22.8	91% 2 | ^{3}F) ^{4}F + 8% 2 | ^{1}D) ^{2}D
59910.8	59914.6	−3.8	66% 1 | $^2_1$D + 33% 1 | $^2_3$D + 1% 1 | ^{4}P
40202.6	40207.6	−5.0	55% 1 | ^{2}P + 17% 1 | $^2_3$D + 14% 1 | $^2_1$D
27894.0	27893.9	0.1	42% 1 | ^{4}P + 34% 1 | $^2_3$D + 10% 1 | $^2_1$D
14430.2	14406.8	23.4	46% 1 | ^{4}P + 34% 1 | ^{2}P + 9% 1 | ^{4}F
0.0	6.0	−6.0	82% 1 | ^{4}F + 10% 1 | $^2_3$D + 6% 1 | $^2_1$D
$J = 5/2$			
—	234944.0	—	100% 3 | $^2_1$D) ^{2}D
131676.2	131661.2	15.0	55% 2 | ^{1}D) ^{2}D + 39% 2 | ^{3}P) ^{4}P + 5% 2 | ^{3}F) ^{2}F
—	119231.9	—	51% 2 | ^{3}P) ^{4}P + 29% 2 | ^{3}F) ^{2}F + 19% 2 | ^{1}D) ^{2}D
114140.1	114146.5	−6.4	53% 2 | ^{3}F) ^{2}F + 21% 2 | ^{3}F) ^{4}F + 16% 2 | ^{1}D) ^{2}D
100973.9	100974.7	−0.8	78% 2 | ^{3}F) ^{4}F + 12% 2 | ^{3}F) ^{2}F + 9% 2 | ^{1}D) ^{2}D
61005.3	61000.5	4.8	78% 1 | $^2_1$D + 12% 1 | ^{2}F + 6% 1 | $^2_3$D
39600.8	39605.2	−4.4	85% 1 | ^{2}F + 8% 1 | $^2_1$D + 4% 1 | $^2_3$D
34417.8	34419.2	−1.4	84% 1 | $^2_3$D + 6% 1 | $^2_1$D + 5% 1 | ^{4}P
24828.5	24836.3	−7.8	90% 1 | ^{4}P + 7% 1 | $^2_1$D + 2% 1 | $^2_3$D
6397.4	6395.2	2.2	95% 1 | ^{4}F + 4% 1 | $^2_3$D + 1% 1 | $^2_1$D
$J = 7/2$			
132989.9	132998.7	−8.8	63% 2 | ^{1}G) ^{2}G + 34% 2 | ^{3}F) ^{2}F + 3% 2 | ^{3}F) ^{4}F
123600.5	123592.3	8.2	61% 2 | ^{3}F) ^{2}F + 37% 2 | ^{1}G) ^{2}G + 2% 2 | ^{3}F) ^{4}F
108538.4	108541.4	−3.0	95% 2 | ^{3}F) ^{4}F + 5% 2 | ^{3}F) ^{2}F
40447.0	40442.3	4.7	94% 1 | ^{2}F + 5% 1 | ^{2}G + 1% 1 | ^{4}F
22919.6	22921.7	−2.1	82% 1 | ^{2}G + 15% 1 | ^{4}F + 3% 1 | ^{2}F
11444.1	11443.1	1.0	84% 1 | ^{4}F + 13% 1 | ^{2}G + 2% 1 | ^{2}F
$J = 9/2$			
130849.6	130846.7	2.9	89% 2 | ^{1}G) ^{2}G + 10% 2 | ^{3}F) ^{4}F
115173.8	115179.0	−5.2	90% 2 | ^{3}F) ^{4}F + 10% 2 | ^{1}G) ^{2}G
37019.4	37012.2	7.2	57% 1 | ^{2}G + 32% 1 | ^{2}H + 11% 1 | ^{4}F
24028.4	24027.9	0.5	56% 1 | ^{2}H + 34% 1 | ^{4}F + 10% 1 | ^{2}G
14678.3	14682.4	−4.1	55% 1 | ^{4}F + 33% 1 | ^{2}G + 12% 1 | ^{2}H
$J = 11/2$			
32155.8	32158.6	−2.8	100% 1 | ^{2}H)

Table IV. *Experimental and calculated energy values in the* $5d^26p$ *configuration of Os VI*

