Extension of the Rh I-Like Isoelectronic Sequence to the Spectrum of Ag III

W. P. GILBERT, *Department of Physics, Cornell University*

(Received June 15, 1935)

The spark spectrum of silver has been photographed and measured in the region from 500 to 3000A. To assist in the identification of Ag III lines, the spectrum of silver from the hollow cathode discharge in an atmosphere of helium was photographed from 500 to 2600A. A spark gap placed in series with the Schüler tube served to bring out the Ag III lines in the spectrum of this discharge. With the already reported separation of 4607 cm^{-1} for the ground state, $4d^9\ ^2D_{2\frac{1}{2},\ 1\frac{1}{2}}$, as a basis and by employing the above method of distinguishing the radiations, it has been possible to establish 55 terms originating from the $4d^9$, $4d^85s$, and $4d^85p$ configurations and to classify a total of 257 lines. Approximate term values have been obtained by extrapolation of a Moseley diagram for the elements of this sequence. The value obtained for the lowest state of Ag III with respect to the $4d^8\ ^3F_4$ state of Ag IV is 291,250 cm^{-1}, which corresponds to an ionization potential of 35.9 volts.

An analysis of the Rh I spectrum has been given by Sommer[1] and an analysis of the Pd II spectrum has been reported by Shenstone[2] and Blair.[3] Kimura and Nakamura[4] photographed the spectrum of silver from the condensed discharge and found a few lines which they attributed to Ag III. Gibbs and White[5] have published a preliminary report on the analysis of this spectrum but the work has not been completed and published in detail. Their abstract communicates solely the separation, 4607 cm^{-1}, of the low $4d^9\ ^2D_{2\frac{1}{2},\ 1\frac{1}{2}}$ levels. In another paper[6] the wave number of the line $4d^8(^3F)5s\ ^4F_{4\frac{1}{2}}-4d^8(^3F)5p\ ^4G^\circ_{5\frac{1}{2}}$ has been reported.

Experimental Details

The vacuum spark spectrum of silver was photographed in the region from 500–1200A with a vacuum spectrograph equipped with a grating which gave a dispersion of about 5.2A per mm, and from 1200–2600A with a similar instrument which gave a dispersion of 11.3A per mm. The aluminum lines measured by Ekefors[7] and by Zumstein,[8] and impurity lines of carbon, nitrogen and oxygen[9] served as standards. In the region 1900–3000A the spectrum of a silver spark in air between pointed electrodes was photographed with a grating (Rowland mounting) which gave a dispersion of about 4.6A per mm. Sharp lines of Ag II[10] were used as standards. The Ag III lines could be readily recognized by their polar character.

To provide a way of distinguishing between the spectrum lines arising from various stages of ionization which appeared on the vacuum spark plates, the spectrum of silver from the hollow cathode discharge in an atmosphere of helium was photographed in the region from 500–2600A. A spark gap placed in series with the Schüler tube[11] served to bring out strongly in the discharge lines arising from transitions between the lower configurations of Ag III without exciting higher stages of ionization to any appreciable extent. Since the majority of the Ag II lines which fall in this region have been previously classified, it was thus possible, by comparing the vacuum spark and hollow cathode data, to select the Ag III lines with considerable assurance.

Term Values and Classifications

The normal $4d^9$ electron configuration of the Ag III ion gives rise to inverted ^2D terms. The present work is concerned with the identification of the terms which arise when one of the $4d$ electrons is raised to a $5s$ or $5p$ state. The terms predicted by the Hund theory for these configurations are listed in Table I together with those identified in this investigation.

By analogy with the Rh I and Pd II spectra three of the strongest lines of the Ag III spectrum should arise from the transitions: $4d^8(^3F)5s\ ^4F_{4\frac{1}{2}}-4d^8(^3F)5p\ ^4G^\circ_{5\frac{1}{2}}$, $^4D^\circ_{3\frac{1}{2}}$ and $^4F^\circ_{4\frac{1}{2}}$. A linear extrapolation of the wave numbers for the ele-

[1] Sommer, Zeits. f. Physik **45**, 147 (1927).
[2] Shenstone, Phys. Rev. **32**, 30 (1928).
[3] Blair, Phys. Rev. **36**, 173 (1930).
[4] Kimura and Nakamura, Jap. J. Phys. **3**, 197 (1924).
[5] Gibbs and White, Phys. Rev. **32**, 318 (1928).
[6] Gibbs and White, Proc. Nat. Acad. Sci. **14**, 559 (1928).
[7] Ekefors, Zeits. f. Physik **51**, 471 (1928).
[8] Zumstein, Phys. Rev. **38**, 2214 (1931).
[9] Edlén, Zeits. f. Physik **85**, 85 (1933).
[10] Shenstone, Phys. Rev. **31**, 317 (1928).
[11] Gartlein and Gibbs, Phys. Rev. **38**, 1907 (1931).

