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Multi-channel Decay Partial Widths of ^{1,3}L° Autoionizing Levels of O^{6+} Below N=5 Threshold

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Abstract: The motivation of the diagonalization method is to take into consideration the coupling between closed and opened channels in term of perturbation theory and to neglect the indirect coupling as well but also the autoionisation states through the opened channels. This procedure leads to a relatively simple mathematical problem consisting of solving a system of linear algebraic equations instead of a system of coupled differential equations or integro-differential equations. In this paper, we will focus on the Resonance positions, Partial and total widths for the autoionization into various decay channels of some ^{1,3}L° doubly excited states of helium-like oxygen ion O^{6+} converging on the N=5 hydrogenic thresholds are reported for L=1, 2, 3, 4, 5, 6 and 7. The calculation was made in the framework of the diagonalization method approximation in LS coupling scheme. The partial widths for multi-channel autoionizing levels to sublevels of O^{7+} are calculated by neglecting the direct coupling between the open channels. We were able to find results consistent with some in the literature. It is about the configuration P, D, F, G, H, I and K. We could see that the decays are relatively dependent on the ionization thresholds of the residual ion O^{7+}. Some analyses are made on these resultast and only according to the level of decay focused in this paper then made a surplus in the framework of nuclear spectroscopy.

Keywords: Autoionization, Electron-electron Interactions, Partial Widths

1. Introduction

Since the discovery of strong electron-electron correlation effects in doubly excited states of helium during the experimental seminar by Madden and Codling [1], there has been continuous interest in the studies of He-like autoionizing states and their properties [2, 3]. Several experimental investigations of electron-transfer collisions between highly stripped ion and neutral atom have been made. Among these experiences include production of doubly excited autoionization states of O^{6+} ions below the N=3 and N=4 thresholds in collisions of O^{8+} ions with He atoms [4, 5]. To interpret and identify satellite lines of such highly stripped ions, which in turn would play an important role in spectroscopic diagnostics of high-temperature astrophysical and laboratory plasmas, knowledge of the doubly excited autoionizing states are needed [6, 7].

There are not too many direct measurements of the resonance positions for Z > 2 systems. The resonance positions for High-Z ions are determined mostly from theoretical calculations [8, 9]. Calculations of the characteristics of double excited resonances in helium like have been carried out by various methods using different approaches. Among these methods are the saddle-point complex-rotation method [10, 11], the close-coupling method [12], the truncated-diagonalization method [13], the discretization technique [14, 15], the complex coordinate

rotation [16, 17], the computing double sum over the complete hydrogen spectrum [18], the density functional theory [19], the Feshbach-projection formalism [20], the spin-dependent localized Hartree-Fock density-functional method [21], the method combining Hylleraas and incomplete hydrogenic wave functions [22] and semi-empirical method [23]. For most of the preceding methods, calculations are performed mainly for resonance energies and total widths. The extension of these methods to the calculation of partial widths, which is, the probabilities of decay into various exit channels, is less well established.

The method of diagonalization approximation (see Ref. [24] and references therein) is used for the present investigation. The advantage of using such method is that resonance positions, total and partial widths can be obtained. Particular interest of the diagonalization method is to take into account the coupling between closed and open channels in terms of perturbation theory and to neglect the indirect coupling of autoinizing states through the open channels. This procedure leads to a relatively simple mathematical problem consisting of solving a system of linear algebraic equations instead of a system of coupled differential equations or integro-differential equations [25, 26].

The use of this method has been very successful for calculations of L=1 resonant states of two-electron atoms [27, 28]. We now extend calculations to the partial autoinisation widths to 2ℓ, 3ℓ and 4ℓ sublevels for the ^{1,3}L° resonance states with L=1, 2, 3, 4, 5, 6 and 7 quantum numbers.

2. Theory

In the diagonalization approximation, the final-state wave function is expanded in the subspaces of closed and open channels as follows:

$$\Psi_{Ei}(r_1,r_2) = \hat{A}\sum_k \Psi_k(r_1)U_{ki}(E,r_2) + \sum_\mu \Lambda_\mu(E)\phi_\mu(r_1,r_2) \quad (1)$$

Where Â is the operator of antisymetrization, k represents a set of quantum numbers that characterise the system ion photoelectron in the subspace of open channels is an unknown function describing the motion of the photoelectron is the eigenfunction of residual ion satisfying the relations:

$$\Psi_k \vee \Psi_{k'} = \delta_{kk'} \quad (2)$$

$$\Psi_k \vee \hat{H} \vee \Psi_{k'} = \varepsilon_k\delta_{kk'} + V_{kk'} \quad (3)$$

The functions are obtained by unitary transformation of the Hamiltonian in the subspace of closed channels:

$$\phi_\mu(r_1,r_2) = \hat{A}\sum_{lm} \alpha_\mu [\Psi_l(r_1)\Psi_m(r_2)] \quad (4)$$

With the condition of diagonalization:

$$\phi_\mu \vee \hat{H} \vee \phi_\nu = E_\mu\delta_{\mu\nu} \quad (5)$$

The coefficients α of the unitary transformation (4) are found by solving the system of linear algebraic equations:

$$\sum_\nu\{(E_\mu E_0) - \chi_\mu|\hat{V}|\chi_\nu\alpha_\nu\} = 0 \quad (6)$$

Where Eo is the energy eigenvalue of the zero-order Hamiltonian corresponding to the eigenfunctions defined by:

$$\chi_\mu = \hat{A}[\Psi_l(r_1)\Psi_m(r_2)] \quad (7)$$

The determination of the function is equivalent to the calculation of the coefficients and Detailed calculation of these coefficients and systems of equations which they satisfy has been reported by Balashov et al. [29], Senashenko et al. [30] and by Wague [31]. Form these works, the partial photo-ionization amplitude that describes the formation of a residual ion and a photoelectron in a definite state, has been defined by the following expression:

$$T_j = \varphi_j(E)|\hat{D}|\Psi_0 + \frac{q+i}{i}\,\phi_\mu|\hat{D}|\phi_j(E) \quad (8)$$

In this relation β parameter will be defined by:

$$\beta = \frac{\sum_k \phi_\mu|\hat{V}|\varphi_k(E)\varphi_k(E)|\hat{D}|\Psi_0}{\sum_k|\langle\phi_\mu|\hat{V}|\varphi_j(E)\rangle|^2} \quad (9)$$