E (Obs)	*E* (Calc)	diff	*LS*-composition
$J = 1/2$			
236614.5	236726.9	−112.4	56% (^{1}S) ^{2}P + 26% (^{3}P) ^{2}P + 14% (^{1}D) ^{2}P
224004.9	223646.5	358.3	48% (^{3}P) ^{2}P + 28% (^{1}S) ^{2}P + 14% (^{3}P) ^{4}D
219979.0	220308.0	−329.0	42% (^{1}D) ^{2}P + 18% (^{3}P) ^{4}P + 15% (^{3}P) ^{2}S
212086.5	211995.6	90.0	42% (^{3}P) ^{4}P + 26% (^{1}D) ^{2}P + 21% (^{3}P) ^{2}S
198144.3	198271.2	−126.9	71% (^{3}F) ^{4}D + 13% (^{1}D) ^{2}P + 11% (^{3}P) ^{4}D
192087.9	192027.0	60.8	39% (^{3}P) ^{2}S + 33% (^{3}P) ^{4}P + 23% (^{3}P) ^{4}D
186854.0	186761.6	92.3	50% (^{3}P) ^{4}D + 16% (^{3}P) ^{2}S + 9% (^{1}S) ^{2}P
$J = 3/2$			
252203.4	252224.3	−20.9	89% (^{1}S) ^{2}P + 3% (^{3}P) ^{2}D + 3% (^{3}P) ^{4}P
231998.6	232224.5	−225.9	49% (^{3}P) ^{2}P + 17% (^{1}D) ^{2}D + 12% (^{3}P) ^{2}D
219500.4	219526.8	−26.4	56% (^{3}P) ^{2}D + 12% (^{3}F) ^{2}D + 10% (^{3}P) ^{4}S
217361.9	217330.1	31.7	31% (^{1}D) ^{2}D + 26% (^{3}P) ^{2}P + 24% (^{1}D) ^{2}P
211634.7	211531.0	103.6	56% (^{3}P) ^{4}P + 17% (^{3}P) ^{4}S + 8% (^{3}F) ^{2}D
207349.5	207402.6	−53.1	55% (^{3}F) ^{4}D + 22% (^{3}F) ^{2}D + 12% (^{3}P) ^{4}D

Table IV. *Continued*

E (Obs)	*E* (Calc)	diff	*LS*-composition
205 711.8	205 845.0	−133.2	36% $(^3P)^4S$ + 21% $(^1D)^2P$ + 19% $(^1D)^2D$
195 716.1	195 930.2	−214.1	37% $(^3P)^4D$ + 24% $(^3P)^4S$ + 12% $(^3P)^2P$
194 263.2	194 328.7	−65.5	35% $(^3F)^4F$ + 25% $(^3F)^4D$ + 18% $(^3F)^2D$
190 987.8	190 993.5	−5.7	32% $(^3P)^4D$ + 18% $(^1D)^2P$ + 15% $(^1D)^2D$
175 839.8	175 810.6	29.1	50% $(^3F)^4F$ + 31% $(^3F)^2D$ + 9% $(^3F)^4D$
J = 5/2			
233 168.5	233 048.2	120.2	59% $(^1G)^2F$ + 14% $(^3F)^2D$ + 9% $(^3P)^2D$
227 935.6	227 793.8	141.7	30% $(^1G)^2F$ + 29% $(^3P)^4P$ + 18% $(^3P)^2D$
220 744.9	220 903.4	−158.5	28% $(^1D)^2D$ + 25% $(^3P)^2D$ + 21% $(^3F)^2D$
216 397.1	216 358.2	38.8	42% $(^3P)^4P$ + 24% $(^1D)^2D$ + 22% $(^3P)^4D$
214 387.4	214 417.6	−30.2	29% $(^3F)^2D$ + 21% $(^3P)^4D$ + 18% $(^3F)^4D$
207 333.9	207 185.0	148.8	33% $(^1D)^2F$ + 25% $(^3F)^2F$ + 20% $(^3P)^4D$
204 720.9	204 759.4	−38.5	22% $(^3F)^2F$ + 16% $(^3F)^4D$ + 15% $(^1D)^2F$
196 152.8	196 126.5	26.2	24% $(^3F)^2F$ + 21% $(^3F)^4F$ + 20% $(^3F)^4D$
191 516.9	191 421.4	95.4	20% $(^3F)^4G$ + 19% $(^3F)^4F$ + 15% $(^1D)^2F$
184 033.0	184 006.4	26.5	44% $(^3F)^4F$ + 20% $(^3F)^2D$ + 19% $(^3F)^4D$
170 473.6	170 604.5	−130.9	63% $(^3F)^4G$ + 19% $(^3F)^2F$ + 12% $(^1D)^2F$
J = 7/2			
228 256.2	228 321.0	−64.8	45% $(^1G)^2F$ + 18% $(^1G)^2G$ + 11% $(^3P)^4D$
225 818.9	225 695.7	123.1	38% $(^1D)^2F$ + 32% $(^3P)^4D$ + 8% $(^1G)^2G$
216 704.6	216 667.6	36.9	32% $(^3P)^4D$ + 17% $(^3F)^2F$ + 15% $(^3F)^4D$
209 856.0	209 848.4	7.5	25% $(^3F)^4D$ + 18% $(^3P)^4D$ + 16% $(^3F)^2G$
206 193.4	206 169.7	23.6	21% $(^3F)^2G$ + 18% $(^1D)^2F$ + 17% $(^3F)^2F$
203 069.9	203 167.1	−97.2	44% $(^1G)^2G$ + 32% $(^3F)^4F$ + 16% $(^1G)^2F$
197 134.0	197 076.8	57.1	34% $(^3F)^2G$ + 16% $(^3F)^4G$ + 15% $(^3F)^4D$
192 575.6	192 470.3	105.2	33% $(^3F)^4D$ + 31% $(^3F)^4F$ + 14% $(^3F)^2F$
182 479.5	182 441.2	38.2	72% $(^3F)^4G$ + 10% $(^3F)^2F$ + 9% $(^3F)^4F$
J = 9/2			
221 932.2	221 965.5	−33.3	44% $(^1G)^2G$ + 35% $(^1G)^2H$ + 14% $(^3F)^4F$
215 369.6	215 383.2	−13.6	58% $(^3F)^2G$ + 20% $(^3F)^4F$ + 19% $(^1G)^2G$
206 555.3	206 534.4	20.8	42% $(^3F)^4F$ + 34% $(^1G)^2H$ + 11% $(^3F)^2G$
202 263.2	202 313.5	−50.3	58% $(^3F)^4G$ + 18% $(^1G)^2G$ + 16% $(^1G)^2H$
190 882.5	190 857.8	24.6	36% $(^3F)^4G$ + 21% $(^3F)^4F$ + 19% $(^3F)^2G$
J = 11/2			
226 320.5	226 302.9	17.5	90% $(^1G)^2H$ + 10% $(^3F)^4G$
210 146.1	210 206.3	−60.2	90% $(^3F)^4G$ + 10% $(^1G)^2H$

