

LINE SPECTRA OF THE ELEMENTS

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The original tables from which this table was derived were prepared under the auspices of the Committee on Line Spectra of the Elements of the National Academy of Sciences-National Research Council. The table contains the outstanding spectral lines of neutral (I) and singly ionized (II) atoms of the elements from hydrogen through plutonium ($Z = 1-94$); selected strong lines from doubly ionized (III), triply ionized (IV), and quadruply ionized (V) atoms are also included. Listed are lines that appear in emission from the vacuum ultraviolet to the far infrared. These lines were selected from much larger lists in such a way as to include the stronger observed lines in each spectral region. A more extensive list may be found in Reference 1.

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All wavelengths are given in Ångstrom units (10^{-10} m). Below 2000 Å the wavelengths are in vacuum (except for the Cu II line at 1999.698 Å, which is in air); above 2000 Å the wavelengths are in air. Wavelengths given to three decimal places have an uncertainty of less than 0.001 Å and are therefore suitable for calibration purposes. In the air region, the elements used most commonly for calibration are Ne, Ar, Kr, Fe, Th, and Hg; in the vacuum region, the most common are C, N, O, Si, Cu.

All data refer to natural isotopic abundance of the elements except that Kr I and Kr II lines below 11,000 Å given to three decimal

places are for ^{86}Kr . A separate table for ^{198}Hg contains accurately known wavelengths that are frequently used for calibration.

A large number of the lines for neutral and singly ionized atoms were extracted from the National Bureau of Standards (NBS) *Tables of Spectral-Line Intensities* (Reference 2). The intensities of these lines represent quantitative estimates of relative line strengths that take account of varying detection sensitivity at different wavelengths. They are on a linear scale. For nearly all of the other lines the intensities represent qualitative estimates of the relative strengths of lines not greatly separated in wavelength. Because different observers frequently use different scales for their intensity estimates, these intensities are useful only as a rough indication of the appearance of a spectrum. In some cases the intensity scale is not intended to be linear. In the first and second spectra the intensities of the lines of the singly ionized atom (II) relative to those of the neutral atom (I) should be used with caution, inasmuch as the concentration of ions in a light source depends greatly on the excitation conditions.

Descriptive symbols that follow the wavelength have the following meanings:

c — complex
d — line consists of two unresolved lines
h — hazy
l — shaded to longer wavelengths
s — shaded to shorter wavelengths
p — perturbed by a close line
r — easily reversed
w — wide

The table is arranged alphabetically by element name (not symbol); for each element the lines are listed by wavelength. References to the sources of data for each element are given at the end of the table, starting on page 10-89.

General References

1. Reader, J., Corliss, C. H., Wiese, W. L., and Martin, G. A., *Tables of Line Spectra of the Elements, Part 1. Wavelengths and Intensities*, Nat. Stand. Ref. Data Sys.- Nat. Bur. Standards (U.S.), No. 68, 1980.
2. Meggers, W. F., Corliss, C. H., and Scribner, B. F., *Tables of Spectral Line Intensities, Part 1. Arranged by Elements*, Nat. Bur. Stand. (U.S.), Monograph 145, 1975.
3. Fuhr, J. R., Martin, W. C., Musgrove, A., Sugar, J., and Wiese, W. L., "NIST Atomic Spectroscopic Database" ver. 1.1, January 1996. *NIST Physical Reference Data*, National Institute of Standards and Technology, Gaithersburg, MD. Available at the WWW address: <http://physics.nist.gov/PhysRefData/contents.html>

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
<i>Actinium Ac Z = 89</i>			900	1582.04	IV	110	2368.11	I	290	6068.43	II
2000 h	2952.55	III	800	1584.46	IV	180	2369.30	I	110	6068.53	II
2000 h	3392.78	III	125	1596.059	II	140	2370.22	I	450	6073.23	II
3000	3487.59	III	700	1605.766	III	160	2372.07	I	110	6181.57	II
2000 s	3863.12	II	100	1611.814	III	850	2373.12	I	150	6181.68	II
3000 s	4088.44	II	800	1611.874	III	170	2373.35	I	290	6182.28	II
3000 s	4168.40	II	150	1625.627	II	110	2373.57	I	220	6182.45	II
100	4179.98	I	800	1639.06	IV	240	2567.98	I	450 h	6183.42	II
20	4183.12	I	100	1644.235	II	480	2575.10	I	450	6201.52	II
20	4194.40	I	100	1644.809	II	110	2637.70	II	360	6201.70	II
20 l	4384.53	I	1000	1670.787	II	150	2652.48	I	290	6226.18	II
20	4396.71	I	100	1686.250	II	200	2660.39	I	360	6231.78	II
2000 h	4413.09	III	800	1719.440	II	160	2669.17	II	450	6243.36	II
20	4462.73	I	500	1721.244	II	650	2816.19	II	450	6335.74	II
3000 h	4569.87	III	900	1721.271	II	150	3041.28	II	360	6696.02	I
1000	5910.85	II	500	1724.952	II	360	3050.07	I	230	6698.67	I
20	6359.86	I	900	1724.984	II	450	3057.14	I	110	7361.57	I
20 l	6691.27	I	350	1760.104	II	150	3074.64	II	140	7362.30	I
<i>Aluminum Al Z = 13</i>			300	1761.975	II	4500 r	3082.153	I	230	7835.31	I
900	125.53	V	290	1763.00	I	7200 r	3092.710	I	290	7836.13	I
800	126.07	V	500	1763.869	II	1800 r	3092.839	I	110	8075.35	I
800	130.41	V	700	1763.952	II	150	3428.92	II	290	8640.70	II
1000	130.85	V	450	1765.64	I	150	3443.64	I	360	8772.87	I
900	131.00	V	300	1765.815	II	900	3492.23	IV	450	8773.90	I
900	131.44	V	450	1766.38	I	800	3508.46	IV	110	8828.91	I
800	160.07	IV	400	1767.731	II	450	3586.56	II	180	8841.28	I
1000	278.69	V	450	1769.14	I	360	3587.07	II	140	8923.56	I
900	281.39	V	1000	1818.56	IV	290	3587.45	II	150	9290.65	II
70	486.884	III	600	1828.588	II	870	3601.63	III	110	9290.75	II
30	486.912	III	400	1832.837	II	220	3651.06	II	150	10076.29	II
250	511.138	III	250	1834.808	II	110	3651.10	II	110	10768.36	I
150	511.191	III	1000	1854.716	III	150	3654.98	II	140	10782.04	I
500	560.317	III	300	1855.929	II	290	3655.00	II	110	10872.98	I
200	560.433	III	700	1858.026	II	450	3900.68	II	230	10891.73	I
100	670.068	III	120	1859.980	II	4500 r	3944.006	I	450	11253.19	I
200	671.118	III	1000	1862.311	II	9000 r	3961.520	I	570	11254.88	I
500	695.829	III	600	1862.790	III	110	3995.86	II	570	13123.41	I
400	696.217	III	200	1929.978	II	290	4226.81	II	450	13150.76	I
200	725.683	III	150	1931.048	II	870	4529.19	III	230	16718.96	I
300	726.915	III	200	1932.377	II	150	4585.82	II	300	16750.56	I
400	855.034	III	400	1934.503	II	110	4588.19	II	140	16763.36	I
500	856.746	III	150	1934.713	II	550	4666.80	II	300	21093.04	I
400	892.024	III	300	1935.840	III	110	4898.76	II	360	21163.75	I
50	893.887	III	200	1935.949	III	110	4902.77	II	<i>Antimony Sb Z = 51</i>		
450	893.897	III	150	1936.907	II	150	5280.21	II	15	722.86	III
800	1042.17	IV	220	1939.261	II	290	5283.77	II	15	732.33	III
50	1191.812	II	700	1990.531	II	150	5285.85	II		861.5	IV
900	1237.19	IV	150	2016.052	II	110	5312.32	II	4	876.84	II
900	1257.62	IV	150	2016.234	II	220	5316.07	II	4	921.07	II
800	1264.18	IV	100	2016.368	II	150	5371.84	II	6	983.57	II
1000	1272.76	IV	200	2074.008	II	180	5557.06	I	15	999.62	III
150	1350.18	II	700	2094.264	II	110	5557.95	I	6	1001.13	II
800	1384.13	III	150	2094.744	II	450	5593.23	II	6	1009.43	II
800	1447.51	IV	300	2094.791	II	1200	5696.60	III	40	1011.94	III
800	1494.79	IV	100	2095.104	II	1000	5722.73	III	6	1052.21	II
1000	1526.14	V	200	2095.141	II	110	5853.62	II	8	1056.27	II
800	1537.54	IV	400	2269.10	I	220	5971.94	II	8	1057.32	II
800	1539.830	II	120	2269.22	I	290	6001.76	II	40	1065.90	III
1000	1557.25	IV	140	2321.56	I	220	6001.88	II	6	1073.81	II
100	1569.385	II	460	2367.05	I	450	6006.42	II	30	1075.82	III
			110	2367.61	I	150	6061.11	II		1087.6	IV