In (8), $\varphi_j(E)$ is the wave function of the continuous spectrum in the channel j, without resonance; is the relative deviation from resonance; Eμ is the energy of the autoionizing level μ; q is the profile index of the resonance. If E designates the continuous spectrum energy and Eμ (as that defined to be the autoionizing resonance energy), the relative deviation ε with respect to the resonance is defined by:

$$\epsilon = \frac{E-E_\mu}{\frac{1}{2}\Gamma_\mu^{tot}} \quad (10)$$

The sum of integrals in the denominator of (10) determines the total width of the autoionizing level and it is defined by:

$$\Gamma_\mu^{tot} = 2\pi\sum_k|\langle\phi_\mu|\hat{V}|\varphi_j(E)\rangle|^2 \quad (11)$$

3. Results and Discussion

We use here the ordinary configuration states Nlnl' to label the double excited state but we have to keep in mind that there is a mixing configurations. All the configurations contribute to the various decay channels and the predominant one in the doubly excited (Nlnl') ^{1,3}L° state can be identified with the value of the eigenvectors. The diagonalization calculations of the excitation energy of the ^{1,3}P°, ^{1,3}D°, ^{1,3}F°, ^{1,3}G°, ^{1,3}H°, ^{1,3}I° and ^{1,3}K° autoinisation states were carried out in the LS coupling scheme, respectively, in the basis of 31, 24, 44, 30, 36, 19 and 20 configurations: 5ln'l' with n' ≤ 8. For this high value of Z, it is not necessary to use a very large basis states for accurate determination of resonances parameters. The partials and totals widths were calculated with the coulomb function of the continuum spectrum with charge $(Z-1)$.

Below the threshold N, the open channels can be labeled $n_2l_2kl_1$; with n_2l_2 representing the state of the residual ion and $1/2k^2$ the energy of the ejected electron with angular momentum l_1. The open channels are obtained by the selection rules (conservation of L, S and their parity) that govern the decay of the autoionizing states. For example, the $(5lnl')^{1,3}$P°

resonance states has fifthteen decay channels, labeled 1skp, 2skp, 2pks, 2pkd, 3skp, 3pks, 3pkd, 3dkp, 3dkf, 4skp, 4pks, 4pkd, 4dkp, 4dkf, 4fkd, which lead to O^{7+} in the indicated state an outgoing electron (k) with the indicated angular momentum.

By using the assumption with consist of neglecting the direct coupling between the open channels, calculated partials autoionization widths for the global decay to n_2l_2 final sublevels are given for in tables 1 to 14 for respectively for some $^1P°$, $^3P°$, $^1D°$, $^3D°$, $^1F°$, $^3F°$, $^1G°$, $^3G°$, $^1H°$, $^3H°$, $^1I°$, $^3I°$, $^1K°$ and $^3K°$ (5lnl') doubly excited states of O^{6+} ions. The value "0" in the tables is given when the states are located under the nearest ionization threshold. When their decay to sublevels is forbidden by parity conservation, the channel is omitted in the tables.

We can see from the results obtained here, the assumption attesting that autoionization leads preferentially to the nearest excitation levels for the residual ion is not systematically observed. *(see tables in appendix).*

It is seen in table 1, that $(5lnl')^1P°$ autoionization levels located under the N=5 threshold decay preferentially to the nearest 3d excitation level for the residual ion except the $(nsn'p)^1P°$ levels which decay mainly to the 3p excitation level of the residual ion. The $^1P°$ states located above the N=5 threshold may often decay to the 4p state of O^{7+}.

Table 2 shows that the $(5lnl')^3P°$ levels shows different tendencies, they decay preferentially to the 3p when located under the N=5 threshold and to the 4d when they are placed above the N=5 threshold.

For the $(5ln'l')^1D°$ states reported in table 3, the selection rules reduce the decay sublevels to 2p, 3p, 3d, 4p, 4d and 4f. All the $(5ln'l')^1D°$ states under the N=5 threshold decay mainly to the nearest 3d excitation while that over the N=5 decay preferentially to 4d. Table 4 shows that, the under threshold $(5ln'l')^3D°$ states break this tendency to decay more often to 3d while that over threshold decay mainly to 4d.

Tables 5 and 6 shows that most of the singlets $(5ln'l')^1F°$ and triplets $(5ln'l')^3F°$ states of O^{6+} have the similar decay tendencies. The $(5ln'l')^{1,3}F°$ states located under the N=5 threshold and decay preferentially to the 3p sublevel of O^{7+} while that over the N=5 decay to 4d or 4f. The $(5ln'l')^{1.3}G°$ states reported in tables 7 and 8, present, as the $(5ln'l')^{1.3}D°$ states, reduced decay pathways channels because of parity conservation. When located above the threshold N=5, $(5ln'l')^1G°$ states autoionize preferentially through the 3d highest excited of the residual. The over threshold $(5ln'l')^1G°$ states autoionise more often to 4f highest excited of O^{7+} sublevels.

The under threshold $(5ln'l')^3G°$ states reported in table 8 decay preferentially to the 3d sublevel while the over threshold.

It is seen in table 9, that $(5lnl')^1H°$ autoinisation level located under the N=5 threshold decay mainly to the 3d excitation level of the residual ion. The $(5lnl')^1H°$ state located above the N=5 threshold decay more often to the 4d state of O^{7+}.

The under threshold $(5ln'l')^3H°$ reported in table 10 decay preferentially either to the 3d of O^{7+} sublevels while the over threshold $(5ln'l')^3H°$ decay mainly through 4d sublevel of O^{7+}.

The tables 11 and 12 indicated the reduced decay pathways of the $(5lnl')^1I°$ autoinisation levels. For these states with even value of the quantum angular momentum, the $(5lnl')^1I°$ states decay seemingly to the nearest 3d highest excited level of O^{7+}. This trend is observed by the under threshold $(5lnl')^3I°$ states but it breaks when such states are over threshold which decay oftenly through both 4d and 4f sublevels of the residual O^{7+} ion.

It is seen in the tables 13 and 14 that the few $(5l4l')^{1,3}K°$ below threshold states decay preferentially to the nearest 3d sublevel of O^{7+}. The upper threshold $(5l4l')^1K°$ states decay mainly to the 4f sublevel of O^{7+} while the corresponding $(5l4l')^3K°$ states decay mainly through the 4d sublevel of O^{7+}. In the literature, there have been developed some cases that seem to be the ones here. In doing so, we can cite the works of Bachau, Ho and Bhatia and Martin and al, they are well described in [1]. These authors have treated the case of N=2, 3 and 4 for singulet and triplet odd state. The visibility of their results and this success inspired us to study the case of N=5. Thus, this paper is a reinforcement of these so-called ideas in the framework of atomic spectroscopy and thus for the first time, we produce results beyond the ionization levels N=2, 3 and 4.

