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PARTIAL AND TOTAL ELECTRONIC STOPPING CROSS SECTIONS OF ATOMS FOR A SINGLY CHARGED HELIUM ION : PART II

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Partial and total electronic stopping cross sections of atoms with Z ($55 \leq Z \leq 92$) for a He^+ ion are tabulated as the second part of NIFS-DATA-11(1991) on the basis of the wave-packet theory [Phys.Rev. A40,2188(1989); Phys.Stat.Sol. (B)156,49(1989)].

[key words ; electronic stopping, partial cross section, total cross section, a singly charged helium ion, wave packet theory]

This document was prepared as an extension of the previous work[1] to show the calculated results of electronic stopping power of matter for a singly charged helium ion in the frozen charge state 1s. Theoretical background of this calculation is the wave packet theory [1-6]. Different types of the dielectric function to the wake potential was applied[7] on the basis of the wave packet treatment. A full detail of the theory was given in references [2] so that a brief outline is presented here.

The dielectric function of the atomic shell (n,l) is described in the reduced form :

$$\varepsilon(z,u) = 1 + \chi^2 / z^2 [\, f_1(z,u) + i\, f_2(z,u) \,] , \qquad (1)$$

$$f_1(z,u) = (\pi)^{1/2}/(4z) \,[\, G(u+z) - G(u-z) \,] , \qquad (2)$$

$$f_2(z,u) = \pi/(8z) \,[\, \exp\{-(u-z)^2\} - \exp\{-(u+z)^2\} \,] , \qquad (3)$$

$$G(y) = y \exp(-y^2)\, \Phi(1/2,\ 3/2,\ y^2) , \qquad (4)$$

in the framework of the linear response theory. In the above equations, $\chi^2 = 1/(\pi \bar{Q})$ in atomic units (hereafter atomic units are used) and $\Phi(1/2,\ 3/2,\ y^2)$ denotes a degenerate hypergeometric function[8]. The characteristic momentum $\bar{Q}$ for the shell (n,l) becomes

$$\bar{Q} = Q\, N^{1/3}, \qquad (5)$$

$$Q = [\{f_{HF}(0)\}^{-2/3}/\pi\,]^{1/2},$$

Here $f_{HF}(0)$ denotes the one-electron Hartree-Fock(HF) momentum distribution $f_{HF}(q)$ calculated from the corresponding double zeta wavefunctions [9,10], and N is the number of the bound electrons in the shell (n,l). The calculated values of Q for elements with atomic number Z_2 ($2 \leq Z_2 \leq 92$) are shown in figures 1 and 2.

The stopping power S of a perticular single-shell for a partially stripped ion with nuclear charge $Z_1 e$ moving at velocity v on a straight-line trajectory is calculated as

$$S = 4\pi / v^2 N_A N L , \tag{6}$$

$$L = 8/(\pi^{3/2} \chi^2) \int_0^{\infty} dz \, z \, |Z_1 - \rho(2\bar{Q}z)|^2 \int_0^{v/\bar{Q}} du \, u \, \mathrm{Im}\{\varepsilon^{-1}(z,u)-1\}, \tag{7}$$

where N_A denotes the number density of target atoms. The factor $\rho(2\bar{Q}z)$ denotes the atomic form factor of a He^+ ion:

$$\rho(q) = [\, 1 + (q/4)^2 \,]^{-2}. \tag{8}$$

Figures 3 and 4 show the target atomic number dependence of the stopping power for a He^+ ion at v=0.2, 2, and $4v_0$. At a glance, the oscillatory behavior can be seen. Especially, in the low velocity region the target atoms with a closed-shell configuration have a locally minimum stopping power. With increasing velocity such oscillations tend to vanish. This feature is due to the outermost shell effect. The absolute values of the stopping cross sections as well as these oscillations are the same in

phase as those of a proton[6]. It seems interesting that the phase of oscillation of effective charge with respect to Z_2 is opposite to that of the stopping power[6].

This publication is intended to provide the calculated values of the partial and total stopping power of neutral atoms with $55 \leq Z_2 \leq 92$ for a He^+ ion, which are tabulated at energies ranging from 1 keV/amu ($v=0.2v_0$) to 10^4 keV/amu ($v=20v_0$). How to read these tables of He^+ stopping is explained in the EXPLANATION OF TABLES. We hope these data together with the previous document[1] stimulates strongly the experimental measurement of the stopping power for a He^+ ion.

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FIGURE CAPTIONS

Figures 1 and 2:

The values of parameter Q with respect to Z_2, determined from the double zeta wavefunctions[9,10]. The Q values for Li atom has been recalculated using the Roothan-Hartree-Fock wavefunctions because the original double zeta functions has been found to be in error.*

Figures 3 and 4 :

Target dependence of the calculated stopping cross section of atoms with $2 \leq Z_2 \leq 92$ for a singly charged helium ion with $v=0.2$, 2, and $4v_0$.

* The author(T.K.) would like to acknowledge the letter from Dr. Angela Li-Scholz, the editor of Atomic Data and Nuclear Data Tables, which pointed out this error.

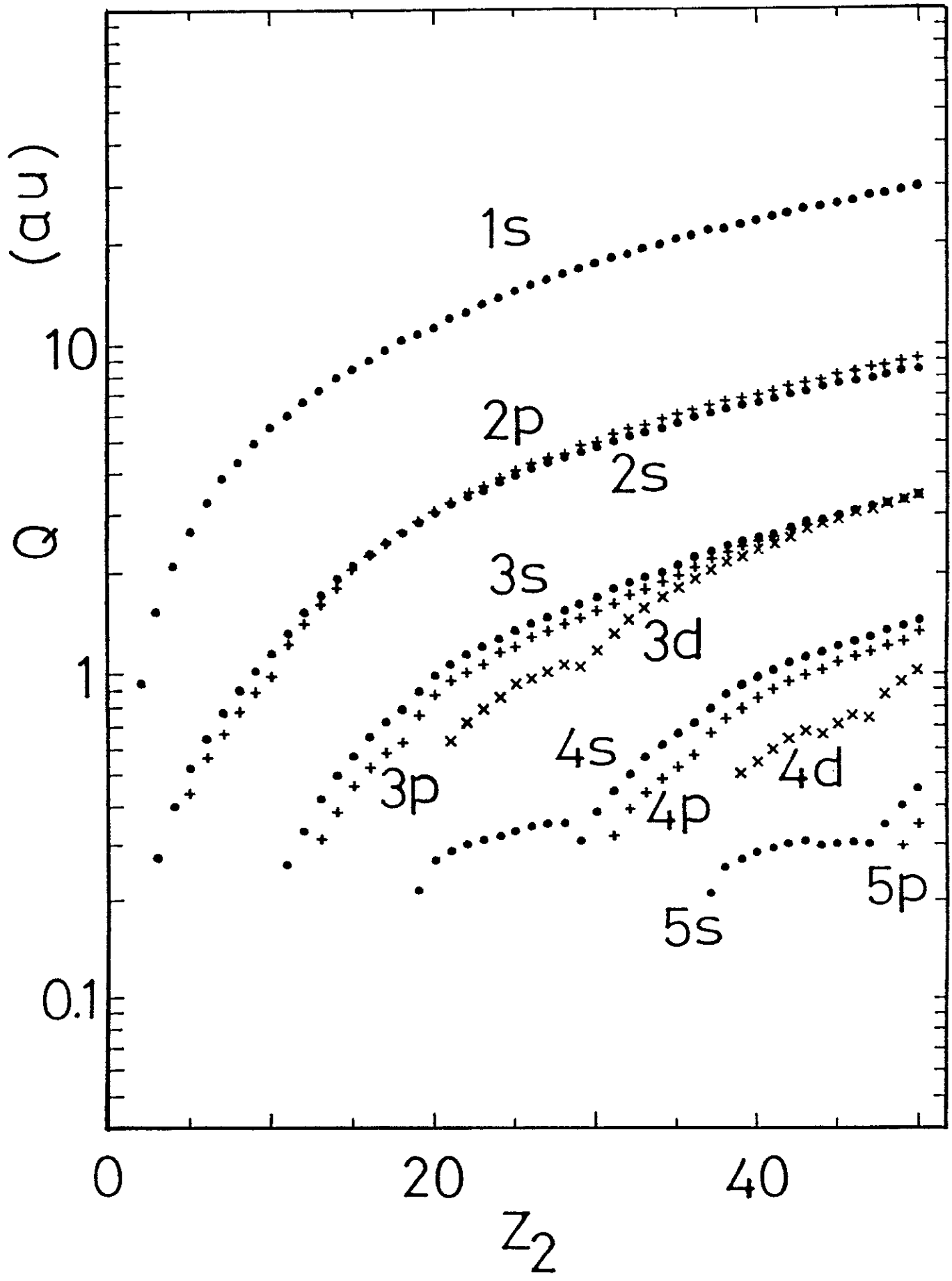

figure 1

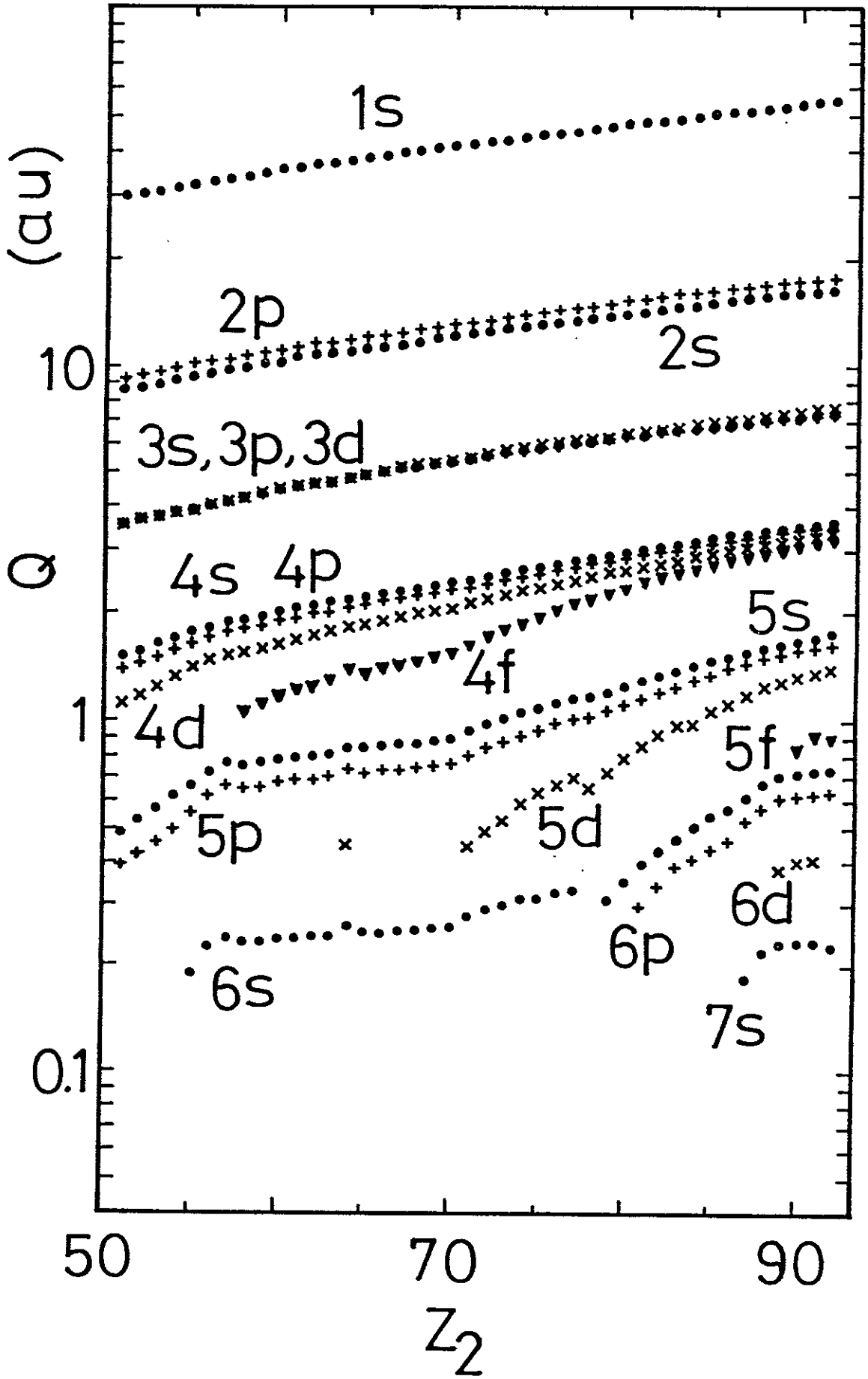
1s
2p
2s
3s, 3p, 3d
4s
4p
4f
4d
5s
5f
5p
5d
6d
6p
6s
7s
Q (au)
10
1
0.1
50
70
90
Z_2

figure 2

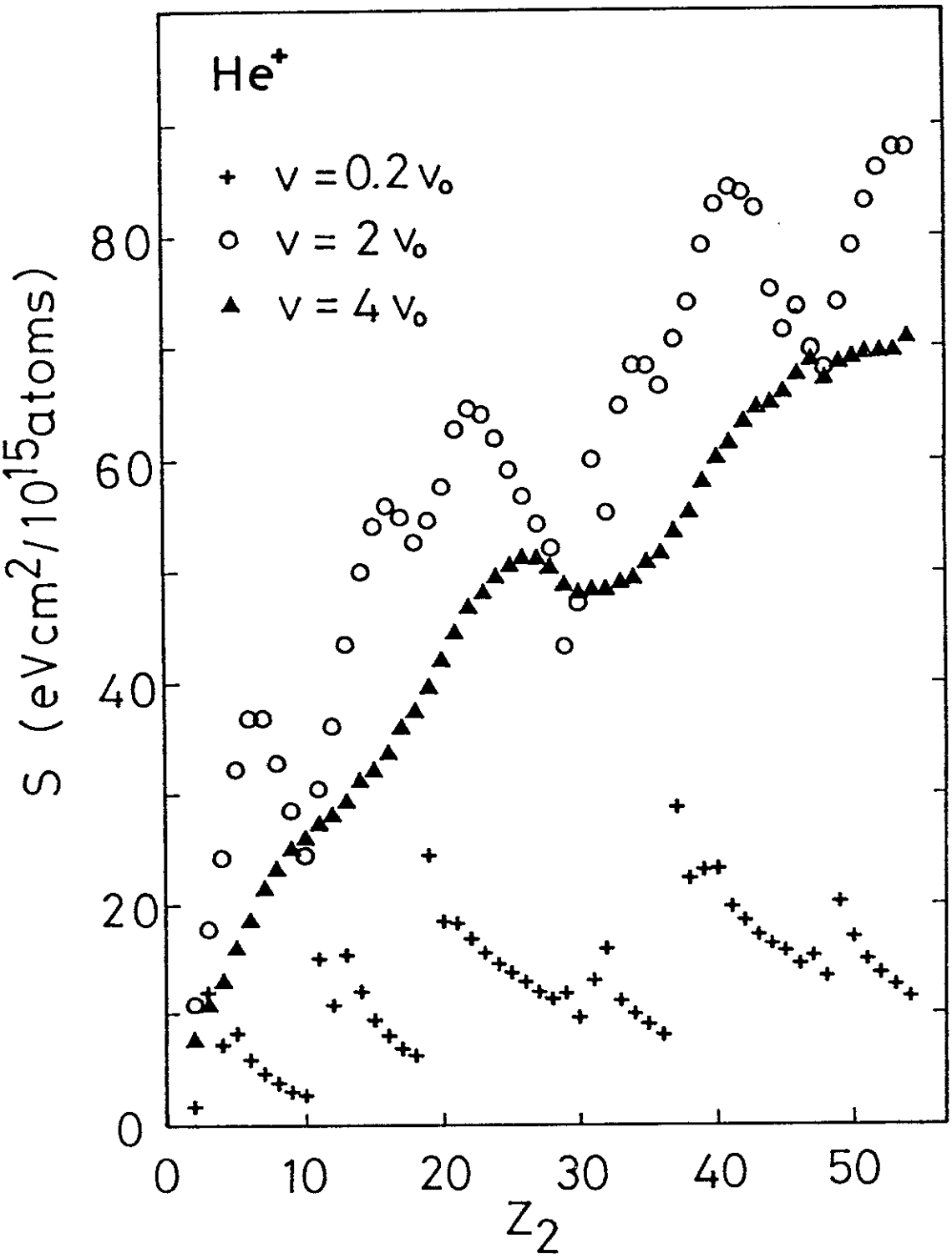
He+
v = 0.2 v0
v = 2 v0
v = 4 v0
S (eVcm2/10^15atoms)
0
20
40
60
80
0
10
20
30
40
50
Z2

figure 3

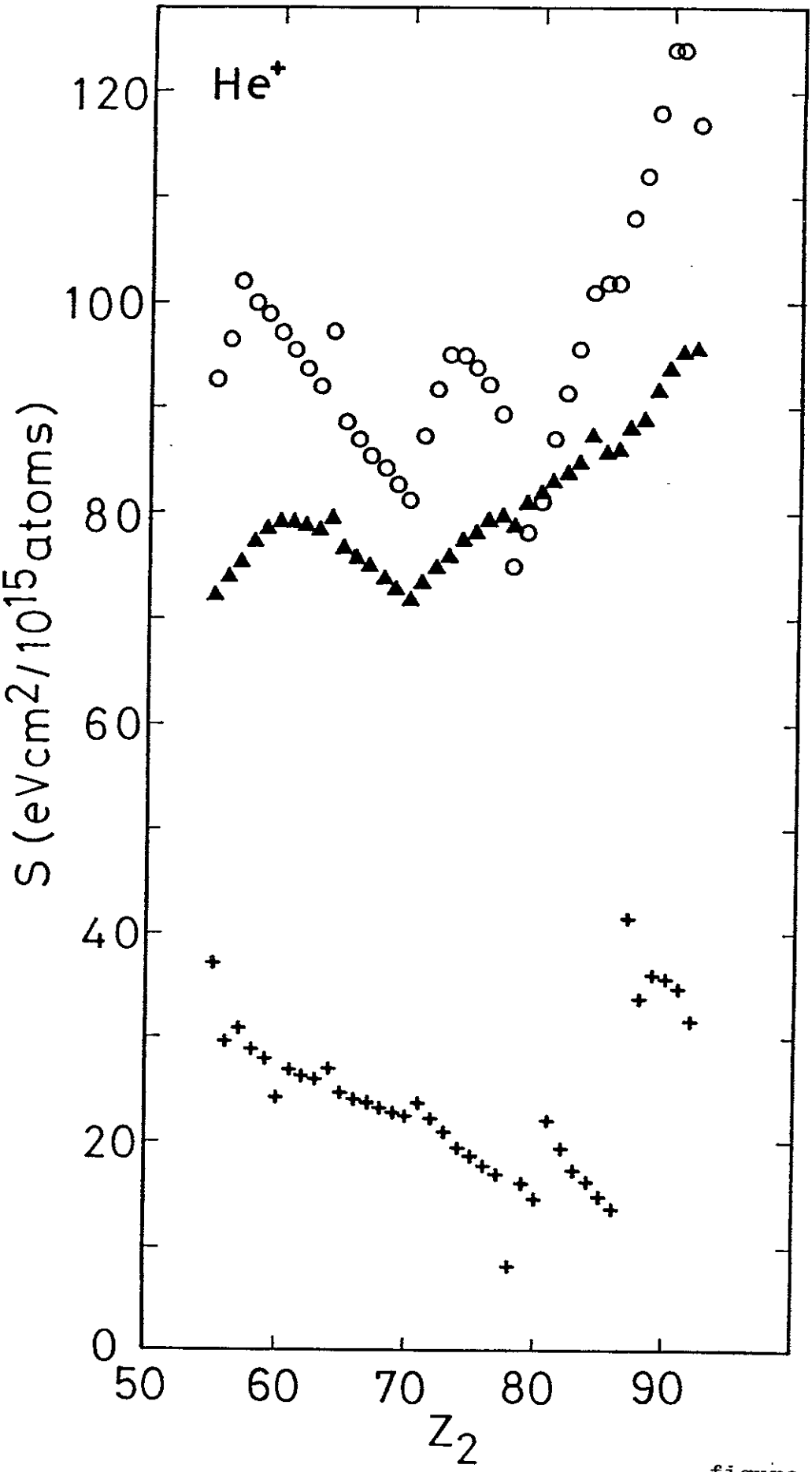

figure 4

EXPLANATION OF TABLES

(1) Symbol of a target element.

(2) Electronic state and the number of electrons, N, in each state.

(3) The value of the parameter Q for each electronic state in atomic units.

(4) The velocity of a He^+ ion in units of V_0 =2.18 x 10^8 cm/s. V=1 corresponds to kinetic energy E=25 keV/amu.

(5) Stopping cross sections in units of eV $cm^2/10^{15}$ atoms.

(1) → C (Z=6) 1s(2)2s(2)2p(2) ← (2)

(3) Q	---->	3.268	0.6420	0.5725
(4) V	TOTAL	1s(2)	2s(2)	2p(2)
0.2	5.89	0.0983	2.57	3.21
0.4	12.0	0.196	5.23	6.55
0.6	18.3	0.295	7.98	10.1
0.8	24.8	0.393	10.8	13.6
1.0	31.0	0.490	13.5	17.0
1.2	36.0	0.587	15.8	19.6
1.4	39.0	0.682	17.4	20.9
1.6	39.8	0.777	18.1	20.9
1.8	38.7	0.870	17.9	19.9
2.0	36.9	0.961	17.1	18.8
2.2	34.1	1.05	16.1	16.9
2.4	31.4	1.14	14.7	15.5
2.6	29.1	1.22	13.6	14.3
2.8	27.0	1.31	12.5	13.2
3.0	25.2	1.39	11.6	12.2
3.2	23.6	1.47	10.8	11.3
3.4	22.2	1.54	10.1	10.5
3.6	20.8	1.61	9.44	9.79
3.8	19.7	1.68	8.82	9.15
4.0	18.6	1.74	8.27	8.56
5	14.5	1.98	6.16	6.34
6	11.7	2.09	4.76	4.89
7	9.76	2.07	3.80	3.89
8	8.25	1.95	3.11	3.18
9	7.04	1.79	2.60	2.65
10	6.05	1.59	2.21	2.25
12	4.58	1.24	1.65	1.68
14	3.60	0.998	1.29	1.31
16	2.88	0.818	1.03	1.02
18	2.33	0.685	0.829	0.815
20	1.92	0.581	0.677	0.665

(5) →

Cs (Z=55) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(1) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10)

Q	---->	32.25	9.405	3.943	1.765	0.6642	0.1900	10.11	3.917	1.641	0.5642	3.942	1.398
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(1)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)
0.2	37.3	0.000287	0.00761	0.0640	0.366	2.41	27.8	0.00730	0.0816	0.598	4.92	0.0881	0.976
0.4	86.2	0.000584	0.0153	0.128	0.735	4.89	67.0	0.0147	0.163	1.20	9.91	0.177	1.95
0.6	92.5	0.000880	0.0229	0.192	1.10	7.45	63.5	0.0221	0.245	1.80	15.0	0.265	2.93
0.8	85.9	0.00118	0.0305	0.256	1.47	10.1	47.0	0.0295	0.326	2.39	20.1	0.352	3.90
1.0	84.7	0.00147	0.0381	0.319	1.83	12.6	36.0	0.0368	0.408	2.80	25.2	0.441	4.86
1.2	86.5	0.00177	0.0457	0.383	2.18	14.8	28.7	0.0442	0.489	3.56	30.0	0.529	5.81
1.4	89.3	0.00206	0.0534	0.445	2.53	16.5	23.5	0.0515	0.570	4.14	34.2	0.616	6.75
1.6	91.7	0.00235	0.0610	0.507	2.87	17.3	19.8	0.0588	0.650	4.70	37.5	0.704	7.67
1.8	92.9	0.00265	0.0686	0.569	3.19	17.3	16.9	0.0661	0.730	5.25	39.5	0.794	8.57
2.0	92.7	0.00294	0.0761	0.629	3.50	16.6	14.7	0.0734	0.809	5.79	40.2	0.877	9.44
2.2	91.6	0.00324	0.0836	0.689	3.79	15.8	13.0	0.0808	0.888	6.30	39.7	0.963	10.3
2.4	89.4	0.00353	0.0911	0.748	4.06	14.5	11.5	0.0881	0.966	6.80	38.5	1.05	11.1
2.6	86.7	0.00382	0.0986	0.806	4.29	13.3	10.3	0.0954	1.04	7.27	36.5	1.13	11.9
2.8	84.9	0.00412	0.106	0.862	4.49	12.4	9.29	0.103	1.12	7.71	35.0	1.22	12.6
3.0	82.5	0.00441	0.113	0.917	4.66	11.5	8.43	0.110	1.20	8.12	32.9	1.30	13.3
3.2	80.0	0.00470	0.121	0.971	4.79	10.7	7.68	0.117	1.27	8.49	30.6	1.38	13.9
3.4	77.9	0.00499	0.128	1.02	4.88	10.0	7.04	0.124	1.34	8.83	28.6	1.46	14.4
3.6	75.9	0.00529	0.135	1.07	4.93	9.35	6.48	0.132	1.41	9.13	26.8	1.54	14.9
3.8	74.1	0.00558	0.143	1.12	4.94	8.75	5.95	0.139	1.49	9.38	25.2	1.62	15.4
4.0	72.3	0.00587	0.150	1.17	4.92	8.21	5.43	0.146	1.56	9.58	23.7	1.70	15.7
5	63.9	0.00733	0.185	1.37	4.45	6.11	3.56	0.181	1.88	9.93	17.8	2.08	16.3
6	56.3	0.00878	0.218	1.51	3.81	4.74	2.53	0.216	2.17	9.34	13.9	2.42	15.4
7	49.3	0.0102	0.249	1.58	3.11	3.78	1.89	0.250	2.40	8.36	11.1	2.72	13.8
8	43.0	0.0117	0.278	1.58	2.61	3.10	1.46	0.282	2.58	7.16	9.11	2.98	11.9
9	37.8	0.0131	0.305	1.52	2.22	2.59	1.18	0.313	2.69	6.09	7.63	3.18	10.1
10	33.8	0.0145	0.328	1.42	1.90	2.20	0.961	0.343	2.74	5.28	6.48	3.33	8.78
12	27.5	0.0172	0.366	1.17	1.45	1.65	0.671	0.399	2.66	4.06	4.86	3.44	6.76
14	22.9	0.0199	0.389	0.948	1.14	1.29	0.501	0.447	2.41	3.23	3.80	3.35	5.37
16	19.3	0.0225	0.398	0.780	0.924	1.03	0.393	0.488	2.09	2.63	3.06	3.10	4.38
18	16.4	0.0249	0.394	0.656	0.766	0.834	0.320	0.520	1.79	2.19	2.52	2.76	3.64
20	14.1	0.0273	0.377	0.559	0.646	0.680	0.258	0.544	1.53	1.85	2.12	2.42	3.08

Ba (Z=56) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10)