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
8	1104.32	V	100 r	2139.69	I	15	4514.50	II	4	447.53	V
30	1151.49	III	10	2141.80	II	30	4596.90	II	18	449.06	V
40	1157.74	III	50 r	2141.83	I	20	4599.09	II	4	449.49	V
	1199.1	IV	100 r	2144.86	I	15	4604.77	II	3	458.12	V
50	1205.20	III	1500 r	2175.81	I	30	4647.32	II	2	458.98	V
50	1210.64	III	250 r	2179.19	I	20	4675.74	II	6 p	461.23	V
12	1226.00	V	200 r	2201.32	I	40	4711.26	II	3	462.42	V
6	1230.30	II	300 r	2208.45	I	20	4757.81	II	7	463.94	V
8	1274.98	II	150 r	2220.73	I	20	4765.36	II	30	487.227	II
20	1306.69	III	100	2221.98	I	30	4784.03	II	50	490.650	II
8	1327.40	II	120 r	2224.93	I	20	4802.01	II	30	490.701	II
6	1358.04	II	300 r	2262.51	I	20	4832.82	II	30	519.327	II
8	1384.70	II	120	2288.98	I	20	4877.24	II	3	522.09	V
20	1404.18	III	150 r	2293.44	I	15	4947.40	II	5	524.19	V
6	1407.83	II	300 r	2306.46	I	15	5044.56	II	6	527.69	V
8	1436.49	II	2500 r	2311.47	I	20	5238.94	II	30	542.912	II
20 r	1486.57	I	150	2315.89	I	20	5354.24	II	200	543.203	II
40 h	1491.36	I	400 h	2373.67	I	40 h	5556.10	I	70	547.461	II
	1499.2	IV	300 h	2383.64	I	100 l	5632.02	I	2	554.50	V
12	1505.70	V	100	2395.22	I	30	5639.75	II	70	556.817	II
50 r	1512.57	I	150	2422.13	I	60 h	5830.34	I	5	558.48	V
12	1524.47	V	250	2426.35	I	100	6005.21	II	70	573.362	II
120 r	1532.74	I	400 r	2445.51	I	20	6053.41	II	30	576.736	II
80 r	1535.06	I	400	2478.32	I	30	6079.80	II	70	580.263	II
6	1565.51	II	150	2480.44	I	50	6130.04	II	30	583.437	II
8	1576.11	II	100	2510.54	I	20	6154.94	II	70	597.700	II
7	1581.36	II	2000 r	2528.52	I	20	6611.49	I	30	602.858	II
80 r	1599.96	I	15	2528.54	II	30	6647.44	II	30	612.372	II
10	1606.98	II	10	2567.75	II	30 h	7648.28	I	6	623.77	IV
200 w	1612.8	I	150	2574.06	I	80	7844.44	I	3	635.12	V
100 w	1623.3	I	15	2590.13	III	200	7924.65	I	500	661.867	II
20	1657.04	II	1500 r	2598.05	I	60	8411.69	I	30	664.562	II
100 w	1662.6	I	500 r	2598.09	I	150	8572.64	I	200	666.011	II
15	1673.89	III	300 r	2612.31	I	100	8619.55	I	1000	670.946	II
15	1711.84	III	12	2617.17	III	400	9518.68	I	3000	671.851	II
80 r	1716.93	I	200 r	2652.60	I	400	9949.14	I	70	676.242	II
150 r	1717.45	I	20	2669.39	III	200	10078.49	I	30	677.952	II
150 r	1723.43	I	300 r	2670.64	I	300	10261.01	I	30	679.218	II
15	1725.33	III	200 r	2682.76	I	200	10585.60	I	200	679.401	II
100 r	1736.19	I	120	2692.25	I	1000	10677.41	I	10	683.28	IV
100 h	1765.76	I	150 r	2718.90	I	800	10741.94	I	7	688.39	IV
100 r	1780.87	I	400 r	2769.95	I	80	10794.11	I	12 p	689.01	IV
100 r	1788.24	I	1000 r	2877.92	I	600	10839.73	I	6	699.41	IV
150	1800.18	I	15	2980.96	II	200	10868.58	I	8	700.28	IV
50 r	1810.50	I	500 r	3029.83	I	400	10879.55	I	3	705.35	V
80 r	1814.20	I	600 r	3232.52	I	300	11012.79	I	5	709.20	V
100	1829.50	I	20	3241.28	II	150	11266.23	I	4	715.60	V
50 r	1868.17	I	700 r	3267.51	I	5	12116.06	I	3	715.65	V
300 r	1871.15	I	15	3498.46	II				200	718.090	II
150 r	1882.56	I	25	3637.80	II	<i>Argon Ar Z = 18</i>			3000	723.361	II
100	1927.08	I	250	3637.83	I	3	336.56	V	2	725.11	V
200 r	1950.39	I	20	3722.78	II	3	337.56	V	500	725.548	II
60 r	2029.49	I	200 r	3722.79	I	6	338.00	V	70	730.930	II
70 r	2039.77	I	20	3850.22	II	2	338.43	V	200	740.269	II
150 r	2049.57	I	200	4033.55	I	2	339.01	V	200	744.925	II
1000 r	2068.33	I	20	4033.56	II	3	339.89	V	70	745.322	II
100	2079.56	I	20	4133.63	II	3	350.88	V	4	754.20	IV
50 r	2098.41	I	15	4140.54	II	4	396.87	IV	5	761.47	IV
80 r	2118.48	I	15	4195.17	II	4	398.55	IV	12	769.15	III
100 r	2127.39	I	20	4219.07	II	2	436.67	V	5	800.57	IV
50 r	2137.05	I	20	4314.32	II	5	446.00	V	10	801.09	IV
						8	446.95	V			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
10	801.41	IV	12	2293.03	III	12	2913.00	IV	35	3718.206	II
5	801.91	IV	4	2299.72	IV	11	2926.33	IV	70	3729.309	II
20	802.859	I	10	2300.85	III	200	2942.893	II	50	3737.889	II
100	806.471	I	15	2302.17	III	100	2979.050	II	150	3765.270	II
60	806.869	I	9	2317.00	III	10	3010.02	III	50	3766.119	II
30	807.218	I	15	2317.47	III	12	3024.05	III	20	3770.369	I
40	807.653	I	12	2318.04	III	50	3033.508	II	20	3770.520	II
50	809.927	I	10	2319.13	III	6	3037.98	IV	25	3780.840	II
120	816.232	I	10	2319.37	III	12	3054.82	III	20	3795.37	III
70	816.464	I	9	2345.17	III	10	3064.77	III	25	3803.172	II
80	820.124	I	7	2351.67	III	8	3077.40	IV	50	3809.456	II
4	822.16	V	9	2360.26	III	10	3078.15	III	7	3834.679	I
120	825.346	I	10	2395.63	III	50	3093.402	II	70	3850.581	II
120	826.365	I	12	2399.15	III	7	3110.41	III	10	3858.32	III
5	827.05	V	10	2413.20	III	7	3127.90	III	35	3868.528	II
3	827.35	V	7	2415.61	III	8	3200.37	I	7	3907.84	III
150	834.392	I	10	2418.82	III	20	3243.689	II	35	3925.719	II
4 p	834.88	V	5	2420.456	II	25	3285.85	III	50	3928.623	II
100	835.002	I	12	2423.52	III	25	3293.640	II	25	3932.547	II
2	836.13	V	12	2423.93	III	20	3301.88	III	70	3946.097	II
15	840.03	IV	7	2443.69	III	20	3307.228	II	7	3947.505	I
100	842.805	I	8	2447.71	IV	15	3311.25	III	35	3948.979	I
20	843.77	IV	8	2472.95	III	7	3319.34	I	8	3960.53	III
25	850.60	IV	7	2476.10	III	7	3323.59	III	20	3979.356	II
180	866.800	I	12	2488.86	III	25	3336.13	III	35	3994.792	II
150	869.754	I	12	2513.28	IV	20	3344.72	III	50	4013.857	II
10	871.10	III	10	2516.789	II	25	3350.924	II	6	4023.60	III
9	875.53	III	6	2518.40	IV	15	3358.49	III	50	4033.809	II
180 r	876.058	I	9	2525.69	IV	7	3361.28	III	20	4035.460	II
12	878.73	III	10	2534.709	II	7	3373.47	I	150	4042.894	II
8	879.62	III	15	2562.087	II	25	3376.436	II	50	4044.418	I
180 r	879.947	I	12	2562.17	IV	25	3388.531	II	100	4052.921	II
9	883.18	III	10	2568.07	IV	15	3391.85	III	200	4072.005	II
10	887.40	III	7	2569.53	IV	7	3393.73	I	70	4072.385	II
150	894.310	I	12	2599.47	IV	7	3417.49	III	25	4076.628	II
5	900.36	IV	10	2608.06	IV	9	3424.25	III	35	4079.574	II
9	901.17	IV	7	2608.44	IV	8	3438.04	III	25	4082.387	II
1000	919.781	II	12	2615.68	IV	7	3461.07	I	150	4103.912	II
1000	932.054	II	6	2619.98	IV	9	3471.32	III	300	4131.724	II
1000 r	1048.220	I	12	2621.36	IV	70	3476.747	II	5	4146.70	III
500 r	1066.660	I	12	2624.92	IV	20	3478.232	II	35	4156.086	II
7	1669.67	III	7	2631.90	III	20	3480.55	III	400	4158.590	I
7	1673.42	III	15	2640.34	IV	50	3491.244	II	50	4164.180	I
7	1675.48	III	10	2654.63	III	100	3491.536	II	35	4179.297	II
9	1914.40	III	8	2674.02	III	12	3499.67	III	50	4181.884	I
7	1915.56	III	9	2678.38	III	15	3503.58	III	100	4190.713	I
10	2125.16	III	9	2682.63	IV	70	3509.778	II	50	4191.029	I
15	2133.87	III	10	2724.84	III	8	3511.12	III	200	4198.317	I
10	2138.59	III	14	2757.92	IV	70	3514.388	II	400	4200.674	I
10	2148.73	III	7	2762.23	III	70	3545.596	II	25	4218.665	II
15	2166.19	III	10	2776.26	IV	70	3545.845	II	25	4222.637	II
10	2168.26	III	12	2784.47	IV	7	3554.306	I	25	4226.988	II
20	2170.23	III	14	2788.96	IV	100	3559.508	II	100	4228.158	II
25	2177.22	III	7	2797.11	IV	100	3561.030	II	100	4237.220	II
8	2184.06	III	16	2809.44	IV	70	3576.616	II	25	4251.185	I
10	2188.22	III	10	2830.25	IV	25	3581.608	II	200	4259.362	I
15	2192.06	III	7	2842.88	III	50	3582.355	II	100	4266.286	I
7	2248.73	III	8	2855.29	III	70	3588.441	II	70	4266.527	II
10	2279.10	III	6	2874.40	IV	7	3606.522	I	150	4272.169	I
7	2281.22	III	9	2884.12	III	25	3622.138	II	550	4277.528	II
7	2282.21	III	25	2891.612	II	20	3639.833	II	20	4282.898	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	4300.101	I	25	5165.773	II	7	6951.478	I	200	10673.565	I
25	4300.650	II	20	5187.746	I	7	6960.250	I	11	10681.773	I
70	4309.239	II	20	5216.814	II	10000	6965.431	I	7	10683.034	II
200	4331.200	II	7	5221.271	I	150	7030.251	I	30	10733.87	I
50	4332.030	II	5	5421.352	I	10000	7067.218	I	30	10759.16	I
100	4333.561	I	10	5451.652	I	100	7068.736	I	7	10812.896	II
50	4335.338	I	25	5495.874	I	25	7107.478	I	11	11078.869	I
25	4345.168	I	5	5506.113	I	25	7125.820	I	30	11106.46	I
800	4348.064	II	25	5558.702	I	1000	7147.042	I	12	11441.832	I
50	4352.205	II	10	5572.541	I	15	7158.839	I	400	11488.109	I
25	4362.066	II	35	5606.733	I	70	7206.980	I	200	11668.710	I
50	4367.832	II	20	5650.704	I	15	7265.172	I	12	11719.488	I
200	4370.753	II	10	5739.520	I	7	7270.664	I	200	12112.326	I
70	4371.329	II	5	5834.263	I	2000	7272.936	I	50	12139.738	I
50	4375.954	II	10	5860.310	I	35	7311.716	I	50	12343.393	I
150	4379.667	II	15	5882.624	I	25	7316.005	I	200	12402.827	I
50	4385.057	II	25	5888.584	I	5	7350.814	I	200	12439.321	I
70	4400.097	II	50	5912.085	I	70	7353.293	I	100	12456.12	I
200	4400.986	II	15	5928.813	I	200	7372.118	I	200	12487.663	I
400	4426.001	II	5	5942.669	I	20	7380.426	II	150	12702.281	I
150	4430.189	II	7	5987.302	I	10000	7383.980	I	30	12733.418	I
50	4430.996	II	5	5998.999	I	20	7392.980	I	12	12746.232	I
50	4433.838	II	5	6025.150	I	15	7412.337	I	200	12802.739	I
20	4439.461	II	70	6032.127	I	10	7425.294	I	50	12933.195	I
35	4448.879	II	35	6043.223	I	25	7435.368	I	500	12956.659	I
100	4474.759	II	10	6052.723	I	10	7436.297	I	200	13008.264	I
200	4481.811	II	20	6059.372	I	20000	7503.869	I	200	13213.99	I
100	4510.733	I	7	6098.803	I	15000	7514.652	I	200	13228.107	I
20	4522.323	I	10	6105.635	I	25000	7635.106	I	100	13230.90	I
20	4530.552	II	100	6114.923	II	15000	7723.761	I	500	13272.64	I
400	4545.052	II	10	6145.441	I	10000	7724.207	I	1000	13313.210	I
20	4564.405	II	7	6170.174	I	10	7891.075	I	1000	13367.111	I
400	4579.350	II	150	6172.278	II	20000	7948.176	I	30	13499.41	I
400	4589.898	II	10	6173.096	I	20000	8006.157	I	1000	13504.191	I
15	4596.097	I	10	6212.503	I	25000	8014.786	I	11	13573.617	I
550	4609.567	II	5	6215.938	I	7	8053.308	I	30	13599.333	I
7	4628.441	I	25	6243.120	II	20000	8103.693	I	400	13622.659	I
35	4637.233	II	7	6296.872	I	35000	8115.311	I	200	13678.550	I
400	4657.901	II	15	6307.657	I	10000	8264.522	I	1000	13718.577	I
15	4702.316	I	7	6369.575	I	20	8392.27	I	10	13825.715	I
20	4721.591	II	20	6384.717	I	15000	8408.210	I	10	13907.478	I
550	4726.868	II	70	6416.307	I	20000	8424.648	I	200	14093.640	I
50	4732.053	II	25	6483.082	II	15000	8521.442	I	100	15046.50	I
300	4735.906	II	15	6538.112	I	7	8605.776	I	25	15172.69	I
800	4764.865	II	15	6604.853	I	4500	8667.944	I	10	15329.34	I
550	4806.020	II	25	6638.221	II	20	8771.860	II	30	15989.49	I
150	4847.810	II	20	6639.740	II	180	8849.91	I	30	16519.86	I
50	4865.910	II	50	6643.698	II	20	9075.394	I	500	16940.58	I
800	4879.864	II	5	6660.676	I	35000	9122.967	I	12	18427.76	I
70	4889.042	II	5	6664.051	I	550	9194.638	I	50	20616.23	I
20	4904.752	II	25	6666.359	II	15000	9224.499	I	30	20986.11	I
35	4933.209	II	100	6677.282	I	400	9291.531	I	20	23133.20	I
200	4965.080	II	35	6684.293	II	1600	9354.220	I	20	23966.52	I
50	5009.334	II	150	6752.834	I	25000	9657.786	I			
70	5017.163	II	5	6756.163	I	4500	9784.503	I	<i>Arsenic As Z = 33</i>		
70	5062.037	II	15	6766.612	I	180	10052.06	I	510	871.7	III
20	5090.495	II	20	6861.269	II	30	10332.72	I	325	889.0	III
100	5141.783	II	150	6871.289	I	100	10467.177	II	325	927.5	III
70	5145.308	II	5	6879.582	I	1600	10470.054	I	325	937.2	III
5	5151.391	I	10	6888.174	I	13	10478.034	I	325	953.6	III
15	5162.285	I	50	6937.664	I	180	10506.50	I	325	963.8	III
									250	987.7	V