4. Conclusion

In summary we have carried out calculation of total and partial widths of the $(Nln'l')^{1,3}L°$ (L=1, 2, 3, 4, 5, 6 and 7) multiple-decay-channel system O^{6+}. For L even, the $(4lnl')^1L°$ state located under N=5 autoionise mainly to the 3d highest excited of O^{7+} sublevels. The $(5ln'l')^1L°$ state located above N=5 autoionise mainly to the 4f highest excited of O^{7+} sublevels.

The $(5ln'l')^3L°$, L even states located under N=5 autoionise also mainly to the 3d highest excited of O^{7+} sublevels; this trend increase with L. The $(5ln'l')^3L°$ state located above N=5 autoionise preferentially to the 4d excited state of O^{7+}; when L increase decay through both 4f and 4d of O^{7+}.

For L odd, the $(5ln'l')^1L°$ state located under N=5 autoionise mainly to the 3d highest excited of O^{7+} sublevels; this trend increases with L. The $(5ln'l')^1L°$ state located above N=5 autoionise mainly to the 4p for low value of L and for high value of L the residual O^{7+} ion is left in its 4d and 4f sublevels.

The $(5ln'l')^3L°$, L odd states located under N=5 autoionise also mainly to the 3d highest excited of O^{7+} sublevels; this trend increase with L. The $(5ln'l'')^3L°$ state located above N=5 autoionise preferentially to the 4d excited state of O^{7+}.

The general belief that the trend for helium-like systems to decay through the nearest excited state of the residual ion is observed only by the $(5ln'l')^1L°$ states with L even.

The present calculations are expected to become better, when high order coupling between the open channels are take into account.

However, after this paper, we intend to focus on quantum calculations. It will be a case of using qubit to compare

classical results with quantum ones. And on the other hand, we plan to treat the even states which are not yet seen according to the diagonalization methode.

Appendix

Table 1. *Calculated energies -E, autoionisation width(eV), partial width(eV) and main configuration of the ^{1}P° states of the O^{6+} ion converging to n=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5s5p ^{1}P°	4,834	8,11[-5]	3,49[-3]	8,21[-3]	4,49[-3]	2,01[-2]	1,23[-2]	0	0	0	0	5,11[-2]
5d5f ^{1}P°	4,748	8,08[-5]	4,53[-5]	1,12[-4]	1,32[-2]	2,27[-2]	3,30[-2]	0	0	0	0	7,03[-2]
5f5g ^{1}P°	4,615	5,03[-5]	5,47[-5]	5,21[-4]	2,90[-5]	2,50[-4]	7,80[-4]	0	0	0	0	9,58[-3]
5s8p ^{1}P°	4,372	8,16[-5]	3,35[-3]	6,44[-3]	3,74[-3]	1,89[-2]	1,27[-2]	0	0	0	0	5,49[-2]
5p5d ^{1}P°	4,357	1,28[-5]	3,93[-5]	4,44[-4]	4,40[-6]	2,53[-3]	4,21[-3]	0	0	0	0	1,28[-2]
5p6d ^{1}P°	4,141	1,28[-5]	4,02[-5]	4,37[-4]	1,22[-5]	2,55[-3]	3,93[-3]	0	0	0	0	8,73[-3]
6p5d ^{1}P°	4,100	3,00[-7]	3,00[-7]	8,40[-6]	2,00[-7]	1,40[-5]	3,91[-5]	0	0	0	0	4,10[-3]
5d6f ^{1}P°	4,084	8,08[-5]	6,11[-5]	1,14[-4]	1,30[-2]	2,00[-2]	3,38[-2]	0	0	0	0	7,06[-2]
6d5f ^{1}P°	4,041	2,77[-5]	1,70[-6]	5,28[-4]	3,37[-4]	1,22[-4]	8,72[-4]	0	0	0	0	6,86[-3]
6s5p ^{1}P°	4,01	9,90[-6]	6,55[-4]	3,80[-3]	7,47[-4]	1,62[-2]	6,47[-3]	0	0	0	0	2,94[-2]
6f5g ^{1}P°	3,95	4,32[-4]	2,46[-3]	2,15[-3]	1,12[-2]	1,27[-2]	4,15[-3]	5,41[-2]	7,12[-2]	1,93[-2]	2,24[-3]	1,87[-1]
5f6g ^{1}P°	3,91	5,02[-5]	6,81[-5]	5,09[-4]	1,72[-5]	6,75[-4]	9,13[-4]	5,45[-2]	1,35[-1]	1,19[-1]	9,01[-2]	4,02[-1]
7s5p ^{1}P°	3,769	2,50[-5]	2,91[-3]	6,28[-3]	2,40[-3]	2,14[-2]	1,51[-2]	5,50[-3]	6,02[-2]	5,72[-2]	3,21[-3]	1,77[-1]
5g6h ^{1}P°	3,76	3,00[-7]	5,00[-7]	2,90[-6]	1,92[-5]	5,38[-5]	4,61[-5]	7,30[-4]	1,54[-3]	5,97[-3]	1,04[-2]	2,01[-2]

Table 2. *Calculated energies -E, autoionisation width(eV), partial width(eV) and main configuration of the ^{3}P° states of the O^{6+} ion converging to n=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5s5p ^{3}P°	4,863	2,16[-5]	7,27[-4]	1,94[-3]	3,79[-3]	7,10[-3]	2,91[-3]	0	0	0	0	1,87[-2]
5p5d ^{3}P°	4,794	2,20[-6]	2,69[-4]	1,71[-4]	1,46[-3]	5,75[-3]	1,71[-2]	0	0	0	0	2,78[-2]
5d5f ^{3}P°	4,694	1,00[-7]	5,61[-5]	1,21[-4]	8,28[-4]	2,42[-3]	5,21[-4]	0	0	0	0	6,49[-3]
5f5g ^{3}P°	4,534	0,00[-7]	3,30[-6]	1,61[-5]	1,65[-4]	5,56[-4]	3,56[-4]	0	0	0	0	1,65[-2]
6s5p ^{3}P°	4,130	0,00[-7]	2,71[-5]	1,68[-4]	3,58[-4]	1,74[-3]	2,16[-4]	0	0	0	0	1,75[-2]
5s6p ^{3}P°	4,123	2,09[-5]	6,77[-4]	1,86[-3]	3,15[-3]	6,18[-3]	2,84[-3]	0	0	0	0	1,77[-2]
6d5f ^{3}P°	4,076	0,00[-7]	0.00[-7]	1,00[-7]	0.00[-7]	1,30[-6]	8,10[-6]	0	0	0	0	6,32[-4]
5d6f ^{3}P°	4,056	1,00[-7]	5,18[-5]	1,10[-4]	7,54[-4]	2,14[-3]	3,88[-4]	0	0	0	0	8,14[-3]
6f5g ^{3}P°	4,005	0,00[-7]	1,00[-7]	1,00[-6]	0.00[-7]	1,50[-6]	1,62[-5]	0	0	0	0	1,00[-2]