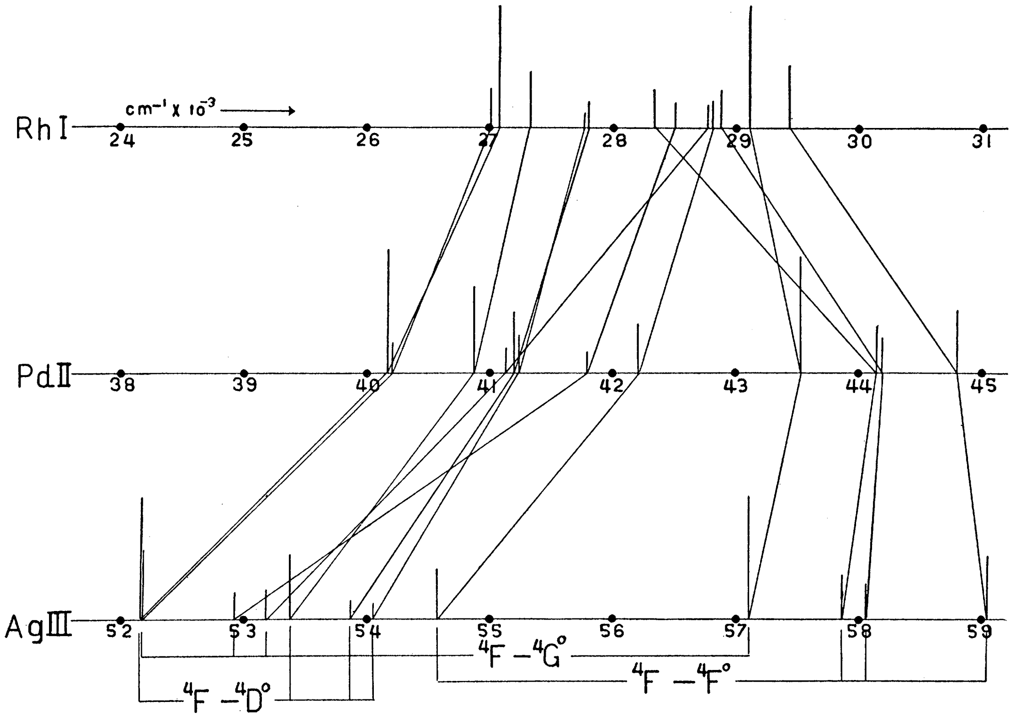

FIG. 1. Regular displacement of wave number for the electron transition $4d^85s-4d^85p$.

TABLE I. *Predicted and observed terms of Ag III.*

Electron configuration	Predicted terms	Limit Ag IV	Observed terms	Remarks
$4d^9$	^2D		^2D	
$4d^85s$	^2S	(^1S)	—	
	^2D	(^1D)	^2D	
	^2G	(^1G)	^2G	
	$^{2,\,4}P$	(^3P)	$^{2,\,4}P$	$^4P_{\frac{1}{2}}$ questionable
	$^{2,\,4}F$	(^3F)	$^{2,\,4}F$	
$4d^85p$	$^2S^\circ$	(^1S)	—	
	$^2(P^\circ D^\circ F^\circ)$	(^1D)	$^2(P^\circ D^\circ F^\circ)$	
	$^2(F^\circ G^\circ H^\circ)$	(^1G)	$^2(F^\circ H^\circ)$	
	$^{2,\,4}(S^\circ P^\circ D^\circ)$	(^3P)	$^{2,\,4}(P^\circ D^\circ)$	$^4D^\circ_{\frac{1}{2}}$ missing
	$^{2,\,4}(D^\circ F^\circ G^\circ)$	(^3F)	$^{2,\,4}(D^\circ F^\circ G^\circ)$	

TABLE II. *Square roots of some term values of the Rh I-like isoelectronic sequence.*

Terms	Rh I	$\Delta(\nu)^{\frac{1}{2}}$	Pd II	$\Delta(\nu)^{\frac{1}{2}}$	Ag III
$4d^9\ ^2D_{2\frac{1}{2}}$	243.1	157.7	400.8	138.9	539.7
$4d^8(^3F_4)5s\ ^4F_{4\frac{1}{2}}$	249.8	118.3	368.1	109.4	*477.5**
$^2F_{3\frac{1}{2}}$	238.2	120.0	358.2	110.3	468.5
$4d^8(^3F_4)5p\ ^4D^\circ_{3\frac{1}{2}}$	188.0	120.8	308.8	110.5	419.3
$^4G^\circ_{5\frac{1}{2}}$	182.5	120.8	303.3	110.1	*413.4**
$^4F^\circ_{4\frac{1}{2}}$	181.6	119.6	301.2	109.9	411.1
$^2F^\circ_{3\frac{1}{2}}$	174.4	121.0	295.4	110.2	405.6

* Used in establishing the approximate absolute term values.