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
340	1021.96	II	300	2831.164	II	14	587.57	III	10	3193.91	I
250	1029.5	V	100 r	2860.44	I	18	647.27	III	25 h	3203.70	I
340	1082.35	II	300	2884.406	II	300	719.86	V	30	3221.63	I
500	1139.40	II	80	2926.3	III	150	721.85	V	40	3222.19	I
615	1149.31	II	615	2959.572	II	1000	766.87	V	50	3261.96	I
555	1181.51	II	300	3003.819	II	40000	794.89	IV	60 r	3262.34	I
555	1189.87	II	300	3116.516	II	300	877.41	V	40	3281.50	I
615	1196.38	II	340	3842.60	II	50000	923.74	IV	15	3281.77	I
615	1196.56	II	325	3922.6	III	200	946.26	V	50	3322.80	I
340	1207.44	II	715	4190.082	II	200	1486.72	II	80 h	3356.80	I
800	1211.17	II	615	4197.40	II	400	1504.01	II	50	3368.18	III
800	1218.10	II	615	4242.982	II	300	1554.38	II	60 r	3377.08	I
340	1223.15	II	500	4315.657	II	200	1572.73	II	20	3377.39	I
760	1241.31	II	500	4323.867	II		1573.92	II	70 r	3420.32	I
965	1243.08	II	500	4336.64	II		1630.40	II	25	3421.01	I
870	1245.67	II	500	4352.145	II	100	1674.51	II	30 h	3421.48	I
800	1258.58	II	425	4352.864	II	400	1694.37	II	40	3463.74	I
965	1263.77	II	375	4371.17	II		1697.16	II	200 r	3501.11	I
800	1266.34	II	615	4427.106	II		1761.75	II	80 h	3524.97	I
800	1267.59	II	615	4431.562	II		1771.03	II	30 h	3531.35	I
715	1280.99	II	715	4458.469	II		1786.93	II	80 h	3544.66	I
715	1287.54	II	340	4461.075	II	100	1904.15	II	20 h	3547.68	I
715	1305.70	II	715	4466.348	II	500	1924.70	II	100	3552.45	II
340	1307.74	II	500	4474.46	II		1985.60	II	200	3567.73	II
760	1333.15	II	800	4494.230	II	300	1999.54	II	100	3576.28	II
965	1341.55	II	850	4507.659	II	10	2001.30	III	30	3577.62	I
760	1355.93	II	615	4539.74	II		2009.20	II	80 h	3579.67	I
965	1369.77	II	715	4543.483	II	400	2023.95	II	200	3596.57	II
800	1373.65	II	615	4602.427	II		2052.68	II	40	3630.64	I
1000	1375.07	II	340	4629.787	II		2054.57	II	40 h	3636.83	I
760	1375.78	II	340	4707.586	II	500	2214.7	II	20 h	3688.47	I
800	1394.64	II	340	4730.67	II	800	2245.61	II	400	3735.75	II
800	1400.31	II	340	4888.557	II	1000	2254.73	II	200	3816.69	II
500	1448.59	II	340	5105.58	II	1400	2304.24	II	200	3842.80	II
500	1558.88	II	500	5107.55	II	60	2331.10	III	100	3854.76	II
500	1570.99	II	425	5231.38	II	2000	2335.27	II	20	3889.33	I
100 r	1593.60	I	500	5331.23	II	190	2347.58	II	1400 l	3891.78	II
500	1660.55	II	340	5497.727	II	40	2512.28	III	20	3892.65	I
340	1860.34	II	425	5558.09	II	40	2523.83	III	40	3909.91	I
1000 r	1890.42	I	425	5651.32	II	60	2528.51	II	500	3914.73	II
500	1912.94	II	425	6110.07	II	50	2559.54	III	25	3926.85	III
800 r	1937.59	I	500	6170.27	II	8 h	2596.64	I	50	3935.72	I
585 r	1972.62	I	300	6511.74	II	100	2634.78	II	20	3937.87	I
170 r	1990.35	I	300	7092.27	II	40	2681.89	III	200	3939.67	II
100 r	1991.13	I	300	7102.72	II	8	2702.63	I	500	3949.51	II
100 r	1995.43	I	340	7990.53	II	18	2771.36	II	25	3993.06	III
230 r	2003.34	I	300	8174.51	II	15	2785.28	I	80	3993.40	I
100 r	2009.19	I	200	9300.61	I	100 r	3071.58	I	30	3995.66	I
200	2263.2	IV	230	9597.95	I	40	3079.14	III	300	4036.26	II
350 r	2288.12	I	290	9626.70	I	10 h	3108.21	I	200	4083.77	II
200	2301.0	IV	230	9833.76	I	8	3132.60	I	30 h	4084.86	I
350 r	2349.84	I	170	9915.71	I	8 h	3135.72	I	1500 h	4130.66	II
100 r	2370.77	I	290	9923.05	I	10	3137.70	I	20	4132.43	I
135 r	2381.18	I	290	10024.04	I	10	3155.34	I	200	4166.00	II
250	2417.5	IV	170	10614.07	I	10	3155.67	I	500	4216.04	II
250	2454.0	IV				12	3158.05	I	800	4267.95	II
170 r	2456.53	I	<i>Astatine At Z = 85</i>			12 h	3158.54	I	100	4283.10	I
200	2461.4	IV	8	2162.25	I	25	3165.60	I	300	4287.80	II
340	2602.00	II	10	2244.01	I	15 h	3173.69	I	200	4297.60	II
170 r	2780.22	I	<i>Barium Ba Z = 56</i>			30	3183.16	I	800	4309.32	II
300	2830.359	II	14	555.48	III	15	3183.96	I	20 h	4323.00	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
600	4325.73	II	300	6110.78	I	120 h	11697.45	I		107.38	I
200	4326.74	II	400	6135.83	II	120	13207.30	I	3	509.99	III
300	4329.62	II	20000	6141.72	II	120	13810.50	I	2	549.31	III
80	4350.33	I	150	6341.68	I	120	14077.90	I	6	582.08	III
60	4402.54	I	500	6378.91	II	120	15000.40	I	4	661.32	III
400	4405.23	II	10	6383.76	III	120	20712.00	I	8	675.59	III
40	4431.89	I	90	6450.85	I	150	25515.70	I		714.0	II
60 h	4488.98	I	150	6482.91	I	150	29223.90	I	4	725.59	III
50 h	4493.64	I	12000	6496.90	II				5	725.71	II
40	4505.92	I	300	6498.76	I				5	743.58	II
200	4509.63	II	150	6527.31	I				7	746.23	III
60 h	4523.17	I	3000	6595.33	I				2	767.75	III
130	4524.93	II	150	6654.10	I				8	775.37	II
65000	4554.03	II	1500	6675.27	I				20	842.06	II
40	4573.85	I	1800	6693.84	I					865.3	II
80	4579.64	I	1000	6769.62	II				2	925.25	II
30	4599.75	I	600	6865.69	I	1 h	76.10	III	10	943.56	II
20 h	4619.92	I	300 h	6867.85	I	2	76.48	III	10	973.27	II
25 h	4628.33	I	1000	6874.09	II	3	78.53	III		981.4	II
300	4644.10	II	6000	7059.94	I	4	78.66	III		1020.1	II
30	4673.62	I	2400 hs	7120.33	I	1 h	78.92	III	8	1026.93	II
35	4691.62	I	600	7195.24	I	5	81.89	III	5	1036.32	II
20	4700.43	I	600 hl	7228.84	I	10	82.38	III	15	1048.23	II
800	4708.94	II	3000	7280.30	I		82.58	II	1	1114.69	III
40	4726.44	I	1200	7392.41	I	20	83.20	III	20	1143.03	II
800	4843.46	II	300	7417.53	I		83.66	II		1155.9	II
300	4847.14	II	900 hl	7459.78	I	30	84.76	III	60	1197.19	II
200	4850.84	II	600	7488.08	I	50	88.31	III	2	1213.12	III
30 h	4877.65	I	450 hl	7636.90	I		89.16	I	1	1214.32	III
400	4899.97	II	600 hl	7642.91	I		89.80	II	2	1362.25	III
15	4902.90	I	1800	7672.09	I		90.04	II	1	1401.52	III
20000	4934.09	II	1200	7780.48	I		90.21	I	10	1421.26	III
8	4947.35	I	180 h	7839.57	I		90.67	I	5	1422.86	III
1000	4957.15	II	1500	7905.75	I		91.06	II		1426.12	I
300	4997.81	II	600	7911.34	I		91.36	II	1	1435.17	III
1000	5013.00	II	900 h	8210.24	I		91.74	II	2	1440.77	III
20 h	5159.94	I	8	8308.69	III		92.19	I		1491.76	I
20	5267.03	I	1800 h	8559.97	I		92.61	II	20	1512.30	II
800	5361.35	II	100	8710.74	II		93.14	II	60	1512.43	II
1000	5391.60	II	100	8737.71	II		93.42	II	100	1661.49	I
200	5421.05	II	300 h	8799.76	I		93.93	II	2 h	1754.69	III
100	5424.55	I	300	8860.98	I		94.78	II	15	1776.12	II
200	5428.79	II	450	8914.99	I		95.76	II	20	1776.34	II
300	5480.30	II	300	9219.69	I		96.29	I		1907.	I
200	5519.05	I	300	9308.08	I		97.24	I		1909.0	II
1000 r	5535.48	I	300 h	9324.58	I		97.44	I		1912.	I
20 h	5620.40	I	1500	9370.06	I		97.86	I	3	1917.03	III
10	5680.18	I	300	9455.92	I		97.97	I		1919.	I
400	5777.62	I	8	9521.76	III		98.12	I	5	1929.67	I
800	5784.18	II	450	9589.37	I		98.37	I	10	1943.68	I
100	5800.23	I	900	9608.88	I		98.66	I	60 h	1954.97	III
20	5805.69	I	300 h	9645.72	I		98.94	I		1956.	I
150	5826.28	I	1500 hl	9830.37	I		99.19	I	50	1964.59	I
2800	5853.68	II	900	10001.08	I	100	100.25	III	5	1985.13	I
15	5907.64	I	600	10032.10	I		100.86	I		1997.95	I
100	5971.70	I	1200 h	10233.23	I		101.20	I		1997.98	I
800	5981.25	II	300	10471.26	I		102.13	I	60	1998.01	I
100	5997.09	I	120 hl	10791.25	I		102.49	II		2033.25	I
300	5999.85	II	180 hl	11012.69	I		104.40	II		2033.28	I
100	6019.47	I	150 h	11114.42	I		104.67	I		2033.38	I
200	6063.12	I	240	11303.04	I		105.80	I	50	2055.90	I
							107.26	I			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	2056.01	I		3163.	I	64	5270.28	II	60	14644.75	I
75 h	2076.94	III		3168.	I	500	5270.81	II	200	16157.72	I
60 h	2080.38	III		3180.7	II	20	5403.04	II	80	17855.38	I
25	2118.56	III		3187.	I	20	5410.21	II	120	17856.63	I
15 h	2122.27	III	20	3193.81	I		5558.	I	100	18143.54	I
10	2125.57	I	20	3197.10	II	140 h	6142.01	III	160	31775.05	I
20	2125.68	I	30	3197.15	II	10	6229.11	I	200	31778.70	I
15 h	2127.20	III	20	3208.60	I	16	6279.43	II	<i>Bismuth Bi Z = 83</i>		
5	2137.25	III		3220.	I	30	6279.73	II	6	420.7	IV
25	2145.	I	60	3229.63	I	30	6473.54	I	6	431.2	IV
55	2174.99	I	2	3233.52	II	60	6547.89	II	2	488.39	V
55	2175.10	I	10	3241.62	II	60	6558.36	II	3	563.62	V
5	2191.57	III	30	3241.83	II	30	6564.52	I	5	670.76	III
	2273.5	II	15	3269.02	I	2 h	6636.44	II	6	686.88	V
	2324.6	II	100	3274.58	II	1	6756.72	II	5	730.71	V
	2337.0	I	30	3274.67	II	2	6757.13	II	10	738.17	V
950	2348.61	I	30	3282.91	I	30	6786.56	I	4	775.16	III
20	2350.66	I	30	3321.01	I	1 h	6884.22	I	6	790.5	IV
60	2350.71	I	30	3321.09	I	6 h	6884.44	I	6	790.6	IV
200	2350.83	I	220	3321.34	I	100	6982.75	I	8	792.5	IV
2	2413.34	II	20	3345.43	I	6 h	7154.40	I	10	820.3	IV
16	2413.46	II	60	3367.63	I	40 h	7154.65	I	9	822.9	IV
20	2453.84	II		3405.6	II	100	7209.13	I	12	824.9	IV
	2480.6	I	5	3451.37	I	3	7401.20	II	15 d	864.45	V
35	2494.54	I	300	3455.18	I	2	7401.43	II	15	872.6	IV
35	2494.58	I	20	3476.56	I	10	7551.90	I	12	923.9	IV
100	2494.73	I	300	3515.54	I	10 h	7618.68	I	15	943.3	IV
16	2507.43	II	10	3555.	I	20 h	7618.88	I	25	1039.99	III
5	2617.99	II	100	3720.36	III	60	8090.06	I	50 h	1045.76	III
20	2618.13	II		3720.92	III	5 h	8158.99	I	30	1051.81	III
100	2650.45	I		3722.98	III	10 h	8159.24	I	15	1058.88	II
60	2650.55	I	100	3736.30	I	4	8254.07	I	20	1085.47	II
200	2650.62	I	700	3813.45	I	10 h	8287.07	I	10	1099.20	II
60	2650.69	I	40	3865.13	I	30	8547.36	I	24	1103.4	IV
100	2650.76	I	80	3865.42	I	60	8547.67	I	20	1139.01	III
5	2697.46	II	1	3865.51	I	300	8801.37	I	50	1224.64	III
20	2697.58	II	6	3865.72	I	6	8882.18	I	10	1225.43	II
20	2728.88	II	100	3866.03	I	40	9190.45	I	15	1232.78	II
30	2738.05	I	90 h	4249.14	III	20 h	9243.92	I	10	1241.05	II
	2764.2	II	100	4253.05	I	1 h	9343.89	II	10	1265.35	II
20	2898.13	I	60	4253.76	I	40	9392.74	I	15	1283.73	II
10	2898.19	I	300	4360.66	II	2	9476.43	II	10	1306.18	II
20	2898.25	I	500	4360.99	II	16	9477.03	II	60	1317.0	IV
30	2986.06	I	400	4407.94	I	20	9847.32	I	20	1325.46	II
10	2986.42	I	2	4485.52	III	10 h	9895.63	I	40	1326.84	III
60	3019.33	I	100 h	4487.30	III	20 h	9895.96	I	20	1329.47	II
30	3019.49	I	1	4495.09	III	80	9939.78	I	60	1346.12	III
30	3019.53	I	140 h	4497.8	III	16	10095.52	II	20	1350.07	II
20	3019.60	I		4526.6	I	20	10095.73	II	25	1372.61	II
10	3046.52	II		4548.	I	60	10119.92	II	15	1376.02	II
30	3046.69	II	12	4572.66	I	80	10331.03	I	20	1393.92	II
	3090.3	I	700	4673.33	II	30	11066.46	I	35	1423.33	III
10	3110.81	I	1000	4673.42	II		11173.	II	35	1423.52	III
10	3110.92	I	6	4709.37	I	1	11173.73	II	45	1436.83	II
20	3110.99	I	200	4828.16	II	120	11496.39	I	25	1447.94	II
	3120.	I	40	4849.16	I	2 h	11625.16	II	50	1455.11	II
480	3130.42	II	2 h	4858.22	II		11659.	II	60 h	1461.00	III
320	3131.07	II	80	5087.75	I	2	11660.25	II	25	1462.14	II
	3136.	I	8	5218.12	II	100	12095.36	II	35	1486.93	II
	3150.	I	20	5218.33	II	30	12098.18	II	20	1502.50	II
	3160.6	I	3	5255.86	II	100	14643.92	I	40	1520.57	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
40	1533.17	II	100	2924.	IV	60 h	5144.3	II	<i>Boron B Z = 5</i>		
30	1536.77	II	100	2933.	IV	20	5201.5	II		41.00	V
35	1538.06	II	100	2936.	IV	75 h	5209.2	II	30	48.59	V
20	1563.67	II	15	2936.7	II	40 h	5270.3	II	10	52.68	IV
40	1573.70	II	3200	2938.30	I	10	5397.8	II	30	60.31	IV
60	1591.79	II	20	2950.4	II	10 c	5552.35	I		194.37	V
25	1601.58	II	12	2963.4	II	3	5599.41	I		262.37	V
60 h	1606.40	III	2800	2989.03	I	20	5655.2	II	160	344.0	IV
40	1609.70	II	700	2993.34	I	40 h	5719.2	II	450	385.0	IV
40	1611.38	II	100	3012.	IV	6	5742.55	I	40	411.80	III
20	1652.81	II	2400	3024.64	I	12	5818.3	II	285	418.7	IV
20	1749.29	II	60	3034.87	I	20	5860.2	II	20	510.77	III
80	1777.11	II	100	3042.	IV	20	5973.0	II	40	510.85	III
60	1787.47	II	9000 c	3067.72	I	15	6059.1	II		512.53	V
70	1791.93	II	140	3076.66	I	15	6128.0	II	150	518.24	III
70	1823.80	II	35	3115.0	III	6	6134.82	I	75	518.27	III
100	1902.41	II	100	3239.	IV	3	6475.73	I	110	677.00	III
9000	1954.53	I	550 c	3397.21	I	3	6476.24	I	160	677.14	III
7000	1960.13	I	10	3430.83	II	15	6497.7	II	40	693.95	II
25	1989.35	II	12	3431.23	II	10	6577.2	II	40	731.36	II
7000	2021.21	I	40 h	3451.0	III	40 h	6600.2	II	40	731.44	II
9000	2061.70	I	40	3473.8	III	50 h	6808.6	II		749.74	V
45 h	2068.9	II	35	3485.5	III	4 h	6991.12	I	40	758.48	III
4600	2110.26	I	500 c	3510.85	I	12	7033.	II	70	758.67	III
2500	2133.63	I	380 c	3596.11	I	2	7036.15	I	110	882.54	II
15	2143.40	II	45	3613.4	III	10 h	7381.	II	110	882.68	II
15	2143.46	II	100	3643.	IV	2	7502.33	I	40	984.67	II
60	2186.9	II	12	3654.2	II	10 h	7637.	II	110	1081.88	II
40 h	2214.0	II	100	3682.	IV	10	7750.	II	110	1082.07	II
360	2228.25	I	50	3695.32	III	3	7838.70	I	70	1112.2	IV
1700	2230.61	I	50	3695.68	III	2	7840.33	I	450	1168.9	IV
340	2276.58	I	100	3734.	IV	20	7965.	II	70	1170.9	IV
100	2311.	IV	70 h	3792.5	II	40	8008.	III	110	1230.16	II
100	2326.	IV	12	3811.1	II	12 h	8050.	II	220	1362.46	II
16	2368.12	II	20	3815.8	II	50	8070.	III	70	1600.46	I
12	2368.25	II	10	3845.8	II	15	8328.	II	120	1600.73	I
100	2376.	IV	30	3863.9	II	15	8388.	II	160	1623.58	II
190	2400.88	I	100	3868.	IV	30	8532.	II	110	1623.77	II
75 h	2414.6	III	40 h	4079.1	II	2	8544.54	I	220	1624.02	II
10	2501.0	II	10	4097.2	II	1	8579.74	I	70	1624.16	II
25	2515.69	I	140	4121.53	I	25	8653.	II	160	1624.34	II
70	2524.49	I	140	4121.86	I	2	8754.88	I	100	1663.04	I
20 h	2544.5	II	75 h	4259.4	II	3	8761.54	I	150	1666.87	I
700	2627.91	I	25	4272.0	II	25	8863.	II	200	1667.29	I
100	2629.	IV	70 h	4301.7	II	2	8907.81	I	150	1817.86	I
100	2677.	IV	12 h	4339.8	II	2000 d	9657.04	I	200	1818.37	I
12	2693.0	II	25 h	4340.5	II	40	9827.78	I	300	1825.91	I
280 c	2696.76	I	12 h	4379.4	II	20	10104.5	I	300	1826.41	I
20	2713.3	II	25 h	4476.8	II	15	10138.8	I	110	1842.81	II
140 d	2730.50	I	60 h	4705.3	II	20	10300.6	I	20	1953.83	III
100	2767.	IV	600 c	4722.52	I	20	10536.19	I	550	2065.78	III
100	2772.	IV	30	4730.3	II	50	11072.44	I	250	2066.38	I
360	2780.52	I	20	4749.7	II	1500 d	11710.37	I	250	2066.65	I
100	2786.	IV	40 h	4797.4	III	40	11999.49	I	100	2066.93	I
15	2803.42	II	12	4908.2	II	200	12165.08	I	300	2067.19	I
11	2803.70	II	10	4916.6	II	200	12690.04	I	450	2067.23	III
12	2805.3	II	12	4969.7	II	100	12817.8	I	160	2077.09	III
140 c	2809.62	I	20	4993.6	II	200	14330.5	I	500	2088.91	I
100	2842.	IV	45 h	5079.3	III	50	16001.5	I	500	2089.57	I
80 h	2855.6	III	10	5091.6	II	60	22551.6	I	70	2220.30	II
4000	2897.98	I	50 h	5124.3	II				40	2234.09	III