Table 3. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the ^{1}D° states of the O^{6+} ion converging to n=5 hydrogen threshold.*

State	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5p5d ^{1}D°	4,799	5,98[-4]	5,90[-4]	2,71[-3]	0	0	0	3,90[-3]
5d5f ^{1}D°	4,704	1,26[-4]	3,83[-4]	3,11[-3]	0	0	0	3,62[-3]
5f5g ^{1}D°	4,562	1,20[-6]	6,20[-5]	1,02[-4]	0	0	0	1,65[-4]
5p6d ^{1}D°	4,119	5,72[-4]	7,73[-4]	2,68[-3]	0	0	0	4,03[-3]
6d5f ^{1}D°	4,069	0,00[-7]	4,38[-5]	3,07[-3]	0	0	0	3,12[-3]
6p5d ^{1}D°	4,057	9,96[-5]	1,06[-3]	9,69[-3]	0	0	0	1,09[-2]
6f5g ^{1}D°	3,994	2,68[-5]	6,97[-5]	4,82[-4]	2,25[-4]	3,60[-3]	4,89[-3]	9,30[-3]
5f6g ^{1}D°	3,980	1,10[-6]	4,96[-5]	9,02[-5]	1,60[-3]	2,56[-3]	6,69[-4]	4,97[-3]
5g6h ^{1}D°	3,892	1,26[-3]	9,76[-3]	1,82[-2]	3,91[-2]	8,71[-2]	2,37[-2]	1,79[-1]
5d6f ^{1}D°	3,856	1,18[-4]	3,91[-4]	2,45[-3]	9,56[-4]	1,56[-2]	2,40[-4]	1,97[-2]
7p5d ^{1}D°	3,680	1,85[-5]	4,44[-4]	5,73[-4]	2,92[-4]	4,54[-3]	1,53[-2]	2,11[-2]
5p7d ^{1}D°	3,650	5,56[-4]	8,77[-4]	2,59[-3]	1,86[-2]	3,57[-2]	5,42[-2]	1,13[-1]
7d5f ^{1}D°	3,643	4,00[-7]	5,72[-5]	3,87[-5]	1,10[-4]	1,51[-3]	5,07[-3]	6,79[-3]
7f5g ^{1}D°	3,596	4,95[-4]	9,35[-4]	2,64[-3]	6,64[-3]	2,50[-2]	7,35[-3]	4,31[-2]

Table 4. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^3D°$ states of the O^{6+} ion converging to n=5 hydrogen threshold.*

State	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
$5p5d^3D°$	4,827	5,40[-6]	1,07[-3]	1,02[-3]	0	0	0	2,09[-3]
$5d5f^3D°$	4,746	2,00[-7]	4,21[-5]	6,83[-5]	0	0	0	1,11[-4]
$5f5g^3D°$	4,628	7,00[-7]	6,75[-5]	1,46[-4]	0	0	0	2,14[-4]
$5p6d^3D°$	4,102	4,40[-6]	8,59[-4]	6,64[-4]	0	0	0	1,53[-3]
$6p5d^3D°$	4,083	9,50[-6]	2,52[-5]	1,51[-3]	0	0	0	1,54[-3]
$6d5f^3D°$	4,046	1,00[-6]	0,00[-7]	1,80[-4]	0	0	0	1,81[-4]
$5d6f^3D°$	4,017	2,00[-7]	3,06[-5]	4,43[-5]	0	0	0	7,51[-5]
$6f5g^3D°$	3,964	3,60[-6]	2,80[-6]	1,92[-4]	1,58[-3]	9,22[-3]	6,61[-3]	1,76[-2]
$5f6g^3D°$	3,940	7,00[-7]	5,48[-5]	1,40[-4]	1,16[-3]	3,59[-3]	1,34[-3]	6,28[-3]
$5g6h^3D°$	3,885	2,28[-4]	4,85[-3]	9,31[-3]	3,48[-2]	5,12[-2]	1,05[-2]	1,11[-1]
$7p5d^3D°$	3,671	6,00[-6]	1,17[-4]	1,41[-4]	1,70[-3]	1,94[-3]	1,52[-3]	5,42[-3]
$5p7d^3D°$	3,667	3,80[-6]	7,55[-4]	5,11[-4]	7,23[-3]	2,29[-2]	4,55[-2]	7,69[-2]
$5d7f^3D°$	3,626	2,00[-7]	2,61[-5]	3,54[-5]	1,46[-3]	5,34[-3]	2,25[-4]	7,09[-3]
$7d5f^3D°$	3,621	1,00[-7]	1,00[-6]	3,80[-5]	2,67[-5]	2,02[-3]	1,74[-3]	3,82[-3]