Q/Rs	---->	32.94	9.589	4.039	1.807	0.7238	0.2280	10.30	4.015	1.704	0.6226	4.048	1.468
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)
0.2	29.7	0.000271	0.00724	0.0605	0.349	2.05	21.6	0.00695	0.0768	0.552	4.08	0.0824	0.879
0.4	65.0	0.000551	0.0145	0.121	0.700	4.14	49.3	0.0140	0.154	1.11	8.21	0.165	1.76
0.6	98.9	0.000831	0.0218	0.184	1.05	6.28	74.2	0.0210	0.231	1.66	12.4	0.248	2.64
0.8	105	0.00111	0.0291	0.242	1.40	8.46	72.2	0.0281	0.307	2.21	16.6	0.330	3.51
1.0	101	0.00139	0.0363	0.302	1.74	10.6	59.8	0.0351	0.384	2.75	20.8	0.413	4.38
1.2	98.3	0.00167	0.0435	0.362	2.08	12.6	49.0	0.0421	0.461	3.29	24.8	0.495	5.24
1.4	97.7	0.00195	0.0508	0.421	2.41	14.1	41.2	0.0490	0.537	3.82	28.4	0.577	6.08
1.6	97.5	0.00222	0.0580	0.480	2.74	15.2	35.0	0.0560	0.613	4.34	31.5	0.659	6.91
1.8	97.3	0.00250	0.0653	0.538	3.05	15.6	30.2	0.0629	0.688	4.85	33.8	0.740	7.73
2.0	96.6	0.00278	0.0725	0.595	3.34	15.4	26.6	0.0699	0.762	5.35	35.1	0.821	8.52
2.2	95.2	0.00306	0.0796	0.652	3.62	14.8	23.6	0.0769	0.837	5.83	35.5	0.902	9.29
2.4	93.0	0.00333	0.0868	0.708	3.88	13.9	21.1	0.0839	0.910	6.29	35.0	0.982	10.0
2.6	90.8	0.00361	0.0939	0.763	4.11	13.2	19.0	0.0909	0.983	6.23	34.0	1.06	10.7
2.8	88.1	0.00389	0.101	0.816	4.31	12.5	17.2	0.0980	1.06	7.15	32.4	1.14	11.4
3.0	86.0	0.00416	0.108	0.869	4.48	11.6	15.7	0.105	1.13	7.53	31.2	1.22	12.0
3.2	83.2	0.00444	0.115	0.920	4.61	10.8	14.2	0.112	1.20	7.89	29.4	2.30	12.6
3.4	80.6	0.00472	0.122	0.970	4.70	10.1	13.2	0.119	1.27	8.22	27.4	1.37	13.2
3.6	78.1	0.00499	0.129	1.02	4.76	9.43	12.0	0.125	1.33	8.51	25.7	1.45	13.6
3.8	76.2	0.00527	0.136	1.07	4.79	8.81	11.3	0.132	1.40	8.77	24.2	1.52	14.1
4.0	74.0	0.00554	0.143	1.11	4.78	8.27	10.4	0.139	1.47	8.98	22.8	1.60	14.4
5	65.5	0.00692	0.176	1.31	4.38	6.17	7.54	0.173	1.78	9.44	17.3	1.95	15.3
6	57.6	0.00829	0.208	1.45	3.77	4.78	5.58	0.206	2.05	9.02	13.5	2.28	14.7
7	50.2	0.00965	0.238	1.52	3.09	3.82	4.17	0.238	2.28	8.13	10.9	2.57	13.3
8	43.9	0.0110	0.267	1.53	2.59	3.12	3.20	0.269	2.45	7.07	8.92	2.81	11.7
9	38.6	0.0123	0.291	1.48	2.20	2.61	2.59	0.299	2.57	6.03	7.47	3.01	10.0
10	34.3	0.0137	0.314	1.40	1.89	2.21	2.10	0.328	2.63	5.22	6.36	3.16	8.64
12	27.9	0.0163	0.351	1.16	1.44	1.66	1.50	0.381	2.58	4.03	4.79	3.30	6.67
14	23.2	0.0188	0.375	0.942	1.14	1.30	1.12	0.428	2.37	3.20	3.74	3.24	5.31
16	19.5	0.0212	0.385	0.776	0.922	1.04	0.851	0.468	2.07	2.61	3.01	3.02	4.33
18	16.6	0.0326	0.382	0.651	0.764	0.852	0.695	0.499	1.77	2.17	2.48	2.71	3.61
20	14.3	0.0258	0.368	0.557	0.644	0.703	0.553	0.523	1.52	1.84	2.09	2.39	3.05

La (Z=57) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(1)

Q	---->	33.5	9.78	4.13	1.87	0.766	0.242	10.5	4.11	1.77	0.665	5.34	1.53	0.421
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(1)
0.2	30.9	0.000258	0.00689	0.0575	0.326	1.84	18.9	0.00659	0.0726	0.509	3.60	0.0410	0.805	4.75
0.4	67.5	0.000526	0.0138	0.115	0.654	3.71	42.7	0.0133	0.145	1.02	7.24	0.0823	1.61	10.2
0.6	104	0.000793	0.0208	0.178	0.980	5.62	65.8	0.0199	0.218	1.53	10.9	0.123	2.42	16.1
0.8	119	0.00106	0.0277	0.230	1.30	7.57	68.4	0.0266	0.290	2.04	14.6	0.165	3.22	20.9
1.0	116	0.00133	0.0345	0.287	1.63	9.48	57.5	0.0333	0.363	2.54	18.3	0.205	4.01	21.7
1.2	112	0.00159	0.0414	0.344	1.94	11.3	47.5	0.0399	0.435	3.03	21.8	0.246	4.80	20.2
1.4	108	0.00186	0.0483	0.400	2.25	12.8	40.0	0.0465	0.507	3.52	25.1	0.287	5.57	17.3
1.6	105	0.00212	0.0552	0.456	2.55	13.8	34.2	0.0531	0.579	4.01	27.9	0.328	6.33	15.1
1.8	104	0.00239	0.0621	0.511	2.85	14.4	29.7	0.0597	0.650	4.48	30.2	0.369	7.08	13.3
2.0	102	0.00265	0.0689	0.566	3.13	14.4	26.1	0.0663	0.721	4.94	31.8	0.410	7.81	11.8
2.2	99.6	0.00292	0.0758	0.620	3.39	14.1	23.1	0.0729	0.791	5.38	32.5	0.450	8.52	10.6
2.4	97.1	0.00318	0.0826	0.673	3.63	13.5	20.7	0.0796	0.861	5.82	32.6	0.491	9.21	9.48
2.6	94.1	0.00345	0.0893	0.725	3.85	12.6	18.6	0.0862	0.930	6.23	32.0	0.531	9.87	8.59
2.8	91.5	0.00371	0.0961	0.777	4.05	12.2	16.9	0.0928	0.998	6.62	30.9	0.571	10.5	7.83
3.0	88.3	0.00397	0.103	0.827	4.22	11.2	15.4	0.0993	1.07	6.99	29.5	0.611	11.1	7.16
3.2	85.9	0.00424	0.109	0.876	4.35	10.5	14.1	0.106	1.13	7.33	28.5	0.650	11.6	6.57
3.4	82.9	0.00450	0.116	0.924	4.46	9.83	12.9	0.112	1.20	7.65	26.7	0.689	12.2	6.06
3.6	80.0	0.00476	0.123	0.970	4.53	9.20	12.0	0.119	1.26	7.93	25.0	0.728	12.6	5.61
3.8	77.5	0.00503	0.129	1.02	4.57	8.61	11.1	0.125	1.33	8.18	23.5	0.767	13.0	5.21
4.0	75.3	0.00529	0.136	1.06	4.58	8.10	10.3	0.132	1.39	8.40	22.2	0.805	13.4	4.85
5	65.8	0.00661	0.168	1.25	4.26	6.06	7.42	0.164	1.69	8.95	16.9	0.993	14.4	3.52
6	57.7	0.00792	0.198	1.39	3.71	4.70	5.61	0.195	1.95	8.68	13.3	1.17	14.1	2.69
7	50.1	0.00922	0.227	1.46	3.06	3.76	4.22	0.226	2.17	7.90	10.7	1.34	12.9	2.13
8	43.7	0.0105	0.254	1.48	2.57	3.08	3.26	0.255	2.34	6.97	8.80	1.49	11.5	1.72
9	38.1	0.0118	0.278	1.44	2.18	2.57	2.63	0.284	2.46	5.97	7.37	1.63	9.88	1.40
10	33.6	0.0131	0.300	1.37	1.88	2.19	2.15	0.312	2.52	5.15	6.28	1.75	8.54	1.14
12	27.0	0.0155	0.337	1.15	1.43	1.64	1.51	0.363	2.50	3.99	4.73	1.95	6.61	0.806
14	22.4	0.0180	0.361	0.937	1.13	1.28	1.12	0.408	2.32	3.18	3.70	2.06	5.26	0.597
16	18.9	0.0203	0.372	0.770	0.916	1.03	0.864	0.446	2.04	2.59	2.99	2.09	4.30	0.464
18	16.2	0.0226	0.371	0.649	0.760	0.849	0.690	0.478	1.56	2.16	2.46	2.05	3.58	0.371
20	14.1	0.0247	0.360	0.553	0.640	0.705	0.577	0.501	1.52	1.83	2.07	1.95	3.03	0.304

Ce (Z=58) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(2)

Q	---->	34.15	9.96	4.22	1.90	0.752	0.234	10.7	4.20	1.80	0.650	4.26	1.56	1.07
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(2)
0.2	28.9	0.000245	0.00656	0.0546	0.315	1.90	20.5	0.00626	0.0686	0.490	3.76	0.0728	0.768	0.977
0.4	63.5	0.000500	0.0132	0.109	0.631	3.84	46.6	0.0126	0.138	0.981	7.56	0.146	1.54	1.96
0.6	96.4	0.000754	0.0192	0.164	0.946	5.83	70.8	0.0189	0.206	1.47	11.4	0.219	2.31	2.95
0.8	105	0.00101	0.0264	0.218	1.26	7.85	70.8	0.0253	0.274	1.96	15.3	0.291	3.07	3.94
1.0	102	0.00126	0.0329	0.273	1.57	9.83	59.4	0.0316	0.343	2.44	19.1	0.364	3.83	4.92
1.2	99.8	0.00151	0.0395	0.327	1.87	11.7	48.9	0.0379	0.412	2.92	22.8	0.437	4.58	5.88
1.4	99.4	0.00177	0.0460	0.380	2.17	13.2	40.9	0.0442	0.480	3.39	26.2	0.510	5.32	6.79
1.6	100	0.00202	0.0526	0.433	2.47	14.3	34.9	0.0504	0.548	3.86	29.2	0.582	6.05	7.61
1.8	101	0.00227	0.0592	0.486	2.75	14.8	30.2	0.0567	0.615	4.31	31.4	0.654	6.76	8.32
2.0	100	0.00252	0.0657	0.538	3.02	14.7	26.5	0.0629	0.682	4.76	32.9	0.725	7.46	8.88
2.2	99.5	0.00278	0.0722	0.589	3.27	14.3	23.5	0.0692	0.748	5.19	33.6	0.797	8.14	9.26
2.4	97.9	0.00303	0.0787	0.640	3.51	13.7	21.0	0.0755	0.814	5.61	33.4	0.867	8.80	9.45
2.6	95.6	0.00328	0.0852	0.690	3.73	12.7	18.9	0.0818	0.880	6.01	32.7	0.938	9.43	9.46
2.8	93.4	0.00353	0.0916	0.738	3.29	12.3	17.1	0.0881	0.944	6.39	31.5	1.01	10.0	9.33
3.0	90.5	0.00378	0.0980	0.786	4.09	11.4	15.6	0.0943	1.01	6.75	30.0	1.08	10.6	9.08
3.2	88.1	0.00403	0.104	0.833	4.23	10.6	14.2	0.101	1.07	7.08	28.8	1.15	11.2	8.72
3.4	85.2	0.00428	0.111	0.879	4.33	9.91	13.1	0.107	1.13	7.39	27.0	1.21	11.7	8.44
3.6	82.3	0.00453	0.117	0.923	4.41	9.27	12.1	0.113	1.20	7.67	25.2	1.28	12.1	8.00
3.8	79.8	0.00478	0.123	0.967	4.46	8.68	11.2	0.119	1.26	7.92	23.7	1.35	12.5	7.53
4.0	77.5	0.00503	0.130	1.01	4.47	8.16	10.4	0.125	1.32	8.14	22.4	1.41	12.9	7.09
5	67.8	0.00629	0.160	1.19	4.20	6.09	7.48	0.156	1.60	8.72	17.0	1.73	13.9	5.45
6	59.5	0.00753	0.189	1.33	3.67	4.73	5.62	0.185	1.85	8.52	13.4	2.02	13.8	4.30
7	51.9	0.00877	0.217	1.41	3.04	3.78	4.19	0.215	2.07	7.79	10.8	2.29	12.7	3.47
8	45.6	0.0100	0.242	1.43	2.45	3.10	3.27	0.243	2.24	6.91	8.85	2.52	11.4	2.86
9	39.9	0.0112	0.266	1.40	2.17	2.59	2.59	0.270	2.36	5.94	7.41	2.71	9.82	2.41
10	35.4	0.0124	0.288	1.34	1.87	2.20	2.12	0.296	2.43	5.13	6.31	2.86	8.48	2.05
12	28.7	0.0148	0.323	1.14	1.42	1.65	1.49	0.345	2.42	3.97	4.75	3.02	6.58	1.55
14	23.8	0.0171	0.347	0.931	1.13	1.29	1.11	0.389	2.27	3.16	3.71	3.02	5.25	1.21
16	20.1	0.0193	0.360	0.765	0.913	1.03	0.880	0.426	2.01	2.58	2.99	2.87	4.28	0.97
18	17.1	0.0215	0.361	0.644	0.757	0.849	0.688	0.457	1.74	2.15	2.47	2.62	3.56	0.80
20	14.7	0.0236	0.351	0.551	0.639	0.706	0.565	0.481	1.51	1.82	2.08	2.33	3.02	0.68

Pr (Z=59) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(3)

Q	---->	34.8	10.2	4.31	1.95	0.767	0.236	10.9	4.30	1.84	0.659	4.36	1.61	1.13
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(3)
0.2	28.2	0.000233	0.00624	0.0520	0.300	1.83	20.0	0.00596	0.0649	0.465	3.66	0.0685	0.723	1.03
0.4	62.0	0.000476	0.0125	0.104	0.601	3.70	45.5	0.0120	0.130	0.931	7.36	0.137	1.45	2.06
0.6	94.3	0.000717	0.0188	0.156	0.900	5.61	69.5	0.0180	0.195	1.40	11.1	0.206	2.17	3.09
0.8	103	0.000958	0.0251	0.208	1.20	7.54	70.2	0.0241	0.260	1.86	14.9	0.275	2.89	4.11
1.0	100	0.00120	0.0313	0.260	1.49	9.45	58.9	0.0301	0.325	2.32	18.6	0.343	3.60	5.13
1.2	98.1	0.00144	0.0375	0.311	1.78	11.2	48.5	0.0361	0.389	2.77	22.2	0.412	4.31	6.13
1.4	97.7	0.00168	0.0438	0.362	2.07	12.7	40.6	0.0421	0.454	3.22	25.5	0.480	5.01	7.09
1.6	98.2	0.00192	0.0500	0.413	2.35	13.8	34.7	0.0480	0.518	3.66	28.4	0.548	5.70	8.01
1.8	98.8	0.00216	0.0563	0.463	2.62	14.4	30.1	0.0540	0.582	4.10	30.7	0.616	6.37	8.85
2.0	99.7	0.00240	0.0625	0.512	2.88	14.4	26.4	0.0599	0.645	4.52	32.2	0.683	7.03	9.59
2.2	98.5	0.00264	0.0687	0.561	3.12	14.0	23.4	0.0660	0.708	4.93	32.9	0.751	7.67	10.2
2.4	97.3	0.00288	0.0749	0.610	3.35	14.5	20.9	0.0719	0.770	5.33	32.9	0.817	8.30	10.7
2.6	95.3	0.00312	0.0810	0.657	3.56	12.6	18.8	0.0779	0.832	5.71	32.2	0.884	8.90	11.0
2.8	93.6	0.00336	0.0871	0.704	3.75	12.2	17.1	0.0839	0.894	6.08	31.2	0.950	9.47	11.2
3.0	90.9	0.00360	0.0932	0.750	3.92	11.2	15.5	0.0898	0.954	6.42	29.7	1.02	10.0	11.2
3.2	88.8	0.00384	0.0993	0.795	4.05	10.5	14.2	0.0958	1.01	6.75	28.6	1.08	10.5	11.1
3.4	86.1	0.00408	0.105	0.839	4.17	9.82	13.1	0.102	1.07	7.05	26.8	1.14	11.0	10.9
3.6	83.3	0.00438	0.111	0.881	4.25	9.20	12.1	0.108	1.13	7.32	25.1	1.21	11.5	10.6
3.8	81.0	0.00455	0.117	0.923	4.30	8.61	11.2	0.113	1.19	7.57	23.6	1.27	11.9	10.2
4.0	78.7	0.00479	0.123	0.963	4.33	8.09	10.4	0.119	1.25	7.79	22.3	1.33	12.2	9.85
5	69.0	0.00598	0.152	1.14	4.11	6.06	7.45	0.148	1.52	8.41	17.0	1.63	13.3	8.04
6	60.5	0.00717	0.180	1.28	3.60	4.70	5.64	0.177	1.76	8.29	13.3	1.91	13.3	6.39
7	52.8	0.00835	0.207	1.36	3.02	3.76	4.21	0.205	1.97	7.65	10.7	2.17	12.4	5.18
8	46.4	0.00952	0.231	1.39	2.53	3.08	3.27	0.232	2.13	6.84	8.82	2.39	11.2	4.28
9	40.7	0.0107	0.254	1.37	2.15	2.57	2.60	0.258	2.25	5.90	7.39	2.57	9.73	3.60
10	36.0	0.0118	0.275	1.31	1.86	2.19	2.13	0.283	2.33	5.09	6.29	2.72	8.42	3.07
12	29.1	0.0141	0.310	1.13	1.42	1.64	1.49	0.330	2.35	3.95	4.74	2.90	6.53	2.32
14	24.2	0.0163	0.334	0.925	1.12	1.28	1.11	0.372	2.21	3.15	3.71	2.91	5.21	1.82
16	20.4	0.0184	0.347	0.762	0.910	1.03	0.872	0.408	1.98	2.57	2.99	2.79	4.26	1.47
18	17.4	0.0205	0.349	0.642	0.755	0.849	0.689	0.438	1.73	2.14	2.46	2.57	3.54	1.21
20	15.0	0.0225	0.342	0.547	0.636	0.704	0.571	0.462	1.49	1.81	2.07	2.30	3.00	1.02

Nd (Z=60) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(4)

Q	---->	35.3	10.3	4.40	1.99	0.779	0.238	11.1	4.40	1.89	0.669	4.46	1.65	1.17
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(4)
0.2	27.6	0.000223	0.00596	0.0494	0.286	1.78	19.6	0.00568	0.0615	0.443	3.56	0.0646	0.683	1.04
0.4	60.5	0.000456	0.0120	0.0989	0.574	3.59	44.4	0.0114	0.123	0.885	7.15	0.130	1.37	2.10
0.6	92.2	0.000687	0.0181	0.148	0.861	5.44	68.1	0.0172	0.185	1.33	10.8	0.194	2.05	3.14
0.8	102	0.000918	0.0240	0.198	1.15	7.31	69.6	0.0229	0.246	1.77	14.4	0.259	2.73	4.18
1.0	98.7	0.00115	0.0299	0.247	1.43	9.15	58.4	0.0287	0.308	2.21	18.0	0.323	3.40	5.21
1.2	96.3	0.00138	0.0359	0.256	1.71	10.9	48.2	0.0344	0.369	2.64	21.5	0.388	4.07	6.23
1.4	95.8	0.00161	0.0419	0.345	1.98	12.4	40.4	0.0401	0.430	3.07	24.8	0.453	4.73	7.22
1.6	96.4	0.00184	0.0478	0.393	2.25	13.4	34.6	0.0458	0.491	3.49	27.6	0.517	5.38	8.16
1.8	97.1	0.00207	0.0538	0.441	2.50	14.0	30.0	0.0515	0.552	3.90	29.9	0.581	6.02	9.06
2.0	97.3	0.00230	0.0598	0.488	2.75	14.1	26.3	0.0571	0.612	4.30	31.5	0.645	6.64	9.89
2.2	97.0	0.00253	0.0657	0.534	2.99	13.8	23.3	0.0629	0.672	4.69	32.2	0.708	7.25	10.6
2.4	96.1	0.00276	0.0716	0.581	3.21	13.3	20.8	0.0686	0.731	5.08	32.3	0.771	7.84	11.3
2.6	94.4	0.00299	0.0775	0.626	3.41	12.5	18.7	0.0743	0.790	5.44	31.7	0.834	8.42	11.8
2.8	92.9	0.00322	0.0833	0.671	3.60	12.1	17.0	0.0800	0.848	5.79	30.8	0.896	8.96	12.1
3.0	90.5	0.00345	0.0891	0.714	3.76	11.2	15.5	0.0856	0.906	6.13	29.3	0.958	9.49	12.4
3.2	88.7	0.00368	0.0949	0.757	3.90	10.4	14.2	0.0913	0.963	6.44	28.4	1.02	9.98	12.5
3.4	86.2	0.00391	0.101	0.799	4.02	9.75	13.0	0.0969	1.02	6.73	26.7	1.08	10.5	12.5
3.6	83.7	0.00413	0.107	0.840	4.10	9.13	12.0	0.103	1.08	7.00	24.9	1.14	10.9	12.3
3.8	81.4	0.00436	0.112	0.880	4.16	8.55	11.1	0.108	1.13	7.24	23.4	1.20	11.3	12.1
4.0	79.2	0.00459	0.118	0.919	4.20	8.04	10.3	0.114	1.18	7.46	22.1	1.26	11.6	11.8
5	69.6	0.00573	0.146	1.09	4.03	6.02	7.45	0.141	1.44	8.12	16.9	1.54	12.8	9.93
6	61.2	0.00687	0.172	1.22	3.54	4.68	5.63	0.169	1.67	8.07	13.3	1.81	12.9	8.09
7	53.5	0.00800	0.198	1.31	3.00	3.75	4.23	0.195	1.87	7.50	10.7	2.05	12.1	6.61
8	47.0	0.00912	0.222	1.34	2.51	3.07	3.26	0.221	2.04	6.76	8.78	2.27	11.0	5.50
9	41.2	0.0102	0.244	1.33	2.14	2.57	2.61	0.246	2.16	5.86	7.36	2.45	9.64	4.63
10	36.5	0.0113	0.264	1.28	1.85	2.18	2.14	0.270	2.24	5.06	6.28	2.59	8.36	3.96
12	29.5	0.0135	0.298	1.11	1.41	1.64	1.50	0.315	2.27	3.92	4.72	2.78	6.48	3.00
14	24.5	0.0156	0.322	0.918	1.12	1.28	1.11	0.356	2.16	3.13	3.70	2.81	5.18	2.36
16	20.6	0.0177	0.336	0.758	0.906	1.03	0.866	0.391	1.95	2.56	2.98	2.76	4.23	1.91
18	17.6	0.0197	0.339	0.637	0.751	0.854	0.689	0.421	1.71	2.13	2.46	2.52	3.53	1.58
20	15.2	0.0216	0.334	0.546	0.635	0.706	0.577	0.444	1.48	1.81	2.07	2.27	2.99	1.33

Pm (Z=61) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(5)

Q	---->	36.0	10.4	4.49	2.03	0.792	0.240	11.3	4.49	1.93	0.679	4.57	1.69	1.22
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(5)
0.2	27.0	0.000213	0.00586	0.0471	0.274	1.73	19.2	0.00541	0.0584	0.421	3.46	0.0610	0.645	1.05
0.4	59.0	0.000432	0.0118	0.0942	0.550	3.48	43.5	0.0109	0.117	0.841	6.95	0.122	1.29	2.11
0.6	90.3	0.000655	0.0177	0.141	0.824	5.27	66.8	0.0164	0.175	1.26	10.5	0.184	1.94	3.16
0.8	100	0.000875	0.0236	0.188	1.10	7.08	68.9	0.0219	0.234	1.68	14.0	0.245	2.58	4.20
1.0	97.1	0.00109	0.0294	0.235	1.37	8.87	57.9	0.0273	0.292	2.10	17.5	0.305	3.21	5.24
1.2	94.6	0.00131	0.0353	0.282	1.63	10.6	47.8	0.0328	0.351	2.51	20.9	0.367	3.85	6.26
1.4	94.1	0.00153	0.0411	0.328	1.90	12.0	40.3	0.0383	0.409	2.92	24.1	0.428	4.47	7.25
1.6	94.6	0.00175	0.0470	0.374	2.15	13.1	34.4	0.0437	0.466	3.32	26.9	0.488	5.08	8.22
1.8	95.2	0.00197	0.0529	0.420	2.40	13.7	29.8	0.0491	0.524	3.71	29.1	0.549	5.69	9.14
2.0	95.6	0.00219	0.0587	0.465	2.64	13.9	26.2	0.0545	0.581	4.09	30.7	0.609	6.28	10.0
2.2	95.3	0.00241	0.0646	0.509	2.87	13.6	23.2	0.0600	0.638	4.47	31.6	0.669	6.86	10.8
2.4	94.6	0.00263	0.0704	0.553	3.08	13.2	20.7	0.0654	0.694	4.83	31.7	0.729	7.42	11.5
2.6	93.2	0.00285	0.0761	0.597	3.28	12.4	18.7	0.0709	0.750	5.18	31.3	0.788	7.97	12.1
2.8	91.9	0.00307	0.0819	0.639	3.46	12.0	16.9	0.0763	0.805	5.52	30.4	0.847	8.49	12.7
3.0	89.7	0.00328	0.0876	0.681	3.62	11.1	15.4	0.0817	0.860	5.84	29.1	0.905	8.99	13.1
3.2	88.0	0.00350	0.0933	0.722	3.76	10.3	14.1	0.0871	0.915	6.14	28.1	0.963	9.47	13.3
3.4	85.8	0.00372	0.0990	0.763	3.87	9.67	13.0	0.0925	0.968	6.43	26.5	1.02	9.91	13.5
3.6	83.5	0.00394	0.105	0.802	3.96	9.06	12.0	0.0979	1.02	6.69	24.8	1.08	10.3	13.5
3.8	81.3	0.00416	0.110	0.840	4.03	8.51	11.1	0.103	1.07	6.93	23.3	1.13	10.7	13.5
4.0	79.3	0.00437	0.116	0.877	4.07	7.99	10.3	0.109	1.13	7.14	22.0	1.19	11.1	13.3
5	70.0	0.00546	0.143	1.04	3.95	5.99	7.44	0.135	1.37	7.83	16.8	1.46	12.3	11.6
6	61.8	0.00654	0.170	1.17	3.49	4.66	5.61	0.161	1.60	7.84	13.2	1.71	12.5	9.74
7	54.1	0.00762	0.195	1.26	2.98	3.73	4.22	0.186	1.79	7.36	10.6	1.95	11.8	7.98
8	47.5	0.00869	0.218	1.30	2.50	3.06	3.26	0.211	1.95	6.66	8.76	2.15	10.8	6.65
9	41.8	0.00975	0.240	1.29	2.13	2.56	2.62	0.235	2.07	5.81	7.35	2.33	9.55	5.63
10	37.0	0.0108	0.260	1.25	1.84	2.17	2.15	0.258	2.15	5.04	6.26	2.47	8.31	4.83
12	29.8	0.0129	0.293	1.10	1.40	1.63	1.50	0.302	2.20	3.90	4.71	2.66	6.43	3.67
14	24.7	0.0149	0.317	0.912	1.11	1.27	1.11	0.341	2.11	3.11	3.69	2.71	5.14	2.89
16	20.9	0.0169	0.332	0.754	0.902	1.02	0.864	0.375	1.92	2.55	2.98	2.64	4.21	2.34
18	17.9	0.0188	0.336	0.635	0.748	0.844	0.689	0.404	1.69	2.12	2.45	2.47	3.51	1.94
20	15.4	0.0206	0.330	0.542	0.632	0.707	0.579	0.427	1.47	1.80	2.06	2.24	2.98	1.63