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1000	23513.15	I	75	1793.40	III	30	2823.19	II	1000	5378.13	II
500	28346.50	I	40	1823.41	III	200	2836.900	I	200	5381.89	II
500	30380.85	I	100	1827.70	II	25	2856.46	II	40	5843.30	II
600	31630.13	I	50	1844.66	III	100	2868.180	I	50	5880.22	II
150	38345.75	I	40	1851.13	III	200 r	2880.767	I	300	6099.142	I
120	39964.36	I	40	1855.85	III	50 r	2881.224	I	100	6111.49	I
<i>Cadmium Cd Z = 48</i>											
50	427.01	IV	200	1856.67	III	200	2914.67	II	100	6325.166	I
50	447.85	IV	150	1874.08	III	50	2927.87	II	30	6330.013	I
60	480.90	IV	300	1922.23	II	200	2929.27	II	400	6354.72	II
70	493.00	IV	100	1943.54	II	1000 r	2980.620	I	500	6359.98	II
70	495.13	IV	40	1965.54	II	200 r	2981.362	I	2000	6438.470	I
70	498.14	IV	30	1986.89	II	50	2981.845	I	400	6464.94	II
70	498.53	IV	200	1995.43	II	50	3030.60	II	25	6567.65	II
80	504.09	IV	100	2007.49	II	150	3080.822	I	500	6725.78	II
70	504.20	IV	50	2032.45	II	25	3081.48	II	100	6759.19	II
70	504.50	IV	75	2036.23	II	30	3082.593	I	30	6778.116	I
80	506.31	IV	40	2039.83	III	100	3092.34	II	50	7237.01	II
60	508.01	IV	50	2045.61	III	200	3133.167	I	100	7284.38	II
50	508.95	IV	75	2087.91	III	50	3146.79	II	1000	7345.670	I
70	509.55	IV	150	2096.00	II	150	3250.33	II	50	8066.99	II
70	511.40	IV	50	2111.60	III	300	3252.524	I	5	8200.309	I
80	513.00	IV	1000 r	2144.41	II	300	3261.055	I	20	9289.	I
70	514.50	IV	50	2155.06	II	50	3343.21	II	15	11652.	I
60	519.42	IV	100	2187.79	II	50	3385.49	II	35	14487.	I
80	524.41	IV	1000	2194.56	II	30	3388.88	II	80	15708.	I
70	524.47	IV	1000	2265.02	II	800	3403.652	I	55 d	19120.	I
70	525.10	IV	1500 r	2288.022	I	50	3417.49	II	25	24371.	I
60	525.19	IV	1000	2312.77	II	50	3442.42	II	35	25448.	I
70	527.07	IV	200	2321.07	II	100	3464.43	II	<i>Calcium Ca Z = 20</i>		
80	531.09	IV	40	2376.82	II	1000	3466.200	I	250	190.46	V
80	531.51	IV	50	2418.69	II	800	3467.655	I	250	196.97	V
70	534.29	IV	50	2469.73	II	25	3483.08	II	300	199.55	V
70	536.77	IV	40	2487.93	II	150	3495.44	II	250	200.51	V
60	540.90	IV	40	2495.58	II	25	3499.952	I	265	257.98	V
70	541.74	IV	50	2509.11	II	100	3524.11	II	400	267.77	V
80	542.60	IV	30	2516.22	II	100	3535.69	II	300	270.31	V
60	553.06	IV	25 h	2525.196	I	1000	3610.508	I	400	280.99	V
80	554.05	IV	50	2544.613	I	800	3612.873	I	300	284.98	V
60	567.01	IV	50	2551.98	II	60	3614.453	I	450 c	286.96	V
150	1118.16	IV	25	2553.465	I	20	3649.558	I	500	322.17	V
100	1164.65	IV	3	2565.789	I	10	3981.926	I	300	323.22	V
100	1183.40	IV	500	2572.93	II	100	4029.12	II	300	330.94	V
100	1256.00	II	50	2580.106	I	200	4134.77	II	300	334.55	V
150	1296.43	II	30	2592.026	I	50	4141.49	II	250 c	342.45	IV
100	1326.50	II	25 h	2592.026	I	100	4285.08	II	250	343.93	IV
60	1370.48	IV	50	2602.048	I	8	4306.672	I	450	352.92	V
150	1370.91	II	50	2628.979	I	100	4412.41	II	250	377.18	V
60	1418.89	IV	40	2632.190	I	3	4412.989	I	200	387.08	V
200	1514.26	II	75	2639.420	I	1000	4415.63	II	750	425.00	V
50	1545.17	III	40	2659.23	II	30	4440.45	II	600	434.57	IV
200	1571.58	II	50 h	2660.325	I	8	4662.352	I	250	437.77	IV
100	1668.60	II	25	2668.20	II	200	4678.149	I	750	443.82	IV
50	1702.47	II	50	2672.62	II	30	4744.69	II	500	450.57	IV
40	1707.16	III	100	2677.540	I	300	4799.912	I	500	558.60	V
40	1722.95	III	25	2677.748	I	50	4881.72	II	400	637.93	V
50	1724.41	II	50	2707.00	II	50	5025.50	II	300	643.12	V
40	1747.67	III	75	2712.505	I	1000 h	5085.822	I	400	646.57	V
40	1773.06	III	50	2733.820	I	6	5154.660	I	750	656.00	IV
100	1785.84	II	1000	2748.54	II	100	5268.01	II	300	656.76	V
			100 h	2763.894	I	100	5271.60	II	500	669.70	IV
			50 h	2764.230	I	1000	5337.48	II	24	1341.89	II
			50	2774.958	I						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
12	1342.54	II	20	4489.18	II	40	7820.78	II	250	371.75	III
20	1433.75	II	19	4499.88	III	60	7843.38	II	150	371.78	III
20	1545.29	III	23	4526.94	I	20	8017.50	II	650	384.03	IV
60	1649.86	II	22	4578.55	I	20	8020.50	II	700	384.18	IV
20	1807.34	II	23	4581.40	I	70	8133.05	II	500	386.203	III
40	1814.50	II	23	4581.47	I	100	8201.72	II	400	419.52	IV
40	1838.01	II	24	4585.87	I	110	8248.80	II	500	419.71	IV
60	1840.06	II	24	4585.96	I	70	8254.73	II	200	450.734	III
20	1843.09	II	20	4685.27	I	130	8498.02	II	400	459.46	III
40	1850.69	II	30	4716.74	II	170	8542.09	II	500	459.52	III
17	2123.03	III	40	4721.03	II	160	8662.14	II	570	459.63	III
16	2152.43	III	40	4799.97	II	100	8912.07	II	250	511.522	III
16	2687.76	III	25	4878.13	I	110	8927.36	II	250	535.288	III
19	2881.78	III	70	5001.48	II	110	9213.90	II	300	538.080	III
21	2899.79	III	80	5019.97	II	90	9312.00	II	350	538.149	III
19	2924.33	III	40	5021.14	II	100	9319.56	II	400	538.312	III
20	2988.63	III	23	5041.62	I	110	9320.65	II	350	574.281	III
10	3006.86	I	25	5188.85	I	25	9416.97	I	9	595.022	II
15	3028.59	III	22	5261.71	I	100	9567.97	II	30	687.053	II
3	3055.32	I	23	5262.24	I	110	9599.24	II	50	687.345	II
19	3119.67	III	22	5264.24	I	80	9601.82	II	10	858.092	II
170	3158.87	II	24	5265.56	I	80	9854.74	II	20	858.559	II
180	3179.33	II	25	5270.27	I	110	9890.63	II	30	903.624	II
150	3181.28	II	60	5285.27	II	90	9931.39	II	60	903.962	II
20	3316.51	II	70	5307.22	II	100	10223.04	II	150	904.142	II
12	3361.92	I	50	5339.19	II	20	10343.81	I	30	904.480	II
19	3372.67	III	27	5349.47	I	20	11838.99	II	800	977.03	III
20	3461.87	II	23	5512.98	I	25	12816.04	I	9	1009.86	II
13	3487.60	I	25	5581.97	I	24	12823.86	I	10	1010.08	II
18	3537.77	III	27	5588.76	I	25	12909.10	I	10	1010.37	II
20	3644.41	I	24	5590.12	I	30	13033.57	I	80	1036.337	II
30	3683.70	II	26	5594.47	I	21	13086.44	I	150	1037.018	II
40	3694.11	II	25	5598.49	I	24	13134.95	I	150	1157.910	I
170	3706.03	II	24	5601.29	I	20	16150.77	I	150	1158.019	I
180	3736.90	II	24	5602.85	I	22	16157.36	I	150	1158.035	I
20	3755.67	II	30	5857.45	I	21	16197.04	I	370	1174.93	III
30	3758.39	II	27	6102.72	I	20	18925.47	I	350	1175.26	III
230	3933.66	II	29	6122.22	I	24	18970.14	I	330	1175.59	III
220	3968.47	II	22	6161.29	I	30	19046.14	I	500	1175.71	III
50	4097.10	II	30	6162.17	I	48	19309.20	I	350	1175.99	III
60	4109.82	II	22	6163.76	I	49	19452.99	I	370	1176.37	III
30	4110.28	II	24	6166.44	I	47	19505.72	I	150	1188.992	I
40	4206.18	II	26	6169.06	I	50	19776.79	I	150	1189.447	I
50	4220.07	II	28	6169.56	I	35	19853.10	I	200	1189.631	I
50	4226.73	I	35	6439.07	I	34	19862.22	I	300	1193.009	I
24	4283.01	I	30	6449.81	I	23	19917.19	I	300	1193.031	I
22	4289.36	I	22	6455.60	I	24	19933.70	I	300	1193.240	I
22	4298.99	I	80	6456.87	II	25	22624.93	I	300	1193.264	I
25	4302.53	I	34	6462.57	I	30	22651.23	I	100	1193.393	I
20	4302.81	III	29	6471.66	I				150	1193.649	I
23	4307.74	I	32	6493.78	I				150	1193.679	I
22	4318.65	I	28	6499.65	I	110	34.973	V	100	1194.064	I
20	4355.08	I	23	6572.78	I	450	40.268	V	100	1194.488	I
19	4399.59	III	30	6717.69	I	110	227.19	V	100	1261.552	I
25	4425.44	I	33	7148.15	I	250	244.91	IV	100	1277.245	I
26	4434.96	I	31	7202.19	I	160	248.66	V	250	1277.282	I
25	4435.69	I	33	7326.15	I	160	248.74	V	250	1277.513	I
30	4454.78	I	30	7575.81	II	200	289.14	IV	300	1277.550	I
28	4455.89	I	60	7581.11	II	250	289.23	IV	300	1280.333	I
20	4456.61	I	80	7601.30	II	570	312.42	IV	100	1311.363	I
20	4472.04	II	20	7602.32	II	500	312.46	IV	9	1323.951	II
						250	371.69	III			