TABLE III. *Term values for Ag III.*

Term symbol	Relative term values (cm⁻¹)	Term symbol	Relative term values (cm⁻¹)	Term symbol	Relative term values (cm⁻¹)	Term symbol	Relative term values (cm⁻¹)
$4d^9\ ^2D_{2\frac{1}{2}}$	0	$4d^8(^1G)5s\ ^2G_{4\frac{1}{2}}$	85599	$^2D^\circ_{2\frac{1}{2}}$	125095	$^2D^\circ_{1\frac{1}{2}}$	135356
$^2D_{1\frac{1}{2}}$	4607	$^2G_{3\frac{1}{2}}$	85727	$^2G^\circ_{4\frac{1}{2}}$	125250	$^2D^\circ_{2\frac{1}{2}}$	135762
$4d^8(^3F)5s\ ^4F_{4\frac{1}{2}}$	63250	$4d^8(^3P)5s\ ^2P_{\frac{1}{2}}$	87477	$^4F^\circ_{2\frac{1}{2}}$	126208	$4d^8(^3P)5p\ ^4D^\circ_{1\frac{1}{2}}$	136808
$^4F_{3\frac{1}{2}}$	65764	$4d^8(^3F)5p\ ^4D^\circ_{3\frac{1}{2}}$	115412	$^2F^\circ_{3\frac{1}{2}}$	126732	$4d^8(^1G)5p\ ^2H^\circ_{4\frac{1}{2}}$	136809
$^4F_{2\frac{1}{2}}$	68145	$^4G^\circ_{4\frac{1}{2}}$	117931	$^2G^\circ_{3\frac{1}{2}}$	127729	$4d^8(^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$	136931
$^4F_{1\frac{1}{2}}$	69351	$^4D^\circ_{2\frac{1}{2}}$	119143	$^2D^\circ_{1\frac{1}{2}}$	127870	$^4D^\circ_{3\frac{1}{2}}$	136976
$^2F_{3\frac{1}{2}}$	71691	$^4G^\circ_{5\frac{1}{2}}$	120359	$^2F^\circ_{2\frac{1}{2}}$	128804	$^2D^\circ_{2\frac{1}{2}}$	138849
$^2F_{2\frac{1}{2}}$	73934	$^4G^\circ_{3\frac{1}{2}}$	121068	$4d^8(^3P)5p\ ^4P^\circ_{\frac{1}{2}}$	129143	$^2D^\circ_{1\frac{1}{2}}$	139322
$4d^8(^3P)5s\ ^4P_{2\frac{1}{2}}$	76406	$^4D^\circ_{1\frac{1}{2}}$	122014	$^4P^\circ_{1\frac{1}{2}}$	129937	$4d^8(^1G)5p\ ^2H^\circ_{5\frac{1}{2}}$	139942
$^4P_{1\frac{1}{2}}$	77413	$^4F^\circ_{4\frac{1}{2}}$	122300	$^4P^\circ_{2\frac{1}{2}}$	130152	$4d^8(^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$	140078
$^4P_{\frac{1}{2}}$	79326?	$^4G^\circ_{2\frac{1}{2}}$	122532	$4d^8(^1D)5p\ ^2F^\circ_{2\frac{1}{2}}$	131875	$4d^8(^1G)5p\ ^2F^\circ_{3\frac{1}{2}}$	140881
$4d^8(^1D)5s\ ^2D_{1\frac{1}{2}}$	80131	$^4D^\circ_{\frac{1}{2}}$	123408	$^2P^\circ_{\frac{1}{2}}$	133467	$^2F^\circ_{2\frac{1}{2}}$	142165
$^2D_{2\frac{1}{2}}$	82231	$^4F^\circ_{3\frac{1}{2}}$	123631	$^2F^\circ_{3\frac{1}{2}}$	133635	$4d^8(^3P)5p\ ^2P^\circ_{\frac{1}{2}}$	143781
$4d^8(^3P)5s\ ^2P_{1\frac{1}{2}}$	85182	$^4F^\circ_{1\frac{1}{2}}$	123927	$^2P^\circ_{1\frac{1}{2}}$	134955		

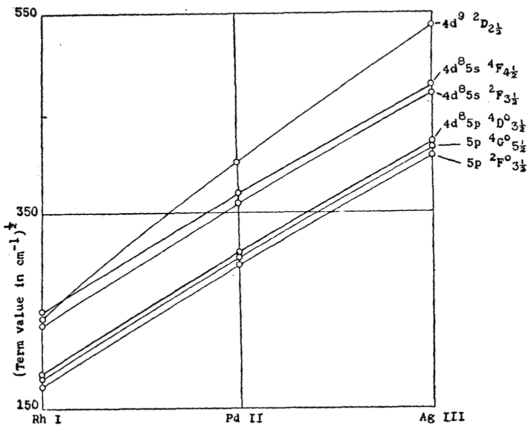

FIG. 2. Moseley diagram.

ments of this sequence (irregular doublet law) gave the approximate position in the spectrum of these Ag III lines. (Fig. 1.) The absolute term values were approximated by the extrapolation of a Moseley diagram (Fig. 2). The lines representing the terms $4d^8(^3F)5s\ ^4F_{4\frac{1}{2}}$ and $4d^8(^3F)5p\ ^4G^o_{5\frac{1}{2}}$ were extended to Ag III by drawing them so as to keep $\Delta(\nu)^{\frac{1}{2}}$ constant (required by the irregular doublet law) and yet choose the ordinates so that the difference in their squares is equal to the wave number of the radiated line. The data used in plotting the Moseley diagram are given in Table II. As determined by this method the absolute value of the $4d^8(^3F_4)5s\ ^4F_{4\frac{1}{2}}$ term is 228,000 cm^{-1}.[12]

The approximate position of the low $4d^9\ ^2D_{2\frac{1}{2}}$ term was likewise obtained by extrapolation on a Moseley diagram and the finding and classification of the majority of the $4d^9-4d^85p$ transitions then established accurately the relative position of the ground levels. The $4d^9\ ^2D_{2\frac{1}{2}}$ term lies 63,250 cm^{-1} below $4d^8(^3F_4)5s\ ^4F_{4\frac{1}{2}}$. Therefore the approximate absolute value of the lowest state of Ag III with respect to $4d^8\ ^3F_4$ of Ag IV is 291,250 cm^{-1}, which corresponds to an ionization potential of 35.9 volts.

A centroid diagram for the terms of the $4d^85s$ configuration is shown in Fig. 3. The $4d^8(^1S_0)5s\ ^2S_{\frac{1}{2}}$ term is omitted since it has not been found for

[12] B. V. R. Rao (Proc. Ind. Acad. Sci. **1**, 28, July (1934)), reports 237,000 cm^{-1} for the absolute value of this term. According to the abstract of Rao's article the terms $4d^8(^3F)5s\ ^{2,4}F$ and $4d^8(^3F)5p\ ^{2,4}F^o$ have been identified by him. Since the author has been unable to obtain a copy of Rao's paper, no detailed comparison could be made with the results reported here.