Sm (Z=62) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(6)

Q	---->	36.5	10.7	4.59	2.08	0.803	0.242	10.4	4.58	1.97	0.688	4.67	1.73	1.26
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(6)
0.2	26.4	0.000204	0.00545	0.0449	0.263	1.68	18.8	0.00673	0.0556	0.401	3.37	0.0577	0.611	1.04
0.4	57.7	0.000416	0.0109	0.0899	0.527	3.39	42.6	0.0135	0.111	0.802	6.78	0.116	1.22	2.08
0.6	88.4	0.000628	0.0164	0.135	0.790	5.13	65.7	0.0204	0.167	1.21	10.2	0.174	1.83	3.12
0.8	98.7	0.000838	0.0219	0.180	1.05	6.89	68.3	0.0271	0.222	1.60	13.6	0.231	2.44	4.16
1.0	95.5	0.00105	0.0274	0.224	1.31	8.62	57.5	0.0339	0.278	2.00	17.1	0.289	3.05	5.18
1.2	93.0	0.00126	0.0328	0.269	1.57	10.3	47.5	0.0407	0.334	2.39	20.4	0.347	3.64	6.19
1.4	92.4	0.00147	0.0382	0.313	1.82	11.7	40.0	0.0475	0.389	2.78	23.5	0.405	4.23	7.18
1.6	92.7	0.00168	0.0437	0.357	2.06	12.8	34.2	0.0542	0.444	3.16	26.2	0.462	4.82	8.14
1.8	93.4	0.00189	0.0492	0.400	2.30	13.4	29.7	0.0609	0.499	3.54	28.5	0.519	5.39	9.07
2.0	93.8	0.00210	0.0546.	0.443	2.53	13.6	26.1	0.0677	0.553	3.91	30.1	0.576	5.95	9.95
2.2	93.7	0.00231	0.0600	0.486	2.75	13.4	23.1	0.0744	0.607	4.27	31.0	0.633	6.50	10.8
2.4	93.1	0.00252	0.0654	0.528	2.96	13.0	20.7	0.0812	0.661	4.62	31.2	0.689	7.04	11.5
2.6	91.8	0.00273	0.0708	0.570	3.15	12.3	18.6	0.0879	0.714	4.95	30.8	0.746	7.56	12.2
2.8	90.6	0.00294	0.0761	0.610	3.33	11.8	16.9	0.0946	0.767	5.28	30.1	0.801	8.06	12.8
3.0	88.6	0.00315	0.0815	0.650	3.49	11.0	15.4	0.101	0.820	5.59	28.8	0.857	8.54	13.3
3.2	87.0	0.00336	0.0868	0.690	3.62	10.2	14.1	0.108	0.872	5.88	27.8	0.912	9.00	13.7
3.4	85.1	0.00857	0.0921	0.728	3.74	9.60	12.9	0.115	0.923	6.15	26.4	0.966	9.43	14.0
3.6	82.9	0.00378	0.0973	0.766	3.83	9.00	12.0	0.121	0.974	6.41	24.7	1.02	9.83	14.2
3.8	80.9	0.00398	0.103	0.803	3.90	8.45	11.1	0.128	1.02	6.64	23.1	1.07	10.2	14.3
4.0	79.0	0.00419	0.108	0.839	3.95	7.94	10.3	0.135	1.07	6.86	21.9	1.13	10.6	14.3
5	70.4	0.00523	0.133	1.00	3.86	5.97	7.41	0.167	1.31	7.56	16.7	1.39	11.8	13.1
6	62.4	0.00627	0.158	1.13	3.44	4.64	5.61	0.199	1.52	7.63	13.1	1.63	12.0	11.3
7	54.7	0.00731	0.181	1.21	2.96	3.72	4.22	0.230	1.71	7.21	10.6	1.85	11.6	9.25
8	48.1	0.00833	0.203	1.26	2.48	3.05	3.27	0.260	1.87	6.57	8.73	2.05	10.6	7.77
9	42.4	0.00935	0.224	1.26	2.21	2.55	2.63	0.290	1.99	5.77	7.32	2.22	9.95	6.60
10	37.5	0.0164	0.243	1.22	1.82	2.17	2.14	0.318	2.08	5.01	6.24	2.36	8.25	5.67
12	30.2	0.0124	0.275	1.08	1.40	1.63	1.51	0.369	2.13	3.88	4.70	2.55	6.38	4.32
14	25.1	0.0143	0.299	0.905	1.11	1.27	1.12	0.415	2.06	3.10	3.68	2.62	5.12	3.41
16	21.2	0.0162	0.314	0.751	0.899	1.02	0.864	0.454	1.89	2.53	2.97	2.56	4.19	2.76
18	18.2	0.0180	0.320	0.630	0.746	0.843	0.690	0.486	1.67	2.02	2.17	2.41	3.36	2.12
20	15.7	0.0198	0.317	0.540	0.630	0.705	0.577	0.509	1.46	1.79	2.06	2.20	2.96	1.93

Eu (Z=63) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(7)

Q	---->	37.15	10.90	4.667	2.118	0.8144	0.2429	11.72	4.673	2.014	0.6975	4.769	1.776	1.301
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(7)
0.2	26.1	0.000194	0.00520	0.0431	0.252	1.64	18.8	0.00494	0.0529	0.384	3.29	0.0547	0.579	1.02
0.4	57.1	0.000400	0.0105	0.0862	0.505	3.30	42.4	0.00995	0.106	0.767	6.61	0.110	1.16	2.04
0.6	87.5	0.000598	0.0157	0.129	0.757	4.99	65.4	0.0150	0.159	1.15	9.95	0.165	1.74	3.06
0.8	97.7	0.000800	0.0209	0.172	1.01	6.70	68.1	0.0200	0.212	1.53	13.3	0.219	2.32	4.07
1.0	94.4	0.00100	0.0261	0.215	1.26	8.39	57.4	0.0249	0.265	1.91	16.6	0.274	2.89	5.08
1.2	91.6	0.00120	0.0313	0.258	1.50	9.99	47.5	0.0299	0.317	2.29	19.9	0.328	3.46	6.07
1.4	90.8	0.00140	0.0365	0.300	1.74	11.4	40.0	0.0349	0.370	2.66	22.9	0.383	4.02	7.04
1.6	91.1	0.00160	0.0418	0.342	1.98	12.5	34.2	0.0399	0.422	3.02	25.6	0.438	4.57	7.99
1.8	91.7	0.00180	0.0470	0.384	2.21	13.2	29.7	0.0448	0.474	3.38	27.8	0.492	5.12	8.91
2.0	92.1	0.00200	0.0522	0.425	2.43	13.4	26.1	0.0498	0.526	3.74	29.5	0.546	5.65	9.79
2.2	92.0	0.00220	0.0574	0.466	2.64	13.2	23.1	0.0547	0.578	4.08	30.4	0.600	6.17	10.6
2.4	91.4	0.00240	0.0625	0.507	2.84	12.8	20.6	0.0597	0.629	4.42	30.7	0.653	6.68	11.4
2.6	90.3	0.00260	0.0677	0.546	3.03	12.2	18.6	0.0647	0.680	4.74	30.4	0.706	7.18	12.1
2.8	89.1	0.00280	0.0728	0.586	3.20	11.7	16.9	0.0696	0.730	5.05	29.7	0.759	7.66	12.8
3.0	87.4	0.00300	0.0779	0.624	3.35	11.0	15.4	0.0746	0.780	5.35	28.5	0.812	8.12	13.4
3.2	85.8	0.00320	0.0830	0.662	3.49	10.2	14.1	0.0795	0.829	5.63	27.5	0.864	8.56	13.9
3.4	84.1	0.00340	0.0880	0.699	3.61	9.53	12.9	0.0844	0.878	5.90	26.2	0.916	8.97	14.2
3.6	82.0	0.00360	0.0931	0.736	3.70	8.94	11.9	0.0893	0.927	6.15	24.6	0.967	9.37	14.5
3.8	80.1	0.00380	0.0981	0.771	3.78	8.40	11.1	0.0942	0.975	6.38	23.1	1.02	9.73	14.7
4.0	78.4	0.00400	0.103	0.806	3.83	7.91	10.3	0.0991	1.02	6.59	21.7	1.07	10.1	14.9
5	70.4	0.00499	0.128	0.962	3.78	5.94	7.41	0.123	1.25	7.30	16.7	1.31	11.3	14.2
6	62.6	0.00598	0.151	1.09	3.39	4.62	5.60	0.147	1.45	7.43	13.1	1.54	11.6	12.5
7	55.2	0.00697	0.174	1.17	2.94	3.71	4.22	0.170	1.64	7.07	10.6	1.76	11.3	10.5
8	48.5	0.00795	0.195	1.22	2.46	3.04	3.27	0.193	1.79	6.47	8.71	1.95	10.4	8.82
9	42.8	0.00892	0.215	1.23	2.10	2.54	2.63	0.215	1.91	5.72	7.31	2.11	9.35	7.52
10	37.9	0.00989	0.233	1.20	1.82	2.16	2.14	0.236	2.00	4.98	6.23	2.25	8.18	6.47
12	30.5	0.0118	0.265	1.07	1.39	1.62	1.51	0.277	2.07	3.85	4.69	2.45	6.34	4.95
14	25.3	0.0136	0.288	0.899	1.10	1.27	1.12	0.313	2.01	3.08	3.67	2.52	5.08	3.91
16	21.4	0.0155	0.303	0.747	0.895	1.02	0.866	0.345	1.86	2.52	2.96	2.49	4.16	3.17
18	18.3	0.0172	0.310	0.628	0.743	0.840	0.690	0.373	1.65	2.11	2.44	2.36	3.48	2.63
20	15.8	0.0189	0.308	0.537	0.628	0.706	0.576	0.396	1.45	1.78	2.06	2.17	2.95	2.22

Gd (Z=64) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(1) 4f(7)

Q	---->	37.74	11.01	4.769	2.170	0.8537	0.2586	11.93	4.791	2.068	0.7372	4.882	1.824	0.4537	1.399
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(1)	4f(7)
0.2	27.1	0.000186	0.00507	0.0409	0.240	1.50	16.4	0.00471	0.0497	0.362	2.96	0.0515	0.546	4.06	0.877
0.4	58.4	0.000380	0.0102	0.0819	0.480	3.01	36.5	0.00950	0.0996	0.723	5.95	0.103	1.09	8.61	1.76
0.6	90.9	0.000573	0.0153	0.123	0.719	4.55	57.2	0.0143	0.149	1.09	8.94	0.155	1.64	13.6	2.63
0.8	108	0.000766	0.0204	0.164	0.957	6.11	62.9	0.0190	0.199	1.45	11.9	0.207	2.18	18.0	3.50
1.0	108	0.000960	0.0255	0.204	1.19	7.64	54.5	0.0238	0.249	1.80	14.9	0.258	2.72	19.7	4.37
1.2	104	0.00115	0.0305	0.245	1.43	9.11	45.4	0.0286	0.298	2.16	17.8	0.310	3.26	18.5	5.22
1.4	101	0.00134	0.0356	0.285	1.66	10.4	38.5	0.0333	0.348	2.51	20.6	0.361	3.79	16.4	6.06
1.6	99.1	0.00154	0.0407	0.325	1.88	11.5	33.0	0.0380	0.397	2.85	23.1	0.413	4.31	14.4	6.88
1.8	98.1	0.00173	0.0458	0.365	2.10	12.2	28.8	0.0428	0.446	3.19	25.2	0.464	4.82	12.7	7.67
2.0	97.3	0.00192	0.0508	0.404	2.31	12.6	25.3	0.0475	0.495	3.53	26.9	0.515	5.33	11.4	8.44
2.2	96.3	0.00211	0.0559	0.443	2.51	12.6	22.5	0.0522	0.543	3.85	28.0	0.565	5.82	10.2	9.18
2.4	95.1	0.00230	0.0609	0.482	2.70	12.3	20.2	0.0570	0.592	4.17	28.6	0.616	6.31	9.19	9.88
2.6	93.5	0.00250	0.0660	0.520	2.88	11.8	18.2	0.0617	0.639	4.48	28.6	0.666	6.78	8.34	10.5
2.8	91.7	0.00269	0.0709	0.557	3.05	11.1	16.5	0.0664	0.687	4.78	28.1	0.716	7.23	7.62	11.1
3.0	90.0	0.00288	0.0759	0.594	3.20	10.7	15.1	0.0711	0.734	5.06	27.4	0.766	7.67	6.98	11.7
3.2	87.7	0.00307	0.0809	0.630	3.34	9.98	13.8	0.0759	0.780	5.33	26.3	0.815	8.09	6.41	12.2
3.4	86.0	0.00326	0.0858	0.665	3.45	9.31	12.7	0.0805	0.827	5.59	25.4	0.864	8.49	5.92	12.6
3.6	83.9	0.00345	0.0907	0.700	3.55	8.77	11.7	0.0852	0.872	5.83	24.1	0.912	8.87	5.49	12.9
3.8	81.7	0.00364	0.0956	0.734	3.63	8.23	10.9	0.0899	0.918	6.05	22.6	0.961	9.22	5.09	13.2
4.0	79.7	0.00383	0.100	0.767	3.68	7.76	10.1	0.0946	0.962	6.26	21.3	1.01	9.55	4.75	13.3
5	71.2	0.00478	0.124	0.918	3.68	5.86	7.30	0.118	1.18	6.98	16.4	1.24	10.8	3.46	13.2
6	63.4	0.00573	0.147	1.04	3.34	4.56	5.55	0.140	1.37	7.17	12.9	1.46	11.2	2.64	11.9
7	56.1	0.00668	0.169	1.13	2.91	3.66	4.26	0.163	1.55	6.89	10.4	1.66	10.9	2.09	10.3
8	49.3	0.00762	0.190	1.18	2.45	3.01	3.31	0.184	1.69	6.34	8.60	1.84	10.2	1.70	8.61
9	43.5	0.00855	0.210	1.19	2.08	2.52	2.65	0.205	1.81	5.66	7.22	2.00	9.22	1.41	7.35
10	38.5	0.00947	0.228	1.17	1.80	2.14	2.16	0.226	1.90	4.94	6.16	2.14	8.11	1.16	6.36
12	30.9	0.0113	0.259	1.05	1.38	1.61	1.52	0.264	1.98	3.82	4.65	2.34	6.29	0.817	4.87
14	25.5	0.0131	0.282	0.891	1.10	1.26	1.13	0.300	1.95	3.06	3.64	2.42	5.05	0.606	3.85
16	21.6	0.0148	0.297	0.743	0.890	1.01	0.884	0.331	1.82	2.51	2.94	2.41	4.13	0.469	3.13
18	18.5	0.0165	0.305	0.624	0.741	0.835	0.707	0.358	1.63	2.09	2.43	2.30	3.46	0.374	2.60
20	15.9	0.0181	0.304	0.535	0.625	0.701	0.568	0.380	1.44	1.77	2.04	2.13	2.93	0.305	2.20

Tb (Z=65) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(9)

Q	---->	38.40	11.29	4.858	2.203	0.8381	0.2487	12.14	4.868	2.099	0.7165	4.973	1.860	1.363
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(9)
0.2	24.7	0.000177	0.00475	0.0391	0.232	1.55	17.8	0.00450	0.0478	0.350	3.13	0.0492	0.522	0.999
0.4	53.9	0.000363	0.00955	0.0783	0.465	3.12	40.1	0.00907	0.0957	0.699	6.28	0.0987	1.04	2.00
0.6	83.1	0.000547	0.0143	0.117	0.697	4.72	62.2	0.0136	0.144	1.05	9.45	0.148	1.57	3.00
0.8	94.1	0.000731	0.0191	0.157	0.927	6.33	66.2	0.0182	0.191	1.40	12.6	0.197	2.09	3.99
1.0	91.0	0.000914	0.0239	0.196	1.16	7.93	56.1	0.0227	0.239	1.75	15.8	0.246	2.61	4.97
1.2	88.4	0.00110	0.0286	0.234	1.38	9.44	46.7	0.0273	0.287	2.09	18.8	0.295	3.12	5.95
1.4	87.4	0.00128	0.0334	0.273	1.60	10.8	39.3	0.0318	0.334	2.43	21.7	0.345	3.63	6.90
1.6	87.7	0.00147	0.0381	0.311	1.82	11.9	33.8	0.0363	0.382	2.76	24.3	0.394	4.13	7.84
1.8	88.2	0.00165	0.0429	0.349	2.03	12.6	29.3	0.0408	0.429	3.09	26.5	0.443	4.62	8.75
2.0	88.7	0.00183	0.0477	0.387	2.24	12.9	25.8	0.0453	0.476	3.41	28.2	0.491	5.10	9.64
2.2	88.8	0.00201	0.0524	0.424	2.44	12.8	22.9	0.0498	0.522	3.73	29.2	0.540	5.58	10.5
2.4	88.4	0.00220	0.0571	0.461	2.62	12.5	20.5	0.0544	0.569	4.04	29.7	0.588	6.04	11.3
2.6	87.5	0.00238	0.0618	0.498	2.80	12.0	18.5	0.0589	0.615	4.34	29.5	0.636	6.50	12.1
2.8	86.3	0.00256	0.0665	0.533	2.96	11.3	16.7	0.0634	0.660	4.63	28.9	0.684	6.93	12.8
3.0	85.0	0.00275	0.0712	0.569	3.11	10.8	15.2	0.0679	0.706	4.90	28.0	0.731	7.36	13.4
3.2	83.3	0.00293	0.0758	0.603	3.24	10.0	14.0	0.0724	0.751	5.17	26.8	0.778	7.76	14.0
3.4	82.0	0.00311	0.0804	0.638	3.36	9.39	12.9	0.0769	0.795	5.42	25.9	0.825	8.15	14.6
3.6	80.2	0.00329	0.0851	0.671	3.46	8.84	11.9	0.0814	0.839	5.66	24.3	0.871	8.52	15.0
3.8	78.5	0.00347	0.0896	0.704	3.54	8.29	11.0	0.0859	0.883	5.88	22.9	0.917	8.86	15.4
4.0	76.8	0.00366	0.0942	0.736	3.60	7.81	10.2	0.0903	0.926	6.08	21.5	0.963	9.18	15.6
5	69.9	0.00456	0.117	0.881	3.62	5.89	7.37	0.112	1.13	6.81	16.5	1.19	10.4	15.9
6	63.0	0.00547	0.138	1.00	3.30	4.59	5.59	0.134	1.32	7.02	13.0	1.40	10.9	14.6
7	56.2	0.00637	0.159	1.09	2.90	3.68	4.24	0.155	1.49	6.78	10.5	1.59	10.7	12.9
8	49.5	0.00727	0.179	1.14	2.44	3.02	3.29	0.176	1.64	6.27	8.66	1.77	10.0	10.9
9	43.7	0.00816	0.197	1.15	2.08	2.53	2.62	0.196	1.75	5.62	7.27	1.92	9.12	9.28
10	38.8	0.00904	0.214	1.14	1.79	2.15	2.14	0.216	1.84	4.92	6.20	2.06	8.06	8.04
12	31.2	0.0108	0.244	1.04	1.38	1.61	1.52	0.253	1.93	3.81	4.67	2.25	6.25	6.18
14	25.8	0.0125	0.267	0.883	1.09	1.26	1.14	0.287	1.91	3.05	3.66	2.35	5.03	4.90
16	21.8	0.0142	0.283	0.739	0.889	1.02	0.869	0.317	1.79	2.50	2.95	2.34	4.12	3.98
18	18.7	0.0158	0.291	0.621	0.738	0.867	0.693	0.344	1.61	2.09	2.43	2.25	3.45	3.31
20	16.2	0.0173	0.292	0.531	0.624	0.703	0.569	0.366	1.43	1.77	2.05	2.09	2.93	2.79

Dy (Z=66) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(10)

Q	---->	38.99	11.47	4.947	2.245	0.8492	0.2509	12.33	4.952	2.140	0.7257	5.075	1.901	1.398
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(10)
0.2	24.2	0.000170	0.00456	0.0375	0.223	1.51	17.5	0.00431	0.0458	0.335	3.05	0.0467	0.497	0.976
0.4	52.7	0.000348	0.00917	0.0750	0.447	3.04	39.2	0.00870	0.0918	0.670	6.13	0.0937	0.994	1.95
0.6	81.4	0.000524	0.0138	0.112	0.670	4.60	61.1	0.0131	0.138	1.01	9.22	0.141	1.49	2.93
0.8	92.6	0.000701	0.0184	0.150	0.891	6.17	65.4	0.0174	0.183	1.34	12.3	0.187	1.99	3.90
1.0	89.6	0.000877	0.0229	0.187	1.11	7.72	55.7	0.0218	0.229	1.67	15.4	0.234	2.48	4.86
1.2	86.9	0.00105	0.0275	0.225	1.33	9.21	46.4	0.0262	0.275	2.00	18.4	0.281	2.97	5.81
1.4	86.0	0.00123	0.0320	0.261	1.54	10.5	39.2	0.0305	0.320	2.33	21.2	0.327	3.45	6.75
1.6	86.0	0.00141	0.0366	0.298	1.75	11.6	33.6	0.0349	0.366	2.65	23.8	0.374	3.93	7.67
1.8	86.6	0.00158	0.0412	0.335	1.95	12.3	29.2	0.0392	0.411	2.96	25.9	0.420	4.40	8.57
2.0	87.0	0.00176	0.0458	0.371	2.15	12.7	25.7	0.0435	0.456	3.27	27.6	0.467	4.86	9.44
2.2	87.1	0.00193	0.0503	0.406	2.34	12.6	22.8	0.0478	0.501	3.58	28.7	0.513	5.32	10.3
2.4	86.8	0.00211	0.0548	0.442	2.52	12.3	20.4	0.0522	0.545	3.87	29.2	0.559	5.76	11.1
2.6	86.0	0.00228	0.0593	0.477	2.70	11.9	18.4	0.0565	0.589	4.16	29.1	0.604	6.19	11.9
2.8	84.8	0.00246	0.0638	0.511	2.85	11.2	16.7	0.0609	0.633	4.44	28.6	0.650	6.61	12.6
3.0	83.7	0.00263	0.0683	0.545	3.00	10.8	15.2	0.0652	0.677	4.71	27.7	0.695	7.02	13.3
3.2	82.1	0.00281	0.0728	0.579	3.13	10.0	13.9	0.0695	0.720	4.96	26.6	0.739	7.41	13.9
3.4	80.8	0.00298	0.0772	0.611	3.25	9.36	12.8	0.0738	0.762	5.21	25.7	0.784	7.78	14.4
3.6	79.1	0.00316	0.0817	0.643	3.35	8.78	11.8	0.0781	0.805	5.44	24.2	0.828	8.14	14.9
3.8	77.4	0.00333	0.0861	0.675	3.43	8.26	11.0	0.0824	0.847	5.65	22.8	0.872	8.47	15.4
4.0	75.9	0.00351	0.0905	0.706	3.49	7.77	10.2	0.0867	0.888	5.85	21.4	0.916	8.78	15.7
5	69.4	0.00438	0.112	0.847	3.54	5.86	7.35	0.108	1.09	6.58	16.5	1.13	9.99	16.3
6	63.0	0.00525	0.133	0.963	3.25	4.57	5.57	0.129	1.27	6.83	13.0	1.33	10.5	15.4
7	56.4	0.00611	0.153	1.05	2.87	3.67	4.25	0.149	1.43	6.64	10.5	1.51	10.4	13.8
8	49.9	0.00697	0.172	1.10	2.42	3.01	3.29	0.169	1.58	6.17	8.63	1.68	9.82	11.9
9	44.2	0.00783	0.190	1.12	2.06	2.52	2.62	0.189	1.69	5.56	7.25	1.84	8.99	10.1
10	39.2	0.00868	0.206	1.11	1.79	2.14	2.14	0.208	1.78	4.88	6.18	1.97	7.99	8.78
12	31.5	0.0104	0.235	1.02	1.37	1.61	1.52	0.243	1.88	3.78	4.66	2.16	6.22	6.76
14	26.1	0.0120	0.258	0.876	1.09	1.26	1.14	0.276	1.86	3.03	3.65	2.26	4.99	5.37
16	22.0	0.0136	0.274	0.735	0.887	1.01	0.871	0.306	1.76	2.49	2.95	2.27	4.10	4.38
18	18.9	0.0151	0.283	0.619	0.736	0.835	0.696	0.331	1.59	2.08	2.43	2.19	3.43	3.64
20	16.3	0.0166	0.284	0.529	0.621	0.702	0.569	0.353	1.41	1.76	2.04	2.05	2.91	3.08

Ho (Z=67) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(11)

Q	---->	39.57	11.65	5.045	2.287	0.8604	0.2529	12.55	5.069	2.179	0.7334	5.176	1.942	1.433
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(11)
0.2	23.7	0.000163	0.00438	0.0357	0.214	1.47	17.2	0.00411	0.0432	0.322	2.99	0.0444	0.474	0.951
0.4	51.7	0.000334	0.00880	0.0716	0.429	2.97	38.5	0.00830	0.0866	0.643	6.00	0.0891	0.947	1.90
0.6	79.8	0.000504	0.0132	0.107	0.644	4.48	60.1	0.0125	0.130	0.966	9.03	0.134	1.42	2.86
0.8	91.2	0.000673	0.0176	0.143	0.857	6.01	64.7	0.0166	0.173	1.29	12.1	0.178	1.90	3.80
1.0	88.5	0.000842	0.0220	0.179	1.07	7.53	55.5	0.0208	0.216	1.61	15.1	0.223	2.36	4.74
1.2	85.6	0.00101	0.0264	0.214	1.28	8.97	46.1	0.0250	0.259	1.92	18.0	0.267	2.83	5.67
1.4	84.5	0.00118	0.0308	0.250	1.48	10.3	39.0	0.0291	0.302	2.23	20.8	0.311	3.29	6.58
1.6	84.6	0.00135	0.0352	0.285	1.68	11.3	33.4	0.0333	0.345	2.54	23.3	0.356	3.75	7.48
1.8	85.1	0.00152	0.0396	0.319	1.88	12.1	29.1	0.0374	0.388	2.85	25.5	0.400	4.20	8.36
2.0	85.5	0.00169	0.0439	0.354	2.07	12.4	25.6	0.0415	0.430	3.15	27.1	0.444	4.64	9.22
2.2	85.6	0.00186	0.0483	0.388	2.26	12.5	22.7	0.0457	0.473	3.44	28.2	0.488	5.07	10.1
2.4	85.3	0.00202	0.0527	0.422	2.43	12.2	20.3	0.0498	0.515	3.72	28.8	0.531	5.50	10.9
2.6	84.7	0.00219	0.0570	0.455	2.60	11.7	18.3	0.0539	0.556	4.00	28.7	0.575	5.91	11.6
2.8	83.5	0.00236	0.0613	0.488	2.75	11.1	16.6	0.0581	0.598	4.27	28.3	0.618	6.31	12.4
3.0	82.4	0.00253	0.0656	0.521	2.89	10.7	15.2	0.0622	0.639	4.53	27.5	0.661	6.70	13.0
3.2	80.8	0.00270	0.0699	0.553	3.02	9.95	13.9	0.0663	0.680	4.78	26.4	0.704	7.08	13.7
3.4	79.6	0.00287	0.0742	0.584	3.14	9.29	12.8	0.0705	0.720	5.01	25.5	0.746	7.44	14.3
3.6	78.0	0.00303	0.0785	0.615	3.24	8.73	11.8	0.0746	0.760	5.24	24.1	0.788	7.78	14.8
3.8	76.4	0.00320	0.0827	0.645	3.32	8.21	10.9	0.0786	0.800	5.45	22.7	0.830	8.11	15.2
4.0	74.9	0.00337	0.0869	0.675	3.38	7.74	10.2	0.0827	0.839	5.64	21.3	0.872	8.41	15.6
5	68.7	0.00420	0.108	0.811	3.46	5.84	7.33	0.103	1.03	6.37	16.4	1.07	9.60	16.6
6	62.8	0.00504	0.128	0.924	3.21	4.56	5.57	0.123	1.20	6.65	12.9	1.27	10.2	16.1
7	56.5	0.00587	0.147	1.01	2.84	3.66	4.25	0.142	1.36	6.50	10.5	1.44	10.1	14.6
8	50.3	0.00670	0.165	1.06	2.41	3.00	3.29	0.162	1.50	6.07	8.62	1.61	9.62	12.8
9	44.6	0.00752	0.183	1.09	2.05	2.51	2.63	0.180	1.61	5.51	7.24	1.76	8.86	11.0
10	39.6	0.00834	0.199	1.08	1.78	2.14	2.15	0.198	1.70	4.85	6.17	1.88	7.92	9.49
12	31.8	0.00994	0.227	1.00	1.37	1.61	1.52	0.233	1.80	3.76	4.65	2.08	6.19	7.33
14	26.3	0.0115	0.250	0.867	1.08	1.26	1.14	0.264	1.80	3.02	3.64	2.18	4.96	5.83
16	22.2	0.0131	0.265	0.730	0.883	1.01	0.873	0.293	1.71	2.48	2.94	2.20	4.08	4.76
18	19.1	0.0146	0.275	0.616	0.733	0.834	0.700	0.318	1.57	2.07	2.43	2.14	3.41	3.97
20	16.5	0.0160	0.277	0.525	0.620	0.700	0.568	0.339	1.40	1.76	2.04	2.01	2.90	3.35