Carbon C Z = 6

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
120	1329.578	I	1000	4267.26	II	250	9620.80	I	40000	3085.10	III
120	1329.600	I	200	4325.56	III	300	9658.44	I	20000	3106.98	III
150	1334.532	II	600	4647.42	III	200	10683.08	I	30000	3110.53	III
300	1335.708	II	520	4650.25	III	300	10691.25	I	30000	3121.56	III
100	1354.288	I	375	4651.47	III	12	11619.29	I	20000	3141.29	III
150	1355.84	I	200 w	4658.30	IV	23	11628.83	I	20000	3143.96	III
120	1364.164	I	200	4665.86	III	13	11658.85	I	20000	3147.06	III
100	1459.032	I	200	4771.75	I	47	11659.68	I	710	3194.83	II
200	1463.336	I	200	4932.05	I	24	11669.63	I	990	3201.71	II
120	1467.402	I	5	4943.88	V	85	11748.22	I	710	3218.94	II
150	1481.764	I	5	4944.56	V	142	11753.32	I	880	3221.17	II
1000	1548.202	IV	200	5052.17	I	114	11754.76	I	710	3227.11	II
900	1550.774	IV	350	5132.94	II	11	11777.54	I	20000	3228.57	III
150	1560.310	I	350	5133.28	II	17	11892.91	I	710	3234.16	II
400	1560.683	I	350	5143.49	II	30	11895.75	I	990	3272.25	II
400	1560.708	I	570	5145.16	II	26	12614.10	I	20000	3353.29	III
100	1561.341	I	400	5151.09	II	20	13502.27	I	10000	3395.77	III
400	1561.438	I	300	5380.34	I	38	14399.65	I	30000	3427.36	III
150	1656.266	I	250	5648.07	II	16	14403.25	I	40000	3443.63	III
120	1656.928	I	350	5662.47	II	61	14420.12	I	30000	3454.39	III
300	1657.008	I	450	5695.92	III	12	14429.03	I	40000	3459.39	III
120	1657.380	I	250	5801.33	IV	13	14442.24	I	60000	3470.92	III
120	1657.907	I	200	5811.98	IV	12	16559.66	I	710	3485.05	II
150	1658.122	I	150	5826.42	III	50	16890.38	I	50000	3497.81	III
500	1751.823	I	570	5889.77	II	10	17338.56	I	60000	3504.64	III
1000	1930.905	I	350	5891.59	II	11	17448.60	I	770	3539.08	II
250	2162.94	III	200	6001.13	I	13	18139.80	I	50000	3544.07	III
40	2270.91	V	250	6006.03	I	23	19721.99	I	1200	3560.80	II
5	2277.25	V	110	6007.18	I				1000	3577.45	II
20	2277.92	V	150	6010.68	I				1800	3655.85	II
800	2296.87	III	300	6013.22	I	300	399.36	V	880	3660.64	II
800	2478.56	I	250	6014.84	I	200	482.96	V	880	3667.98	II
250	2509.12	II	800	6578.05	II	40	741.79	IV	1000	3709.29	II
350	2512.06	II	570	6582.88	II	30	754.60	IV	1000	3709.93	II
200 l	2524.41	IV	200	6587.61	I	75	1332.16	IV	1400	3716.37	II
300 s	2529.98	IV	150	6744.38	III	75	1372.72	IV	800	3728.42	II
250 h	2574.83	II	250	6783.90	II	100	2000.42	IV	860	3786.63	II
150	2697.75	III	150 h	7037.25	III	100	2009.94	IV	2500	3801.52	II
110 l	2724.85	III	250	7113.18	I	10000	2318.64	III	800	3803.09	II
150 l	2725.30	III	250	7115.19	I	10000	2372.34	III	1000	3808.11	II
150 l	2725.90	III	250	7115.63	II	10000	2380.12	III	1100	3838.54	II
350 l	2741.28	II	200	7116.99	I	10000	2431.45	III	860	3848.59	II
250	2746.49	II	350	7119.90	II	15000	2439.80	III	860	3853.15	II
1000	2836.71	II	800	7231.32	II	10000	2454.32	III	1200	3854.18	II
800	2837.60	II	1000	7236.42	II	10000	2469.95	III	1200	3854.31	II
200	2982.11	III	150	7612.65	III	10000	2483.82	III	1100	3878.36	II
800 h	2992.62	II	90 w	7726.2	IV	10000	2497.50	III	1500	3882.45	II
350	3876.19	II	200	7860.89	I	20000	2531.99	III	1000	3889.98	II
350	3876.41	II	200	8058.62	I	10000	2603.59	III	770	3907.29	II
350	3876.66	II	300 h	8196.48	III	340	2651.01	II	980	3912.44	II
570	3918.98	II	150	8332.99	III	270	2830.90	II	770	3918.28	II
800	3920.69	II	520	8335.15	I	250	2874.14	II	770	3931.09	II
150	4056.06	III	300	8500.32	III	10000	2923.81	III	770	3940.34	II
200	4067.94	III	250	9061.43	I	10000	2931.54	III	2000	3942.15	II
250	4068.91	III	200	9062.47	I	400	2976.91	II	2700	3942.75	II
250	4070.26	III	200	9078.28	I	10000	3022.75	III	770	3943.89	II
250	4074.52	II	250	9088.51	I	50000	3031.58	III	3100	3952.54	II
350 l	4075.85	II	450	9094.83	I	95000	3055.59	III	980	3956.28	II
150	4162.86	III	300	9111.80	I	20000	3056.56	III	770	3960.91	II
250 h	4186.90	III	800	9405.73	I	40000	3057.23	III	770	3967.05	II
800	4267.00	II	150	9603.03	I	20000	3057.58	III	770	3978.65	II
						680	3063.01	II			