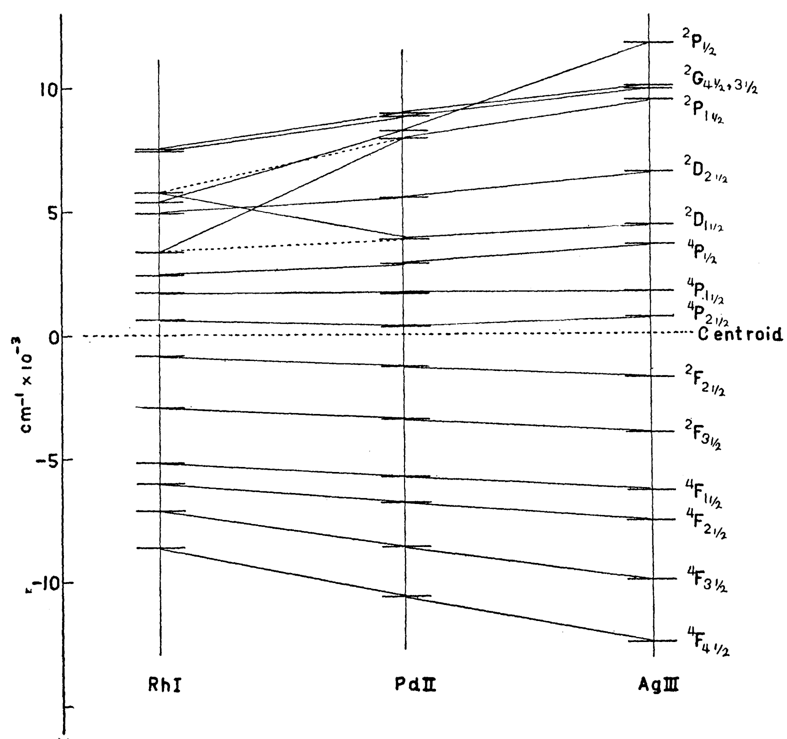

FIG. 3. Centroid diagram for $4d^85s$ configuration.