Table 5. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^1F°$ states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
$5s5f^1F°$	4,809	2,68[-5]	4,91[-5]	1,10[-3]	4,20[-3]	2,99[-3]	5,21[-3]	0	0	0	0	2,74[-2]
$5d5f^1F°$	4,758	2,68[-5]	4,86[-5]	1,10[-3]	4,17[-3]	3,08[-3]	5,15[-3]	0	0	0	0	1,73[-2]
$5p5g^1F°$	4,702	7,50[-6]	1,46[-3]	7,93[-4]	3,07[-3]	2,17[-2]	1,46[-2]	0	0	0	0	4,24[-2]
$5f5g^1F°$	4,646	7,50[-6]	1,45[-3]	7,97[-4]	2,93[-3]	2,16[-2]	1,48[-2]	0	0	0	0	5,54[-2]
$5p5d^1F°$	4,468	3,07[-5]	4,38[-5]	9,21[-4]	2,52[-3]	1,87[-3]	5,11[-3]	0	0	0	0	1,41[-2]
$6p5d^1F°$	4,130	1,00[-7]	3,20[-6]	5,50[-6]	5,41[-5]	1,05[-4]	1,35[-4]	0	0	0	0	1,16[-2]
$6s5f^1F°$	4,093	3,07[-5]	2,77[-4]	1,07[-3]	1,46[-3]	2,33[-3]	1,61[-3]	0	0	0	0	1,61[-2]
$6d5f^1F°$	4,081	3,07[-5]	2,77[-4]	1,07[-3]	1,46[-3]	2,34[-3]	1,61[-3]	0	0	0	0	1,19[-2]
$5p6d^1F°$	4,067	3,04[-5]	4,30[-5]	9,11[-4]	2,51[-3]	2,11[-3]	4,77[-3]	0	0	0	0	1,90[-1]
$5p6g^1F°$	4,029	7,50[-6]	1,36[-3]	8,45[-4]	1,64[-3]	1,94[-2]	1,65[-2]	0	0	0	0	6,39[-2]
$5d6f^1F°$	4,022	2,64[-5]	4,21[-5]	1,10[-3]	3,43[-3]	4,42[-3]	4,27[-3]	0	0	0	0	3,90[-2]
$6p5g^1F°$	4,000	1,50[-6]	5,29[-5]	3,52[-5]	2,84[-4]	1,37[-3]	2,64[-4]	0	0	0	0	1,15[-1]
$5f6g^1F°$	3,982	7,40[-6]	1,35[-3]	8,49[-4]	1,56[-3]	1,92[-2]	1,66[-2]	3,28[-3]	2,11[-2]	7,77[-2]	8,09[-2]	2,23[-1]
$6f5g^1F°$	3,943	1,50[-6]	5,27[-5]	3,56[-5]	2,75[-4]	1,38[-3]	2,74[-4]	3,30[-6]	7,47[-3]	4,77[-3]	3,28[-3]	1,75[-2]

Table 6. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^3F°$ states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
$5p5d^3F°$	4,844	1,54[-5]	7,90[-6]	1,03[-5]	1,23[-3]	5,43[-3]	8,66[-3]	0	0	0	0	2,01[-2]
$5s5f^3F°$	4,786	1,50[-6]	5,06[-5]	1,85[-5]	2,03[-4]	8,45[-4]	1,49[-4]	0	0	0	0	1,82[-3]
$5d5f^3F°$	4,762	1,50[-6]	5,05[-5]	1,84[-5]	2,03[-4]	8,37[-4]	1,44[-4]	0	0	0	0	1,65[-3]
$5f5g^3F°$	4,686	5,40[-6]	1,33[-4]	1,98[-5]	1,02[-4]	1,02[-3]	5,17[-4]	0	0	0	0	3,34[-3]
$5p5g^3F°$	4,624	5,40[-6]	1,32[-4]	1,93[-5]	9,74[-5]	9,71[-4]	4,92[-4]	0	0	0	0	3,46[-3]
$5p6d^3F°$	4,109	1,49[-5]	8,80[-6]	1,84[-5]	1,08[-3]	4,42[-3]	7,10[-3]	0	0	0	0	1,53[-2]
$6p5d^3F°$	4,098	1,92[-5]	1,72[-5]	1,00[-5]	9,41[-4]	5,06[-3]	7,94[-3]	0	0	0	0	1,41[-2]
$5d6f^3F°$	4,079	1,40[-6]	4,76[-5]	1,49[-5]	2,13[-4]	6,26[-4]	5,44[-5]	0	0	0	0	1,87[-2]
$6d5f^3F°$	4,050	0,00[-7]	9,00[-7]	1,20[-6]	4,50[-6]	3,12[-5]	2,10[-5]	0	0	0	0	6,34[-3]
$6p5g^3F°$	4,047	4,00[-7]	1,22[-5]	2,10[-6]	5,44[-5]	1,29[-4]	4,95[-5]	0	0	0	0	1,11[-1]
$5p6g^3F°$	4,029	5,20[-6]	1,27[-4]	1,48[-5]	6,47[-5]	6,37[-4]	3,31[-4]	0	0	0	0	6,61[-3]
$6f5g^3F°$	4,014	4,00[-7]	1,21[-5]	2,10[-6]	5,39[-5]	1,29[-4]	4,86[-5]	0	0	0	0	7,71[-2]
$5f6g^3F°$	3,980	5,20[-6]	1,26[-4]	1,44[-5]	6,26[-5]	6,15[-4]	3,23[-4]	6,24[-3]	3,45[-2]	2,48[-2]	2,07[-2]	8,75[-2]
$5g6h^3F°$	3,943	2,00[-7]	1,15[-5]	1,75[-5]	5,59[-4]	7,65[-5]	8,26[-4]	3,33[-3]	5,39[-3]	1,32[-2]	4,35[-3]	2,77[-2]

Table 7. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the ^{1}G° states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5p5g^{1}G°	4,762	2,7[-4]	1,1[-4]	5,3[-3]	0	0	0	6,3[-3]
5d5f^{1}G°	4,721	2,8[-4]	9,0[-5]	6,4[-3]	0	0	0	6,9[-3]
5f5g^{1}G°	4,619	2,7[-4]	1,1[-4]	5,1[-3]	0	0	0	5,5[-3]
6d5f^{1}G°	4,098	2,0[-5]	1,5[-4]	1,0[-3]	0	0	0	1,7[-3]
6p5g^{1}G°	4,062	1,7[-4]	4,9[-5]	6,6[-3]	0	0	0	6,8[-3]
5d6f^{1}G°	4,036	2,6[-4]	8,0[-5]	5,5[-3]	0	0	0	6,0[-3]
6f5g^{1}G°	4,029	1,7[-4]	4,7[-5]	6,6[-3]	0	0	0	6,8[-3]
5f6g^{1}G°	3,996	2,5[-4]	9,7[-5]	4,6[-3]	9,4[-3]	2,0[-2]	5,0[-2]	8,4[-2]
5d6h^{1}G°	3,973	5,0[-7]	2,6[-5]	4,8[-5]	2,4[-3]	1,2[-3]	6,6[-4]	5,7[-3]
5p6g^{1}G°	3,924	2,5[-4]	9,6[-5]	4,5[-3]	9,3[-3]	1,9[-2]	4,9[-2]	8,2[-2]
5g6h^{1}G°	3,887	5,0[-7]	2,5[-5]	4,8[-5]	2,2[-3]	1,2[-3]	6,7[-4]	4,2[-3]
7d5f^{1}G°	3,666	2,4[-4]	4,6[-3]	5,8[-3]	2,0[-2]	4,3[-2]	6,1[-2]	1,3[-1]
7p5g^{1}G°	3,640	3,3[-6]	2,3[-5]	8,5[-5]	1,1[-3]	6,4[-3]	8,0[-3]	1,6[-2]
5d7f^{1}G°	3,632	2,4[-4]	7,2[-5]	5,1[-3]	7,7[-3]	1,8[-2]	5,8[-2]	9,0[-2]