Er (Z=68) 1s(2)2s(2)3s(2)4s(2)5s(2)6s(2)2p(6)3p(6)4p(6)5p(6)3d(10)4d(10)4f(12)

Q	---->	39.91	11.84	5.128	2.328	0.8657	0.2549	12.75	5.162	2.221	0.7420	5.227	1.982	1.465
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(12)
0.2	23.3	0.000159	0.00420	0.0344	0.207	1.46	16.9	0.00394	0.0412	0.309	2.92	0.0423	0.453	0.929
0.4	50.6	0.000326	0.00844	0.0688	0.413	2.93	37.8	0.00796	0.0827	0.616	5.87	0.0849	0.904	1.86
0.6	78.4	0.000492	0.0127	0.103	0.620	4.43	59.0	0.0120	0.124	0.926	8.83	0.127	1.36	2.79
0.8	89.9	0.000658	0.0169	0.138	0.825	5.94	64.1	0.0160	0.165	1.23	11.8	0.170	1.81	3.71
1.0	87.3	0.000823	0.0211	0.172	1.03	7.44	55.0	0.0200	0.206	1.54	14.7	0.212	2.26	4.63
1.2	84.5	0.000988	0.0253	0.206	1.23	8.87	46.0	0.0239	0.248	1.84	17.6	0.254	2.70	5.54
1.4	83.3	0.00115	0.0295	0.240	1.43	10.2	38.8	0.0279	0.289	2.14	20.3	0.297	3.14	6.43
1.6	83.3	0.00132	0.0337	0.274	1.62	11.2	33.3	0.0319	0.330	2.44	22.8	0.339	3.58	7.31
1.8	83.7	0.00148	0.0379	0.307	1.81	12.0	29.0	0.0359	0.371	2.73	24.9	0.381	4.01	8.18
2.0	84.1	0.00165	0.0421	0.340	2.00	12.3	25.5	0.0398	0.411	3.02	26.6	0.423	4.43	9.02
2.2	84.3	0.00181	0.0463	0.373	2.17	12.4	22.7	0.0438	0.452	3.30	27.7	0.465	4.85	9.84
2.4	84.0	0.00198	0.0505	0.406	2.34	12.1	20.3	0.0477	0.492	3.57	28.3	0.506	5.25	10.6
2.6	83.3	0.00214	0.0547	0.438	2.51	11.7	18.3	0.0517	0.532	3.84	28.4	0.548	5.65	11.4
2.8	82.2	0.00231	0.0588	0.470	2.66	11.0	16.6	0.0557	0.571	4.10	27.9	0.589	6.04	12.1
3.0	81.2	0.00247	0.0630	0.501	2.80	10.7	15.1	0.0597	0.611	4.35	27.2	0.630	6.41	12.8
3.2	79.7	0.00264	0.0671	0.532	2.92	9.93	13.9	0.0636	0.650	4.59	26.1	0.670	6.77	13.5
3.4	78.5	0.00280	0.0712	0.562	3.04	9.27	12.8	0.0676	0.688	4.82	25.3	0.711	7.12	14.1
3.6	76.9	0.00296	0.0753	0.592	3.14	8.71	11.8	0.0715	0.727	5.03	24.0	0.751	7.45	14.6
3.8	75.4	0.00313	0.0793	0.621	3.22	8.20	10.9	0.0754	0.765	5.24	22.6	0.791	7.77	15.1
4.0	73.9	0.00329	0.0834	0.650	3.29	7.71	10.2	0.0793	0.802	5.43	21.3	0.831	8.06	15.6
5	68.1	0.00411	0.103	0.782	3.38	5.83	7.33	0.0988	0.983	6.16	16.3	1.02	9.24	16.8
6	62.5	0.00493	0.123	0.892	3.16	4.55	5.56	0.118	1.15	6.46	12.9	1.21	9.85	16.6
7	56.6	0.00574	0.141	0.977	2.82	3.65	4.25	0.137	1.30	6.36	10.4	1.38	9.87	15.3
8	50.7	0.00655	0.159	1.03	2.40	3.00	3.29	0.155	1.44	5.97	8.59	1.54	9.43	13.7
9	45.0	0.00735	0.176	1.06	2.04	2.51	2.64	0.173	1.55	5.45	7.21	1.68	8.73	11.8
10	40.0	0.00815	0.191	1.06	1.77	2.14	2.16	0.190	1.64	4.82	6.16	1.80	7.85	10.2
12	32.1	0.00972	0.219	0.987	1.36	1.60	1.51	0.224	1.74	3.74	4.64	2.00	6.16	7.90
14	26.6	0.0113	0.241	0.859	1.08	1.25	1.13	0.254	1.75	3.00	3.64	2.11	4.94	6.30
16	22.5	0.0128	0.257	0.726	0.881	1.01	0.876	0.282	1.68	2.47	2.94	2.13	4.06	5.14
18	19.3	0.0142	0.266	0.613	0.731	0.832	0.704	0.306	1.54	2.06	2.42	2.09	3.40	4.28
20	16.7	0.0157	0.269	0.523	0.619	0.699	0.568	0.327	1.38	1.75	2.04	1.97	2.89	3.62

Tm (Z=69) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(13)

Q	---->	40.78	12.03	5.218	2.369	0.8820	0.2568	12.96	5.259	2.259	0.7496	5.379	2.022	1.498
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(13)
0.2	22.8	0.000150	0.00403	0.0330	0.199	1.41	16.6	0.00378	0.0394	0.297	2.87	0.0403	0.433	0.904
0.4	49.6	0.000307	0.00810	0.0660	0.398	2.83	37.1	0.00762	0.0790	0.593	5.76	0.0808	0.864	1.81
0.6	76.9	0.000464	0.0122	0.0989	0.598	4.27	58.1	0.0115	0.118	0.891	8.66	0.121	1.30	2.71
0.8	88.6	0.000620	0.0162	0.132	0.795	5.73	63.5	0.0153	0.158	1.19	11.6	0.162	1.73	3.61
1.0	86.1	0.000776	0.0203	0.165	0.991	7.17	54.7	0.0191	0.197	1.48	14.4	0.202	2.16	4.51
1.2	83.1	0.000932	0.0243	0.198	1.19	8.55	45.7	0.0229	0.236	1.77	17.3	0.242	2.58	5.39
1.4	81.9	0.00109	0.0283	0.230	1.38	9.80	38.7	0.0267	0.276	2.06	19.9	0.282	3.01	6.26
1.6	81.8	0.00124	0.0324	0.263	1.56	10.8	33.2	0.0306	0.315	2.35	22.4	0.323	3.42	7.12
1.8	82.2	0.00140	0.0364	0.295	1.75	11.6	28.8	0.0344	0.354	2.63	24.5	0.363	3.83	7.97
2.0	82.6	0.00155	0.0404	0.327	1.92	12.0	25.4	0.0381	0.393	2.90	26.1	0.403	4.24	8.80
2.2	82.8	0.00171	0.0445	0.358	2.10	12.1	22.6	0.0419	0.431	3.17	27.3	0.443	4.64	9.60
2.4	82.5	0.00187	0.0485	0.389	2.26	11.9	20.2	0.0457	0.470	3.44	27.9	0.482	5.03	10.4
2.6	82.0	0.00202	0.0525	0.420	2.42	11.5	18.3	0.0495	0.508	3.70	28.0	0.522	5.41	11.1
2.8	80.9	0.00218	0.0565	0.451	2.57	10.9	16.6	0.0533	0.546	3.95	27.7	0.561	5.78	11.9
3.0	80.0	0.00233	0.0604	0.481	2.70	10.6	15.1	0.0571	0.583	4.19	27.0	0.600	6.14	12.6
3.2	78.5	0.00249	0.0644	0.511	2.83	9.86	13.8	0.0609	0.621	4.42	26.0	0.639	6.49	13.2
3.4	77.3	0.00264	0.0683	0.540	2.94	9.19	12.7	0.0647	0.658	4.65	25.1	0.677	6.82	13.8
3.6	75.8	0.00280	0.0723	0.568	3.04	8.64	11.8	0.0685	0.694	4.86	23.9	0.716	7.14	14.4
3.8	74.3	0.00295	0.0762	0.597	3.12	8.13	10.9	0.0722	0.731	5.06	22.5	0.754	7.45	14.9
4.0	72.8	0.00310	0.0800	0.624	3.19	7.65	10.1	0.0760	0.767	5.25	21.2	0.792	7.74	15.4
5	67.3	0.00387	0.0992	0.752	3.31	5.79	7.31	0.0946	0.940	5.97	16.3	0.976	8.90	16.9
6	62.1	0.00464	0.118	0.860	3.11	4.53	5.56	0.113	1.10	6.29	12.9	1.15	9.53	16.9
7	56.6	0.00541	0.136	0.944	2.78	3.63	4.26	0.131	1.25	6.23	10.4	1.32	9.61	15.9
8	50.9	0.00617	0.153	1.00	2.39	2.99	3.30	0.149	1.38	5.88	8.58	1.47	9.23	14.4
9	45.4	0.00693	0.169	1.03	2.03	2.50	2.64	0.166	1.49	5.39	7.21	1.61	8.59	12.6
10	40.4	0.00768	0.184	1.03	1.76	2.13	2.16	0.183	1.58	4.79	6.14	1.73	7.77	10.9
12	32.4	0.00917	0.211	0.969	1.36	1.60	1.52	0.215	1.68	3.73	4.64	1.92	6.12	8.44
14	26.8	0.0106	0.232	0.850	1.08	1.25	1.13	0.244	1.70	3.00	3.64	2.03	4.90	6.74
16	22.7	0.0121	0.248	0.721	0.877	1.01	0.879	0.271	1.64	2.46	2.93	2.07	4.04	5.50
18	19.4	0.0134	0.258	0.610	0.728	0.831	0.706	0.294	1.52	2.06	2.42	2.03	3.38	4.59
20	16.8	0.0148	0.262	0.522	0.616	0.698	0.568	0.315	1.37	1.75	2.04	1.93	2.88	3.89

Yb (Z=70) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(14)

Q	---->	41.38	12.21	5.311	2.407	0.8918	0.2585	13.16	5.353	2.298	0.7573	5.479	2.062	1.533
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	4f(14)
0.2	22.5	0.000144	0.00388	0.0316	0.192	1.38	16.4	0.00362	0.0376	0.286	2.81	0.0384	0.414	0.876
0.4	48.7	0.000295	0.00779	0.0633	0.385	2.77	36.6	0.00731	0.0755	0.571	5.65	0.0771	0.827	1.75
0.6	75.6	0.000446	0.0117	0.0947	0.578	4.18	57.3	0.0110	0.113	0.857	8.49	0.116	1.24	2.63
0.8	87.4	0.000596	0.0156	0.126	0.769	5.61	63.0	0.0147	0.151	1.14	11.3	0.154	1.65	3.50
1.0	85.1	0.000745	0.0195	0.158	0.958	7.02	54.5	0.0183	0.188	1.43	14.2	0.193	2.06	4.37
1.2	81.9	0.000895	0.0234	0.189	1.15	8.37	45.4	0.0220	0.226	1.71	16.9	0.231	2.47	5.23
1.4	80.7	0.00105	0.0273	0.221	1.33	9.60	38.5	0.0257	0.264	1.98	19.5	0.269	2.87	6.07
1.6	80.5	0.00119	0.0311	0.252	1.51	10.6	33.1	0.0293	0.301	2.26	21.9	0.308	3.27	6.91
1.8	80.8	0.00134	0.0350	0.282	1.69	11.4	28.8	0.0330	0.339	2.53	24.0	0.346	3.67	7.73
2.0	81.2	0.00149	0.0389	0.313	1.86	11.8	25.3	0.0366	0.376	2.80	25.7	0.384	4.06	8.54
2.2	81.4	0.00164	0.0428	0.343	2.03	11.9	22.5	0.0403	0.413	3.06	26.9	0.422	4.44	9.33
2.4	81.2	0.00179	0.0466	0.373	2.19	11.8	20.2	0.0439	0.449	3.31	27.5	0.460	4.81	10.1
2.6	80.6	0.00194	0.0505	0.403	2.34	11.4	18.2	0.0476	0.486	3.56	27.7	0.498	5.18	10.8
2.8	79.7	0.00209	0.0543	0.432	2.48	10.8	16.5	0.0512	0.522	3.80	27.4	0.535	5.53	11.6
3.0	78.7	0.00224	0.0582	0.461	2.62	10.5	15.1	0.0549	0.558	4.04	26.7	0.573	5.88	12.2
3.2	77.3	0.00239	0.0620	0.490	2.74	9.82	13.8	0.0585	0.594	4.26	25.8	0.610	6.22	12.9
3.4	76.0	0.00254	0.0658	0.518	2.85	9.14	12.7	0.0621	0.629	4.48	24.9	0.647	6.54	13.5
3.6	74.7	0.00269	0.0695	0.545	2.95	8.58	11.7	0.0657	0.665	4.69	23.8	0.683	6.85	14.1
3.8	73.2	0.00283	0.0733	0.573	3.03	8.09	10.9	0.0694	0.699	4.88	22.4	0.720	7.15	14.6
4.0	71.8	0.00298	0.0770	0.599	3.10	7.63	10.1	0.0730	0.734	5.07	21.1	0.756	7.43	15.1
5	66.4	0.00372	0.0955	0.723	3.24	5.78	7.30	0.0909	0.901	5.78	16.2	0.932	8.57	16.8
6	61.6	0.00446	0.113	0.828	3.07	4.51	5.55	0.109	1.06	6.12	12.8	1.10	9.22	17.1
7	56.4	0.00520	0.131	0.910	2.75	3.63	4.26	0.126	1.20	6.10	10.4	1.26	9.35	16.4
8	51.0	0.00593	0.147	0.968	2.37	2.98	3.31	0.143	1.32	5.78	8.55	1.41	9.04	15.0
9	45.7	0.00666	0.163	0.999	2.02	2.49	2.65	0.159	1.43	5.33	7.18	1.54	8.45	13.3
10	40.7	0.00739	0.177	1.00	1.75	2.12	2.16	0.176	1.52	4.75	6.13	1.66	7.69	11.6
12	32.7	0.00881	0.204	0.952	1.35	1.60	1.52	0.206	1.63	3.71	4.63	1.84	6.09	8.97
14	27.0	0.0102	0.225	0.841	1.07	1.25	1.13	0.235	1.66	2.98	3.63	1.96	4.89	7.18
16	22.9	0.0116	0.241	0.716	0.875	1.01	0.883	0.261	1.61	2.45	2.93	2.00	4.02	5.87
18	19.6	0.0129	0.251	0.608	0.727	0.829	0.707	0.284	1.49	2.05	2.42	1.98	3.37	4.91
20	17.0	0.0142	0.255	0.519	0.615	0.696	0.568	0.304	1.35	1.74	2.03	1.89	2.86	4.16

Lu (Z=71) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(1) 4f(14)

Q	---->	41.99	12.42	5.399	2.467	0.9367	0.2770	13.38	5.447	2.350	0.8014	5.594	2.111	0.4444	1.624
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(1)	4f(14)
0.2	23.9	1.38(-4)	0.00371	0.0304	0.183	1.26	14.1	0.00347	0.0360	0.272	2.52	0.0364	0.392	4.24	0.771
0.4	51.2	2.84(-4)	0.00746	0.0608	0.365	2.52	31.1	0.00700	0.0723	0.543	5.07	0.0731	0.784	9.01	1.54
0.6	80.1	4.28(-4)	0.0112	0.0911	0.548	3.81	49.2	0.0105	0.108	0.815	7.61	0.110	1.18	14.3	2.31
0.8	98.3	5.72(-4)	0.0149	0.121	0.729	5.09	57.4	0.0140	0.144	1.09	10.2	0.146	1.57	18.8	3.08
1.0	100	7.16(-4)	0.0187	0.152	0.909	6.37	52.5	0.0176	0.180	1.36	12.7	0.183	1.96	20.3	3.84
1.2	95.3	8.60(-4)	0.0224	0.182	1.09	7.60	43.4	0.0211	0.217	1.62	15.1	0.219	2.34	18.9	4.60
1.4	91.9	0.00100	0.0261	0.212	1.26	8.74	37.0	0.0246	0.253	1.89	17.5	0.256	2.73	16.6	5.35
1.6	89.6	0.00115	0.0298	0.242	1.43	9.73	32.0	0.0281	0.288	2.15	19.7	0.292	3.10	14.6	6.09
1.8	88.2	0.00129	0.0335	0.272	1.60	10.5	27.9	0.0316	0.324	2.41	21.7	0.328	3.48	12.9	6.81
2.0	87.3	0.00144	0.0372	0.301	1.77	11.0	24.7	0.0351	0.360	2.66	23.3	0.365	3.85	11.5	7.53
2.2	86.4	0.00158	0.0409	0.330	1.93	11.2	22.0	0.0385	0.395	2.91	24.5	0.401	4.21	10.3	8.23
2.4	85.5	0.00172	0.0446	0.359	2.08	11.2	19.7	0.0420	0.430	3.15	25.3	0.437	4.57	9.28	8.91
2.6	84.3	0.00187	0.0483	0.388	2.23	10.9	17.8	0.0455	0.465	3.39	25.7	0.472	4.91	8.42	9.57
2.8	83.0	0.00201	0.0520	0.416	2.36	10.5	16.2	0.0490	0.500	3.62	25.7	0.508	5.25	7.67	10.2
3.0	81.4	0.00215	0.0556	0.444	2.49	10.0	14.8	0.0525	0.535	3.85	25.3	0.543	5.58	7.02	10.8
3.2	80.0	0.00230	0.0593	0.471	2.61	9.62	13.5	0.0560	0.569	4.06	24.6	0.579	5.91	6.46	11.4
3.4	78.2	0.00244	0.0629	0.498	2.72	8.99	12.5	0.0595	0.603	4.27	23.8	0.614	6.22	5.96	12.0
3.6	76.7	0.00258	0.0665	0.525	2.82	8.39	11.5	0.0629	0.637	4.47	23.0	0.648	6.51	5.52	12.5
3.8	75.0	0.00272	0.0701	0.551	2.90	7.91	10.7	0.0664	0.670	4.66	21.9	0.683	6.80	5.13	13.0
4.0	73.4	0.00287	0.0737	0.577	2.97	7.47	9.94	0.0698	0.703	4.84	20.7	0.717	7.07	4.77	13.5
5	66.9	0.00358	0.0914	0.696	3.13	5.68	7.20	0.0870	0.863	5.55	15.9	0.885	8.19	3.48	15.2
6	61.8	0.00429	0.109	0.799	2.99	4.45	5.48	0.104	1.01	5.91	12.7	1.05	8.86	2.65	15.8
7	56.7	0.00500	0.125	0.880	2.70	3.58	4.30	0.120	1.15	5.92	10.2	1.20	9.04	2.10	15.4
8	51.4	0.00570	0.141	0.938	2.35	2.95	3.34	0.137	1.27	5.66	8.46	1.34	8.80	1.71	14.3
9	46.2	0.00640	0.156	0.971	2.01	2.47	2.67	0.153	1.38	5.24	7.11	1.47	8.28	1.41	12.9
10	41.3	0.00710	0.170	0.979	1.73	2.10	2.18	0.168	1.46	4.71	6.08	1.58	7.59	1.15	11.4
12	33.1	0.00847	0.196	0.935	1.34	1.58	1.54	0.198	1.58	3.69	4.59	1.76	6.05	0.812	8.81
14	27.3	0.00982	0.126	0.832	1.07	1.24	1.15	0.225	1.61	2.96	3.60	1.88	4.85	0.604	7.07
16	23.1	0.0111	0.232	0.712	0.870	0.998	0.886	0.250	1.57	2.43	2.90	1.93	4.00	0.470	5.81
18	19.8	0.0124	0.243	0.605	0.723	0.824	0.707	0.273	1.47	2.04	2.40	1.92	3.35	0.372	4.84
20	17.2	0.0137	0.248	0.517	0.612	0.692	0.582	0.292	1.34	1.73	2.02	1.85	2.85	0.303	4.11

H f (Z=72) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(2) 4f(14)

Q	---->	42.61	12.65	5.489	2.518	0.9746	0.2889	13.58	5.540	2.403	0.8409	5.697	2.169	0.4900	1.712
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(2)	4f(14)
0.2	22.3	1.33(-4)	0.00353	0.0292	0.175	1.16	12.9	0.00333	0.0345	0.258	2.30	0.0348	0.368	4.36	0.685
0.4	47.3	2.73(-4)	0.00711	0.0584	0.349	2.34	28.2	0.00673	0.0693	0.516	4.62	0.0698	0.737	8.98	1.37
0.6	73.9	4.11(-4)	0.0107	0.0875	0.524	3.52	44.8	0.0101	0.104	0.775	6.94	0.105	1.11	13.9	2.06
0.8	93.0	5.50(-4)	0.0142	0.117	0.698	4.71	53.8	0.0135	0.138	1.03	9.25	0.140	1.47	18.9	2.74
1.0	99.4	6.88(-4)	0.0178	0.146	0.870	5.90	51.0	0.0169	0.173	1.29	11.5	0.174	1.84	23.1	3.42
1.2	98.1	8.26(-4)	0.0213	0.175	1.04	7.04	42.2	0.0203	0.207	1.54	13.8	0.209	2.20	25.5	4.09
1.4	96.9	9.64(-4)	0.0249	0.204	1.21	8.11	36.1	0.0236	0.242	1.79	16.0	0.244	2.56	25.7	4.75
1.6	95.2	0.00110	0.0284	0.232	1.37	9.04	31.3	0.0270	0.276	2.04	18.0	0.279	2.92	24.3	5.41
1.8	93.8	0.00124	0.0319	0.261	1.54	9.80	27.4	0.0303	0.311	2.29	19.8	0.313	3.27	22.7	6.06
2.0	91.8	0.00138	0.0355	0.289	1.69	10.3	24.2	0.0337	0.345	2.53	21.4	0.348	3.62	20.3	6.70
2.2	90.3	0.00152	0.0390	0.317	1.85	10.6	21.6	0.0370	0.379	2.77	22.6	0.382	3.96	18.5	7.32
2.4	88.9	0.00165	0.0426	0.345	1.99	10.6	19.4	0.0404	0.412	3.00	23.5	0.417	4.30	16.8	7.94
2.6	87.3	0.00179	0.0461	0.373	2.13	10.5	17.5	0.0437	0.446	3.23	24.1	0.451	4.62	15.4	8.53
2.8	85.6	0.00193	0.0496	0.400	2.27	10.2	16.0	0.0471	0.479	3.45	24.2	0.485	4.95	14.1	9.11
3.0	83.8	0.00207	0.0531	0.427	2.39	9.72	14.6	0.0505	0.513	3.66	24.0	0.519	5.26	13.0	9.67
3.2	82.2	0.00221	0.0565	0.453	2.51	9.41	13.4	0.0538	0.545	3.87	23.6	0.552	5.56	12.0	10.2
3.4	80.2	0.00234	0.0600	0.479	2.62	8.85	12.3	0.0572	0.578	4.07	22.9	0.586	5.86	11.1	10.7
3.6	78.4	0.00248	0.0635	0.505	2.71	8.29	11.4	0.0605	0.610	4.26	22.2	0.619	6.14	10.3	11.2
3.8	76.6	0.00262	0.0669	0.530	2.80	7.77	10.6	0.0638	0.643	4.45	21.4	0.652	6.41	9.61	11.7
4.0	74.8	0.00275	0.0703	0.555	2.87	7.35	9.85	0.0671	0.674	4.62	20.3	0.685	6.67	8.97	12.1
5	67.7	0.00344	0.0872	0.671	3.04	5.61	7.13	0.0836	0.828	5.32	15.9	0.846	7.77	6.60	13.8
6	62.1	0.00412	0.104	0.770	2.93	4.40	5.43	0.0999	0.973	5.70	12.6	0.999	8.45	5.07	14.6
7	56.9	0.00480	0.120	0.850	2.66	3.55	4.29	0.116	1.11	5.75	10.2	1.14	8.69	4.02	14.4
8	51.8	0.00548	0.135	0.909	2.33	2.92	3.37	0.132	1.22	5.53	8.47	1.28	8.53	3.28	13.7
9	46.7	0.00615	0.149	0.943	2.00	2.45	2.69	0.147	1.33	5.15	7.12	1.40	8.08	2.73	12.5
10	41.9	0.00682	0.163	0.955	1.73	2.09	2.20	0.162	1.41	4.66	6.06	1.52	7.46	2.31	11.2
12	33.7	0.00814	0.187	0.917	1.33	1.57	1.55	0.190	1.53	3.67	4.59	1.70	6.00	1.73	8.69
14	27.7	0.00944	0.208	0.823	1.06	1.23	1.16	0.217	1.57	2.94	3.60	1.82	4.81	1.30	6.98
16	23.4	0.0107	0.223	0.707	0.866	0.992	0.897	0.241	1.54	2.43	2.90	1.87	3.97	0.998	5.73
18	20.0	0.0120	0.234	0.602	0.721	0.818	0.716	0.263	1.45	2.03	2.40	1.87	3.33	0.797	4.79
20	17.4	0.0132	0.239	0.515	0.611	0.689	0.582	0.282	1.32	1.73	2.02	1.81	2.83	0.654	4.07

Ta (Z=73) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(3) 4f(14)