Table V. *Fitted and calculated parameter values in the $5d^3 + 5d^26s + 5d6s^2$ system of Os VI*

Parameter	*Fitted value*	*Cowan*	*LSF/HF*	*MCDF*	*LSF/DF*
$5d^3$					
E_{av}	28543.4 (2.4)				
O_2	6737.9 (4.0)	8050.2	0.8370	8012.2	0.8410
O'_2	4416.2 (2.6)	5429.5	0.8134	5406.1	0.8169
E_α	94.5 (2.0)				
E_β	80.0 (2.7)				
$T1$	−0.324 (0.10)				
$T2$	0.042 (0.10)				
$T3$	−0.027 (0.10)				
$T4$	0				
ζ_d	4546.3 (2.9)	4704.5	0.9664	4282.5	1.0616
A_c	21.6 (2.4)			30.8	
A_3	2.4 (1.6)			5.7	
A_4	4.2			8.4	
A_5	4.3 (1.7)			8.7	
A_6	11.7 (1.3)			12.6	
A_1	−1.8			−3.5	
A_2	2.0			3.9	
A_0	−1.6			−3.2	
$5d^26s$					
E_{av}	120814.8 (3.1)	95504	0.9662[a]		
O_2	6861.3 (4.9)	8209.8	0.8357	8175.0	0.8393
O'_2	4511.4 (4.9)	5525.2	0.8165	5504.2	0.8196
E_α	87.7 (3.7)				

Table V. *Fitted and calculated parameter values in the $5d^3 + 5d^26s + 5d6s^2$ system of Os VI*

Parameter	*Fitted value*	*Cowan*	*LSF/HF*	*MCDF*	*LSF/DF*
E_β	86.0 (2.3)				
ζ_d	4776.8 (2.8)	4919.4	0.9710	4508.5	1.0595
A_c	20.9			29.8	
A_3	2.4			5.9	
A_4	4.2			8.8	
A_5	4.2			8.6	
A_6	11.3			11.9	
A_1	−1.7			−3.5	
A_2	1.9			3.8	
A_0	−1.5			−3.2	
C_{ds}	3209.2 (3.5)	3922.3	0.8182	3914.9	0.8197
T_{dds}	−22.3 (4.4)				
A_{mso}	43.5 (2.3)			56.2	
A_{ss}	−1.0			−1.0	
$5d6s^2$					
E_{av}	229325.0	112700	0.963[b]		
ζ_d	5008.0	5136.4	0.975	4734.8	1.058
R^2(dd, ds)	−22248.0	−27132.0	0.82	−27094.7	0.82
R^2(dd, ss)	20255.0	24700.9	0.82	24832.0	0.82
R^2(dd, ds)	−22212.0	−27088.7	0.82	−27290.5	0.81
Sigma = 10.7 cm^{-1}					