Table 8. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the ^{3}G° states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5d5f^{3}G°	4,795	4,04[-5]	5,2[-4]	8,1[-4]	0	0	0	1,4[-3]
5p5g^{3}G°	4,741	4,48[-5]	5,0[-4]	7,9[-4]	0	0	0	1,3[-3]
5f5g^{3}G°	4,691	4,44[-5]	4,9[-4]	7,6[-4]	0	0	0	1,3[-3]
6p5g^{3}G°	4,077	9,30[-6]	7,6[-5]	6,1[-5]	0	0	0	1,5[-4]
6d5f^{3}G°	4,060	3,27[-5]	1,0[-3]	1,2[-3]	0	0	0	2,3[-3]
5d6f^{3}G°	4,055	3,47[-5]	4,4[-4]	5,0[-4]	0	0	0	9,8[-4]
5f6g^{3}G°	4,020	3,87[-5]	4,4[-4]	5,0[-4]	0	0	0	9,9[-4]
6f5g^{3}G°	3,998	9,20[-6]	7,5[-5]	6,5[-5]	0	0	0	1,5[-4]
5p6g^{3}G°	3,988	3,85[-5]	4,4[-4]	5,0[-4]	1,6[-5]	3,1[-3]	1,1[-3]	5,2[-3]
5g6h^{3}G°	3,974	1,00[-7]	3,5[-6]	4,9[-5]	1,7[-3]	1,5[-3]	2,9[-3]	6,5[-3]
5d6h^{3}G°	3,939	1,00[-7]	3,5[-6]	4,9[-5]	1,7[-3]	1,5[-3]	2,9[-3]	6,0[-3]
5d7f^{3}G°	3,651	3,20[-5]	4,0[-4]	3,9[-4]	2,1[-4]	2,2[-3]	6,6[-4]	3,9[-3]
7d5f^{3}G°	3,649	6,98[-5]	6,8[-4]	3,4[-4]	1,4[-3]	5,4[-3]	5,9[-3]	1,4[-2]
7p5g^{3}G°	3,633	2,20[-6]	3,7[-5]	3,1[-4]	1,4[-4]	2,3[-3]	1,5[-3]	4,3[-3]

Table 9. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the ^{1}H° states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5p5g^{1}H°	4,750	2,00[-7]	1,42[-5]	2,53[-4]	5,34[-4]	3,30[-4]	1,69[-3]	0	0	0	0	1,09[-2]
5f5g^{1}H°	4,682	2,00[-7]	1,43[-5]	2,53[-4]	5,15[-4]	3,41[-4]	1,67[-3]	0	0	0	0	9,74[-3]
5d5f^{1}H°	4,541	4,00[-7]	1,61[-5]	4,32[-4]	3,32[-3]	1,91[-2]	1,19[-2]	0	0	0	0	4,07[-2]
5p6g^{1}H°	4,105	2,00[-7]	1,60[-5]	2,45[-4]	3,67[-4]	4,16[-4]	1,53[-3]	0	0	0	0	6,18[-3]
5d6f^{1}H°	4,055	4,00[-7]	1,07[-5]	4,33[-4]	4,09[-3]	1,61[-2]	1,25[-2]	0	0	0	0	4,04[-2]
5d6h^{1}H°	4,031	0,00[-7]	2,01[-5]	3,78[-5]	1,62[-5]	1,64[-4]	3,27[-4]	0	0	0	0	6,96[-3]
5f6g^{1}H°	4,023	2,00[-7]	1,62[-5]	2,44[-4]	3,49[-4]	4,25[-4]	1,52[-3]	0	0	0	0	9,39[-3]
6d5f^{1}H°	4,018	1,00[-7]	1,00[-6]	9,69[-5]	3,92[-5]	2,78[-3]	8,83[-4]	0	0	0	0	8,80[-2]
6f5g^{1}H°	3,968	3,00[-7]	1,73[-5]	3,40[-4]	2,00[-7]	3,98[-3]	1,82[-3]	1,04[-2]	1,89[-2]	6,09[-2]	2,72[-2]	1,30[-1]
5g6h^{1}H°	3,939	0,00[-7]	2,00[-5]	3,75[-5]	1,64[-5]	1,60[-4]	3,12[-4]	2,93[-4]	2,16[-3]	4,60[-3]	2,88[-3]	9,44[-2]
6p5g^{1}H°	3,878	3,00[-7]	1,77[-5]	3,40[-4]	6,00[-7]	3,89[-3]	1,87[-3]	1,10[-2]	1,68[-2]	6,10[-2]	2,73[-2]	1,26[-1]
5s6h^{1}H°	3,828	0,00[-7]	1,99[-5]	3,71[-5]	1,67[-5]	1,55[-4]	2,96[-4]	2,86[-4]	2,01[-3]	4,18[-3]	2,62[-3]	1,45[-1]
5s7h^{1}H°	3,671	0,00[-7]	1,98[-5]	3,65[-5]	1,70[-5]	1,49[-4]	2,75[-4]	2,76[-4]	1,82[-3]	3,68[-3]	2,29[-3]	2,63[-2]
7d5f^{1}H°	3,636	1,00[-7]	1,97[-4]	6,35[-4]	1,48[-3]	6,29[-4]	1,15[-2]	6,75[-3]	7,73[-3]	1,68[-3]	3,35[-2]	1,55[-1]

Table 10. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^3H°$ states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5d5f^{3}H°	4,802	0,00[-7]	1,05[-5]	4,11[-5]	2,60[-6]	2,58[-4]	3,01[-3]	0	0	0	0	5,13[-3]
5f5g^{3}H°	4,728	0,00[-7]	3,00[-7]	2,06[-5]	1,98[-4]	2,82[-4]	2,38[-4]	0	0	0	0	2,21[-3]
5p5g^{3}H°	4,679	0,00[-7]	3,00[-7]	2,05[-5]	1,92[-4]	2,82[-4]	2,32[-4]	0	0	0	0	2,08[-3]
5p6g^{3}H°	4,075	0,00[-7]	2,00[-7]	1,88[-5]	1,24[-4]	2,80[-4]	1,68[-4]	0	0	0	0	7,42[-4]
6d5f^{3}H°	4,064	0,00[-7]	1,10[-6]	2,20[-6]	3,55[-5]	4,34[-5]	6,37[-5]	0	0	0	0	2,51[-3]
5f6g^{3}H°	4,039	0,00[-7]	2,00[-7]	1,87[-5]	1,20[-4]	2,79[-4]	1,64[-4]	0	0	0	0	1,99[-3]
5d6h^{3}H°	4,022	0,00[-7]	3,00[-7]	5,00[-6]	6,00[-7]	2,87[-5]	9,72[-5]	0	0	0	0	1,12[-3]
6f5g^{3}H°	4,010	0,00[-7]	1,10[-6]	7,00[-7]	5,70[-6]	6,75[-5]	1,30[-4]	0	0	0	0	4,08[-4]
5g6h^{3}H°	3,983	0,00[-7]	3,00[-7]	4,90[-6]	6,00[-7]	2,89[-5]	9,90[-5]	1,43[-3]	3,68[-3]	3,39[-4]	7,89[-3]	1,87[-2]
6p5g^{3}H°	3,976	0,00[-7]	1,00[-6]	7,00[-7]	5,80[-6]	6,54[-5]	1,28[-4]	8,32[-4]	5,43[-3]	2,41[-3]	1,04[-2]	2,58[-2]