Q	---->	43.22	12.80	5.578	2.570	1.010	0.2987	13.79	5.634	2.458	0.8781	5.800	2.227	0.5329	1.798
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(3)	4f(14)
0.2	21.0	0.000127	0.00343	0.0280	0.167	1.09	12.0	0.00320	0.0331	0.245	2.12	0.0332	0.347	4.26	0.613
0.4	44.2	0.000262	0.00689	0.0562	0.334	2.19	26.2	0.00646	0.0664	0.490	4.25	0.0667	0.693	8.67	1.23
0.6	68.9	0.000396	0.0104	0.0842	0.502	3.29	41.5	0.00971	0.0996	0.736	6.38	0.100	1.04	13.3	1.84
0.8	87.7	0.000529	0.0138	0.112	0.668	4.40	51.0	0.0130	0.133	0.980	8.50	0.133	1.39	18.0	2.45
1.0	95.3	0.000662	0.0173	0.140	0.832	5.50	49.4	0.0162	0.166	1.22	10.6	0.167	1.73	22.4	3.06
1.2	95.5	0.000795	0.0207	0.168	0.995	6.57	41.4	0.0194	0.199	1.47	12.7	0.200	2.07	26.1	3.66
1.4	96.5	0.000928	0.0241	0.196	1.16	7.57	35.6	0.0227	0.232	1.70	14.7	0.233	2.41	28.4	4.26
1.6	96.6	0.00106	0.0275	0.224	1.31	8.47	30.9	0.0259	0.265	1.94	16.5	0.266	2.75	29.1	4.85
1.8	95.9	0.00119	0.0310	0.251	1.47	9.21	27.1	0.0291	0.298	2.17	18.3	0.299	3.08	28.4	5.43
2.0	95.0	0.00133	0.0344	0.278	1.62	9.76	24.0	0.0324	0.331	2.40	19.8	0.332	3.41	27.0	6.00
2.2	93.1	0.00146	0.0379	0.305	1.77	10.1	21.4	0.0356	0.363	2.63	21.0	0.365	3.73	24.8	6.57
2.4	91.0	0.00159	0.0413	0.332	1.91	10.2	19.2	0.0388	0.395	2.85	22.0	0.398	4.05	22.5	7.12
2.6	89.3	0.00172	0.0447	0.358	2.05	10.1	17.4	0.0420	0.428	3.07	22.6	0.431	4.36	20.8	7.66
2.8	87.5	0.00186	0.0481	0.385	2.17	9.86	15.8	0.0452	0.460	3.28	22.9	0.463	4.66	19.2	8.18
3.0	85.5	0.00199	0.0515	0.411	2.30	9.48	14.5	0.0484	0.491	3.49	22.8	0.496	4.96	17.8	8.69
3.2	83.7	0.00212	0.0548	0.436	2.41	9.13	13.3	0.0517	0.523	3.69	22.6	0.528	5.25	16.6	9.19
3.4	81.7	0.00225	0.0582	0.461	2.51	8.72	12.2	0.0549	0.554	3.88	22.1	0.560	5.53	15.4	9.66
3.6	79.7	0.00239	0.0616	0.486	2.61	8.18	11.3	0.0581	0.585	4.06	21.4	0.592	5.80	14.4	10.1
3.8	77.8	0.00252	0.0649	0.510	2.69	7.67	10.5	0.0613	0.616	4.24	20.8	0.623	6.06	13.4	10.5
4.0	75.9	0.00265	0.0682	0.534	2.76	7.23	9.80	0.0645	0.647	4.41	19.9	0.655	6.31	12.6	11.0
5	68.6	0.00331	0.0846	0.646	2.95	5.55	7.10	0.0803	0.795	5.09	16.2	0.809	7.37	9.34	12.6
6	62.5	0.00396	0.101	0.744	2.87	4.37	5.41	0.0959	0.934	5.48	12.9	0.956	8.06	7.23	13.5
7	57.2	0.00462	0.116	0.822	2.62	3.52	4.27	0.111	1.06	5.57	10.4	1.10	8.34	5.76	13.6
8	52.1	0.00527	0.131	0.881	2.32	2.90	3.40	0.126	1.18	5.39	8.61	1.23	8.25	4.71	13.0
9	47.1	0.00592	0.145	0.917	1.99	2.43	2.71	0.141	1.28	5.05	7.24	1.35	7.87	3.93	12.1
10	42.4	0.00656	0.158	0.931	1.71	2.07	2.22	0.156	1.36	4.60	6.17	1.45	7.32	3.34	10.9
12	34.2	0.00784	0.182	0.900	1.33	1.56	1.56	0.183	1.48	3.65	4.65	1.63	5.94	2.50	8.58
14	28.1	0.00909	0.202	0.813	1.06	1.22	1.16	0.209	1.52	2.92	3.64	1.75	4.78	1.95	6.87
16	23.7	0.0103	0.218	0.702	0.863	0.987	0.898	0.232	1.50	2.41	2.95	1.81	3.94	1.55	5.67
18	20.3	0.0115	0.228	0.599	0.718	0.814	0.717	0.254	1.42	2.02	2.43	1.82	3.31	1.23	4.75
20	17.6	0.0127	0.234	0.513	0.608	0.685	0.587	0.272	1.30	1.72	2.04	1.77	2.82	1.01	4.03

W (Z=74) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(4) 4f(14)

Q	---->	43.84	12.98	5.665	2.623	1.045	0.3070	14.00	5.728	2.512	0.9141	5.902	2.287	0.5927	1.880
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(4)	4f(14)
0.2	19.5	0.000122	0.00330	0.0270	0.160	1.02	11.3	0.00307	0.0317	0.233	1.96	0.0317	0.326	3.86	0.554
0.4	41.1	0.000252	0.00665	0.0541	0.320	2.05	24.6	0.00620	0.0637	0.466	3.93	0.0638	0.652	7.79	1.11
0.6	64.0	0.000380	0.00998	0.0811	0.480	3.08	39.1	0.00932	0.0955	0.700	5.90	0.0957	0.978	11.8	1.66
0.8	82.0	0.000509	0.0133	0.108	0.639	4.12	48.7	0.0124	0.127	0.933	7.86	0.128	1.30	15.9	2.21
1.0	89.5	0.000637	0.0166	0.135	0.797	5.14	47.8	0.0156	0.159	1.16	9.80	0.159	1.63	19.9	2.76
1.2	91.6	0.000764	0.0200	0.162	0.953	6.14	42.0	0.0187	0.191	1.39	11.7	0.191	1.95	23.6	3.31
1.4	92.8	0.000892	0.0233	0.189	1.11	7.09	36.0	0.0218	0.223	1.62	13.6	0.223	2.27	26.7	3.85
1.6	93.9	0.00102	0.0265	0.215	1.26	7.94	31.0	0.0249	0.254	1.85	15.3	0.255	2.58	28.9	4.38
1.8	95.0	0.00115	0.0299	0.242	1.41	8.67	27.4	0.0280	0.286	2.07	16.9	0.286	2.90	29.8	4.91
2.0	95.0	0.00128	0.0332	0.268	1.55	9.22	24.3	0.0311	0.317	2.29	18.4	0.318	3.21	29.7	5.43
2.2	94.2	0.00140	0.0365	0.294	1.69	9.58	21.5	0.0342	0.348	2.51	19.6	0.349	3.51	28.7	5.94
2.4	93.0	0.00153	0.0398	0.320	1.83	9.74	19.3	0.0372	0.379	2.72	20.6	0.381	3.81	27.4	6.44
2.6	91.2	0.00166	0.0431	0.345	1.96	9.72	17.5	0.0403	0.410	2.92	21.2	0.412	4.10	25.6	6.94
2.8	90.1	0.00179	0.0464	0.371	2.08	9.54	16.0	0.0434	0.441	3.13	21.6	0.443	4.39	24.6	7.42
3.0	88.0	0.00191	0.0496	0.396	2.20	9.25	14.6	0.0465	0.472	3.32	21.7	0.474	4.67	22.8	7.88
3.2	85.7	0.00204	0.0529	0.420	2.31	8.87	13.3	0.0496	0.502	3.52	21.6	0.505	4.95	21.3	8.34
3.4	83.7	0.00217	0.0561	0.445	2.41	8.57	12.3	0.0527	0.532	3.70	21.2	0.536	5.21	19.9	8.77
3.6	81.6	0.00229	0.0594	0.469	2.51	8.08	11.5	0.0558	0.562	3.88	20.7	0.566	5.47	18.6	9.19
3.8	79.5	0.00242	0.0626	0.492	2.59	7.59	10.6	0.0589	0.592	4.05	20.1	0.596	5.72	17.4	9.59
4.0	77.4	0.00255	0.0658	0.515	2.66	7.13	9.82	0.0619	0.621	4.21	19.4	0.627	5.96	16.3	9.98
5	69.4	0.00318	0.0816	0.624	2.86	5.49	7.13	0.0771	0.763	4.88	15.9	0.774	6.98	12.2	11.6
6	62.9	0.00381	0.0970	0.719	2.81	4.32	5.48	0.0921	0.898	5.28	12.7	0.915	7.68	9.46	12.5
7	57.4	0.00444	0.112	0.796	2.58	3.49	4.26	0.107	1.02	5.40	10.3	1.05	8.00	7.57	12.7
8	52.3	0.00507	0.126	0.854	2.29	2.88	3.42	0.121	1.13	5.26	8.51	1.18	7.97	6.20	12.4
9	47.4	0.00570	0.140	0.891	1.97	2.42	2.79	0.136	1.23	4.95	7.15	1.29	7.66	5.17	11.6
10	42.8	0.00632	0.153	0.907	1.70	2.06	2.26	0.150	1.31	4.54	6.11	1.40	7.17	4.39	10.7
12	34.6	0.00754	0.176	0.883	1.32	1.55	1.58	0.176	1.43	3.63	4.62	1.57	5.89	3.30	8.48
14	28.5	0.00875	0.196	0.803	1.05	1.22	1.17	0.201	1.48	2.91	3.62	1.69	4.75	2.57	6.79
16	24.0	0.00993	0.211	0.696	0.859	0.982	0.911	0.224	1.47	2.39	2.92	1.76	3.91	2.07	5.61
18	20.6	0.0111	0.222	0.596	0.716	0.810	0.752	0.244	1.40	2.01	2.42	1.77	3.28	1.70	4.69
20	17.9	0.0122	0.228	0.511	0.605	0.681	0.607	0.263	1.29	1.71	2.03	1.73	2.80	1.41	4.00

Re (Z=75) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(5) 4f(14)

Q	---->	44.46	13.17	5.760	2.675	1.079	0.3146	14.21	5.822	2.568	0.9492	6.005	2.350	0.6339	1.961
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(5)	4f(14)
0.2	18.5	1.18(-4)	0.00318	0.0259	0.153	0.959	10.8	0.00295	0.0305	0.222	1.82	0.0304	0.306	3.69	0.503
0.4	38.8	2.42(-4)	0.00640	0.0520	0.306	1.93	23.3	0.00596	0.0611	0.443	3.65	0.0610	0.612	7.42	1.01
0.6	60.4	3.66(-4)	0.00961	0.0779	0.460	2.90	37.0	0.00896	0.0917	0.665	5.48	0.0915	0.918	11.2	1.51
0.8	77.9	4.89(-4)	0.0128	0.104	0.612	3.87	46.7	0.0120	0.122	0.887	7.30	0.122	1.22	15.0	2.01
1.0	85.6	6.13(-4)	0.0160	0.130	0.763	4.83	46.5	0.0150	0.153	1.11	9.10	0.152	1.53	18.8	2.51
1.2	89.1	7.36(-4)	0.0192	0.156	0.913	5.77	42.3	0.0179	0.183	1.33	10.9	0.183	1.83	22.4	3.00
1.4	89.9	8.59(-4)	0.0224	0.181	1.06	6.67	36.2	0.0210	0.214	1.54	12.6	0.213	2.13	25.7	3.49
1.6	91.5	9.82(-4)	0.0256	0.207	1.21	7.48	31.3	0.0239	0.244	1.76	14.2	0.244	2.43	28.3	3.98
1.8	92.8	0.00110	0.0288	0.232	1.35	8.18	27.4	0.0269	0.274	1.97	15.8	0.274	2.72	30.2	4.46
2.0	93.8	0.00123	0.0320	0.257	1.49	8.74	24.3	0.0300	0.304	2.18	17.1	0.304	3.01	31.1	4.94
2.2	93.9	0.00135	0.0351	0.283	1.62	9.13	21.7	0.0328	0.334	2.38	18.3	0.334	3.30	31.1	5.40
2.4	93.4	0.00147	0.0383	0.307	1.76	9.33	19.4	0.0358	0.364	2.59	19.3	0.364	3.58	30.4	5.86
2.6	92.3	0.00160	0.0415	0.332	1.88	9.36	17.6	0.0388	0.394	2.78	20.0	0.394	3.86	29.4	6.31
2.8	90.6	0.00172	0.0446	0.356	2.00	9.24	16.0	0.0417	0.423	2.98	20.5	0.424	4.13	27.7	6.75
3.0	89.3	0.00184	0.0478	0.380	2.12	9.00	14.6	0.0447	0.453	3.17	20.7	0.454	4.40	26.8	7.18
3.2	86.9	0.00196	0.0509	0.404	2.22	8.66	13.4	0.0477	0.482	3.35	20.7	0.483	4.66	24.9	7.60
3.4	84.7	0.00209	0.0541	0.427	2.32	8.39	12.4	0.0507	0.511	3.53	20.4	0.513	4.91	23.2	8.00
3.6	82.5	0.00221	0.0572	0.450	2.41	7.97	11.4	0.0536	0.540	3.70	20.0	0.542	5.15	21.8	8.39
3.8	80.3	0.00233	0.0603	0.473	2.50	7.51	10.6	0.0566	0.568	3.86	19.5	0.571	5.39	20.5	8.76
4.0	78.3	0.00245	0.0634	0.496	2.57	7.07	9.85	0.0595	0.596	4.02	18.9	0.600	5.62	18.8	9.12
5	69.8	0.00306	0.0786	0.601	2.78	5.42	7.16	0.0741	0.734	4.67	15.7	0.741	6.60	14.6	10.6
6	62.9	0.00367	0.0935	0.693	2.74	4.29	5.44	0.0886	0.863	5.08	12.5	0.877	7.30	11.4	11.6
7	57.4	0.00428	0.108	0.769	2.54	3.47	4.30	0.103	0.983	5.22	10.2	1.01	7.65	9.15	12.0
8	52.4	0.00488	0.122	0.827	2.27	2.86	3.46	0.117	1.09	5.12	8.43	1.13	7.68	7.51	11.8
9	47.5	0.00548	0.135	0.865	1.96	2.40	2.76	0.131	1.19	4.85	7.09	1.24	7.43	6.29	11.2
10	43.0	0.00608	0.147	0.883	1.70	2.05	2.26	0.144	1.27	4.48	6.06	1.34	7.01	5.34	10.4
12	35.0	0.00726	0.170	0.865	1.31	1.55	1.61	0.170	1.39	3.60	4.58	1.51	5.82	4.01	8.36
14	28.8	0.00842	0.189	0.792	1.05	1.21	1.19	0.194	1.44	2.89	3.59	1.63	4.72	3.14	6.72
16	24.2	0.00956	0.204	0.691	0.857	0.978	0.911	0.216	1.43	2.38	2.90	1.70	3.89	2.53	5.55
18	20.8	0.0107	0.215	0.592	0.713	0.807	0.736	0.236	1.37	2.00	2.40	1.72	3.27	2.09	4.64
20	18.0	0.0118	0.222	0.509	0.603	0.679	0.596	0.254	1.27	1.70	2.02	1.68	2.79	1.75	3.96

Os (Z=76) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(6) 4f(14)

Q	---->	45.02	13.35	5.846	2.726	1.113	0.3225	14.42	5.923	2.622	0.9836	6.107	2.406	0.6621	2.041
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(6)	4f(14)
0.2	17.7	0.000114	0.00307	0.0250	0.147	0.904	10.2	0.00284	0.0292	0.211	1.70	0.0291	0.290	3.63	0.458
0.4	36.9	0.000234	0.00618	0.0501	0.294	1.82	22.0	0.00573	0.0585	0.423	3.41	0.0584	0.580	7.30	0.916
0.6	57.4	0.000354	0.00927	0.0751	0.441	2.73	34.9	0.00862	0.0878	0.634	5.11	0.0877	0.869	11.0	1.37
0.8	74.5	0.000473	0.0124	0.100	0.588	3.64	44.5	0.0115	0.117	0.845	6.80	0.117	1.16	14.7	1.83
1.0	82.7	0.000592	0.0155	0.125	0.733	4.55	45.3	0.0144	0.146	1.06	8.48	0.146	1.45	18.4	2.29
1.2	86.5	0.000711	0.0185	0.150	0.876	5.43	41.8	0.0173	0.175	1.26	10.1	0.175	1.73	22.0	2.74
1.4	87.1	0.000830	0.0216	0.175	1.02	6.28	35.5	0.0201	0.204	1.47	11.7	0.204	2.02	25.3	3.19
1.6	88.9	0.000949	0.0247	0.200	1.16	7.06	30.9	0.0230	0.234	1.68	13.3	0.233	2.30	28.2	3.63
1.8	90.6	0.00107	0.0278	0.224	1.30	7.74	27.1	0.0259	0.263	1.88	14.7	0.262	2.58	30.5	4.07
2.0	92.1	0.00119	0.0308	0.248	1.43	8.29	24.0	0.0287	0.291	2.08	16.0	0.291	2.85	32.0	4.51
2.2	92.9	0.00131	0.0339	0.273	1.56	8.69	21.4	0.0316	0.320	2.27	17.2	0.320	3.13	32.7	4.93
2.4	93.0	0.00142	0.0370	0.297	1.69	8.93	19.3	0.0344	0.349	2.47	18.1	0.349	3.39	32.7	5.35
2.6	92.5	0.00154	0.0400	0.320	1.81	9.00	17.4	0.0373	0.377	2.66	18.9	0.378	3.66	32.1	5.77
2.8	91.3	0.00166	0.0431	0.344	1.92	8.93	15.9	0.0401	0.406	2.84	19.4	0.406	3.91	31.0	6.17
3.0	89.6	0.00178	0.0461	0.367	2.04	8.75	14.5	0.0430	0.434	3.02	19.7	0.435	4.17	29.6	6.57
3.2	88.2	0.00190	0.0492	0.390	2.14	8.46	13.3	0.0459	0.462	3.20	19.8	0.463	4.41	28.6	6.95
3.4	85.9	0.00202	0.0522	0.413	2.24	8.17	12.3	0.0487	0.489	3.37	19.6	0.491	4.66	26.8	7.32
3.6	83.5	0.00213	0.0552	0.435	2.33	7.85	11.3	0.0516	0.517	3.53	19.3	0.519	4.89	25.0	7.69
3.8	81.2	0.00225	0.0582	0.457	2.41	7.42	10.5	0.0544	0.544	3.69	18.9	0.547	5.12	23.5	8.04
4.0	79.2	0.00237	0.0612	0.479	2.48	6.99	9.80	0.0572	0.571	3.84	18.4	0.575	5.33	22.2	8.37
5	70.3	0.00296	0.0759	0.580	2.70	5.37	7.11	0.0713	0.703	4.48	15.5	0.710	6.29	16.9	9.81
6	63.1	0.00355	0.0903	0.670	2.68	4.25	5.41	0.0852	0.828	4.90	12.3	0.841	6.98	13.3	10.8
7	57.5	0.00413	0.104	0.745	2.50	3.44	4.29	0.0989	0.943	5.06	10.1	0.965	7.36	10.7	11.2
8	52.5	0.00472	0.118	0.802	2.25	2.84	3.46	0.112	1.05	4.99	8.33	1.08	7.43	8.81	11.2
9	47.7	0.00530	0.130	0.841	1.95	2.39	2.79	0.126	1.14	4.76	7.03	1.19	7.23	7.39	10.7
10	43.3	0.00588	0.143	0.861	1.69	2.04	2.29	0.138	1.22	4.41	6.01	1.29	6.86	6.29	10.1
12	35.3	0.00702	0.165	0.849	1.31	1.54	1.61	0.163	1.34	3.58	4.55	1.46	5.76	4.73	8.24
14	29.1	0.00814	0.183	0.782	1.04	1.21	1.21	0.186	1.40	2.87	3.57	1.58	4.69	3.71	6.65
16	24.5	0.00924	0.198	0.685	0.852	0.974	0.930	0.208	1.40	2.37	2.88	1.65	3.85	2.99	5.47
18	21.0	0.0103	0.209	0.589	0.711	0.804	0.730	0.227	1.34	1.99	2.39	1.67	3.25	2.46	4.60
20	18.2	0.0114	0.216	0.507	0.602	0.676	0.595	0.245	1.25	1.69	2.01	1.64	2.77	2.07	3.93

Ir (Z=77) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(7) 4f(14)

Q	---->	45.62	13.54	5.937	2.778	1.147	0.3296	14.63	6.010	2.677	1.018	6.211	2.464	0.6935	2.118
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(7)	4f(14)
0.2	16.9	0.000109	0.00296	0.0241	0.141	0.854	9.77	0.00273	0.0281	0.202	1.59	0.0278	0.274	3.52	0.420
0.4	35.1	0.000226	0.00595	0.0483	0.282	1.71	20.9	0.00551	0.0564	0.403	3.18	0.0559	0.548	7.07	0.841
0.6	54.6	0.000341	0.00894	0.0723	0.423	2.58	33.3	0.00829	0.0846	0.604	4.77	0.0839	0.821	10.6	1.26
0.8	71.2	0.000456	0.0119	0.0963	0.564	3.44	42.8	0.0111	0.113	0.806	6.36	0.112	1.10	14.2	1.68
1.0	79.7	0.000571	0.0149	0.121	0.703	4.29	44.2	0.0138	0.141	1.01	7.92	0.140	1.37	17.7	2.10
1.2	83.5	0.000686	0.0179	0.145	0.841	5.12	41.0	0.0166	0.169	1.21	9.46	0.168	1.64	21.2	2.51
1.4	84.1	0.000800	0.0208	0.168	0.977	5.92	35.0	0.0194	0.197	1.40	11.0	0.195	1.91	24.5	2.93
1.6	85.8	0.000915	0.0238	0.192	1.11	6.66	30.5	0.0221	0.225	1.60	12.4	0.223	2.18	27.4	3.33
1.8	87.7	0.00103	0.0267	0.216	1.24	7.32	26.7	0.0249	0.253	1.80	13.8	0.251	2.44	29.9	3.74
2.0	89.5	0.00114	0.0297	0.239	1.37	7.87	23.7	0.0276	0.281	1.98	15.0	0.279	2.70	31.9	4.14
2.2	90.9	0.00126	0.0327	0.263	1.50	8.28	21.2	0.0304	0.309	2.17	16.1	0.307	2.96	33.2	4.53
2.4	91.6	0.00137	0.0356	0.286	1.62	8.54	19.1	0.0331	0.336	2.35	17.1	0.334	3.21	33.8	4.92
2.6	91.6	0.00149	0.0386	0.309	1.74	8.66	17.3	0.0359	0.364	2.53	17.8	0.362	3.46	33.7	5.30
2.8	91.1	0.00160	0.0415	0.331	1.85	8.63	15.7	0.0386	0.391	2.71	18.4	0.389	3.71	33.1	5.67
3.0	89.9	0.00172	0.0445	0.354	1.96	8.50	14.4	0.0414	0.418	2.89	18.8	0.416	3.95	32.2	6.04
3.2	88.3	0.00183	0.0474	0.376	2.06	8.26	13.2	0.0441	0.445	3.05	18.9	0.443	4.18	30.9	6.40
3.4	86.8	0.00194	0.0503	0.398	2.15	7.97	12.2	0.0469	0.472	3.22	18.9	0.470	4.41	29.9	6.75
3.6	84.7	0.00206	0.0532	0.419	2.24	7.71	11.3	0.0496	0.498	3.38	18.6	0.497	4.64	28.2	7.08
3.8	82.3	0.00217	0.0561	0.440	2.32	7.32	10.5	0.0523	0.525	3.53	18.3	0.524	4.85	26.5	7.41
4.0	79.9	0.00289	0.0590	0.461	2.39	6.92	9.73	0.0551	0.551	3.68	17.8	0.550	5.06	24.9	7.72
5	70.6	0.00285	0.0732	0.560	2.62	5.33	7.07	0.0686	0.678	4.30	15.0	0.681	5.99	19.2	9.10
6	63.4	0.00342	0.0871	0.647	2.62	4.22	5.40	0.0820	0.799	4.72	12.2	0.806	6.67	15.1	10.1
7	57.5	0.00399	0.101	0.721	2.46	3.41	4.25	0.0952	0.911	4.90	9.93	0.925	7.06	12.2	10.6
8	52.5	0.00455	0.114	0.778	2.23	2.82	3.45	0.108	1.01	4.86	8.26	1.04	7.17	10.1	10.6
9	47.8	0.00511	0.126	0.817	1.94	2.38	2.79	0.121	1.10	4.66	6.96	1.14	7.03	8.45	10.3
10	43.5	0.00567	0.138	0.839	1.68	2.03	2.28	0.133	1.18	4.35	5.95	1.24	6.70	7.20	9.74
12	35.6	0.00677	0.159	0.831	1.30	1.53	1.60	0.157	1.30	3.55	4.52	1.40	5.70	5.43	8.12
14	29.4	0.00786	0.178	0.771	1.04	1.20	1.20	0.180	1.36	2.86	3.55	1.52	4.66	4.25	6.59
16	24.7	0.00892	0.192	0.679	0.850	0.970	0.931	0.201	1.36	2.36	2.87	1.60	3.83	3.43	5.41
18	21.2	0.00996	0.203	0.586	0.707	0.801	0.736	0.220	1.32	1.98	2.37	1.62	3.22	2.84	4.56
20	18.4	0.0110	0.210	0.505	0.599	0.674	0.602	0.237	1.23	1.69	2.00	1.60	2.76	2.38	3.89