Cerium Ce Z = 58

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
770	3984.68	II	280	5159.69	I	25	7329.91	I	630	2845.70	III
700	3992.39	II	280	5161.48	I	25	7397.77	I	3100	2859.32	III
910	3993.82	II	370	5187.46	II	25	7616.11	II	200	2893.85	III
2800	3999.24	II	260	5223.46	I	25	7689.17	II	180	2921.13	III
910	4003.77	II	260	5245.92	I	22	7844.94	II	3200	2976.86	III
2700	4012.39	II	340	5274.23	II	22	7857.54	II	210	3001.28	III
910	4014.90	II	450	5353.53	II	30	8025.56	II	1700	3066.59	III
840	4024.49	II	300	5393.40	II	25	8772.14	II	1100 c	3149.36	III
840	4028.41	II	280	5409.23	II	30	8891.20	II	1400	3152.36	III
840	4031.34	II	260	5512.08	II				8400	3268.32	III
2100	4040.76	II	300	5696.99	I	<i>Cesium Ce Z = 55</i>			1300	3315.51	III
910	4042.58	II	370	5699.23	I	10000	614.01	III	550	3340.60	III
700	4053.51	II	240	5719.03	I	2000	638.17	III	430	3344.02	III
1100	4071.81	II	230	5940.86	I	2500	666.25	III	1200	3349.46	III
1800	4073.48	II	55	6001.90	I	5000	691.60	III	400	3463.45	III
1500	4075.71	II	55	6005.86	I	3500	703.89	III	580	3476.83	III
1500	4075.85	II	55	6006.82	I	15000	718.14	II	480	3559.82	III
910	4083.23	II	75	6013.42	I	20000	721.79	III	7200	3597.45	III
770	4118.14	II	110	6024.20	I	20000	722.20	III	1300	3608.31	III
980	4123.87	II	10000	6032.54	III	5000	731.56	III	2300	3618.19	III
980	4127.37	II	110	6043.39	II	12000	740.29	III	300 c	3641.34	III
2700	4133.80	II	55	6047.40	I	15000	808.76	II	520	3651.08	III
2000	4137.65	II	10000	6060.91	III	15000	813.84	II	4800	3661.40	III
770	4142.40	II	45	6098.34	II	7500	830.39	III	640	3699.50	III
980	4149.94	II	45	6123.67	I	35000	901.27	II	430	3837.46	III
1400	4151.97	II	35	6143.36	II	15000	920.35	III	2100 c	3876.15	I
1300	4165.61	II	35	6186.17	I	40000	926.66	II	2900	3888.37	III
3500	4186.60	II	35	6208.98	I	25000 c	1054.79	III	600 c	3888.61	I
840	4198.72	II	35	6228.94	I	17 c	1673.99	III	2700	3925.60	III
910	4202.94	II	23	6232.45	II	12	1705.25	III	680 c	4001.70	III
1500	4222.60	II	28	6237.45	I	10	1801.83	III	3100	4006.55	III
770	4227.75	II	45	6272.05	II	20 c	1822.40	III	420	4006.78	III
980	4239.92	II	35	6295.58	I	11	1823.93	III	520	4043.42	III
1100	4248.68	II	28	6299.51	II	12	1824.70	III	14000	4264.70	II
2000	4289.94	II	23	6300.21	I	12	1841.80	III	18000 w	4277.13	II
1500	4296.67	II	35	6310.01	I	25	1915.50	III	370	4403.86	III
770	4300.33	II	35	6343.95	II	25 c	1923.29	III	1200	4410.22	III
770	4306.72	II	35	6371.11	II	12	1961.33	III	940	4425.68	III
980	4337.77	II	28	6386.84	I	17	1996.56	III	530	4471.48	III
700	4349.79	II	23	6393.02	II	710	2035.11	III	12000	4501.55	II
910	4364.66	II	35	6430.07	I	120	2056.43	III	1200	4506.72	III
910	4382.17	II	23	6436.40	I	330	2076.43	III	590	4522.86	III
700	4386.84	II	35	6458.03	I	540	2077.30	III	20000	4526.74	II
1700	4391.66	II	28	6467.39	I	410	2088.68	III	1000 c	4555.28	I
980	4418.78	II	35	6473.72	I	210	2101.63	III	460 c	4593.17	I
770	4449.34	II	23	6513.59	II	200	2141.47	III	99900	4603.79	II
2400	4460.21	II	45	6555.65	I	1000	2316.88	III	420 h	4620.61	III
1400	4471.24	II	23	6579.10	I	230	2325.95	III	210	4665.52	III
700	4479.36	II	22	6612.06	I	390	2340.49	III	25000	4830.19	II
700	4483.90	II	30	6628.93	I	1600	2455.81	III	140	4851.59	III
840	4486.91	II	22	6652.72	II	1600	2477.57	III	19000	4870.04	II
770	4523.08	II	26	6700.66	I	890	2485.45	III	37000	4952.85	II
840	4527.35	II	35	6704.27	I	410	2495.07	III	370	5035.72	III
840	4528.47	II	30	6774.28	II	1400	2525.67	III	27000	5043.80	II
840	4539.75	II	35	6775.59	I	430	2573.05	III	75000	5227.04	II
2100	4562.36	II	30	6924.81	I	16000	2596.86	III	29000	5249.38	II
1100	4572.28	II	30	6986.02	I	390	2610.12	III	11000	5274.05	II
840	4593.93	II	35	7061.75	II	6200	2630.51	III	10000 c	5349.13	II
1700	4628.16	II	35	7086.35	II	370	2700.32	III	22000	5370.99	II
310	4737.28	II	22	7238.36	II	710	2701.20	III	230	5380.79	III
470	5079.68	II	25	7252.75	I	390	2776.44	III	60 c	5465.94	I
						270	2810.87	III			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
37	5502.88	I	1500	17012.32	I	2500	728.951	II	12000	1396.527	I
39000	5563.02	II	760	20138.47	I	2000	777.562	II	500	1441.470	II
100	5635.21	I	880	22811.86	I	5000	787.580	II	500	1528.569	II
210 c	5664.02	I	1100	23037.98	I	5000	788.740	II	500	1542.942	II
27	5745.72	I	3900	23344.47	I	5000	793.342	II	500	1558.144	II
24000	5831.14	II	4400	24251.21	I	500	834.84	IV	500	1565.050	II
59 c	5838.83	I	850	24374.96	I	500	834.97	IV	600	1822.50	III
300	5845.14	I	890 d	25763.51	I	6000	839.297	II	500	1828.40	III
51000	5925.63	II	500	25764.73	I	8000	839.599	II	500	1857.488	II
140	5950.14	III	680 c	29310.06	I	600	840.93	IV	500	1901.61	III
110	5979.97	III	2800	30103.27	I	5000	851.691	II	500	1983.61	III
640 c	6010.49	I	610 c	30953.06	I	2000	888.026	II	450 h	1997.370	II
86	6034.09	I	1100	34900.13	I	2000	893.549	II	450	2032.116	II
150	6043.99	III	190	36131.00	I	2000	961.499	II	350 h	2088.583	II
870	6079.86	III	2 c	39177.28	I	500	973.21	IV	350 h	2091.458	II
9800	6128.61	II	2 d	39421.25	I	600	977.56	IV	700	2253.07	III
330	6150.42	III	1	39424.11	I	40	978.284	I	500	2268.95	III
1000	6213.10	I				700	984.95	IV	500	2278.34	III
170	6217.60	I	<i>Chlorine Cl Z = 17</i>			25	998.372	I	700	2283.93	III
450	6242.96	III	500	392.43	V	25	998.432	I	600	2323.50	III
320 c	6354.55	I	800	486.17	IV	75	1002.346	I	500	2336.45	III
510	6456.33	III	800	534.73	IV	500	1005.28	III	600	2340.64	III
8300	6495.53	II	700	535.67	IV	600	1008.78	III	600	2359.67	III
10000 w	6536.44	II	600	536.15	IV	150	1013.664	I	600	2370.37	III
490	6586.51	I	900	537.61	IV	700	1015.02	III	700	2416.42	III
97	6628.66	I	500	538.03	V	90	1025.553	I	600	2447.14	III
8800	6646.57	II	600	538.12	IV	6000	1063.831	II	600	2448.58	III
3300 c	6723.28	I	800	542.23	V	3000	1067.945	II	500	2486.91	III
9600	6724.47	II	600	542.30	V	9000	1071.036	II	500	2532.48	III
400	6753.12	III	1000	545.11	V	6000	1071.767	II	600	2580.67	III
200	6824.65	I	600	546.33	V	5000	1075.230	II	500	2603.59	III
300	6870.45	I	1000	547.63	V	5000	1079.080	II	500	2632.67	III
37000	6955.50	II	500	549.22	IV	200	1084.667	I	500	2633.18	III
4800	6973.30	I	700	552.02	IV	200	1085.171	I	600	2665.54	III
16000	6979.67	II	600	553.30	IV	200	1085.171	I	600	2665.54	III
980	6983.49	I	700	554.62	IV	250	1085.304	I	700	2710.37	III
13000 w	7149.54	II	600	556.23	III	400	1088.06	I	500	2724.03	IV
1900 c	7219.60	III	700	556.61	III	350	1090.271	I	500	2751.23	IV
790	7228.53	I	700	557.12	III	250	1090.982	I	700	2782.47	IV
130	7279.90	I	350	559.305	II	250	1092.437	I	600	2965.56	III
1100	7279.96	I	700	561.53	III	400	1094.769	I	500	3063.13	IV
2600 c	7608.90	I	700	561.68	III	350	1095.148	I	600	3076.68	IV
3300	7943.88	I	700	561.74	III	350	1095.662	I	600	3104.46	III
22000	7997.44	II	400	571.904	II	400	1095.797	I	800	3139.34	III
3500	8015.73	I	800	574.406	II	250	1096.810	I	900	3191.45	III
510	8078.94	I	500	601.50	IV	300	1097.369	I	700	3289.80	III
4500	8079.04	I	500	604.59	IV	200	1098.068	I	700	3320.57	III
59000 c	8521.13	I	500	606.35	III	200	1099.523	I	800	3329.06	III
15000 c	8761.41	I	500	606.35	III	500	1107.528	I	900	3340.42	III
61000 c	8943.47	I	700	618.057	II	800	1139.214	II	800	3392.89	III
18000	9172.32	I	600	619.982	II	800	1167.148	I	800	3393.45	III
5200	9208.53	I	800	620.298	II	3000	1179.293	I	900	3530.03	III
19000	10024.36	I	700	626.735	II	1200	1188.774	I	800	3560.68	III
4800	10123.41	I	800	635.881	II	900	1201.353	I	900	3602.10	III
26000	10123.60	I	1000	636.626	II	3000	1335.726	I	800	3612.85	III
2900	13424.31	I	1000	650.894	II	10000	1347.240	I	700	3622.69	III
38000 c	13588.29	I	1000	659.811	II	5000	1351.657	I	700	3656.95	III
8400	13602.56	I	1300	661.841	II	12000	1363.447	I	700	3670.28	III
5700	13758.81	I	2000	663.074	II	2500	1373.116	I	700	3682.05	III
55000 c	14694.91	I	1500	682.053	II	20000	1379.528	I	600	3705.45	III
820	16535.63	I	1500	687.656	II	25000	1389.693	I	600	3707.34	III
			1500	693.594	II	20000	1389.957	I	800	3720.45	III
			2000	725.271	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
800	3748.81	III	2300	7899.31	I	310	13296.0	I	130	2383.33	I
500	3779.35	III	1800	7915.08	I	550	13346.8	I	140	2408.62	I
10000	3850.99	II	3000	7924.645	I	525	13821.7	I	170	2496.31	I
25000	3860.83	II	2100	7933.89	I	294	14931.7	I	110	2502.53	I
500	3925.87	III	1700	7935.012	I	269	15108.0	I	190	2504.31	I
700	3991.50	III	650	7952.52	I	381	15465.1	I	110	2516.92	I
600	4018.50	III	1500	7974.72	I	1094	15520.3	I	390	2519.52	I
600	4059.07	III	1300	7976.97	I	1487	15730.1	I	190	2527.12	I
500	4104.23	III	600	7980.60	I	2780	15869.7	I	160	2549.54	I
500	4106.83	III	2900	7997.85	I	277	15883.3	I	130	2560.69	I
10000 h	4132.50	II	2200	8015.61	I	342	15928.9	I	150	2571.74	I
500	4608.21	III	1100	8023.33	I	735	15960.0	I	100	2577.65	I
40	4623.938	I	400	8051.07	I	283	15970.5	I	380	2591.85	I
50	4654.040	I	1700	8084.51	I	259	16198.5	I	250	2653.59	II
80	4661.208	I	2200	8085.56	I	717	19755.3	I	250	2658.59	II
45	4691.523	I	3000	8086.67	I	100	24470.0	I	320	2663.42	II
40	4721.255	I	1300	8087.73	I		39716.0	I	440	2666.02	II
45	4740.729	I	2500	8194.42	I		40085.5	I	280	2668.71	II
13000	4781.32	II	2200	8199.13	I		40089.5	I	350	2671.81	II
99000	4794.55	II	2200	8200.21	I		40532.2	I	280	2672.83	II
29000	4810.06	II	800	8203.78	I				1800	2677.16	II
16000	4819.47	II	18000	8212.04	I				320	2678.79	II
81000	4896.77	II	3000	8220.45	I	100	438.62	V	230	2687.09	II
47000	4904.78	II	20000	8221.74	I	100	464.02	V	280	2691.04	II
26000	4917.73	II	18000	8333.31	I	100	620.66	IV	180	2698.41	II
10000	4995.48	II	99900	8375.94	I	100	629.26	IV	180	2698.69	II
26000	5078.26	II	400	8406.199	I	80	630.30	IV	110	2701.99	I
30	5099.789	I	15000	8428.25	I	100	666.55	IV	140	2712.31	II
56000	5217.94	II	2200	8467.34	I	100	693.92	IV	170	2722.75	II
23000	5221.36	II	2200	8550.44	I	60	1030.47	III	420 h	2726.51	I
15000	5392.12	II	20000	8575.24	I	100	1033.69	III	280 h	2731.91	I
99000	5423.23	II	750	8578.02	I	100	1036.03	III	170 h	2736.47	I
10000	5423.51	II	75000	8585.97	I	80	1055.89	IV	250	2743.64	II
19000	5443.37	II	450	8628.54	I	80	1068.41	III	110 h	2748.29	I
10000	5444.21	II	300	8641.71	I	100	1116.48	V	330	2748.98	II
40	5532.162	I	3500	8686.26	I	150	1121.07	V	390	2750.73	II
50 d	5796.305	I	2200	8912.92	I	150	1127.63	V	280	2751.87	II
45	5799.914	I	3000	8948.06	I	100	1263.50	V	110 h	2752.88	I
30	5856.742	I	2000	9038.982	I	100	1417.42	IV	150	2757.10	I
50	6019.812	I	2500	9045.43	I	150	1465.86	V	350	2757.72	II
200	6140.245	I	1000	9069.656	I	150	1497.97	V	750	2762.59	II
160	6194.757	I	2000	9073.17	I	170	1519.03	V	750	2766.54	II
150	6434.833	I	7500	9121.15	I	220	1579.70	V	250 h	2769.92	I
300	6932.903	I	3000	9191.731	I	170	1591.72	V	610	2780.70	I
300	6981.886	I	500	9197.596	I	150	1603.19	V	180	2822.37	II
600	7086.814	I	4000	9288.86	I	120	1672.66	IV	180	2830.47	II
7500	7256.62	I	1500	9393.862	I	120	1758.51	IV	2500	2835.63	II
5000	7414.11	I	3500	9452.10	I	140	1802.72	IV	110	2840.02	II
550	7462.370	I	500	9486.964	I	130	1812.41	IV	1700	2843.25	II
550	7489.47	I	1000	9584.801	I	200	1837.44	V	1200	2849.84	II
700	7492.118	I	3500	9592.22	I	140	1873.89	IV	120	2851.36	II
11000	7547.072	I	250	9632.509	I	140	1967.18	IV	880	2855.68	II
2300	7672.42	I	1000	9702.439	I	120	1972.07	IV	610	2858.91	II
450	7702.828	I	250	9744.426	I	19000	2055.52	II	440	2860.93	II
7000	7717.581	I	200	9807.057	I	14000	2061.49	II	790	2862.57	II
10000	7744.97	I	400	9875.970	I	8900	2065.42	II	750	2865.11	II
2200	7769.16	I	331	10392.549	I	200	2226.72	III	610	2866.74	II
6500	7771.09	I	300	11123.05	I	200	2235.91	III	480	2867.65	II
2200	7821.36	I	269	11409.69	I	150	2237.59	III	210	2870.44	II
1700	7830.75	I	1000	11436.33	I	150	2244.10	III	110	2871.63	I
3000	7878.22	I	350	13243.8	I	150	2284.44	III	160	2873.48	II
						150	2324.88	III			