Table 11. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^1I°$ states of the O^{6+} ion converging to N=5 hydrogen threshold.*

Stat	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	ΓTot)
5f5g^{1}I°	4,658	2,20[-6]	8,26[-4]	2,77[-3]	0	0	0	4,19[-3]
5d6h^{1}I°	4,051	5,10[-6]	6,05[-5]	1,24[-3]	0	0	0	1,43[-3]
6f5g^{1}I°	4,004	3,00[-7]	2,90[-6]	2,48[-4]	0	0	0	2,52[-4]
5f6g^{1}I°	3,945	2,10[-6]	6,92[-4]	2,38[-3]	6,04[-3]	5,03[-4]	5,57[-2]	6,59[-2]
5g6h^{1}I°	3,907	4,90[-6]	6,12[-5]	1,18[-3]	4,16[-3]	5,96[-3]	3,47[-2]	4,60[-2]
5p7i^{1}I°	3,634	2,00[-7]	1,39[-4]	4,56[-4]	1,23[-5]	9,93[-4]	5,03[-3]	6,73[-3]
5d7h^{1}I°	3,614	4,70[-6]	6,22[-5]	1,08[-3]	2,32[-3]	5,52[-3]	2,53[-2]	3,43[-2]
7f5g^{1}I°	3,602	1,00[-7]	1,30[-6]	9,30[-6]	4,60[-5]	3,53[-4]	1,73[-4]	5,84[-4]
5f7i^{1}I°	3,574	2,00[-7]	1,38[-4]	4,47[-4]	1,10[-5]	8,91[-4]	4,51[-3]	7,25[-3]
5g7h^{1}I°	3,562	4,70[-6]	6,24[-5]	1,06[-3]	2,08[-3]	5,40[-3]	2,40[-2]	3,27[-2]
5f7g^{1}I°	3,555	2,10[-6]	6,33[-4]	2,17[-3]	3,61[-3]	7,47[-4]	4,86[-2]	5,57[-2]
5p8i^{1}I°	3,352	2,00[-7]	1,31[-4]	4,14[-4]	7,30[-6]	6,00[-4]	3,04[-3]	4,75[-3]
5d8h^{1}I°	3,342	4,50[-6]	6,27[-5]	9,86[-4]	1,31[-3]	4,84[-3]	1,93[-2]	2,66[-2]
8f5g^{1}I°	3,333	0,00[-7]	3,00[-7]	4,00[-6]	1,47[-5]	7,38[-5]	7,20[-6]	5,95[-4]

Table 12. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the $^3I°$ states of the O^{6+} ion converging to N=5 hydrogen threshold.*

Stat	Energy	Γ→2p	Γ→3p	Γ→3d	Γ→4p	Γ→4d	Γ→4f	ΓTot)
5f5g^{3}I°	4,726	2,10[-6]	5,61[-4]	1,53[-3]	0	0	0	2,10[-3]
5f6g^{3}I°	4,026	1,80[-6]	3,75[-4]	9,08[-4]	0	0	0	1,29[-3]
6f5g^{3}I°	4,017	0,00[-7]	8,00[-7]	2,25[-5]	0	0	0	2,40[-5]
5g6h^{3}I°	4,000	6,50[-6]	2,63[-5]	7,29[-4]	0	0	0	7,66[-4]
5d6h^{3}I°	3,979	6,40[-6]	2,56[-5]	7,20[-4]	3,80[-4]	1,34[-2]	4,92[-3]	1,95[-2]
5f7g^{3}I°	3,628	1,70[-6]	2,97[-4]	6,82[-4]	6,74[-4]	9,79[-4]	1,70[-2]	1,96[-2]
5p7i^{3}I°	3,611	4,00[-7]	1,67[-5]	8,45[-5]	4,03[-4]	4,04[-3]	8,77[-3]	1,33[-2]
7f5g^{3}I°	3,607	1,00[-7]	1,72[-5]	5,20[-6]	1,82[-4]	5,09[-4]	2,56[-4]	9,72[-4]
5d7h^{3}I°	3,600	5,90[-6]	1,46[-5]	5,75[-4]	4,71[-5]	9,09[-3]	3,28[-3]	1,30[-2]
5g7h^{3}I°	3,590	5,90[-6]	1,44[-5]	5,71[-4]	4,35[-5]	8,99[-3]	3,25[-3]	1,31[-2]
5f7i^{3}I°	3,563	4,00[-7]	1,58[-5]	8,42[-5]	4,09[-4]	3,81[-3]	8,72[-3]	1,30[-2]
5f8g^{3}I°	3,350	1,60[-6]	2,52[-4]	5,62[-4]	5,39[-4]	1,51[-3]	1,70[-2]	1,99[-2]
5p8i^{3}I°	3,340	4,00[-7]	1,20[-5]	8,24[-5]	4,24[-4]	2,84[-3]	8,31[-3]	1,17[-2]
5d8h^{3}I°	3,332	5,50[-6]	9,70[-6]	4,91[-4]	1,30[-6]	7,12[-3]	2,69[-3]	1,03[-2]