TABLE IV. *Classified lines of Ag III.*

Int.	λ vac.	ν vac.	Classification	
1	3013.81	33181	$4d^8(^1D)5s\ ^2D_{2½}$	$-4d^8(^3F)5p\ ^4D°_{3½}$
1	2992.50	33962	$(^3P)5s\ ^2P_{1½}$ −	$(^3F)5p\ ^4D°_{2½}$
1	2716.98	36806	$(^1G)5s\ ^2G_{3½}$ −	$(^3F)5p\ ^4G°_{2½}$
1	2709.16	36912	$(^1D)5s\ ^2D_{2½}$ −	$(^3F)5p\ ^4D°_{2½}$
1	2677.44	37349	$(^3P)5s\ ^2P_{1½}$ −	$(^3F)5p\ ^4G°_{2½}$
0	2638.62	37906	$(^1G)5s\ ^2G_{3½}$ −	$(^3F)5p\ ^4F°_{3½}$
8	2629.32	38033	$(^1G)5s\ ^2G_{4½}$ −	$(^3F)5p\ ^4F°_{3½}$
10	2563.64	39007	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4D°_{3½}$
1	2563.30	39012	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^4D°_{2½}$
10	2470.37	40480	$(^1G)5s\ ^2G_{3½}$ −	$(^3F)5p\ ^4F°_{2½}$
0	2415.53	41399	$(^1D)5s\ ^2D_{2½}$ −	$(^3F)5p\ ^4F°_{3½}$
5	2410.82	41480	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4D°_{3½}$
0	2400.01	41667	$(^3P)5s\ ^2P_{½}$ −	$(^3P)5p\ ^4P°_{½}$
30	2396.42	41729	$(^3P)5s\ ^4P_{1½}$ −	$(^3F)5p\ ^4D°_{2½}$
10	2387.57	41884	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^4D°_{1½}$
6	2342.62	42687	{ $(^3P)5s\ ^2P_{1½}$ −	$(^3F)5p\ ^2D°_{1½}$
			{ $(^3P)5s\ ^4P_{½}$ −	$(^3F)5p\ ^4D°_{1½}$
5	2339.94	42736	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4D°_{2½}$
0	2333.00	42863	$(^1D)5s\ ^2D_{2½}$ −	$(^3F)5p\ ^2D°_{2½}$
10	2287.20	43722	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4D°_{3½}$
3	2282.92	43804	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^4F°_{1½}$
6	2273.88	43978	$(^1D)5s\ ^2D_{2½}$ −	$(^3F)5p\ ^4F°_{2½}$
3	2242.06	44602	{ $(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^4D°_{1½}$
			{ $(^3P)5s\ ^4P_{½}$ −	$(^3F)5p\ ^4F°_{1½}$
10	2239.09	44661	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4G°_{3½}$
0	2234.41	44755	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^4P°_{1½}$
5	2223.62	44972	{ $(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^2D°_{2½}$
			{ $(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^4P°_{2½}$
15	2211.92	45210	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4D°_{2½}$
1	2197.86	45499	$(^1D)5s\ ^2D_{2½}$ −	$(^3F)5p\ ^2G°_{3½}$
5	2192.63	45607	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4D°_{1½}$
4	2174.16	45995	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^4D°_{½}$
5	2170.25	46078	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^4F°_{2½}$
60	2162.57	46241	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4G°_{4½}$
15	2149.87	46514	$(^3P)5s\ ^4P_{1½}$ −	$(^3F)5p\ ^4F°_{1½}$
0	2121.58	47135	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4G°_{3½}$
8	2107.39	47452	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4D°_{2½}$
3	2104.30	47522	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4F°_{1½}$
5	2096.13	47707	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^4P°_{1½}$
1	2094.73	47739	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^2D°_{1½}$
4	2088.54	47880	$(^3P)5s\ ^2P_{1½}$ −	$(^1D)5p\ ^2D°_{1½}$
3	2086.78	47921	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^4P°_{2½}$
20	2081.70	48038	$(^1G)5s\ ^2G_{4½}$ −	$(^1D)5p\ ^2F°_{3½}$
1	2071.02	48285	$(^3P)5s\ ^2P_{1½}$ −	$(^1D)5p\ ^2P°_{½}$
20	2057.65	48599	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4G°_{2½}$
15	2054.49	48674	$(^1D)5s\ ^2D_{1½}$ −	$(^3F)5p\ ^2F°_{2½}$
15	2053.83	48690	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^2D°_{2½}$
0	2049.37	48796	$(^3P)5s\ ^4P_{1½}$ −	$(^3F)5p\ ^4F°_{2½}$
5	2040.26	49013	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^4P°_{½}$
2	2025.25	49377	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4G°_{3½}$
15	2014.30	49645	{ $(^1D)5s\ ^2D_{2½}$ −	$(^1D)5p\ ^2F°_{2½}$
			{ $(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4D°_{3½}$
20	2012.14	49698	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4F°_{3½}$
6	2009.10	49774	$(^3P)5s\ ^2P_{1½}$ −	$(^1D)5p\ ^2P°_{1½}$
6	2007.94	49802	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^4F°_{2½}$
6	2007.74	49807	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^4P°_{1½}$
60	2000.24	49994	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4F°_{1½}$
7	1999.14	50022	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^4P°_{2½}$
20	1987.02	50327	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^2F°_{3½}$
15	1981.87	50457	$(^3P)5s\ ^4P_{1½}$ −	$(^3F)5p\ ^2D°_{1½}$
50	1977.03	50581	$(^3P)5s\ ^2P_{1½}$ −	$(^1D)5p\ ^2D°_{2½}$
60	1975.92	50609	{ $(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^1F°_{4½}$
			{ $(^3P)5s\ ^4P_{½}$ −	$(^3P)5p\ ^4P°_{1½}$
40	1966.89	50842	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4G°_{2½}$
10	1960.86	50998	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4D°_{2½}$
70	1957.62	51082	$(^1G)5s\ ^2G_{3½}$ −	$(^1G)5p\ ^2H°_{4½}$
2	1954.59	51162	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^2D°_{2½}$
4	1952.98	51204	$(^1G)5s\ ^2G_{3½}$ −	$(^3P)5p\ ^4D°_{2½}$
5	1952.74	51210	$(^1G)5s\ ^2G_{4½}$ −	$(^1G)5p\ ^2H°_{4½}$
10	1948.44	51323	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^2G°_{3½}$
15	1946.32	51379	$(^1G)5s\ ^2G_{4½}$ −	$(^3P)5p\ ^4D°_{3½}$
5	1945.37	51404	$(^1D)5s\ ^2D_{2½}$ −	$(^1D)5p\ ^2F°_{3½}$
4	1943.12	51464	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^2D°_{1½}$
4	1937.00	51626	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^4D°_{1½}$
7	1933.11	51730	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^4P°_{½}$
5	1932.53	51746	{ $(^1D)5s\ ^2D_{1½}$ −	$(^1D)5p\ ^2F°_{2½}$
			{ $(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^4D°_{2½}$
20	1925.30	51940	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4F°_{3½}$
60	1917.08	52163	$(^3F)5s\ ^4F_{4½}$ −	$(^3F)5p\ ^4D°_{3½}$
40	1916.92	52167	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4G°_{4½}$
6	1913.01	52274	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^4F°_{2½}$
6	1908.49	52397	$(^3P)5s\ ^4P_{2½}$ −	$(^3F)5p\ ^2F°_{2½}$
0	1901.20	52598	$(^3P)5s\ ^2P_{½}$ −	$(^3P)5p\ ^2P°_{1½}$
2	1898.86	52663	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^4D°_{1½}$
7	1896.69	52723	$(^1D)5s\ ^2D_{2½}$ −	$(^1D)5p\ ^2P°_{1½}$
7	1894.01	52798	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^2F°_{3½}$
30	1889.57	52922	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4G°_{3½}$