Chromium Cr Z = 24

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
320	2875.99	II	220	3197.08	II	110	3807.93	I	110	4374.16	I
230	2876.24	II	170	3209.18	II	180	3815.43	I	530	4384.98	I
180	2877.98	II	140	3217.40	II	180	3819.56	I	110	4458.54	I
120	2879.27	I	120	3245.54	I	130	3826.42	I	660	4496.86	I
170	2887.00	I	130	3251.84	I	130	3830.03	I	380	4526.47	I
700	2889.29	I	130	3257.82	I	380	3841.28	I	380	4530.74	I
370	2893.25	I	130	3339.80	II	190	3848.98	I	240	4535.72	I
190	2894.17	I	110	3342.59	II	140	3849.36	I	240	4540.50	I
210	2896.75	I	170	3358.50	II	290	3850.04	I	240	4540.72	I
180	2905.49	I	160	3360.30	II	140	3852.22	I	140	4544.62	I
260	2909.05	I	430	3368.05	II	190	3854.22	I	600	4545.96	I
260	2910.90	I	140	3382.68	II	110	3855.29	I	120	4565.51	I
250	2911.14	I	170	3403.32	II	140	3855.57	I	120	4571.68	I
480	2967.64	I	360	3408.76	II	260	3857.63	I	360	4580.06	I
480	2971.11	I	210	3421.21	II	660	3883.29	I	360	4591.39	I
210	2971.91	II	270	3422.74	II	570	3885.22	I	480	4600.75	I
480	2975.48	I	140	3433.31	II	380	3886.79	I	240	4613.37	I
190	2979.74	II	270	3433.60	I	260	3894.04	I	600	4616.14	I
350	2980.79	I	160	3436.19	I	360	3902.92	I	550	4626.19	I
110	2985.32	II	140	3441.44	I	960	3908.76	I	1600	4646.17	I
480	2985.85	I	170	3445.62	I	120 hd	3911.82	I	570	4651.28	I
1500	2986.00	I	170	3447.43	I	120	3915.84	I	840	4652.16	I
2100	2986.47	I	190	3453.33	I	190	3916.24	I	240 d	4698.46	I
660	2988.65	I	130	3455.60	I	1900	3919.16	I	190	4708.04	I
160	2989.19	II	100	3460.43	I	600	3921.02	I	240	4718.43	I
480	2991.89	I	120	3550.64	I	600	3928.64	I	120	4730.71	I
230	2994.07	I	130	3566.16	I	410	3941.49	I	140	4737.35	I
300	2995.10	I	130	3573.64	I	1900	3963.69	I	340	4756.11	I
700	2996.58	I	330 h	3574.80	I	120	3969.06	I	190	4789.32	I
210	2998.79	I	19000	3578.69	I	1600	3969.75	I	120	4801.03	I
1100	3000.89	I	160 h	3584.33	I	1600	3976.66	I	110	4829.38	I
750	3005.06	I	130	3585.30	II	960	3983.91	I	140	4870.80	I
140	3013.03	I	17000	3593.49	I	190	3984.34	I	130	4887.01	I
710	3013.71	I	350	3601.67	I	160	3989.99	I	260	4922.27	I
710	3014.76	I	13000	3605.33	I	960	3991.12	I	110	4936.33	I
1400	3014.92	I	130	3632.84	I	160	3991.67	I	70	4942.50	I
710	3015.19	I	350	3636.59	I	190	3992.84	I	110	4954.81	I
2800	3017.57	I	630	3639.80	I	160	4001.44	I	60	5013.32	I
430	3018.50	I	220	3641.83	I	120	4012.47	II	70	5166.23	I
240	3018.82	I	220	3649.00	I	120	4026.17	I	70	5184.59	I
430	3020.67	I	170	3653.91	I	190	4039.10	I	70	5192.00	I
2800	3021.56	I	220	3656.26	I	160	4048.78	I	85	5196.44	I
1100	3024.35	I	130	3663.21	I	120	4058.77	I	5300	5204.52	I
170	3029.16	I	120	3685.55	I	140	4126.52	I	8400	5206.04	I
710	3030.24	I	130	3686.80	I	120	4153.82	I	11000	5208.44	I
140	3031.35	I	130	3687.25	I	140	4163.62	I	85	5224.94	I
390	3034.19	I	130	3730.81	I	170	4174.80	I	290	5247.56	I
550	3037.04	I	150	3732.03	I	170	4179.26	I	530	5264.15	I
550	3040.85	I	480	3743.58	I	110	4209.37	I	180	5265.72	I
110	3050.14	II	570	3743.88	I	20000	4254.35	I	95 h	5275.17	I
710	3053.88	I	340	3749.00	I	110	4263.14	I	70 h	5276.03	I
240	3118.65	II	230	3757.66	I	16000	4274.80	I	340	5296.69	I
430	3120.37	II	260	3768.24	I	10000	4289.72	I	70 h	5297.36	I
470	3124.94	II	130	3791.38	I	780	4337.57	I	660	5298.27	I
120	3128.70	II	130	3792.14	I	1100	4339.45	I	85	5300.75	I
590	3132.06	II	120	3793.29	I	380	4339.72	I	340 h	5328.34	I
140	3136.68	II	130	3793.88	I	1900	4344.51	I	70 h	5329.17	I
140	3147.23	II	140	3797.13	I	380	4351.05	I	780	5345.81	I
100	3155.15	I	200	3797.72	I	2300	4351.77	I	380	5348.32	I
100	3163.76	I	530	3804.80	I	570	4359.63	I	40	5400.61	I
240	3180.70	II	110	3806.83	I	530	4371.28	I	1400	5409.79	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1000	3455.23	I	90	4549.66	I	200	974.759	II	250	1418.426	II
5100	3462.80	I	140	4565.59	I	250	977.567	II	250	1421.759	II
5100	3465.80	I	190	4581.60	I	100	987.657	II	200	1427.829	II
8000	3474.02	I	120	4629.38	I	250	992.953	II	400	1430.243	II
1900	3483.41	I	85	4663.41	I	300	1004.055	II	250	1434.904	II
4800	3489.40	I	110	4792.86	I	300	1008.569	II	150	1436.236	II
2400	3495.69	I	100	4840.27	I	300	1008.728	II	150	1442.139	II
50	3501.72	II	150	4867.88	I	300	1010.269	II	200	1445.984	II
9600	3502.28	I	80 h	4964.18	II	250	1012.597	II	200	1449.058	II
7000	3506.32	I	50	5212.71	I	500	1018.707	II	250	1450.304	II
50	3507.77	II	50	5230.22	I	500	1027.831	II	200	1452.294	II
2900	3509.84	I	50	5247.93	I	250	1028.328	II	300	1458.002	II
1400	3510.43	I	50	5342.71	I	200	1030.263	II	250	1459.412	II
4800	3512.64	I	50	5352.05	I	600	1036.470	II	200	1463.752	II
3800	3513.48	I	<i>Copper Cu Z = 29</i>			600	1039.348	II	400	1463.838	II
4800	3518.35	I	80	685.141	II	600	1039.582	II	200	1466.070	II
1300	3520.08	I	100	709.313	II	800	1044.519	II	400	1470.697	II
2700	3521.57	I	100	718.179	II	800	1044.744	II	200	1472.395	II
3800	3523.43	I	150	724.489	II	500	1049.755	II	250	1473.978	II
60	3523.51	II	200	735.520	II	600	1054.690	II	200	1474.935	II
6400	3526.85	I	250	736.032	II	400	1055.797	II	150	1476.059	II
2700	3529.03	I	80	779.295	II	600	1056.955	II	300 r	1481.23	III
7300	3529.81	I	100	797.455	II	400	1058.799	II	200	1481.544	II
1900	3533.36	I	150	810.998	II	600	1059.096	II	200	1485.328	II
50	3545.03	II	200	813.883	II	600	1060.634	II	750	1488.831	II
1100	3560.89	I	300	826.996	II	600	1063.005	II	300	1492.834	II
80	3561.07	II	150	848.808	II	200	1065.782	II	250	1493.366	II
8800	3569.38	I	250	851.303	II	200	1066.134	II	250	1495.430	II
50	3574.95	II	250	858.487	II	500	1069.195	II	350	1496.687	II
1600	3574.96	I	400	861.994	II	300	1073.745	II	150	1503.368	II
60	3575.32	II	400	865.390	II	200	1088.395	II	250	1504.757	II
2500	3575.36	I	250	869.336	II	300	1094.402	II	200	1505.388	II
60	3577.96	II	150	873.263	II	250	1097.053	II	300	1508.632	II
1000	3585.16	I	200	876.723	II	150	1119.947	II	350	1510.506	II
6700	3587.19	I	250	877.012	II	200	1142.640	II	200	1512.465	II
1900	3594.87	I	200	877.555	II	300	1144.856	II	200	1513.366	II
1600	3602.08	I	500	878.699	II	100	1250.048	II	500	1514.492	II
100	3621.21	II	100	884.133	II	150	1265.506	II	200	1517.631	II
1000	3627.81	I	250	885.847	II	300	1275.572	II	500	1519.492	II
80	3643.61	II	600	886.943	II	150	1282.455	II	600	1519.837	II
60	3681.35	II	600	890.567	II	150	1287.468	II	200	1520.540	II
1100	3745.50	I	500	892.414	II	150	1298.395	II	200	1524.860	II
1400	3842.05	I	800	893.678	II	300	1308.297	II	150	1525.764	II
6900	3845.47	I	400	894.227	II	300	1314.337	II	500	1531.856	II
5500	3873.12	I	600	896.759	II	100	1320.686	II	300	1532.131	II
2800	3873.96	I	400	896.976	II	100	1326.395	II	250	1533.986	II
7900	3894.08	I	600	901.073	II	150	1350.594	II	250	1535.002	II
1500	3935.97	I	400	906.113	II	250	1351.837	II	500	1537.559	II
80 h	3963.10	II	800	914.213	II	150	1355.305	II	200	1540.239	II
6000	3995.31	I	600	922.019	II	300	1358.773	II	300	1540.389	II
970	3997.91	I	500	924.239	II	200	1359.009	II	300	1540.588	II
350	4020.90	I	400	935.232	II	200	1362.600	II	750	1541.703	II
370	4045.39	I	600	935.898	II	250	1367.951	II	400	1544.677	II
350	4066.37	I	600	943.335	II	200	1371.840	II	100	1547.958	II
830	4092.39	I	600	945.525	II	300 r	1376.79	III	300	1550.653	II
550	4110.54	I	500	945.965	II	200 r	1377.49	III	300	1551.389	II
2800	4118.77	I	200	954.383	II	100	1393.128	II	500	1552.646	II
4400	4121.32	I	250	956.290	II	100	1398.642	II	250	1553.896	II
90	4190.71	I	400	958.154	II	150	1402.777	II	400	1555.134	II
90	4469.56	I	200	960.414	II	150	1407.169	II	500	1555.703	II
690	4530.96	I	250	968.042	II	100	1414.898	II	300	1558.345	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
400	1565.924	II	900	2135.981	II	800	2769.669	II	500	4043.751	II
400	1566.415	II	400	2148.984	II	200	2791.795	II	2000	4062.64	I
100	1569.416	II	150	2161.320	II	170	2799.528	II	120	4068.106	II
300	1579.492	II	1300 r	2165.09	I	100	2810.804	II	500	4131.363	II
300	1580.626	II	250	2174.982	II	1250 r	2824.37	I	200	4143.017	II
400	1581.995	II	1600 r	2178.94	I	350	2837.368	II	300	4153.623	II
500	1583.682	II	700	2179.410	II	100	2857.748	II	500	4161.140	II
400	1590.165	II	1700 r	2181.72	I	600	2877.100	II	370	4164.284	II
600	1593.556	II	700	2189.630	II	270	2884.196	II	400	4171.851	II
500 r	1593.75	III	900	2192.268	II	2500 r	2961.16	I	500	4179.512	II
400	1598.402	II	400	2195.683	II	100	2986.335	II	500	4211.866	II
400	1602.388	II	1700 r	2199.58	I	2000	2997.36	I	320	4230.449	II
200	1604.848	II	1300 r	2199.75	I	2000	3010.84	I	200	4255.635	II
300	1605.281	II	100	2200.509	II	2500	3036.10	I	950	4275.11	I
400	1606.834	II	200	2209.806	II	2500	3063.41	I	300	4279.962	II
250	1608.639	II	750	2210.268	II	1400	3073.80	I	500	4292.470	II
150	1610.296	II	1600 r	2214.58	I	1500	3093.99	I	400	4365.370	II
200	1617.915	II	250	2215.106	II	1250	3099.93	I	100	4444.831	II
600	1621.426	II	1000 r	2215.65	I	2000	3108.60	I	400	4506.002	II
400	1622.428	II	750	2218.108	II	1400 h	3126.11	I	150	4516.049	II
250	1630.268	II	2100 r	2225.70	I	1500	3194.10	I	150	4541.032	II
100	1636.605	II	150	2226.780	II	1400	3208.23	I	500	4555.920	II
1000 r	1642.21	III	1600 r	2227.78	I	1500 h	3243.16	I	100	4596.906	II
250	1649.458	II	350	2228.868	II	10000 r	3247.54	I	120	4649.271	II
30 r	1655.32	I	2500 r	2230.08	I	10000 r	3273.96	I	2000	4651.12	I
200	1656.322	II	1100 r	2238.45	I	1400 h	3282.72	I	120	4661.363	II
200	1660.001	II	900	2242.618	II	400	3290.418	II	320	4671.702	II
300	1663.002	II	2300 r	2244.26	I	1500 h	3290.54	I	300	4673.577	II
100	1672.776	II	1000	2247.002	II	110	3300.881	II	450	4681.994	II
30	1688.09	I	1300 r	2260.53	I	250	3301.229	II	100	4758.433	II
30	1691.08	I	2200 r	2263.08	I	2500 h	3307.95	I	400	4812.948	II
30 r	1703.84	I	150	2263.786	II	200	3316.276	II	120	4851.262	II
50 r	1713.36	I	200	2276.258	II	1500	3337.84	I	300	4854.988	II
150	1717.721	II	100	2286.645	II	150	3338.648	II	100	4873.304	II
50 r	1725.66	I	2500 r	2293.84	I	200	3365.648	II	150	4901.427	II