[a] As *LSF/HF* is used ($E(5d^3)$–$E(5d^26s)$)/*HF*. *HF* is the differences of the calculated total energies using the Hartree–Fock program of Cowan.
[b] As *LSF/HF* is used ($E(5d^26s)$–$E(5d6s^2)$)/*HF*.

Table VI. *Fitted and calculated parameter values in the $5d^26p$ configuration of Os VI*

Parameter	Fitted value	Cowan	*LSF/HF*	MCDF	*LSF/DF*
$5d^26p$					
E_{av}	208638.4 (16.0)	181648	0.991[a]		
O_2	6954.9 (36.0)	8251.7	0.843	8219.8	0.846
O'_2	4518.2 (37.5)	5550.0	0.814	5530.3	0.817
E_α	105.3 (35.0)				
E_β	66.0 (32.2)				
ζ_d	4864.0 (18.0)	4971.5	0.978	4628.6	1.051
A_c	21.6				
A_3	2.4				
A_4	4.2				
A_5	4.3				
A_6	11.7				
A_1	−1.8				
A_2	2.0				
A_0	−1.6				
C_1 (dp)	3106.5 (26.9)	3748.3	0.829	3696.3	0.840
C_2 (dp)	2539.3 (30.7)	3304.4	0.768	3278.6	0.775
C_3 (dp)	1390.9 (29.5)	1665.2	0.835	1628.1	0.854
*S*1 (dp)	180.0 (23.3)				
*S*2 (dp)	−39.4 (35.0)				
ζ_p	13784.0 (35.9)	12460.7	1.106	12814.3	1.076
*S*d.*L*p	−174.1			−148.9	
*S*p.*L*d	−4.9			−27.4	
Zp2pp′	0			−39.9	
Zp2dd′	51.9			44.5	
Zp1pp′	126.4			232.4	
Zp1dd′	0			−8.9	
Zp3pp′	65.2			77.1	
Zp3dd′	0			−16.1	
5d6s6p					
E_{av}	311300.0	106270	0.97[b]		
ζ_d	5055.0	5178.6	0.98	4850.1	1.04
C_{ds}	3160.0	3904.0	0.81	3908.3	0.81

Table VI. *Fitted and calculated parameter values in the $5d^2 6p$ configuration of Os VI*

Parameter	Fitted value	Cowan	*LSF/HF*	MCDF	*LSF/DF*
A_{mso} (ds)	57.0			51.5	
C_1 (dp)	3150.0	3896.0	0.81	3841.9	0.82
C_2 (dp)	2338.0	3359.4	0.70	3335.5	0.70
C_3 (dp)	1462.0	1676.3	0.87	1667.6	0.88
ζ_p	14969.0	13575.6	1.10	13914.6	1.08
C_{sp}	12708.0	15689.0	0.81	15581.7	0.82
A_{mso} (sp)	−783.0			−783	
R^2 (dd, ds)	−22106.0	−26959	0.82	−27083	0.82
R^2 (dp, sp)	−21150.0	−25789	0.82	−25554	0.83
R^1 (dp, ps)	−18527.0	−22594	0.82	−22397	0.83
$6s^2 6p$					
E_{av}	431000.0	123817	0.97[c]		
ζ_p	16200.0	14666.8	1.10	15252.9	1.06
R^2 (dd, ss)	20160.0	24584	0.82	24717	0.82
R^2 (dp, sp)	−21400.0	−26099	0.82	−25909	0.83
R^1 (dp, ps)	−18660.0	−22757	0.82	−22503	0.83
Sigma = 107 cm^{-1}					

[a] As *LSF* is used the difference between the E_{av} of the $5d^2 6p$ and the $5d^3$ configuration, for *HF* the difference of the total energies of these configurations, as calculated by Cowans programs.
[b] The values are taken from the difference between the 5d6s6p and the $5d^2 6p$ configuration.
[c] The values are taken from the difference between the $6s^2 6p$ and the 5d6s6p configuration.