2	1882.44	53123	$(^1D)5s\ ^2D_{2½}$ −	$(^1D)5p\ ^2D°_{1½}$
25	1880.36	53181	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^4G°_{2½}$
5	1874.93	53335	$(^1D)5s\ ^2D_{1½}$ −	$(^1D)5p\ ^2P°_{½}$
40	1873.45	53378	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4D°_{2½}$
10	1872.55	53403	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^2D°_{2½}$
15	1868.10	53530	{ $(^3P)5s\ ^4P_{2½}$ −	$(^3P)5p\ ^4P°_{1½}$
			{ $(^1D)5s\ ^2D_{2½}$ −	$(^1D)5p\ ^2D°_{2½}$
35	1867.12	53558	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^2G°_{4½}$
8	1863.39	53666	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^2D°_{2½}$
10	1860.64	53745	$(^3P)5s\ ^4P_{2½}$ −	$(^3P)5p\ ^4P°_{2½}$
12	1858.91	53795	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^2G°_{3½}$
15	1856.33	53870	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4D°_{1½}$
6	1854.04	53936	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^2D°_{1½}$
12	1849.93	54056	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^4D°_{½}$
10	1846.96	54143	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^2D°_{1½}$
40	1840.14	54344	$(^1G)5s\ ^2G_{4½}$ −	$(^1G)5p\ ^2H°_{5½}$
15	1838.64	54388	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4G°_{2½}$
25	1836.10	54463	$(^3P)5s\ ^4P_{1½}$ −	$(^1D)5p\ ^2F°_{2½}$
10	1834.31	54516	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^4F°_{2½}$
25	1832.33	54575	{ $(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^4F°_{1½}$
			{ $(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^4D°_{1½}$
35	1828.83	54680	$(^3F)5s\ ^4F_{4½}$ −	$(^3F)5p\ ^4G°_{4½}$
0	1828.21	54698	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^4D°_{2½}$
8	1826.61	54746	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^4D°_{3½}$
4	1823.99	54825	$(^1D)5s\ ^2D_{1½}$ −	$(^1D)5p\ ^2P°_{1½}$
15	1822.45	54871	$(^3F)5s\ ^2F_{2½}$ −	$(^3F)5p\ ^2F°_{2½}$
2	1821.50	54900	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^2P°_{1½}$
25	1816.83	55041	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^2F°_{3½}$
0	1813.15	55153	$(^1G)5s\ ^2G_{3½}$ −	$(^1G)5p\ ^2F°_{3½}$
1	1810.74	55226	$(^1D)5s\ ^2D_{1½}$ −	$(^1D)5p\ ^2D°_{1½}$
5	1808.92	55282	$(^1G)5s\ ^2G_{4½}$ −	$(^1G)5p\ ^2F°_{3½}$
30	1808.23	55303	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4G°_{3½}$
15	1802.24	55487	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4F°_{3½}$
3	1797.64	55629	{ $(^1D)5s\ ^2D_{1½}$ −	$(^1D)5p\ ^2D°_{2½}$
			{ $(^3P)5s\ ^4P_{½}$ −	$(^1D)5p\ ^2P°_{1½}$
15	1793.90	55745	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^2D°_{2½}$
1	1785.59	56004	$(^3F)5s\ ^2F_{2½}$ −	$(^3P)5p\ ^4P°_{1½}$
2	1784.48	56039	$(^3F)5s\ ^2F_{3½}$ −	$(^3F)5p\ ^2G°_{3½}$
1	1783.93	56056	$(^3P)5s\ ^4P_{1½}$ −	$(^1D)5p\ ^2P°_{½}$
5	1778.75	56219	$(^3F)5s\ ^2F_{2½}$ −	$(^3P)5p\ ^4P°_{2½}$
2	1776.07	56304	$(^3P)5s\ ^2P_{½}$ −	$(^3P)5p\ ^2P°_{½}$
10	1771.81	56440	$(^3F)5s\ ^2G_{3½}$ −	$(^1G)5p\ ^2F°_{2½}$
15	1768.70	56536	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4F°_{4½}$
4	1766.22	56618	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^2D°_{2½}$
7	1764.36	56678	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^4D°_{1½}$
1	1761.57	56768	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4G°_{2½}$
10	1760.57	56800	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^4D°_{2½}$
3	1758.79	56857	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^4F°_{2½}$
4	1755.90	56951	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^2D°_{2½}$
2	1754.89	56984	$(^3P)5s\ ^2P_{1½}$ −	$(^1G)5p\ ^2F°_{2½}$
75	1751.03[1]	57109	$(^3F)5s\ ^4F_{4½}$ −	$(^3F)5p\ ^4G°_{5½}$
20	1747.34	57230	$(^3P)5s\ ^4P_{2½}$ −	$(^1D)5p\ ^2F°_{3½}$
3	1739.52	57487	$(^3P)5s\ ^4P_{½}$ −	$(^3P)5p\ ^4D°_{1½}$
1*d*	1737.92	57540	$(^3P)5s\ ^4P_{1½}$ −	$(^1D)5p\ ^2P°_{1½}$
3*d*	1729.55	57819	$(^3F)5s\ ^4F_{4½}$ −	$(^3F)5p\ ^4G°_{3½}$
0	1728.73	57846	$(^1D)5s\ ^2D_{2½}$ −	$(^3P)5p\ ^2P°_{1½}$
25	1728.14	57866	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^4F°_{3½}$
0	1725.85	57943	$(^3F)5s\ ^2F_{2½}$ −	$(^1D)5p\ ^2F°_{2½}$
20	1722.27	58063	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^4F°_{2½}$
2	1713.81	58350	$(^3P)5s\ ^4P_{1½}$ −	$(^1D)5p\ ^2D°_{2½}$
1	1710.56	58460	$(^3F)5s\ ^2F_{3½}$ −	$(^3P)5p\ ^4P°_{2½}$
15	1708.86	58519	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^2D°_{1½}$
0	1707.97	58549	$(^3P)5s\ ^4P_{2½}$ −	$(^1D)5p\ ^2P°_{1½}$
5	1706.89	58586	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^2F°_{3½}$
5	1706.61	58596	$(^3P)5s\ ^2P_{1½}$ −	$(^3P)5p\ ^2P°_{½}$
20	1705.06	58649	$(^1D)5s\ ^2D_{2½}$ −	$(^1G)5p\ ^2F°_{3½}$
5	1703.04	58719	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^2D°_{2½}$
50	1693.51	59049	$(^3F)5s\ ^4F_{4½}$ −	$(^3F)5p\ ^4F°_{4½}$
0	1685.46	59331	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^2D°_{2½}$
0	1684.68	59359	$(^3P)5s\ ^4P_{2½}$ −	$(^1D)5p\ ^2D°_{2½}$
1*d*	1683.56	59398	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^4D°_{1½}$
0	1682.09	59450	$(^3F)5s\ ^4F_{1½}$ −	$(^3F)5p\ ^2F°_{2½}$
10	1681.07	59486	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^2G°_{4½}$
0	1680.18	59517	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^4D°_{2½}$
8	1678.27	59585	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^2G°_{3½}$
6	1674.99	59702	$(^3F)5s\ ^2F_{2½}$ −	$(^1D)5p\ ^2F°_{3½}$
8	1674.34	59725	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^2D°_{1½}$
1	1668.48	59935	$(^1D)5s\ ^2D_{2½}$ −	$(^1G)5p\ ^2F°_{2½}$
0	1668.20	59945	$(^1D)5s\ ^2D_{1½}$ −	$(^3P)5p\ ^2P°_{1½}$
0	1655.60	60401	$(^3P)5s\ ^4P_{2½}$ −	$(^3P)5p\ ^4D°_{1½}$
2	1650.97	60571	$(^3P)5s\ ^4P_{2½}$ −	$(^3P)5p\ ^4D°_{3½}$
2	1650.52	60587	$(^3F)5s\ ^4F_{1½}$ −	$(^3P)5p\ ^4P°_{1½}$
0	1648.54	60660	$(^3F)5s\ ^4F_{2½}$ −	$(^3F)5p\ ^2F°_{2½}$
2	1644.66	60803	$(^3F)5s\ ^4F_{1½}$ −	$(^3P)5p\ ^4P°_{2½}$
2	1640.22	60967	$(^3F)5s\ ^4F_{3½}$ −	$(^3F)5p\ ^2F°_{3½}$
1	1638.75	61022	$(^3F)5s\ ^2F_{2½}$ −	$(^1D)5p\ ^2P°_{1½}$
1	1627.61	61440	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^2D°_{2½}$
1	1618.34	61792	$(^3F)5s\ ^4F_{2½}$ −	$(^3P)5p\ ^4P°_{1½}$
0	1615.25	61910	$(^3P)5s\ ^4P_{1½}$ −	$(^3P)5p\ ^2D°_{1½}$
3	1614.26	61948	$(^3F)5s\ ^2F_{3½}$ −	$(^1D)5p\ ^2F°_{3½}$