Pt (Z =78) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	46.37	13.73	6.027	2.829	1.163	14.83	6.106	2.729	1.026	6.316	2.526	0.6460	2.195
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	8.04	1.05(-4)	0.00285	0.0232	0.136	0.831	0.00263	0.0270	0.193	1.56	0.0267	0.259	4.59	0.387
0.4	16.1	2.16(-4)	0.00574	0.0465	0.271	1.67	0.00532	0.0542	0.385	3.14	0.0535	0.517	9.21	0.774
0.6	24.2	3.26(-4)	0.00862	0.0697	0.407	2.51	0.00799	0.0813	0.578	4.70	0.0804	0.775	13.8	1.16
0.8	32.3	4.36(-4)	0.0115	0.0928	0.542	3.34	0.0107	0.108	0.771	6.26	0.107	1.03	18.5	1.55
1.0	40.3	5.46(-4)	0.0144	0.116	0.675	4.18	0.0133	0.135	0.962	7.80	0.134	1.29	23.1	1.93
1.2	48.2	6.56(-4)	0.0172	0.139	0.808	4.99	0.0160	0.162	1.15	9.32	0.161	1.55	27.6	2.31
1.4	55.8	7.65(-4)	0.0201	0.162	0.939	5.77	0.0187	0.189	1.34	10.8	0.187	1.80	31.9	2.69
1.6	62.9	8.75(-4)	0.0229	0.185	1.07	6.49	0.0213	0.216	1.53	12.2	0.214	2.05	35.8	3.07
1.8	69.3	9.84(-4)	0.0258	0.208	1.20	7.14	0.0240	0.243	1.71	13.6	0.241	2.30	39.2	3.44
2.0	74.9	0.00109	0.0287	0.231	1.32	7.68	0.0267	0.270	1.90	14.8	0.267	2.55	42.0	3.81
2.2	79.4	0.00120	0.0315	0.253	1.44	8.09	0.0293	0.296	2.08	15.9	0.294	2.79	44.0	4.17
2.4	82.7	0.00131	0.0344	0.275	1.56	8.37	0.0320	0.323	2.25	16.8	0.320	3.03	45.1	4.53
2.6	84.9	0.00142	0.0372	0.298	1.67	8.50	0.0346	0.349	2.43	17.6	0.346	3.27	45.4	4.89
2.8	86.0	0.00153	0.0401	0.319	1.78	8.49	0.0372	0.376	2.60	18.2	0.373	3.50	45.0	5.23
3.0	86.2	0.00164	0.0429	0.341	1.89	8.38	0.0399	0.402	2.76	18.5	0.399	3.73	44.1	5.57
3.2	85.5	0.00175	0.0457	0.362	1.98	8.17	0.0426	0.428	2.93	18.7	0.425	3.95	42.6	5.90
3.4	84.6	0.00186	0.0485	0.384	2.08	7.88	0.0452	0.453	3.08	18.7	0.451	4.17	41.1	6.23
3.6	83.3	0.00197	0.0513	0.404	2.16	7.64	0.0478	0.479	3.24	18.5	0.476	4.38	39.4	6.54
3.8	81.2	0.00208	0.0541	0.425	2.24	7.28	0.0505	0.504	3.38	18.2	0.502	4.59	37.2	6.85
4.0	79.0	0.00219	0.0569	0.445	2.31	6.88	0.0531	0.530	3.53	17.7	0.527	4.79	35.1	7.14
5	69.9	0.00273	0.0706	0.541	2.54	5.30	0.0662	0.652	4.14	14.9	0.652	5.68	26.9	8.44
6	62.8	0.00327	0.0840	0.626	2.56	4.20	0.0791	0.769	4.55	12.1	0.773	6.35	21.3	9.39
7	57.1	0.00381	0.0970	0.698	2.42	3.41	0.0918	0.877	4.75	9.91	0.888	6.76	17.2	9.95
8	52.2	0.00435	0.110	0.754	2.20	2.82	0.104	0.976	4.74	8.24	0.996	6.91	14.2	10.1
9	47.7	0.00489	0.122	0.794	1.93	2.37	0.117	1.07	4.56	6.95	1.10	6.81	12.0	9.88
10	43.5	0.00542	0.133	0.817	1.67	2.03	0.129	1.14	4.28	5.95	1.19	6.53	10.2	9.41
12	35.9	0.00648	0.154	0.815	1.30	1.53	0.152	1.26	3.52	4.50	1.35	5.62	7.70	7.99
14	29.7	0.00752	0.172	0.760	1.03	1.20	0.174	1.32	2.85	3.54	1.47	4.62	6.04	6.52
16	25.0	0.00854	0.186	0.673	0.845	0.968	0.194	1.33	2.34	2.86	1.54	3.81	4.87	5.36
18	21.4	0.00954	0.197	0.582	0.706	0.800	0.212	1.29	1.97	2.37	1.58	3.21	4.02	4.51
20	18.6	0.0105	0.205	0.503	0.598	0.673	0.229	1.21	1.68	1.99	1.56	2.74	3.39	3.86

Au (Z=79) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(1) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	46.84	13.92	6.119	2.886	1.199	0.3111	15.04	6.206	2.787	1.070	6.417	2.588	0.7206	2.270
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(1)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	16.0	0.000102	0.00275	0.0224	0.130	0.784	9.05	0.00253	0.0259	0.184	1.44	0.0256	0.244	3.72	0.357
0.4	34.3	0.000210	0.00554	0.0448	0.259	1.57	20.4	0.00512	0.0520	0.367	2.89	0.0514	0.489	7.47	0.715
0.6	52.5	0.000317	0.00831	0.0672	0.389	2.36	31.6	0.00770	0.0780	0.550	4.33	0.0772	0.732	11.2	1.07
0.8	61.2	0.000424	0.0111	0.0894	0.518	3.15	33.4	0.0103	0.104	0.734	5.76	0.103	0.977	14.9	1.43
1.0	63.0	0.000531	0.0139	0.112	0.647	3.93	28.3	0.0129	0.130	0.916	7.18	0.129	1.22	18.6	1.79
1.2	65.0	0.000638	0.0166	0.134	0.773	4.70	23.5	0.0154	0.156	1.10	8.57	0.154	1.46	22.3	2.14
1.4	67.8	0.000744	0.0194	0.156	0.899	5.43	19.8	0.0180	0.182	1.28	9.93	0.180	1.70	25.8	2.49
1.6	71.2	0.000851	0.0221	0.179	1.02	6.12	16.9	0.0206	0.208	1.46	11.3	0.205	1.94	29.1	2.84
1.8	74.8	0.000958	0.0249	0.201	1.14	6.74	14.7	0.0231	0.233	1.63	12.5	0.231	2.18	32.0	3.18
2.0	78.3	0.00106	0.0276	0.222	1.26	7.27	12.9	0.0257	0.259	1.81	13.7	0.256	2.41	34.6	3.52
2.2	81.3	0.00117	0.0304	0.244	1.38	7.69	11.5	0.0282	0.285	1.98	14.7	0.282	2.64	36.7	3.86
2.4	83.8	0.00128	0.0332	0.265	1.49	7.99	10.3	0.0308	0.310	2.15	15.6	0.307	2.87	38.3	4.19
2.6	85.5	0.00138	0.0359	0.287	1.60	8.15	9.25	0.0333	0.335	2.31	16.4	0.333	3.09	39.2	4.52
2.8	86.5	0.00149	0.0386	0.308	1.71	8.18	8.38	0.0359	0.361	2.48	17.0	0.358	3.31	39.5	4.84
3.0	86.8	0.00160	0.0414	0.329	1.81	8.11	7.64	0.0384	0.386	2.64	17.4	0.383	3.53	39.3	5.16
3.2	86.4	0.00170	0.0441	0.349	1.90	7.94	7.00	0.0410	0.411	2.79	17.6	0.408	3.74	38.7	5.47
3.4	85.5	0.00181	0.0468	0.370	1.99	7.70	6.44	0.0435	0.435	2.94	17.7	0.433	3.95	37.6	5.77
3.6	84.3	0.00192	0.0495	0.390	2.08	7.46	5.94	0.0461	0.460	3.09	17.6	0.457	4.15	36.5	6.07
3.8	82.9	0.00202	0.0522	0.410	2.15	7.17	5.50	0.0486	0.484	3.23	17.4	0.482	4.35	35.3	6.35
4.0	80.9	0.00213	0.0549	0.429	2.23	6.80	5.12	0.0512	0.509	3.37	17.1	0.507	4.54	33.6	6.63
5	71.7	0.00266	0.0681	0.522	2.46	5.27	3.69	0.0638	0.627	3.96	14.4	0.627	5.40	26.8	7.86
6	64.2	0.00318	0.0811	0.605	2.50	4.19	2.80	0.0762	0.739	4.38	11.9	0.743	6.05	21.3	8.80
7	57.8	0.00371	0.0937	0.675	2.37	3.40	2.12	0.0885	0.843	4.59	9.77	0.853	6.48	17.2	9.38
8	52.7	0.00423	0.106	0.731	2.17	2.82	1.65	0.101	0.939	4.61	8.14	0.958	6.65	14.2	9.59
9	48.0	0.00476	0.117	0.772	1.91	2.36	1.31	0.112	1.03	4.46	6.88	1.06	6.60	11.9	9.48
10	43.8	0.00528	0.129	0.796	1.66	2.02	1.07	0.124	1.10	4.20	5.89	1.15	6.37	10.2	9.10
12	36.3	0.00630	0.149	0.798	1.29	1.53	0.762	0.146	1.22	3.49	4.47	1.30	5.54	7.75	7.85
14	30.0	0.00732	0.166	0.749	1.03	1.20	0.565	0.168	1.28	2.83	3.51	1.42	4.58	6.00	6.46
16	25.2	0.00831	0.181	0.667	0.843	0.966	0.434	0.187	1.30	2.33	2.84	1.50	3.79	4.84	5.32
18	21.6	0.00928	0.192	0.579	0.702	0.799	0.346	0.205	1.27	1.96	2.35	1.53	3.18	4.04	4.49
20	18.8	0.0102	0.199	0.500	0.595	0.674	0.285	0.221	1.20	1.67	1.98	1.53	2.73	3.36	3.83

Hg (Z=80) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	47.41	14.09	6.183	2.939	1.242	0.3500	15.25	6.294	2.845	1.116	6.521	2.650	0.7876	2.345
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	14.7	9.82(-5)	0.00266	0.0218	0.125	0.733	8.62	0.00244	0.0250	0.175	1.32	0.0245	0.231	3.13	0.331
0.4	30.6	0.000203	0.00536	0.0437	0.249	1.47	18.3	0.00493	0.0502	0.350	2.65	0.0493	0.462	6.28	0.662
0.6	47.5	0.000307	0.00805	0.0655	0.374	2.21	29.0	0.00742	0.0753	0.525	3.98	0.0740	0.692	9.43	0.992
0.8	62.6	0.000410	0.0107	0.0872	0.498	2.94	38.1	0.00990	0.100	0.700	5.29	0.0987	0.923	12.6	1.32
1.0	71.6	0.000514	0.0134	0.109	0.621	3.67	41.0	0.0124	0.125	0.874	6.60	0.123	1.15	15.7	1.65
1.2	74.6	0.000617	0.0161	0.131	0.743	4.39	38.0	0.0149	0.150	1.05	7.88	0.148	1.38	18.7	1.98
1.4	75.9	0.000720	0.0188	0.153	0.864	5.08	33.5	0.0173	0.175	1.22	9.13	0.172	1.61	21.7	2.31
1.6	77.3	0.000823	0.0214	0.174	0.983	5.72	29.3	0.0198	0.200	1.39	10.4	0.197	1.83	24.5	2.63
1.8	79.2	0.000926	0.0241	0.195	1.10	6.31	25.9	0.0223	0.225	1.56	11.5	0.222	2.06	27.1	2.95
2.0	81.1	0.00103	0.0268	0.217	1.21	6.83	23.1	0.0247	0.250	1.72	12.6	0.246	2.28	29.4	3.27
2.2	83.0	0.00113	0.0295	0.238	1.33	7.25	20.6	0.0272	0.275	1.89	13.6	0.271	2.50	31.4	3.58
2.4	84.7	0.00124	0.0321	0.259	1.44	7.55	18.6	0.0297	0.299	2.05	14.5	0.295	2.71	33.1	3.89
2.6	85.9	0.00134	0.0348	0.280	1.54	7.75	16.9	0.0321	0.324	2.21	15.2	0.319	2.93	34.2	4.19
2.8	86.7	0.00144	0.0374	0.300	1.64	7.82	15.4	0.0346	0.348	2.36	15.8	0.343	3.14	35.0	4.49
3.0	86.9	0.00154	0.0401	0.321	1.74	7.79	14.1	0.0370	0.372	2.52	16.3	0.367	3.34	35.2	4.79
3.2	86.6	0.00165	0.0427	0.341	1.83	7.67	12.9	0.0395	0.396	2.67	16.6	0.391	3.54	35.1	5.08
3.4	85.9	0.00175	0.0454	0.361	1.92	7.48	11.9	0.0420	0.420	2.81	16.7	0.415	3.74	34.6	5.36
3.6	84.8	0.00185	0.0480	0.380	2.00	7.24	11.1	0.0444	0.444	2.95	16.7	0.439	3.93	33.8	5.64
3.8	83.4	0.00196	0.0506	0.400	2.08	7.02	10.3	0.0469	0.468	3.09	16.6	0.463	4.12	32.9	5.90
4.0	81.9	0.00206	0.0532	0.419	2.15	6.69	9.57	0.0493	0.491	3.22	16.4	0.486	4.31	31.9	6.17
5	73.3	0.00257	0.0660	0.510	2.39	5.39	6.96	0.0615	0.605	3.80	14.1	0.602	5.13	26.4	7.34
6	65.2	0.00308	0.0786	0.591	2.44	4.30	5.32	0.0735	0.714	4.21	11.8	0.713	5.77	20.9	8.25
7	58.6	0.00359	0.0908	0.660	2.33	3.46	4.20	0.0853	0.815	4.44	9.65	0.820	6.20	17.0	8.84
8	53.3	0.00410	0.103	0.715	2.14	2.87	3.42	0.0970	0.909	4.47	8.03	0.921	6.40	14.1	9.11
9	48.6	0.00460	0.114	0.756	1.90	2.42	2.81	0.108	0.993	4.35	6.80	1.02	6.39	11.9	9.07
10	44.3	0.00510	0.125	0.781	1.65	2.04	2.30	0.120	1.07	4.12	5.83	1.10	6.20	10.1	8.78
12	36.7	0.00610	0.145	0.786	1.28	1.56	1.62	0.141	1.18	3.46	4.43	1.26	5.46	7.65	7.70
14	30.4	0.00708	0.162	0.741	1.03	1.21	1.21	0.162	1.25	2.81	3.49	1.37	4.55	6.00	6.39
16	25.5	0.00804	0.176	0.662	0.839	0.981	0.938	0.181	1.27	2.31	2.82	1.45	3.76	4.86	5.28
18	21.9	0.00899	0.187	0.576	0.701	0.813	0.743	0.198	1.24	1.95	2.33	1.49	3.17	4.01	4.44
20	19.0	0.00991	0.194	0.499	0.594	0.683	0.607	0.214	1.18	1.66	1.97	1.49	2.71	3.38	3.79

T l (Z=81) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(1) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	48.08	14.30	6.301	2.995	1.288	0.3958	15.43	6.400	2.902	1.155	0.2977	6.623	2.712	0.8538	2.419
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(1)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	22.1	0.0000944	0.00256	0.0208	0.120	0.683	6.70	0.00236	0.0239	0.167	1.23	9.96	0.0236	0.219	2.67	0.308
0.4	47.7	0.000195	0.00516	0.0417	0.239	1.37	14.0	0.00478	0.0481	0.334	2.48	22.6	0.0474	0.437	5.37	0.616
0.6	73.1	0.000295	0.00775	0.0625	0.359	2.06	22.1	0.00719	0.0721	0.501	3.71	34.6	0.0711	0.655	8.05	0.922
0.8	86.6	0.000395	0.0103	0.0832	0.478	2.74	29.6	0.00959	0.0961	0.668	4.94	35.0	0.0948	0.874	10.7	1.23
1.0	90.8	0.000494	0.0129	0.104	0.596	3.42	34.1	0.0120	0.120	0.834	6.16	29.4	0.118	1.09	13.4	1.54
1.2	90.9	0.000594	0.0155	0.125	0.713	4.08	34.0	0.0144	0.144	0.999	7.36	24.2	0.142	1.31	16.0	1.84
1.4	89.5	0.000693	0.0181	0.146	0.828	4.73	31.3	0.0168	0.168	1.16	8.53	20.3	0.166	1.52	18.5	2.14
1.6	87.5	0.000792	0.0206	0.166	0.943	5.34	27.2	0.0192	0.192	1.33	9.66	17.3	0.189	1.74	20.9	2.45
1.8	87.0	0.000891	0.0232	0.187	1.06	5.90	24.2	0.0216	0.216	1.49	10.8	15.0	0.213	1.95	23.2	2.74
2.0	87.1	0.000991	0.0258	0.207	1.17	6.39	21.7	0.0240	0.240	1.65	11.8	13.2	0.236	2.16	25.3	3.04
2.2	87.5	0.00109	0.0283	0.227	1.27	6.80	19.5	0.0264	0.263	1.80	12.7	11.7	0.260	2.37	27.2	3.33
2.4	88.0	0.00119	0.0309	0.247	1.38	7.12	17.7	0.0287	0.287	1.96	13.6	10.5	0.283	2.57	28.8	3.62
2.6	88.4	0.00129	0.0335	0.267	1.48	7.34	16.1	0.0311	0.310	2.11	14.3	9.40	0.307	2.77	30.0	3.90
2.8	88.6	0.00139	0.0360	0.287	1.58	7.45	14.7	0.0335	0.334	2.26	14.9	8.52	0.330	2.97	30.9	4.18
3.0	88.4	0.00149	0.0386	0.306	1.67	7.46	13.5	0.0359	0.357	2.41	15.4	7.76	0.353	3.17	31.5	4.46
3.2	88.0	0.00159	0.0411	0.326	1.76	7.38	12.5	0.0383	0.380	2.55	15.8	7.09	0.376	3.36	31.7	4.73
3.4	87.2	0.00168	0.0436	0.345	1.85	7.24	11.5	0.0407	0.403	2.69	16.0	6.52	0.399	3.55	31.6	4.99
3.6	86.0	0.00178	0.0462	0.364	1.93	7.03	10.7	0.0430	0.426	2.82	16.0	6.02	0.422	3.73	31.3	5.25
3.8	84.7	0.00188	0.0487	0.382	2.00	6.83	9.93	0.0454	0.448	2.96	16.0	5.57	0.445	3.91	30.6	5.50
4.0	83.1	0.00198	0.0512	0.400	2.07	6.57	9.27	0.0478	0.471	3.08	15.8	5.18	0.467	4.09	29.9	5.75
5	74.3	0.00247	0.0636	0.488	2.31	5.36	6.77	0.0596	0.581	3.64	13.9	3.72	0.578	4.88	25.2	6.86
6	66.0	0.00296	0.0757	0.566	2.38	4.26	5.18	0.0712	0.685	4.05	11.7	2.82	0.686	5.51	20.3	7.74
7	59.0	0.00345	0.0874	0.633	2.29	3.46	4.11	0.0827	0.783	4.29	9.53	2.11	0.789	5.94	16.6	8.35
8	53.5	0.00394	0.0988	0.688	2.11	2.86	3.34	0.0940	0.873	4.35	7.96	1.63	0.887	6.16	13.8	8.66
9	48.7	0.00443	0.110	0.729	1.88	2.40	2.78	0.105	0.955	4.25	6.75	1.30	0.978	6.19	11.6	8.69
10	44.4	0.00491	0.120	0.755	1.64	2.05	2.34	0.116	1.03	4.05	5.78	1.07	1.06	6.03	9.93	8.47
12	36.9	0.00587	0.139	0.764	1.27	1.55	1.66	0.137	1.14	3.43	4.39	0.747	1.21	5.38	7.53	7.54
14	30.6	0.00682	0.156	0.726	1.02	1.21	1.23	0.157	1.21	2.80	3.46	0.553	1.33	4.51	5.92	6.31
16	25.7	0.00774	0.170	0.654	0.836	0.979	0.952	0.175	1.23	2.30	2.80	0.435	1.41	3.74	4.78	5.24
18	22.0	0.00866	0.181	0.571	0.697	0.809	0.761	0.193	1.21	1.94	2.32	0.345	1.45	3.14	3.96	4.40
20	19.1	0.00955	0.189	0.496	0.591	0.679	0.621	0.208	1.16	1.66	1.96	0.286	1.45	2.69	3.33	3.77

Pb (Z=82) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(2) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	48.66	14.47	6.392	3.048	1.332	0.4353	15.63	6.496	2.957	1.202	0.3435	6.725	2.773	0.9144	2.493
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(2)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	19.4	0.0000913	0.00248	0.0201	0.115	0.640	5.52	0.00228	0.0230	0.160	1.14	8.96	0.0227	0.207	2.33	0.286
0.4	40.5	0.000189	0.00500	0.0403	0.230	1.28	11.5	0.00462	0.0463	0.320	2.29	19.1	0.0455	0.415	4.68	0.573
0.6	63.1	0.000286	0.00751	0.0604	0.345	1.93	17.9	0.00694	0.0694	0.479	3.43	30.3	0.0684	0.621	7.02	0.858
0.8	83.6	0.000382	0.0100	0.0803	0.459	2.57	24.3	0.00927	0.0925	0.639	4.56	39.5	0.0911	0.829	9.35	1.15
1.0	95.6	0.000478	0.0125	0.101	0.573	3.20	28.9	0.0116	0.116	0.798	5.68	42.0	0.114	1.04	11.7	1.43
1.2	98.6	0.000574	0.0150	0.121	0.686	3.82	30.3	0.0139	0.139	0.956	6.79	38.8	0.137	1.24	13.9	1.71
1.4	97.2	0.000671	0.0175	0.141	0.797	4.43	29.0	0.0162	0.162	1.11	7.87	34.0	0.159	1.45	16.1	2.00
1.6	94.7	0.000767	0.0200	0.160	0.907	5.00	26.1	0.0185	0.185	1.27	8.92	29.7	0.182	1.65	18.3	2.28
1.8	92.7	0.000863	0.0225	0.180	1.02	5.53	23.3	0.0209	0.208	1.42	9.93	26.1	0.205	1.85	20.3	2.55
2.0	91.5	0.000959	0.0250	0.200	1.12	6.01	20.9	0.0232	0.231	1.58	10.9	23.2	0.227	2.05	22.2	2.83
2.2	91.0	0.00106	0.0275	0.219	1.23	6.41	19.0	0.0255	0.253	1.73	11.8	20.8	0.250	2.25	23.9	3.10
2.4	90.6	0.00115	0.0300	0.239	1.33	6.74	17.2	0.0278	0.276	1.87	12.6	18.7	0.272	2.44	25.4	3.37
2.6	90.2	0.00125	0.0324	0.258	1.43	6.97	15.7	0.0301	0.299	2.02	13.3	17.0	0.295	2.63	26.7	3.64
2.8	90.0	0.00134	0.0349	0.277	1.52	7.10	14.4	0.0324	0.321	2.16	13.9	15.5	0.317	2.82	27.7	3.90
3.0	89.5	0.00144	0.0374	0.296	1.61	7.15	13.2	0.0347	0.344	2.30	14.4	14.2	0.339	3.01	28.4	4.16
3.2	88.8	0.00153	0.0399	0.315	1.70	7.11	12.2	0.0370	0.366	2.44	14.8	13.0	0.362	3.19	28.9	4.41
3.4	88.0	0.00163	0.0423	0.333	1.78	7.00	11.3	0.0393	0.388	2.58	15.0	12.0	0.384	3.37	29.0	4.66
3.6	86.8	0.00173	0.0448	0.351	1.86	6.83	10.5	0.0416	0.410	2.71	15.2	11.1	0.406	3.55	28.9	4.90
3.8	85.4	0.00182	0.0472	0.369	1.93	6.64	9.77	0.0439	0.432	2.83	15.2	10.3	0.428	3.72	28.6	5.14
4.0	83.9	0.00192	0.0496	0.387	2.00	6.43	9.09	0.0462	0.454	2.96	15.1	9.62	0.449	3.89	28.1	5.37
5	74.9	0.00239	0.0616	0.471	2.24	5.29	6.66	0.0576	0.559	3.50	13.5	6.99	0.556	4.65	23.9	6.43
6	66.7	0.00287	0.0734	0.548	2.32	4.21	5.11	0.0688	0.660	3.91	11.5	5.33	0.660	5.26	19.8	7.28
7	59.6	0.00334	0.0848	0.613	2.24	3.41	4.05	0.0799	0.755	4.15	9.41	4.22	0.759	5.69	16.2	7.89
8	54.0	0.00382	0.0959	0.667	2.08	2.83	3.30	0.0909	0.843	4.23	7.88	3.43	0.854	5.94	13.5	8.23
9	49.1	0.00429	0.107	0.708	1.87	2.38	2.74	0.102	0.923	4.16	6.67	2.81	0.943	5.99	11.4	8.31
10	44.8	0.00476	0.117	0.735	1.64	2.03	2.33	0.112	0.994	3.97	5.74	2.30	1.03	5.87	9.78	8.16
12	37.2	0.00568	0.135	0.748	1.26	1.54	1.69	0.133	1.11	3.40	4.36	1.62	1.17	5.29	7.41	7.37
14	30.9	0.00660	0.152	0.714	1.02	1.21	1.26	0.152	1.18	2.78	3.43	1.21	1.28	4.46	5.84	6.23
16	26.0	0.00750	0.166	0.647	0.832	0.973	0.975	0.170	1.20	2.29	2.78	0.929	1.36	3.72	4.72	5.20
18	22.2	0.00838	0.176	0.567	0.695	0.804	0.772	0.186	1.19	1.93	2.31	0.748	1.41	3.12	3.91	4.36
20	19.3	0.00925	0.184	0.493	0.590	0.676	0.636	0.202	1.14	1.65	1.94	0.611	1.42	2.68	3.29	3.74

Bi (Z=83) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(3) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	49.25	14.66	6.489	3.104	1.377	0.4716	15.85	6.593	3.014	1.253	0.3842	6.829	2.837	0.9724	0.2493
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(3)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	17.3	0.0000882	0.00240	0.0194	0.110	0.600	4.70	0.00220	0.0222	0.153	1.05	8.11	0.218	0.196	2.06	0.286
0.4	35.6	0.000183	0.00483	0.0388	0.220	1.20	9.71	0.00445	0.0446	0.306	2.10	16.8	0.0438	0.393	4.14	0.573
0.6	55.0	0.000276	0.00726	0.0582	0.331	1.81	15.1	0.00669	0.0669	0.458	3.15	26.3	0.0657	0.588	6.21	0.858
0.8	74.2	0.000370	0.00968	0.0774	0.441	2.40	20.5	0.00893	0.0891	0.611	4.19	35.6	0.0876	0.785	8.27	1.15
1.0	90.0	0.000463	0.0121	0.0968	0.550	3.00	24.9	0.0112	0.111	0.763	5.22	42.5	0.109	0.981	10.3	1.43
1.2	98.9	0.000556	0.0145	0.116	0.658	3.58	27.1	0.0134	0.133	0.914	6.24	44.8	0.131	1.18	12.3	1.71
1.4	101	0.000649	0.0169	0.135	0.765	4.15	26.7	0.0156	0.156	1.06	7.24	43.0	0.153	1.37	14.3	2.00
1.6	99.3	0.000742	0.0193	0.155	0.871	4.69	24.9	0.0179	0.178	1.21	8.20	38.9	0.175	1.56	16.2	2.28
1.8	98.0	0.000835	0.0217	0.174	0.975	5.19	23.2	0.0201	0.200	1.36	9.14	35.3	0.197	1.75	18.0	2.55
2.0	95.6	0.000927	0.0241	0.193	1.08	5.65	20.8	0.0223	0.222	1.51	10.0	31.4	0.218	1.94	19.7	2.83
2.2	94.3	0.00102	0.0266	0.211	1.18	6.04	18.9	0.0245	0.244	1.65	10.9	28.5	0.240	2.13	21.3	3.10
2.4	93.3	0.00111	0.0290	0.230	1.28	6.37	17.1	0.0268	0.266	1.79	11.6	26.0	0.262	2.31	22.7	3.37
2.6	92.4	0.00121	0.0314	0.249	1.37	6.61	15.7	0.0290	0.288	1.93	12.3	23.6	0.283	2.50	23.9	3.64
2.8	91.7	0.00130	0.0338	0.267	1.46	6.77	14.3	0.0312	0.309	2.07	12.9	21.7	0.305	2.68	25.0	3.90
3.0	90.8	0.00139	0.0361	0.285	1.55	6.84	13.2	0.0334	0.331	2.21	13.4	19.9	0.326	2.85	25.8	4.16
3.2	90.0	0.00148	0.0385	0.303	1.63	6.84	12.2	0.0356	0.352	2.34	13.8	18.4	0.348	3.03	26.3	4.41
3.4	88.9	0.00158	0.0409	0.321	1.72	6.76	11.3	0.0378	0.374	2.47	14.1	17.0	0.369	3.20	26.7	4.66
3.6	87.7	0.00167	0.0433	0.339	1.79	6.63	10.5	0.0401	0.395	2.59	14.3	15.8	0.390	3.37	26.8	4.90
3.8	86.4	0.00176	0.0456	0.356	1.86	6.46	9.74	0.0423	0.416	2.72	14.4	14.7	0.411	3.53	26.7	5.14
4.0	84.8	0.00185	0.0480	0.373	1.93	6.28	9.08	0.0445	0.437	2.83	14.3	13.6	0.432	3.69	26.4	5.37
5	76.2	0.00232	0.0596	0.455	2.17	5.23	6.67	0.0555	0.539	3.36	13.1	10.0	0.535	4.42	23.1	6.43
6	68.0	0.00277	0.0710	0.529	2.26	4.15	5.12	0.0663	0.637	3.76	11.3	7.70	0.635	5.02	19.4	7.28
7	60.4	0.00323	0.0820	0.593	2.20	3.38	4.05	0.0770	0.728	4.01	9.26	6.08	0.731	5.45	15.9	7.89
8	54.6	0.00369	0.0927	0.646	2.05	2.80	3.31	0.0876	0.814	4.11	7.77	4.94	0.822	5.71	13.3	8.23
9	49.8	0.00415	0.103	0.687	1.85	2.36	2.75	0.0979	0.891	4.06	6.60	4.15	0.908	5.78	11.2	8.31
10	45.4	0.00460	0.113	0.715	1.63	2.02	2.33	0.108	0.961	3.89	5.67	3.48	0.988	5.70	9.64	8.16
12	37.8	0.00550	0.131	0.731	1.26	1.53	1.73	0.128	1.07	3.36	4.32	2.54	1.13	5.19	7.32	7.37
14	31.4	0.00639	0.147	0.702	1.01	1.20	1.29	0.146	1.14	2.77	3.41	1.88	1.24	4.42	5.78	6.23
16	26.3	0.00726	0.161	0.639	0.830	0.967	0.993	0.164	1.17	2.28	2.77	1.46	1.32	3.70	4.67	5.20
18	22.5	0.00811	0.171	0.563	0.692	0.800	0.797	0.180	1.16	1.92	2.29	1.18	1.37	3.11	3.87	4.36
20	19.5	0.00895	0.179	0.491	0.587	0.673	0.646	0.195	1.12	1.64	1.93	0.952	1.38	2.65	3.26	3.74