Table 13. *Calculated energies -E, autoinisation width(eV), partial width(eV) and main configuration of the ^{1}K° states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5f5g^{1}K°	4,590	0	6,00[-5]	1,22[-4]	4,33[-4]	6,07[-3]	1,98[-2]	0	0	0	0	3,25[-2]
5f6g^{1}K°	4,049	0	6,02[-5]	1,19[-4]	5,82[-4]	6,52[-3]	1,85[-2]	0	0	0	0	2,72[-2]
6f5g^{1}K°	3,970	0	4,30[-6]	3,13[-5]	2,46[-4]	1,05[-3]	6,70[-4]	2,90[-3]	9,20[-3]	2,74[-2]	4,02[-3]	4,63[-2]
5g6h^{1}K°	3,906	0	7,70[-5]	2,04[-4]	7,19[-4]	1,29[-3]	1,95[-2]	1,59[-2]	1,23[-1]	1,69[-1]	2,76[-1]	6,74[-1]
5d6h^{1}K°	3,855	0	7,71[-5]	2,04[-4]	6,90[-4]	1,34[-3]	1,95[-2]	1,69[-2]	1,23[-1]	1,58[-1]	2,75[-1]	6,41[-1]
5f7g^{1}K°	3,630	0	6,02[-5]	1,16[-4]	7,13[-4]	6,80[-3]	1,73[-2]	1,31[-2]	3,95[-2]	1,88[-3]	1,87[-1]	2,74[-1]
5f7i^{1}K°	3,601	0	3,55[-5]	9,95[-5]	5,17[-5]	1,97[-4]	6,76[-3]	1,49[-2]	9,58[-3]	4,74[-2]	2,99[-2]	1,43[-1]
7f5g^{1}K°	3,585	0	2,60[-6]	6,70[-6]	7,00[-6]	2,67[-5]	5,09[-4]	9,81[-4]	2,85[-3]	2,68[-3]	5,74[-3]	1,34[-2]
5g7h^{1}K°	3,553	0	7,77[-5]	2,00[-4]	5,25[-4]	1,66[-3]	1,91[-2]	2,27[-2]	1,18[-1]	1,06[-1]	2,62[-1]	5,37[-1]
5d7h^{1}K°	3,535	0	7,77[-5]	1,99[-4]	5,16[-4]	1,69[-3]	1,90[-2]	2,30[-2]	1,17[-1]	1,03[-1]	2,61[-1]	5,61[-1]
5p7i^{1}K°	3,516	0	3,55[-5]	9,88[-5]	4,85[-5]	2,21[-4]	6,71[-3]	1,34[-2]	9,22[-3]	4,47[-2]	3,06[-2]	1,61[-1]
5f8g^{1}K°	3,343	0	6,02[-5]	1,14[-4]	8,08[-4]	6,95[-3]	1,65[-2]	1,31[-2]	3,05[-2]	2,03[-3]	1,69[-1]	2,44[-1]
5s8j^{1}K°	3,338	0	8,00[-6]	2,83[-5]	1,40[-6]	2,79[-5]	1,25[-3]	3,34[-3]	1,10[-2]	6,71[-3]	9,20[-3]	6,02[-2]
5f8i^{1}K°	3,328	0	3,56[-5]	9,73[-5]	4,15[-5]	2,74[-4]	6,60[-3]	1,03[-2]	9,09[-3]	3,82[-2]	3,19[-2]	9,71[-2]

Table 14. *Calculated energies -E, autoinisationwidth(eV), partial width(eV) and main configuration of the ^{3}K° states of the O^{6+} ion converging to N=5 hydrogen threshold.*

State	Energy	Γ→1s	Γ→2s	Γ→2p	Γ→3s	Γ→3p	Γ→3d	Γ→4s	Γ→4p	Γ→4d	Γ→4f	Γ(Tot)
5f5g^{3}K°	4,715	0	6,40[-6]	2,39[-5]	8,56[-5]	1,70[-4]	1,52[-3]	0	0	0	0	4,33[-3]
5g6h^{3}K°	4,015	0	1,51[-5]	2,94[-5]	1,15[-4]	9,98[-4]	2,80[-3]	0	0	0	0	5,38[-3]
5f6g^{3}K°	4,007	0	6,10[-6]	2,08[-5]	8,02[-5]	5,76[-5]	1,20[-3]	0	0	0	0	1,44[-3]
5d6h^{3}K°	3,984	0	1,51[-5]	2,92[-5]	1,15[-4]	9,88[-4]	2,74[-3]	1,51[-4]	5,00[-3]	2,59[-2]	1,45[-2]	5,02[-2]
6f5g^{3}K°	3,967	0	2,30[-6]	3,30[-6]	1,44[-4]	1,24[-4]	2,24[-4]	2,03[-3]	6,69[-3]	2,40[-3]	2,68[-3]	3,39[-2]
5f7g^{3}K°	3,623	0	5,90[-6]	1,93[-5]	7,24[-5]	2,89[-5]	1,04[-3]	8,42[-3]	5,86[-3]	2,94[-2]	8,41[-3]	7,33[-2]
5g7h^{3}K°	3,607	0	1,44[-5]	2,72[-5]	1,17[-4]	8,69[-4]	2,11[-3]	4,38[-4]	6,41[-3]	2,27[-2]	1,12[-2]	5,73[-2]
5d7h^{3}K°	3,591	0	1,44[-5]	2,71[-5]	1,17[-4]	8,64[-4]	2,09[-3]	4,51[-4]	6,45[-3]	2,26[-2]	1,11[-2]	4,48[-2]
5f7i^{3}K°	3,589	0	1,20[-6]	5,70[-6]	4,70[-6]	5,03[-5]	1,90[-4]	1,47[-5]	6,42[-3]	4,61[-3]	1,94[-3]	2,62[-2]
7f5g^{3}K°	3,582	0	0,00[-7]	0,00[-7]	3,30[-6]	1,27[-5]	4,00[-7]	1,34[-5]	1,42[-4]	3,50[-4]	1,16[-4]	1,37[-2]
5p7i^{3}K°	3,543	0	1,20[-6]	5,70[-6]	4,90[-6]	4,81[-5]	1,87[-4]	1,60[-6]	5,90[-3]	4,14[-3]	1,82[-3]	2,51[-2]
5f8g^{3}K°	3,344	0	5,80[-6]	1,83[-5]	6,57[-5]	1,71[-5]	9,40[-4]	5,40[-3]	4,43[-3]	2,13[-2]	6,86[-3]	5,89[-2]
5d8j^{3}K°	3,337	0	3,30[-6]	9,40[-6]	9,17[-5]	9,42[-5]	1,77[-4]	1,07[-4]	8,63[-4]	1,72[-4]	5,12[-3]	1,83[-2]
5g8h^{3}K°	3,333	0	1,40[-5]	2,58[-5]	1,16[-4]	7,87[-4]	1,75[-3]	6,74[-4]	6,90[-3]	2,04[-2]	1,01[-2]	5,11[-2]

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