[1] Classification by Gibbs and White.
d denotes a diffuse line.

TABLE IV—(*continued*)

INT.	λ VAC.	ν VAC.	CLASSIFICATION
1	1612.75	62006	$(^3F)5s\ ^4F_{4\frac{1}{2}} - (^3F)5p\ ^2G^\circ_{4\frac{1}{2}}$
			$(^3F)5s\ ^4F_{2\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{2\frac{1}{2}}$
3	1611.90	62039	$(^3F)5s\ ^2D_{1\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{2\frac{1}{2}}$
2	1601.48	62442	$(^3P)5s\ ^4P_{2\frac{1}{2}} - (^3P)5p\ ^2D^\circ_{2\frac{1}{2}}$
1	1595.69	62669	$(^3P)5s\ ^4P_{1\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
1	1590.47	62875	$(^3F)5s\ ^2F_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{1\frac{1}{2}}$
1	1587.39	62997	$(^3F)5s\ ^2F_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
1	1586.26	63041	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^3F)5p\ ^2F^\circ_{2\frac{1}{2}}$
			$(^3F)5s\ ^2F_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{3\frac{1}{2}}$
1	1575.26	63481	$(^3F)5s\ ^4F_{4\frac{1}{2}} - (^3F)5p\ ^2F^\circ_{3\frac{1}{2}}$
0*d*	1571.07	63651	$(^1D)5s\ ^2D_{1\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{\frac{1}{2}}$
1	1570.38	63679	$(^3P)5s\ ^4P_{2\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
1	1569.16	63728	$(^3F)5s\ ^4F_{2\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{2\frac{1}{2}}$
1	1560.74	64072	$(^3F)5s\ ^2F_{3\frac{1}{2}} - (^1D)5p\ ^2D^\circ_{2\frac{1}{2}}$
1	1551.44	64456	$(^3P)5s\ ^4P_{\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{\frac{1}{2}}$
1	1550.94	64477	$(^3F)5s\ ^4F_{4\frac{1}{2}} - (^3F)5p\ ^2G^\circ_{3\frac{1}{2}}$
			$(^3P)5s\ ^4P_{2\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{3\frac{1}{2}}$
3*d*	1531.71	65287	$(^3F)5s\ ^2F_{3\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{3\frac{1}{2}}$
1	1527.06	65485	$(^3F)5s\ ^4F_{2\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{3\frac{1}{2}}$
1	1512.64	66110	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{2\frac{1}{2}}$
1	1511.86	66144	$(^3F)5s\ ^2F_{2\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
0	1506.74	66369	$(^3P)5s\ ^4P_{1\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{\frac{1}{2}}$
0	1493.69	66948	$(^3F)5s\ ^2F_{2\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{3\frac{1}{2}}$
0	1479.81	67576	$(^3F)5s\ ^4F_{1\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
0	1473.40	67870	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{3\frac{1}{2}}$
1	1453.75	68788	$(^3F)5s\ ^4F_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
0	1445.34	69188	$(^3F)5s\ ^2F_{3\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{3\frac{1}{2}}$
1	1420.82	70382	$(^3F)5s\ ^4F_{4\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{3\frac{1}{2}}$
6	1405.25	71162	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
0	1404.30	71210	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{3\frac{1}{2}}$
0	1390.17	71934	$(^3F)5s\ ^4F_{2\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
0	1356.33	73728	$(^3F)5s\ ^4F_{4\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{3\frac{1}{2}}$
0	1308.84	76404	$(^3F)5s\ ^4F_{3\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{2\frac{1}{2}}$
4	873.13	114530	$4d^9\ ^2D_{1\frac{1}{2}} - 4d^8(^3F)5p\ ^4D^\circ_{2\frac{1}{2}}$
0	866.47	115411	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4D^\circ_{3\frac{1}{2}}$
0	851.69	117414	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^4D^\circ_{1\frac{1}{2}}$
5	848.00	117924	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^4G^\circ_{2\frac{1}{2}}$
6	839.34	119141	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4D^\circ_{2\frac{1}{2}}$
20	838.11	119316	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^4F^\circ_{1\frac{1}{2}}$
8	829.98	120485	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^2D^\circ_{2\frac{1}{2}}$
6	826.00	121065	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4G^\circ_{3\frac{1}{2}}$
18	822.39	121597	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^4F^\circ_{2\frac{1}{2}}$
3	819.59	122012	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4D^\circ_{1\frac{1}{2}}$
15	816.22	122531	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4G^\circ_{2\frac{1}{2}}$
1	811.30	123259	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^2D^\circ_{1\frac{1}{2}}$
30	808.88	123628	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4F^\circ_{3\frac{1}{2}}$
5	806.93	123926	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4F^\circ_{1\frac{1}{2}}$
1	805.18	124196	$^2D_{1\frac{1}{2}} - (^3F)5p\ ^2F^\circ_{2\frac{1}{2}}$
0	802.99	124535	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{\frac{1}{2}}$
40	799.41	125092	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^2D^\circ_{2\frac{1}{2}}$
25	797.91	125327	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{1\frac{1}{2}}$
20	796.54	125543	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{2\frac{1}{2}}$
25	792.35	126207	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^4F^\circ_{2\frac{1}{2}}$
20	789.08	126730	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^2F^\circ_{3\frac{1}{2}}$
15	785.76	127265	$^2D_{1\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{2\frac{1}{2}}$
20	782.91	127729	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^2G^\circ_{3\frac{1}{2}}$
35	776.38	128803	$^2D_{2\frac{1}{2}} - (^3F)5p\ ^2F^\circ_{2\frac{1}{2}}$
5	776.03	128861	$^2D_{1\frac{1}{2}} - (^1D)5p\ ^2P^\circ_{\frac{1}{2}}$
15	769.61	129936	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{1\frac{1}{2}}$
25	768.33	130152	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^4P^\circ_{2\frac{1}{2}}$
20	767.19	130346	$^2D_{1\frac{1}{2}} - (^1D)5p\ ^2P^\circ_{1\frac{1}{2}}$
3	762.43	131160	$^2D_{1\frac{1}{2}} - (^1D)5p\ ^2D^\circ_{2\frac{1}{2}}$
10	758.27	131879	$^2D_{2\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{2\frac{1}{2}}$
4	756.43	132200	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{1\frac{1}{2}}$
15	755.73	132322	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
20	748.30	133636	$^2D_{2\frac{1}{2}} - (^1D)5p\ ^2F^\circ_{3\frac{1}{2}}$
8	744.91	134244	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^2D^\circ_{2\frac{1}{2}}$
20	742.29	134718	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^2D^\circ_{1\frac{1}{2}}$
20	740.98	134956	$^2D_{2\frac{1}{2}} - (^1D)5p\ ^2P^\circ_{1\frac{1}{2}}$
10	738.13	135477	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
20	736.57	135764	$^2D_{2\frac{1}{2}} - (^1D)5p\ ^2D^\circ_{2\frac{1}{2}}$
15	730.94	136810	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{1\frac{1}{2}}$
15	730.28	136934	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{2\frac{1}{2}}$
35	730.04	136979	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^4D^\circ_{3\frac{1}{2}}$
30	726.96	137559	$^2D_{1\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{1\frac{1}{2}}$
5	720.15	138860	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^2D^\circ_{2\frac{1}{2}}$
20	718.53	139173	$^2D_{1\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{\frac{1}{2}}$
10	717.73	139328	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^2D^\circ_{1\frac{1}{2}}$
20	713.85	140085	$^2D_{2\frac{1}{2}} - (^3P)5p\ ^2P^\circ_{1\frac{1}{2}}$
20	709.80	140885	$^2D_{2\frac{1}{2}} - (^1G)5p\ ^2F^\circ_{3\frac{1}{2}}$