Po (Z=84) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(4) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	49.88	14.85	6.578	3.158	1.421	0.5055	16.08	6.690	3.118	1.295	0.4096	6.910	2.878	0.9764	2.493
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(4)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	16.3	0.0000851	0.00232	0.0187	0.106	0.564	4.10	0.00211	0.0214	0.141	0.980	7.87	0.0211	0.190	2.05	0.286
0.4	33.4	0.000177	0.00467	0.0375	0.212	1.13	8.42	0.00428	0.0429	0.282	1.96	16.2	0.0424	0.380	4.11	0.573
0.6	51.1	0.000267	0.00702	0.0562	0.319	1.70	13.0	0.00643	0.0644	0.423	2.95	25.0	0.0637	0.569	6.16	0.858
0.8	69.1	0.000357	0.00936	0.0749	0.424	2.26	17.7	0.00859	0.0858	0.564	3.92	33.9	0.0850	0.759	8.20	1.15
1.0	85.4	0.000447	0.0117	0.0936	0.529	2.82	21.7	0.0107	0.107	0.705	4.88	41.8	0.106	0.948	10.2	1.43
1.2	97.3	0.000537	0.0140	0.112	0.634	3.37	24.3	0.0129	0.129	0.844	5.83	46.9	0.127	1.14	12.2	1.71
1.4	103	0.000626	0.0164	0.131	0.737	3.90	24.7	0.0150	0.150	0.983	6.77	48.2	0.148	1.32	14.2	2.00
1.6	105	0.000716	0.0187	0.150	0.838	4.41	23.7	0.0172	0.171	1.12	7.67	46.6	0.170	1.51	16.0	2.28
1.8	104	0.000806	0.0210	0.168	0.939	4.89	22.3	0.0193	0.193	1.26	8.55	43.9	0.191	1.69	17.8	2.55
2.0	101	0.000896	0.0233	0.186	1.04	5.32	19.9	0.0215	0.214	1.39	9.39	39.4	0.212	1.88	19.5	2.83
2.2	99.5	0.000985	0.0257	0.204	1.13	5.71	18.1	0.0236	0.235	1.53	10.2	35.8	0.233	2.06	21.1	3.10
2.4	98.0	0.00108	0.0280	0.223	1.23	6.03	16.6	0.0257	0.256	1.66	10.9	32.7	0.254	2.24	22.5	3.37
2.6	96.7	0.00117	0.0303	0.240	1.32	6.28	15.1	0.0279	0.277	1.79	11.6	30.0	0.275	2.41	23.8	3.64
2.8	95.6	0.00125	0.0326	0.258	1.41	6.45	13.9	0.0300	0.298	1.92	12.2	27.6	0.296	2.59	24.8	3.90
3.0	94.5	0.00134	0.0349	0.276	1.49	6.55	12.8	0.0321	0.319	2.04	12.7	25.4	0.317	2.76	25.6	4.16
3.2	93.3	0.00143	0.0372	0.293	1.58	6.57	11.8	0.0343	0.340	2.16	13.1	23.5	0.337	2.93	26.2	4.41
3.4	92.0	0.00152	0.0395	0.311	1.65	6.53	11.0	0.0364	0.360	2.28	13.4	21.8	0.358	3.09	26.5	4.66
3.6	90.6	0.00161	0.0418	0.328	1.73	6.43	10.2	0.0385	0.381	2.40	13.6	20.3	0.378	3.26	26.6	4.90
3.8	89.0	0.00170	0.0441	0.345	1.80	6.28	9.52	0.0407	0.401	2.52	13.7	18.9	0.399	3.42	26.5	5.14
4.0	87.4	0.00179	0.0464	0.361	1.86	6.12	8.90	0.0428	0.421	2.63	13.7	17.7	0.419	3.57	26.2	5.37
5	78.1	0.00224	0.0576	0.441	2.11	5.15	6.54	0.0534	0.520	3.13	12.8	13.0	0.519	4.28	23.1	6.43
6	69.4	0.00268	0.0686	0.513	2.20	4.11	5.03	0.0638	0.614	3.52	11.1	10.0	0.616	4.87	19.4	7.28
7	61.6	0.00312	0.0793	0.576	2.16	3.35	4.00	0.0741	0.703	3.77	9.17	7.96	0.709	5.30	15.9	7.89
8	55.6	0.00357	0.0897	0.628	2.02	2.78	3.26	0.0843	0.786	3.89	7.70	6.48	0.798	5.56	13.3	8.23
9	50.5	0.00401	0.997	0.669	1.83	2.34	2.71	0.0943	0.861	3.88	6.55	5.40	0.882	5.66	11.2	8.31
10	46.1	0.00445	0.109	0.697	1.62	2.00	2.30	0.104	0.929	3.75	5.63	4.58	0.960	5.60	9.64	8.16
12	38.4	0.00531	0.127	0.716	1.25	1.52	1.72	0.123	1.04	3.29	4.29	3.42	1.10	5.13	7.32	7.37
14	31.9	0.00617	0.143	0.691	1.01	1.19	1.30	0.141	1.11	2.74	3.39	2.61	1.21	4.39	5.77	6.23
16	26.8	0.00701	0.156	0.632	0.825	0.961	1.01	0.158	1.14	2.26	2.75	2.01	1.29	3.68	4.67	5.20
18	22.8	0.00784	0.167	0.559	0.690	0.795	0.800	0.174	1.14	1.90	2.28	1.60	1.34	3.10	3.87	4.36
20	19.7	0.00865	0.174	0.488	0.586	0.669	0.652	0.188	1.10	1.63	1.92	1.31	1.35	2.65	3.26	3.74

At (Z=85) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(5) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	50.49	15.21	6.670	3.213	1.465	0.5377	16.28	6.786	3.128	1.337	0.4381	7.035	2.961	1.080	2.713
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(5)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	14.9	0.0000822	0.00218	0.0181	0.102	0.531	3.63	0.00204	0.0206	0.140	0.918	7.46	0.0202	0.177	1.67	0.234
0.4	30.3	0.000171	0.00439	0.0362	0.204	1.07	7.43	0.00414	0.0414	0.280	1.84	15.2	0.0405	0.355	3.35	0.468
0.6	46.3	0.000258	0.00659	0.0543	0.307	1.60	11.5	0.00622	0.0621	0.420	2.76	23.3	0.0608	0.531	5.02	0.701
0.8	62.4	0.000345	0.00879	0.0723	0.408	2.13	15.5	0.00831	0.0828	0.560	3.67	31.5	0.0811	0.709	6.68	0.935
1.0	77.7	0.000432	0.0110	0.0905	0.509	2.65	19.2	0.0104	0.103	0.699	4.57	39.3	0.101	0.886	8.33	1.17
1.2	90.4	0.000519	0.0132	0.109	0.610	3.17	21.9	0.0125	0.124	0.838	5.46	45.6	0.122	1.06	9.95	1.40
1.4	98.7	0.000606	0.0154	0.127	0.709	3.67	22.8	0.0146	0.145	0.976	6.34	49.3	0.142	1.24	11.5	1.63
1.6	102	0.000693	0.0175	0.144	0.807	4.15	22.3	0.0166	0.165	1.11	7.19	50.0	0.162	1.41	13.1	1.86
1.8	103	0.000780	0.0197	0.162	0.903	4.61	20.9	0.0187	0.186	1.25	8.02	48.4	0.182	1.58	14.6	2.09
2.0	102	0.000866	0.0219	0.180	0.998	5.03	19.3	0.0208	0.206	1.38	8.81	45.9	0.202	1.75	16.0	2.32
2.2	99.2	0.000953	0.0241	0.198	1.09	5.40	17.5	0.0228	0.227	1.51	9.56	41.7	0.222	1.92	17.4	2.54
2.4	97.0	0.00104	0.0263	0.215	1.18	5.71	16.0	0.0249	0.247	1.65	10.3	38.0	0.242	2.09	18.6	2.76
2.6	95.5	0.00113	0.0285	0.232	1.27	5.97	14.7	0.0270	0.267	1.77	10.9	35.1	0.262	2.26	19.7	2.98
2.8	94.0	0.00121	0.0306	0.250	1.36	6.16	13.6	0.0290	0.288	1.90	11.5	32.4	0.282	2.42	20.7	3.20
3.0	92.7	0.00130	0.0328	0.267	1.44	6.27	12.5	0.0311	0.308	2.03	12.0	30.0	0.302	2.58	21.5	3.41
3.2	91.3	0.00139	0.0350	0.284	1.52	6.32	11.6	0.0332	0.328	2.15	12.4	27.8	0.322	2.74	22.2	3.62
3.4	90.0	0.00147	0.0371	0.300	1.60	6.30	10.7	0.0352	0.347	2.27	12.7	25.9	0.342	2.90	22.7	3.83
3.6	88.7	0.00156	0.0393	0.317	1.67	6.23	10.0	0.0373	0.367	2.38	13.0	24.2	0.361	3.05	23.1	4.03
3.8	87.2	0.00165	0.0414	0.333	1.74	6.11	9.33	0.0393	0.387	2.50	13.1	22.6	0.381	3.20	23.2	4.23
4.0	85.7	0.00173	0.0436	0.349	1.80	5.96	8.72	0.0414	0.406	2.61	13.2	21.2	0.400	3.35	23.3	4.42
5	77.2	0.00216	0.0541	0.426	2.04	5.02	6.44	0.0516	0.502	3.11	12.5	15.7	0.496	4.02	21.5	5.33
6	68.8	0.00259	0.0645	0.496	2.14	4.05	4.95	0.0617	0.593	3.49	10.9	12.1	0.589	4.58	18.7	6.09
7	60.9	0.00302	0.0746	0.558	2.11	3.31	3.94	0.0717	0.679	3.75	9.09	9.65	0.678	5.01	15.3	6.68
8	54.9	0.00345	0.0844	0.610	1.98	2.75	3.22	0.0816	0.759	3.87	7.62	7.89	0.763	5.29	12.9	7.07
9	49.9	0.00388	0.0939	0.650	1.81	2.33	2.68	0.0913	0.833	3.86	6.49	6.58	0.844	5.41	10.9	7.27
10	45.5	0.00430	0.103	0.679	1.61	1.99	2.27	0.101	0.899	3.74	5.58	5.58	0.920	5.38	9.39	7.27
12	38.2	0.00514	0.120	0.700	1.25	1.51	1.70	0.119	1.01	3.29	4.27	4.18	1.05	4.99	7.17	6.82
14	32.0	0.00597	0.135	0.679	1.00	1.18	1.31	0.137	1.08	2.73	3.37	3.26	1.16	4.33	5.66	5.97
16	26.9	0.00679	0.148	0.625	0.823	0.956	1.01	0.153	1.11	2.26	2.73	2.57	1.24	3.65	4.59	5.06
18	22.9	0.00759	0.158	0.555	0.687	0.791	0.806	0.168	1.11	1.90	2.27	2.05	1.29	3.08	3.80	4.28
20	19.8	0.00838	0.166	0.486	0.583	0.665	0.658	0.182	1.08	1.63	1.91	1.67	1.31	2.62	3.21	3.66

Rn (Z=86) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	51.11	15.23	6.761	3.271	1.508	0.5686	16.48	6.882	3.184	1.391	0.4676	7.139	3.025	1.132	2.785
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	13.8	0.0000794	0.00217	0.0175	0.0981	0.501	3.26	0.00198	0.0199	0.134	0.846	7.03	0.0194	0.168	1.52	0.219
0.4	28.0	0.000165	0.00437	0.0351	0.196	1.01	6.64	0.00400	0.0399	0.269	1.70	14.2	0.0390	0.337	3.04	0.439
0.6	42.5	0.000250	0.00657	0.0526	0.294	1.51	10.2	0.00602	0.0599	0.402	2.54	21.7	0.0586	0.505	4.56	0.658
0.8	57.3	0.000334	0.00876	0.0700	0.392	2.01	13.8	0.00804	0.0799	0.537	3.38	29.3	0.0781	0.673	6.07	0.878
1.0	71.5	0.000418	0.0110	0.0875	0.489	2.51	17.2	0.0101	0.0997	0.671	4.21	36.6	0.0975	0.841	7.56	1.10
1.2	84.1	0.000502	0.0131	0.105	0.586	2.99	19.8	0.0121	0.120	0.804	5.04	43.2	0.117	1.01	9.04	1.32
1.4	93.7	0.000586	0.0153	0.122	0.681	3.47	21.1	0.0141	0.140	0.936	5.84	48.1	0.136	1.18	10.5	1.53
1.6	99.6	0.000670	0.0175	0.140	0.775	3.92	21.1	0.0161	0.159	1.07	6.63	50.7	0.156	1.34	11.9	1.75
1.8	102	0.000754	0.0197	0.157	0.868	4.36	20.0	0.0181	0.179	1.20	7.40	50.9	0.175	1.50	13.3	1.96
2.0	102	0.000838	0.0218	0.174	0.959	4.76	18.9	0.0201	0.199	1.33	8.13	49.3	0.195	1.67	14.6	2.17
2.2	101	0.000922	0.0240	0.191	1.05	5.12	17.0	0.0221	0.219	1.45	8.83	47.1	0.214	1.83	15.8	2.39
2.4	98.8	0.00101	0.0262	0.208	1.14	5.43	15.6	0.0241	0.238	1.58	9.49	43.3	0.233	1.99	17.0	2.59
2.6	96.7	0.00109	0.0284	0.225	1.22	5.68	14.4	0.0261	0.258	1.70	10.1	39.9	0.253	2.15	18.0	2.80
2.8	95.1	0.00117	0.0305	0.242	1.31	5.88	13.2	0.0281	0.277	1.82	10.6	37.1	0.272	2.30	19.0	3.00
3.0	93.5	0.00126	0.0327	0.258	1.39	6.01	12.2	0.0301	0.297	1.94	11.1	34.4	0.291	2.45	19.8	3.21
3.2	92.0	0.00134	0.0349	0.274	1.46	6.07	11.3	0.0321	0.316	2.06	11.6	32.1	0.310	2.61	20.5	3.40
3.4	90.6	0.00142	0.0370	0.291	1.54	6.08	10.5	0.0341	0.335	2.18	11.9	30.0	0.329	2.75	21.1	3.60
3.6	89.2	0.00151	0.0392	0.307	1.61	6.03	9.82	0.0361	0.354	2.29	12.2	28.0	0.348	2.90	21.5	3.79
3.8	87.6	0.00159	0.0413	0.322	1.67	5.94	9.16	0.0381	0.373	2.40	12.3	26.2	0.367	3.04	21.7	3.98
4.0	86.0	0.00168	0.0434	0.338	1.74	5.81	8.58	0.0401	0.392	2.51	12.5	24.6	0.385	3.18	21.8	4.16
5	77.5	0.00209	0.0540	0.413	1.98	4.88	6.34	0.0500	0.484	2.99	12.0	18.3	0.478	3.83	20.7	5.02
6	69.1	0.00251	0.0643	0.481	2.08	4.01	4.89	0.0598	0.573	3.37	10.6	14.2	0.567	4.38	18.1	5.75
7	61.5	0.00292	0.0743	0.541	2.07	3.28	3.90	0.0694	0.656	3.63	8.99	11.3	0.654	4.80	15.1	6.33
8	55.1	0.00334	0.0841	0.592	1.95	2.73	3.18	0.0790	0.734	3.76	7.51	9.30	0.736	5.08	12.7	6.73
9	50.1	0.00375	0.0935	0.632	1.79	2.30	2.65	0.0884	0.806	3.76	6.41	7.75	0.814	5.22	10.8	6.95
10	45.7	0.00416	0.103	0.661	1.59	1.97	2.25	0.0976	0.871	3.66	5.53	6.59	0.888	5.22	9.30	7.00
12	38.4	0.00497	0.119	0.685	1.24	1.50	1.68	0.116	0.977	3.25	4.22	4.95	1.02	4.89	7.11	6.64
14	32.3	0.00578	0.134	0.668	0.998	1.18	1.31	0.133	1.05	2.71	3.34	3.86	1.12	4.27	5.61	5.88
16	27.2	0.00657	0.147	0.618	0.818	0.951	1.02	0.149	1.09	2.25	2.72	3.10	1.20	3.62	4.55	5.01
18	23.2	0.00734	0.158	0.550	0.685	0.787	0.813	0.163	1.09	1.89	2.25	2.51	1.25	3.06	3.78	4.25
20	20.1	0.00811	0.165	0.483	0.581	0.662	0.664	0.177	1.06	1.62	1.90	2.05	1.28	2.61	3.18	3.63

Fr (Z=87) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(1) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	51.59	15.41	6.856	3.327	1.554	0.6183	0.1842	16.67	6.972	3.245	1.439	0.5257	7.243	3.088	1.186	2.857
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(1)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	41.6	0.0000774	0.00210	0.0169	0.0944	0.472	2.77	29.9	0.00192	0.0192	0.128	0.789	5.62	0.0187	0.160	1.38	0.206
0.4	95.4	0.000161	0.00424	0.0339	0.189	0.948	5.63	71.8	0.00388	0.0386	0.257	1.58	11.4	0.0376	0.321	2.76	0.413
0.6	101	0.000243	0.00637	0.0508	0.283	1.42	8.60	65.7	0.00584	0.0580	0.385	2.37	17.2	0.0564	0.480	4.14	0.619
0.8	96.0	0.000325	0.00849	0.0676	0.377	1.89	11.6	48.1	0.00780	0.0772	0.513	3.15	23.2	0.0752	0.641	5.51	0.825
1.0	96.6	0.000407	0.0106	0.0845	0.471	2.36	14.5	36.7	0.0975	0.0965	0.641	3.93	29.0	0.0940	0.801	6.87	1.03
1.2	100	0.000489	0.0127	0.101	0.564	2.82	17.0	29.2	0.0117	0.116	0.768	4.69	34.4	0.113	0.960	8.21	1.24
1.4	104	0.000571	0.0148	0.118	0.655	3.27	18.5	23.9	0.0137	0.135	0.895	5.45	39.0	0.131	1.12	9.52	1.44
1.6	107	0.000653	0.0170	0.135	0.746	3.70	19.0	20.1	0.0156	0.154	1.02	6.18	42.2	0.150	1.28	10.8	1.64
1.8	108	0.000735	0.0191	0.152	0.836	4.11	18.7	17.2	0.0176	0.173	1.14	6.90	43.8	0.169	1.43	12.1	1.85
2.0	108	0.000817	0.0212	0.168	0.924	4.49	17.8	14.9	0.0195	0.193	1.27	7.59	43.8	0.188	1.59	13.3	2.05
2.2	107	0.000898	0.0233	0.185	1.01	4.84	16.4	13.1	0.0214	0.212	1.39	8.25	42.5	0.206	1.74	14.4	2.24
2.4	104	0.000980	0.0254	0.201	1.10	5.14	14.9	11.6	0.0234	0.231	1.51	8.87	40.7	0.225	1.89	15.5	2.44
2.6	102	0.00106	0.0275	0.217	1.18	5.40	13.8	10.4	0.0253	0.250	1.63	9.45	38.0	0.243	2.04	16.5	2.64
2.8	101	0.00114	0.0296	0.233	1.26	5.60	12.8	9.38	0.0272	0.268	1.75	9.98	36.7	0.262	2.19	17.4	2.83
3.0	98.1	0.00123	0.0317	0.249	1.34	5.74	11.8	8.50	0.0292	0.287	1.86	10.5	33.9	0.280	2.34	18.2	3.02
3.2	96.0	0.00131	0.0338	0.265	1.41	5.82	11.0	7.75	0.0311	0.306	1.97	10.9	31.7	0.299	2.48	18.9	3.20
3.4	94.0	0.00139	0.0359	0.281	1.48	5.85	10.2	7.10	0.0331	0.324	2.08	11.2	29.6	0.317	2.62	19.5	3.39
3.6	92.1	0.00147	0.0380	0.296	1.55	5.83	9.55	6.52	0.0350	0.343	2.19	11.5	27.7	0.335	2.76	19.9	3.57
3.8	90.2	0.00155	0.0400	0.312	1.62	5.76	8.92	5.96	0.0369	0.361	2.30	11.7	26.0	0.353	2.90	20.2	3.75
4.0	88.2	0.00163	0.0421	0.327	1.68	5.65	8.35	5.42	0.0389	0.379	2.40	11.8	24.4	0.371	3.04	20.4	3.92
5	78.8	0.00204	0.0523	0.399	1.91	4.79	6.22	3.56	0.0485	0.469	2.87	11.6	18.3	0.460	3.66	19.8	4.74
6	69.8	0.00244	0.0624	0.466	2.03	3.97	4.80	2.50	0.0580	0.554	3.24	10.3	14.2	0.547	4.19	17.5	5.44
7	62.2	0.00285	0.0721	0.524	2.02	3.25	3.83	1.88	0.0674	0.635	3.50	8.89	11.3	0.630	4.61	14.9	6.01
8	55.5	0.00325	0.0816	0.574	1.92	2.71	3.13	1.47	0.0766	0.711	3.64	7.43	9.26	0.710	4.89	12.5	6.41
9	50.3	0.00365	0.0908	0.614	1.77	2.29	2.61	1.16	0.0857	0.781	3.66	6.35	7.75	0.786	5.04	10.7	6.65
10	45.9	0.00405	0.0996	0.644	1.58	1.96	2.22	0.963	0.0947	0.845	3.58	5.47	6.58	0.857	5.06	9.18	6.73
12	38.5	0.00485	0.116	0.670	1.24	1.49	1.66	0.670	0.112	0.950	3.20	4.19	4.93	0.984	4.79	7.02	6.45
14	32.4	0.00563	0.131	0.656	0.991	1.17	1.30	0.497	0.129	1.02	2.69	3.32	3.85	1.09	4.22	5.56	5.78
16	27.4	0.00640	0.143	0.610	0.816	0.946	1.03	0.400	0.144	1.06	2.24	2.70	3.10	1.17	3.59	4.51	4.96
18	23.4	0.00716	0.154	0.546	0.681	0.783	0.824	0.314	0.159	1.07	1.88	2.24	2.54	1.22	3.04	3.74	4.22
20	20.3	0.00790	0.161	0.480	0.580	0.659	0.673	0.263	0.172	1.04	1.61	1.89	2.12	1.24	2.60	3.16	3.61

Ra (Z=88) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14)

Q	---->	52.22	15.60	6.950	3.384	1.596	0.6679	0.2185	16.88	7.067	3.303	1.486	0.5754	7.346	3.150	1.239	2.929
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	4f(14)
0.2	33.9	0.748(-4)	0.00204	0.0163	0.0908	0.448	2.39	23.7	0.00185	0.0186	0.123	0.737	4.74	0.0180	0.153	1.26	0.194
0.4	75.2	0.000156	0.00410	0.0327	0.182	0.899	4.84	54.7	0.00375	0.0373	0.246	1.48	9.54	0.0362	0.306	2.52	0.389
0.6	111	0.000235	0.00616	0.0491	0.273	1.35	7.37	80.4	0.00565	0.0560	0.369	2.22	14.4	0.0544	0.458	3.78	0.583
0.8	116	0.000315	0.00822	0.0653	0.363	1.80	9.95	74.4	0.00754	0.0746	0.492	2.95	19.4	0.0725	0.611	5.03	0.777
1.0	111	0.000394	0.0103	0.0817	0.453	2.24	12.5	59.2	0.00943	0.0932	0.615	3.67	24.3	0.0906	0.763	6.27	0.971
1.2	110	0.000473	0.0123	0.0980	0.543	2.67	14.7	48.6	0.0113	0.112	0.737	4.39	28.9	0.109	0.915	7.49	1.16
1.4	111	0.000552	0.0144	0.114	0.631	3.10	16.3	40.7	0.0132	0.130	0.858	5.10	33.0	0.127	1.07	8.70	1.36
1.6	112	0.000632	0.0164	0.131	0.718	3.51	17.1	34.8	0.0151	0.149	0.978	5.79	36.2	0.145	1.22	9.88	1.55
1.8	113	0.000711	0.0185	0.147	0.805	3.90	17.2	30.2	0.0170	0.168	1.10	6.46	38.3	0.163	1.37	11.0	1.74
2.0	112	0.000790	0.0205	0.163	0.889	4.26	16.6	26.4	0.0189	0.186	1.22	7.11	39.2	0.181	1.51	12.1	1.93
2.2	110	0.000869	0.0225	0.179	0.973	4.60	15.8	23.4	0.0207	0.204	1.33	7.73	38.9	0.199	1.66	13.2	2.11
2.4	108	0.000948	0.0246	0.194	1.05	4.90	14.5	20.9	0.0226	0.223	1.45	8.32	37.8	0.217	1.81	14.2	2.30
2.6	105	0.00103	0.0266	0.210	1.13	5.15	13.3	18.8	0.0245	0.241	1.56	8.87	36.1	0.235	1.95	15.1	2.48
2.8	103	0.00111	0.0287	0.226	1.21	5.35	12.4	17.0	0.0263	0.259	1.68	9.38	34.2	0.252	2.09	16.0	2.66
3.0	101	0.00119	0.0307	0.241	1.29	5.50	11.5	15.5	0.0282	0.277	1.79	9.84	32.6	0.270	2.23	16.8	2.84
3.2	98.0	0.00126	0.0327	0.257	1.36	5.60	10.7	14.2	0.0301	0.295	1.89	10.2	30.3	0.288	2.37	17.4	3.02
3.4	95.8	0.00134	0.0348	0.272	1.43	5.64	10.0	13.1	0.0320	0.313	2.00	10.6	28.4	0.306	2.51	18.0	3.20
3.6	93.6	0.00142	0.0368	0.287	1.50	5.64	9.33	12.1	0.0338	0.331	2.11	10.9	26.6	0.323	2.64	18.5	3.37
3.8	91.6	0.00150	0.0388	0.302	1.56	5.59	8.75	11.2	0.0357	0.349	2.21	11.1	25.0	0.341	2.77	18.9	3.54
4.0	89.7	0.00158	0.0408	0.316	1.62	5.50	8.19	10.4	0.0376	0.367	2.31	11.3	23.6	0.358	2.90	19.1	3.70
5	80.1	0.00197	0.0507	0.387	1.85	4.72	6.11	7.46	0.0467	0.453	2.76	11.2	17.7	44.4	3.50	18.9	4.48
6	70.9	0.00236	0.0604	0.451	1.97	3.93	4.74	5.48	0.0561	0.536	3.13	10.1	13.8	0.527	4.01	17.0	5.15
7	63.0	0.00276	0.0699	0.509	1.98	3.22	3.79	4.08	0.0651	0.615	3.39	8.79	11.1	0.608	4.42	14.7	5.70
8	56.0	0.00315	0.0791	0.558	1.89	2.69	3.10	3.17	0.0741	0.688	3.53	7.36	9.09	0.685	4.71	12.3	6.11
9	50.6	0.00354	0.0880	0.597	1.75	2.27	2.59	2.53	0.0829	0.757	3.57	6.29	7.59	0.759	4.87	10.5	6.37
10	46.1	0.00392	0.0966	0.627	1.57	1.95	2.20	2.07	0.0916	0.819	3.50	5.42	6.45	0.828	4.91	9.08	6.47
12	38.7	0.00469	0.113	0.655	1.23	1.48	1.65	1.46	0.108	0.922	3.16	4.16	4.85	0.952	4.69	6.96	6.27
14	32.6	0.00545	0.127	0.644	0.988	1.16	1.28	1.09	0.125	0.995	2.67	3.30	3.79	1.05	4.17	5.50	5.67
16	27.6	0.00620	0.139	0.602	0.812	0.941	1.03	0.146	0.140	1.04	2.23	2.68	3.05	1.13	3.56	4.48	4.90
18	23.6	0.00693	0.149	0.541	0.680	0.779	0.837	0.672	0.154	1.04	1.87	2.23	2.52	1.19	3.03	3.71	4.19
20	20.4	0.00765	0.157	0.477	0.577	0.657	0.681	0.556	0.167	1.02	1.60	1.88	2.11	1.21	2.59	3.14	3.59

Ac (Z =89) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14)

Q	---->	52.54	15.78	7.041	3.441	1.640	0.7029	0.2318	17.09	7.159	3.363	1.533	0.6110	7.458	3.212	1.281	0.3816	3.001
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	6d(1)	4f(14)
0.2	35.9	0.0000735	0.00198	0.0158	0.0875	0.424	2.16	20.8	0.00179	0.0180	0.118	0.691	4.23	0.0173	0.146	1.17	5.84	0.183
0.4	78.7	0.000153	0.00398	0.0317	0.175	0.852	4.38	47.4	0.00363	0.0361	0.236	1.38	8.51	0.0348	0.292	2.35	12.7	0.367
0.6	120	0.000231	0.00598	0.0475	0.262	1.28	6.66	71.9	0.00546	0.0542	0.353	2.08	12.8	0.0523	0.437	3.53	20.1	0.549
0.8	134	0.000309	0.00798	0.0633	0.350	1.70	8.98	71.2	0.00729	0.0722	0.471	2.76	17.2	0.0697	0.582	4.69	24.9	0.732
1.0	131	0.000387	0.00997	0.0791	0.436	2.12	11.2	59.7	0.00912	0.0902	0.589	3.44	21.5	0.0871	0.728	5.85	24.3	0.915
1.2	126	0.000465	0.0120	0.0949	0.522	2.53	13.3	49.1	0.0110	0.108	0.706	4.11	25.7	0.104	0.873	6.99	20.7	1.10
1.4	123	0.000543	0.0140	0.111	0.608	2.93	14.9	41.1	0.0128	0.126	0.822	4.77	29.5	0.122	1.02	8.11	17.8	1.28
1.6	122	0.000621	0.0159	0.126	0.692	3.32	15.9	35.0	0.0146	0.144	0.937	5.42	32.6	0.139	1.16	9.21	15.5	1.46
1.8	120	0.000699	0.0179	0.142	0.775	3.70	16.1	30.3	0.0164	0.162	1.05	6.05	34.8	0.156	1.30	10.3	13.5	1.64
2.0	118	0.000777	0.0199	0.158	0.857	4.05	15.8	26.5	0.0182	0.180	1.17	6.66	36.1	0.174	1.44	11.3	12.0	1.82
2.2	116	0.000854	0.0219	0.173	0.937	4.37	15.2	23.6	0.0201	0.198	1.28	7.25	36.3	0.191	1.58	12.3	10.7	1.99
2.4	113	0.000932	0.0239	0.188	1.02	4.66	14.2	21.0	0.0219	0.216	1.39	7.81	35.7	0.208	1.72	13.3	9.61	2.17
2.6	111	0.00101	0.0258	0.204	1.09	4.91	13.7	18.9	0.0237	0.233	1.50	8.34	34.6	0.226	1.86	14.2	8.69	2.34
2.8	107	0.00109	0.0278	0.219	1.17	5.11	12.6	17.1	0.0255	0.251	1.61	8.82	32.8	0.243	2.00	15.0	7.91	2.51
3.0	105	0.00117	0.0298	0.234	1.24	5.27	11.7	15.6	0.0273	0.268	1.71	9.27	31.7	0.260	2.13	15.7	7.24	2.68
3.2	102	0.00124	0.0318	0.248	1.31	5.38	10.9	14.3	0.0291	0.286	1.82	9.67	29.6	0.277	2.26	16.4	6.64	2.85
3.4	99.1	0.00132	0.0337	0.263	1.38	5.44	10.2	13.1	0.0309	0.303	1.92	10.0	27.6	0.294	2.39	17.0	6.14	3.02
3.6	96.5	0.00140	0.0357	0.278	1.44	5.45	9.49	12.1	0.0327	0.321	2.02	10.3	25.9	0.311	2.52	17.5	5.65	3.18
3.8	94.2	0.00148	0.0376	0.292	1.51	5.42	8.89	11.2	0.0345	0.338	2.12	10.6	24.4	0.328	2.65	17.9	5.25	3.34
4.0	91.9	0.00155	0.0396	0.306	1.56	5.35	8.34	10.4	0.0364	0.355	2.21	10.7	23.0	0.344	2.77	18.2	4.90	3.50
5	81.6	0.00194	0.0492	0.375	1.80	4.66	6.21	7.48	0.0453	0.439	2.65	10.8	17.4	0.427	3.35	18.2	3.55	4.24
6	72.3	0.00233	0.0586	0.438	1.92	3.90	4.80	5.61	0.0542	0.519	3.01	9.87	13.6	0.507	3.85	16.6	2.71	4.88
7	64.1	0.00271	0.0678	0.494	1.93	3.20	3.82	4.19	0.0630	0.595	3.27	8.68	10.9	0.585	4.25	14.5	2.14	5.42
8	56.9	0.00309	0.0768	0.542	1.86	2.67	3.14	3.27	0.0717	0.667	3.43	7.30	8.96	0.660	4.54	12.2	1.71	5.82
9	51.2	0.00348	0.0855	0.581	1.73	2.25	2.62	2.57	0.0803	0.734	3.47	6.23	7.51	0.731	4.71	10.4	1.36	6.09
10	46.5	0.00386	0.0938	0.611	1.56	1.93	2.22	2.10	0.0887	0.794	3.42	5.38	6.38	0.798	4.77	9.01	1.11	6.22
12	38.9	0.00461	0.109	0.640	1.23	1.47	1.66	1.49	0.105	0.896	3.11	4.13	4.80	0.918	4.58	6.91	0.790	6.08
14	32.8	0.00536	0.123	0.633	0.982	1.16	1.30	1.11	0.121	0.968	2.65	3.28	3.75	1.02	4.11	5.47	0.588	5.56
16	27.8	0.00609	0.136	0.594	0.809	0.938	1.05	0.884	0.135	1.01	2.22	2.67	3.02	1.10	3.53	4.45	0.455	4.84
18	23.8	0.00682	0.146	0.536	0.678	0.775	0.857	0.689	0.149	1.02	1.86	2.21	2.49	1.15	3.01	3.69	0.359	4.15
20	20.6	0.00753	0.153	0.474	0.576	0.654	0.691	0.554	0.162	1.00	1.59	1.87	2.09	1.18	2.57	3.12	0.295	3.57

Th (Z=90) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14) 5f(1)

Q	---->	53.39	15.98	7.132	3.498	1.679	0.7184	0.2340	17.31	7.251	3.423	1.572	0.6245	7.563	3.279	1.325	0.4012	3.024	0.8423
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	6d(1)	4f(14)	5f(1)
0.2	35.6	7.02(-5)	0.00191	0.0153	0.0843	0.405	2.08	20.4	0.00173	0.0174	0.113	0.655	4.06	0.0167	0.138	1.09	5.25	0.180	1.19
0.4	77.9	0.000146	0.00385	0.0307	0.168	0.813	4.20	46.3	0.00351	0.0349	0.226	1.31	8.16	0.0336	0.277	2.19	11.3	0.360	2.41
0.6	119	0.000221	0.00578	0.0460	0.253	1.22	6.38	70.5	0.00528	0.0524	0.339	1.97	12.3	0.0504	0.416	3.28	18.0	0.539	3.68
0.8	134	0.000296	0.00772	0.0613	0.337	1.62	8.59	70.7	0.00705	0.0699	0.452	2.62	16.5	0.0672	0.554	4.37	22.8	0.719	4.97
1.0	133	0.000371	0.00964	0.0766	0.420	2.02	10.8	59.3	0.00881	0.0872	0.565	3.26	20.6	0.0840	0.692	5.45	22.9	0.899	6.22
1.2	131	0.000445	0.0116	0.0919	0.503	2.41	12.7	48.8	0.0106	0.105	0.677	3.90	24.6	0.101	0.830	6.51	21.0	1.08	7.32
1.4	128	0.000520	0.0135	0.107	0.585	2.80	14.3	40.9	0.0123	0.122	0.788	4.53	28.3	0.117	0.967	7.56	17.9	1.26	8.13
1.6	127	0.000594	0.0154	0.122	0.667	3.17	15.3	34.8	0.0141	0.139	0.899	5.14	31.3	0.134	1.10	8.59	15.6	1.43	8.55
1.8	126	0.000669	0.0173	0.138	0.747	3.53	15.7	30.2	0.0159	0.157	1.01	5.74	33.6	0.151	1.24	9.59	13.6	1.61	8.57
2.0	124	0.000743	0.0192	0.153	0.826	3.86	15.5	26.5	0.0176	0.174	1.12	6.33	35.0	0.168	1.37	10.6	12.1	1.78	8.28
2.2	121	0.000818	0.0212	0.168	0.903	4.18	14.9	23.5	0.0194	0.191	1.23	6.89	35.3	0.184	1.51	11.5	10.8	1.96	7.89
2.4	118	0.000892	0.0231	0.182	0.980	4.46	14.0	21.0	0.0211	0.209	1.33	7.42	34.9	0.201	1.64	12.4	9.68	2.13	7.24
2.6	115	0.000966	0.0250	0.197	1.05	4.70	13.4	18.9	0.0229	0.226	1.44	7.93	33.9	0.218	1.77	13.2	8.76	2.30	6.66
2.8	111	0.00104	0.0269	0.212	1.13	4.91	12.5	17.1	0.0246	0.243	1.54	8.40	32.3	0.234	1.90	14.0	7.96	2.47	6.19
3.0	108	0.00112	0.0288	0.226	1.20	5.07	11.6	15.6	0.0264	0.260	1.64	8.83	31.1	0.251	2.03	14.7	7.29	2.63	5.76
3.2	105	0.00119	0.0307	0.241	1.27	5.19	10.8	14.2	0.0281	0.277	1.74	9.22	29.4	0.267	2.15	15.4	6.67	2.80	5.35
3.4	102	0.00126	0.0326	0.255	1.33	5.26	10.1	13.1	0.0299	0.294	1.84	9.57	27.3	0.283	2.28	16.0	6.16	2.96	5.00
3.6	98.9	0.00134	0.0345	0.269	1.39	5.28	9.44	12.1	0.0316	0.310	1.94	9.86	25.7	0.300	2.40	16.5	5.69	3.12	4.67
3.8	96.4	0.00141	0.0364	0.283	1.45	5.27	8.84	11.2	0.0334	0.327	2.03	10.1	24.2	0.316	2.52	16.9	5.28	3.28	4.37
4.0	93.9	0.00149	0.0383	0.297	1.51	5.22	8.29	10.4	0.0351	0.344	2.13	10.3	22.8	0.332	2.64	17.2	4.92	3.43	4.10
5	83.0	0.00186	0.0476	0.363	1.74	4.60	6.18	7.47	0.0438	0.425	2.55	10.5	17.3	0.412	3.19	17.5	3.56	4.16	3.06
6	73.5	0.00223	0.0567	0.425	1.87	3.87	4.79	5.63	0.0524	0.503	2.90	9.68	13.5	0.490	3.68	16.2	2.72	4.80	2.37
7	65.1	0.00259	0.0657	0.479	1.89	3.17	3.82	4.20	0.0609	0.577	3.16	8.57	10.9	0.565	4.07	14.3	2.14	5.33	1.89
8	57.8	0.00296	0.0743	0.527	1.82	2.65	3.13	3.27	0.0693	0.647	3.32	7.25	8.92	0.637	4.36	12.1	1.73	5.74	1.55
9	51.8	0.00333	0.0828	0.566	1.70	2.25	2.61	2.59	0.0776	0.712	3.38	6.17	7.47	0.706	4.54	10.3	1.39	6.01	1.30
10	47.0	0.00369	0.0909	0.595	1.55	1.93	2.22	2.12	0.0857	0.771	3.34	5.34	6.36	0.771	4.61	8.90	1.14	6.14	1.10
12	39.4	0.00442	0.106	0.627	1.22	1.46	1.66	1.49	0.102	0.871	3.07	4.11	4.78	0.888	4.47	6.86	0.808	6.02	0.823
14	33.2	0.00513	0.120	0.621	0.979	1.15	1.29	1.11	0.117	0.943	2.63	3.26	3.74	0.987	4.05	5.43	0.600	5.52	0.642
16	28.1	0.00584	0.132	0.586	0.805	0.933	1.04	0.878	0.131	0.986	2.21	2.65	3.01	1.06	3.50	4.42	0.461	4.82	0.517
18	24.1	0.00653	0.141	0.532	0.674	0.773	0.855	0.688	0.144	0.999	1.86	2.20	2.48	1.12	2.99	3.67	0.366	4.14	0.419
20	20.8	0.00721	0.149	0.471	0.573	0.651	0.704	0.566	0.157	0.984	1.59	1.86	2.09	1.15	2.56	3.10	0.297	3.56	0.341

Pa (Z=91) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14) 5f(2)

a	---->	54.06	16.16	7.225	3.553	1.713	0.7310	0.2356	17.51	7.347	3.480	1.607	0.6360	7.669	3.339	1.361	0.4120	3.081	0.9146
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	6d(1)	4f(14)	5f(2)
0.2	34.8	0.0000678	0.00185	0.0148	0.0813	0.389	2.01	20.1	0.00168	0.0168	0.109	0.625	3.92	0.0161	0.133	1.03	4.97	0.172	1.31
0.4	76.0	0.000141	0.00374	0.0297	0.163	0.781	4.06	45.6	0.00340	0.0337	0.217	1.25	7.88	0.0324	0.265	2.07	10.7	0.344	2.64
0.6	116	0.000214	0.00562	0.0446	0.244	1.17	6.16	69.6	0.00512	0.0507	0.326	1.88	11.9	0.0486	0.398	3.10	16.9	0.515	3.98
0.8	132	0.000286	0.00749	0.0593	0.325	1.56	8.30	70.3	0.00683	0.0675	0.434	2.50	15.9	0.0648	0.530	4.13	21.7	0.687	5.34
1.0	131	0.000358	0.00936	0.0741	0.406	1.94	10.4	59.0	0.00854	0.0843	0.543	3.12	19.9	0.0810	0.663	5.15	22.3	0.859	6.68
1.2	129	0.000430	0.0112	0.0890	0.486	2.32	12.3	48.5	0.0103	0.101	0.651	3.72	23.8	0.0971	0.795	6.15	20.7	1.03	7.97
1.4	127	0.000502	0.0131	0.104	0.565	2.69	13.9	40.7	0.0120	0.118	0.758	4.32	27.3	0.113	0.926	7.14	17.6	1.20	9.15
1.6	126	0.000574	0.0150	0.119	0.644	3.05	14.9	34.7	0.0137	0.135	0.864	4.91	30.3	0.129	1.06	8.12	15.3	1.37	10.2
1.8	125	0.000646	0.0168	0.133	0.721	3.39	15.3	30.1	0.0154	0.152	0.970	5.49	32.6	0.145	1.19	9.06	13.4	1.54	10.9
2.0	124	0.000718	0.0187	0.148	0.797	3.72	15.2	26.4	0.0171	0.168	1.07	6.04	34.0	0.162	1.32	9.99	11.9	1.71	11.4
2.2	122	0.000790	0.0205	0.162	0.872	4.02	14.7	23.4	0.0188	0.185	1.18	6.58	34.5	0.178	1.44	10.9	10.6	1.87	11.6
2.4	120	0.000862	0.0224	0.177	0.946	4.29	13.9	20.9	0.0205	0.202	1.28	7.10	34.2	0.194	1.57	11.7	9.58	2.04	11.4
2.6	117	0.000934	0.0243	0.191	1.02	4.53	13.0	18.8	0.0222	0.218	1.38	7.58	33.4	0.210	1.70	12.5	8.67	2.20	11.2
2.8	113	0.00101	0.0261	0.205	1.09	4.74	12.4	17.1	0.0239	0.235	1.48	8.04	31.9	0.226	1.82	13.3	7.89	2.36	10.7
3.0	110	0.00108	0.0280	0.219	1.16	4.90	11.5	15.5	0.0256	0.251	1.58	8.46	30.6	0.242	1.94	14.0	7.21	2.52	10.2
3.2	107	0.00115	0.0298	0.233	1.22	5.02	10.8	14.2	0.0273	0.268	1.68	8.84	29.1	0.258	2.06	14.6	6.62	2.68	9.72
3.4	104	0.00122	0.0317	0.247	1.29	5.10	10.0	13.1	0.0290	0.284	1.77	9.18	27.2	0.273	2.18	15.2	6.11	2.83	9.07
3.6	101	0.00129	0.0335	0.261	1.35	5.14	9.38	12.1	0.0307	0.300	1.87	9.48	25.5	0.289	2.30	15.7	5.65	2.99	8.49
3.8	98.0	0.00136	0.0353	0.274	1.41	5.14	8.79	11.2	0.0324	0.316	1.96	9.73	24.0	0.305	2.42	16.1	5.24	3.14	8.01
4.0	95.4	0.00144	0.0372	0.288	1.46	5.10	8.23	10.4	0.0341	0.332	2.05	9.93	22.6	0.320	2.53	16.4	4.88	3.29	7.54
5	84.1	0.00179	0.0462	0.352	1.69	4.54	6.14	7.45	0.0425	0.411	2.46	10.2	17.2	0.398	3.06	16.9	3.54	3.99	5.72
6	74.4	0.00215	0.0551	0.412	1.82	3.85	4.76	5.64	0.0508	0.486	2.80	9.51	13.4	0.473	3.53	15.8	2.70	4.61	4.48
7	65.9	0.00251	0.0638	0.465	1.85	3.15	3.81	4.21	0.0591	0.558	3.06	8.47	10.8	0.545	3.92	14.1	2.13	5.12	3.60
8	58.4	0.00286	0.0722	0.512	1.79	2.63	3.11	3.27	0.0672	0.626	3.22	7.20	8.88	0.615	4.21	12.0	1.73	5.53	2.97
9	52.3	0.00322	0.0804	0.550	1.68	2.23	2.60	2.60	0.0753	0.690	3.29	6.13	7.44	0.682	4.39	10.2	1.40	5.80	2.48
10	47.4	0.00357	0.0883	0.580	1.53	1.92	2.21	2.13	0.0832	0.747	3.27	5.32	6.33	0.745	4.48	8.83	1.14	5.95	2.11
12	39.7	0.00427	0.103	0.613	1.22	1.46	1.65	1.49	0.0985	0.846	3.02	4.09	4.77	0.860	4.37	6.81	0.802	5.88	1.59
14	33.5	0.00496	0.116	0.610	0.972	1.15	1.29	1.11	0.113	0.918	2.61	3.25	3.73	0.955	3.99	5.41	0.599	5.43	1.24
16	28.4	0.00564	0.128	0.578	0.803	0.929	1.04	0.873	0.127	0.961	2.19	2.64	3.00	1.03	3.47	4.40	0.468	4.77	1.00
18	24.3	0.00631	0.138	0.526	0.673	0.770	0.851	0.689	0.140	0.977	1.85	2.20	2.48	1.09	2.97	3.66	0.367	4.11	0.827
20	21.0	0.00697	0.146	0.468	0.572	0.650	0.701	0.570	0.152	0.966	1.58	1.86	2.08	1.12	2.55	3.09	0.300	3.54	0.695

U (Z=92) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14) 5f(4)

Q	---->	54.51	16.35	7.318	3.608	1.745	0.7252	0.2282	17.71	7.440	3.537	1.633	0.6267	7.766	3.396	1.387	3.167	0.9010
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	6s(2)	7s(2)	2p(6)	3p(6)	4p(6)	5p(6)	6p(6)	3d(10)	4d(10)	5d(10)	4f(14)	5f(4)
0.2	31.8	0.0000662	0.00180	0.0144	0.0785	0.375	2.04	21.5	0.00163	0.0163	0.104	0.604	4.03	0.0156	0.127	0.992	0.160	1.74
0.4	69.9	0.000138	0.00362	0.0288	0.157	0.752	4.12	49.2	0.00330	0.0327	0.209	1.21	8.12	0.0313	0.255	1.99	0.322	3.50
0.6	105	0.000209	0.00544	0.0432	0.236	1.13	6.26	74.1	0.00496	0.0490	0.313	1.82	12.2	0.0470	0.382	2.98	0.482	5.25
0.8	114	0.000280	0.00726	0.0575	0.314	1.50	8.43	72.1	0.00662	0.0654	0.418	2.42	16.4	0.0627	0.508	3.97	0.642	7.01
1.0	112	0.000350	0.00908	0.0718	0.392	1.87	10.6	59.8	0.00829	0.0817	0.522	3.01	20.5	0.0784	0.636	4.94	0.803	8.75
1.2	112	0.000421	0.0109	0.0862	0.469	2.23	12.5	49.3	0.00995	0.0979	0.626	3.60	24.5	0.0940	0.763	5.91	0.963	10.5
1.4	113	0.000491	0.0127	0.101	0.546	2.59	14.1	41.1	0.0116	0.114	0.729	4.18	28.1	0.110	0.889	6.86	1.12	12.1
1.6	114	0.000561	0.0145	0.115	0.621	2.94	15.1	35.0	0.0133	0.131	0.831	4.75	31.1	0.125	1.01	7.80	1.28	13.6
1.8	116	0.000632	0.0163	0.129	0.696	3.27	15.5	30.5	0.0149	0.147	0.933	5.30	33.4	0.141	1.14	8.71	1.44	14.9
2.0	117	0.000702	0.0181	0.143	0.770	3.58	15.3	26.5	0.0166	0.163	1.03	5.84	34.8	0.156	1.26	9.60	1.59	16.0
2.2	117	0.000772	0.0199	0.157	0.843	3.88	14.8	23.6	0.0182	0.179	1.13	6.37	35.2	0.172	1.39	10.5	1.75	16.8
2.4	116	0.000843	0.0217	0.171	0.914	4.14	13.9	21.1	0.0199	0.195	1.23	6.87	34.8	0.188	1.51	11.3	1.90	17.4
2.6	114	0.000913	0.0235	0.185	0.984	4.38	13.2	19.0	0.0215	0.211	1.33	7.34	33.8	0.203	1.63	12.1	2.06	17.6
2.8	112	0.000983	0.0253	0.199	1.05	4.59	12.5	17.2	0.0232	0.227	1.43	7.78	32.2	0.218	1.75	12.8	2.21	17.5
3.0	110	0.00105	0.0271	0.212	1.12	4.75	11.6	15.7	0.0248	0.243	1.52	8.20	31.0	0.234	1.86	13.5	2.36	17.2
3.2	107	0.00112	0.0289	0.226	1.18	4.88	10.8	14.2	0.0264	0.259	1.62	8.57	29.3	0.249	1.98	14.1	2.51	16.7
3.4	104	0.00119	0.0307	0.239	1.24	4.96	10.1	13.2	0.0281	0.275	1.71	8.91	27.3	0.265	2.10	14.7	2.65	16.1
3.6	101	0.00126	0.0325	0.253	1.30	5.01	9.42	12.2	0.0297	0.291	1.80	9.21	25.6	0.280	2.21	15.2	2.80	15.5
3.8	98.4	0.00133	0.0343	0.266	1.36	5.02	8.80	11.3	0.0314	0.306	1.89	9.46	24.1	0.295	2.32	15.6	2.94	14.7
4.0	95.7	0.00140	0.0361	0.279	1.42	4.99	8.27	10.4	0.0330	0.322	1.97	9.66	22.7	0.310	2.43	15.9	3.08	13.9
5	84.5	0.00175	0.0448	0.342	1.64	4.49	6.17	7.54	0.0412	0.398	2.37	9.99	17.3	0.385	2.95	16.5	3.74	10.7
6	74.7	0.00210	0.0535	0.400	1.77	3.82	4.78	5.58	0.0493	0.471	2.71	9.38	13.5	0.458	3.40	15.5	4.33	8.47
7	66.1	0.00245	0.0619	0.452	1.81	3.12	3.81	4.17	0.0573	0.541	2.96	8.38	10.8	0.528	3.78	13.9	4.83	6.85
8	58.6	0.00280	0.0701	0.497	1.76	2.62	3.12	3.20	0.0652	0.607	3.13	7.17	8.91	0.596	4.07	11.9	5.22	5.66
9	52.5	0.00314	0.0781	0.536	1.66	2.22	2.61	2.59	0.0730	0.669	3.21	6.09	7.47	0.661	4.26	10.1	5.51	4.76
10	47.6	0.00349	0.0857	0.565	1.52	1.91	2.21	2.10	0.0807	0.726	3.20	5.28	6.35	0.722	4.36	8.79	5.67	4.07
12	39.9	0.00417	0.100	0.599	1.21	1.45	1.66	1.50	0.0956	0.822	2.98	4.07	4.78	0.834	4.28	6.77	5.66	3.07
14	33.7	0.00485	0.113	0.599	0.969	1.14	1.30	1.12	0.110	0.894	2.59	3.23	3.74	0.928	3.93	5.38	5.29	2.41
16	28.7	0.00552	0.125	0.570	0.800	0.927	1.04	0.851	0.124	0.938	2.18	2.63	3.01	1.00	3.44	4.38	4.70	1.94
18	24.6	0.00617	0.134	0.521	0.669	0.768	0.852	0.694	0.136	0.956	1.84	2.19	2.48	1.06	2.95	3.64	4.07	1.60
20	21.3	0.00682	0.142	0.465	0.571	0.647	0.704	0.553	0.148	0.948	1.57	1.85	2.09	1.09	2.54	3.08	3.51	1.35

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