any of the elements of the sequence. The reinversion of the $4d^8(^1D)5s\ ^2D_{2\frac{1}{2},\,1\frac{1}{2}}$ levels in passing from Rh I to Pd II appears as a marked irregularity. The relative position of the levels in Pd II and Ag III makes it seem probable that the $4d^8(^3P)5s\ ^2P_{1\frac{1}{2}}$ and $4d^8(^1D)5s\ ^2D_{1\frac{1}{2}}$ levels have been confused in the analysis of the Rh I spectrum. The dotted lines indicate the increase in regularity when these two levels are interchanged in Rh I.

The term values relative to $4d^9\ ^2D_{2\frac{1}{2}}$ as zero are given in Table III. The term structure shows considerable departure from L–S coupling. The multiplets in this sequence are irregular and overlap considerably especially in the $4d^85p$ configuration. Except for the multiplets $4d^8(^3F)5p\ ^4D^\circ$ and $4d^8(^3F)5s\ ^4F$, the Landé interval rule is not even approximately obeyed. There are marked departures from the usual L selection rules. Transitions involving a change in L as great as ± 3 are common and give rise to some of the strong lines of the spectrum. The term $4d^8(^3P)5s\ ^4P_{\frac{1}{2}}$ is considered questionable for two reasons. The transition $4d^8(^3P)5s\ ^4P_{\frac{1}{2}} - 4d^8(^3F)5p\ ^4D^\circ_{\frac{1}{2}}$, which should occur with an intensity of about 6 on the scale used, is entirely absent. Furthermore, the use of this term (i.e., $^4P_{\frac{1}{2}} = 79{,}326\ \text{cm}^{-1}$) results in a number of coincidences with lines used elsewhere in the analysis. However, the position of the level in the centroid diagram, and the fact that no other term value has been found which yields the observed transitions, lends some support to the assignment given here. Some terms, notably $4d^8(^1G)5p\ ^2G^\circ_{4\frac{1}{2},\,3\frac{1}{2}}$, $4d^8(^3P)5p\ ^4S^\circ_{1\frac{1}{2}}$ and $^2S^\circ_{\frac{1}{2}}$ could not be definitely established either because of paucity, or lack of intensity, of the combinations with other terms.

The classified lines are collected in Table IV. The measurements are believed to be accurate to at least 0.05A (1.4 cm^{-1} at 1900A to 5 cm^{-1} at 1000A) for all wavelengths reported. The wavelengths and intensities are those obtained from the spectrum of the silver spark.

The author wishes to express his gratitude to Professor R. C. Gibbs for helpful advice and criticism given during the course of this investigation. Thanks are also extended to Dr. C. W. Gartlein, who suggested the problem, for assistance in carrying out some of the experimental work.