100	1736.551	II	170	2294.368	II	450	3370.454	II	1000	4909.734	II
50 r	1741.57	I	1000	2303.12	I	300	3374.952	II	500	4918.376	II
150	1753.281	II	150	2369.890	II	200	3380.712	II	200	4926.424	II
200 r	1774.82	I	2500 r	2392.63	I	100	3384.945	II	900	4931.698	II
100 r	1825.35	I	120	2403.337	II	1250 h	3483.76	I	120	4943.026	II
250	1929.751	II	1500	2406.66	I	1250	3524.23	I	700	4953.724	II
250	1944.597	II	1000 r	2441.64	I	2000	3530.38	I	500	4985.506	II
100	1946.493	II	100	2485.792	II	1400	3599.13	I	400	5006.801	II
200	1957.518	II	2000 r	2492.15	I	1400	3602.03	I	350	5009.851	II
150	1970.495	II	150	2506.273	II	1000	3686.555	II	400	5012.620	II
150	1977.027	II	120	2526.593	II	150	3786.270	II	350	5021.279	II
500	1979.956	II	300	2544.805	II	170	3797.849	II	200	5039.016	II
300	1989.855	II	100	2571.756	II	100	3818.879	II	300	5047.348	II
250	1999.698	II	150	2590.529	II	140	3826.921	II	900	5051.793	II
270	2035.854	II	200	2600.270	II	160	3864.137	II	400	5058.910	II
250	2037.127	II	2500 r	2618.37	I	280	3884.131	II	500	5065.459	II
350	2043.802	II	200	2666.291	II	150	3892.924	II	450	5067.094	II
300	2054.980	II	750	2689.300	II	170	3903.177	II	350	5072.302	II
100	2078.663	II	700	2700.962	II	140	3920.654	II	450	5088.277	II
110	2098.398	II	650	2703.184	II	120	3933.268	II	420	5093.816	II
320	2104.797	II	700	2713.508	II	120	3987.024	II	350	5100.067	II
300	2112.100	II	650	2718.778	II	150	3993.302	II	1500	5105.54	I
320	2117.310	II	300	2721.677	II	140	4003.476	II	250	5124.476	II
350	2122.980	II	120	2737.342	II	1250	4022.63	I	2000	5153.24	I
350	2126.044	II	270	2745.271	II	100	4032.647	II	100	5158.093	II
420	2134.341	II	2500 r	2766.37	I	600	4043.484	II	100	5183.367	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
2500	5218.20	I	270	6879.404	II	1200	3156.52	II	830	3577.98	II
100	5269.991	II	220	6937.553	II	670	3162.83	II	440	3580.04	II
100	5276.525	II	150	6952.871	II	1000	3169.99	II	3300	3585.06	II
1650	5292.52	I	150	6977.572	II	470	3215.19	II	1400	3585.78	II
100	5368.383	II	200	7022.860	II	830	3216.63	II	560	3586.11	II
1500	5700.24	I	300	7194.896	II	490	3235.89	II	1100	3591.41	II
1500	5782.13	I	400	7326.008	II	490	3245.12	II	560	3591.81	II
150	5805.989	II	300	7331.694	II	1200	3251.27	II	560	3592.11	II
100	5833.515	II	250	7382.277	II	890	3280.09	II	1800	3595.04	II
200	5897.971	II	1000	7404.354	II	490	3282.77	II	560	3600.38	II
120	5937.577	II	270	7434.156	II	1100	3308.88	II	1800	3606.12	II
400	5941.196	II	500	7562.015	II	780	3316.32	II	440	3618.51	II
100	5993.260	II	700	7652.333	II	1000	3319.88	II	560	3620.16	II
650	6000.120	II	1000	7664.648	II	780	3341.00	II	470	3624.27	II
100	6023.264	II	150	7681.788	II	510	3353.58	II	1100	3629.42	II
250	6072.218	II	450	7744.097	II	510	3368.11	II	4000	3630.24	II
150	6080.343	II	800	7778.738	II	5300	3385.02	II	440	3632.78	II
150	6099.990	II	750	7805.184	II	610	3388.85	II	1100	3640.25	II
160	6107.412	II	1500	7807.659	II	3800	3393.57	II	11000	3645.40	II
300	6114.493	II	1000	7825.654	II	1300	3396.16	II	1000	3648.78	II
600	6150.384	II	350	7860.577	II	5300	3407.80	II	700	3664.62	II
750	6154.222	II	300	7890.567	II	1300	3413.78	II	990	3672.30	II
500	6172.037	II	700	7902.553	II	530	3414.82	II	420	3672.70	II
550	6186.884	II	1500	7933.13	I	780	3419.63	II	1400	3674.08	II
400	6188.676	II	400	7944.438	II	530	3425.06	II	2200	3676.59	II
300	6198.092	II	400	7972.033	II	1900	3434.37	II	640	3678.51	I
470	6204.261	II	1200	7988.163	II	560	3440.93	II	820	3684.85	I
450	6208.457	II	2000	8092.63	I	1300	3441.45	II	1300	3685.78	I
750	6216.939	II	500	8277.560	II	3800	3445.57	II	4700	3694.81	II
700	6219.844	II	800	8283.160	II	830	3446.99	II	990	3698.21	II
500	6261.848	II	250	8503.396	II	2700	3454.32	II	540	3701.63	II
1000	6273.349	II	750	8511.061	II	1300	3456.56	II	440	3707.57	II
350	6288.696	II	200	8609.134	II	4400	3460.97	II	440	3708.22	II
900	6301.009	II	500	9813.213	II	720	3468.43	II	420	3710.07	II
550	6305.972	II	250	9827.978	II	560	3471.14	II	1600	3724.45	II
400	6312.492	II	200	9830.798	II	560 d	3471.53	II	930	3739.34	I
120	6326.466	II	600	9861.280	II	1300	3477.07	II	1200	3747.82	II
400	6373.268	II	600	9864.137	II	4400	3494.49	II	1400	3753.51	II
750	6377.840	II	200	9883.969	II	560	3496.34	II	1400	3753.75	II
400	6403.384	II	550	9916.419	II	830	3498.71	II	1200	3757.05	I
850	6423.884	II	500	9917.954	II	830	3504.53	II	4700	3757.37	II
200	6442.965	II	550	9925.594	II	830	3505.45	II	640	3767.63	I
750	6448.559	II	450	9938.998	II	1300	3506.81	II	640	3773.05	I
170	6466.246	II	500	9960.354	II	560	3517.26	II	420	3781.47	I
950	6470.168	II	450	10006.588	II	4400	3523.98	II	3300	3786.18	II
750	6481.437	II	550	10022.969	II	22000	3531.70	II	1600	3788.44	II
400	6484.421	II	550	10038.093	II	4400	3534.96	II	700	3791.87	II
220	6517.317	II	650	10054.938	II	5500	3536.02	II	510	3804.14	II
400	6530.083	II	450	10080.354	II	4400	3538.52	II	580	3806.27	II
120	6551.286	II				1700	3542.33	II	470	3812.27	I
200	6577.080	II	<i>Dysprosium Dy Z = 66</i>			1400	3546.83	II	470	3813.67	II
750	6624.292	II	260	2356.91	II	4400	3550.22	II	1400	3816.76	II
800	6641.396	II	240	2410.01	II	2200	3551.62	II	700	3825.68	II
450	6660.962	II	260	2439.84	II	440 h	3558.23	II	2300	3836.50	II
100	6770.362	II	220	2585.30	I	440	3559.30	II	1400	3841.31	II
300	6806.216	II	440	2634.80	II	2200	3563.15	II	420	3846.34	II
400	6809.647	II	220	2755.75	II	560	3563.69	II	420	3847.02	I
320	6823.202	II	300	2816.39	II	780	3573.83	II	1200	3853.03	II
250	6844.157	II	390	2913.95	II	1400	3574.15	II	420	3858.40	I
320	6868.791	II	610	3038.28	II	4400	3576.24	II	560	3868.45	II
270	6872.231	II	830	3135.38	II	1700	3576.87	II	1600	3868.81	I
			500	3141.14	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
820	3869.86	II	990	4612.26	I	1000	3070.40	III	3200	3944.42	I
7000	3872.11	II	170	4731.84	II	610	3073.34	II	2700	3973.04	I
1200	3873.99	II	120 h	4775.79	I	720	3082.08	II	3200	3973.58	I
470	3879.11	II	480	4957.34	II	610	3084.02	II	1400	3974.72	II
5800	3898.53	II	70	5022.12	I	770	3122.72	II	810	3977.02	I
540	3914.87	II	160	5042.63	I	1500	3166.25	III	1100	3982.33	I
540	3915.59	II	95	5070.68	I	870	3181.92	II	810	3987.66	I
540 d	3917.29	I	120	5077.67	I	870	3220.73	II	14000	4007.96	I
420	3927.86	I	80	5090.38	II	610	3223.31	II	1100	4012.58	I
540	3930.14	I	80	5110.32	I	2300	3230.58	II	3000	4020.51	I
2100	3931.52	II	130 h	5120.04	I	2700	3264.78	II	1000	4046.96	I
10000	3944.68	II	190	5139.60	II	720	3279.33	II	940	4055.47	II
800	3957.79	II	110	5169.69	II	720	3280.22	II	690	4059.78	II
14000	3968.39	II	80	5185.30	I	2000	3301.23	III	3500	4087.63	I
2700	3978.57	II	290	5192.86	II	2300	3312.42	II	1100	4098.10	I
1400	3981.92	II	95	5197.66	II	770	3323.19	II	6900	4151.11	I
1600	3983.65	II	70	5259.88	I	770	3332.70	II	1000	4190.70	I
800	3984.21	II	130	5260.56	I	1300	3346.04	II	1400	4218.43	I
540	3991.32	II	65	5267.11	I	1400	3364.08	II	690	4286.56	I
1600	3996.69	II	55	5282.07	I	1400 d	3368.02	II	40000	4290.06	III
8000	4000.45	II	160	5301.58	I	7700	3372.71	II	20000	4386.86	III
420	4005.84	I	65	5340.30	I	970	3374.17	II	810	4409.34	I
540	4011.29	II	85	5389.58	II	1700	3385.08	II	1000	4606.61	I
540	4013.82	I	80	5419.13	I	2300	3392.00	II	570	4675.62	II
540	4014.70	II	70	5423.32	I	770	3441.13	II	15000	4735.56	III
420	4027.78	II	95	5451.11	I	970	3471.71	II	2000	4783.12	III
520 d	4028.32	II	65	5547.27	I	610	3479.41	II	250	5007.25	I
520	4032.47	II	100	5639.50	I	970	3485.85	II	200	5035.94	I
420	4033.65	II	55 h	5645.99	I	6700	3499.10	II	210	5042.05	II
420	4036.32	II	80	5652.01	I	610	3502.78	I	120	5124.56	I
12000	4045.97	I	70 h	5718.46	I	610	3524.91	II	130	5127.41	II
1600	4050.56	II	55	5745.53	I	820	3549.84	II	120	5131.53	I
520	4055.14	II	55 h	5868.11	II	1500	3558.02	I	130	5133.83	II
2500	4073.12	II	70	5945.80	I	1000	3559.90	II	170	5164.77	II
7400	4077.96	II	120	5974.49	I	920	3570.75	II	130	5172.78	I
3900	4103.30	II	140	5988.56	I	1000	3580.52	II	160	5188.90	II
860	4103.87	I	140	6088.26	I	610	3590.76	I	150	5206.52	I
1500	4111.34	II	100	6168.43	I	610	3599.50	II	140	5255.93	II
490	4124.63	II	270	6259.09	I	1000	3599.83	II	80	5272.91	I
990	4129.42	II	160	6579.37	I	3100	3616.56	II	90	5348.06	I
1200	4143.10	II	75	6667.86	I	720	3628.04	I	60	5414.63	II
990	4146.06	I	180	6835.42	I	1000	3633.54	II	180	5456.62	I
5700	4167.97	I	80	6852.96	I	1600	3638.68	I	90	5468.32	I
930	4183.72	I	65	6899.32	II	900	3645.94	II	80	5485.97	II
12000	4186.82	I	55	7426.86	II	7900	3692.65	II	80	5593.46	I
2200	4191.64	I	55	7543.73	I	1300	3729.52	II	60	5611.82	I
6800	4194.84	I	80	7662.36	I	900	3742.64	II	70	5622.01	I
800	4198.02	I	100	8201.57	II	900	3747.43	I	80	5626.53	II
680	4201.30	I	45	8791.39	II	1800	3786.84	II	90	5640.36	I
680	4202.24	I				1600	3810.33	I	70	5664.95	I
16000	4211.72	I				4000	3816.78	III	70	5719.55	I
1800	4213.18	I	<i>Erbium Er Z = 68</i>			3600	3830.48	II	100	5739.19	I
3700	4215.16	I	600	2277.65	III	680	3855.90	I	290	5762.80	I
4400	4218.09	I	290	2586.73	II	7500	3862.85	I	70	5784.66	I
4400	4221.11	I	490	2670.26	II	1500	3880.61	II	70	5800.79	I
2700	4225.16	I	500	2739.27	III	1200	3882.89	II	430	5826.79	I
1000	4308.63	II	610	2755.63	II	4200	3892.68	I	100	5850.07	I
540	4409.38	II	1000	2904.47	II	5200	3896.23	II	120	5855.31	I
740	4449.70	II	1500	2910.36	II	11000	3906.31	II	140	5872.35	I
420	4577.78	I	1500	2964.52	II	3200	3937.01	I	120	5881.14	I
2100	4589.36	I	1200	3002.41	II	2100	3938.63	II	8000	5903.30	III
			1000	3055.10	III						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
70	6022.56	I	140	2893.03	I	9800	4627.22	I	230	6303.41	II
70	6061.25	I	360	2893.83	I	8300	4661.88	I	120 cw	6350.04	I
60	6076.45	II	3200	2906.68	II	110	4867.62	I	120 cw	6400.93	I
360	6221.02	I	160	2908.99	I	150	4907.18	I	180	6410.04	I
55	6262.56	I	850	2925.04	II	180	4911.40	I	140	6411.32	I
60	6268.87	I	200 cw	2952.68	II	180	5013.17	I	830	6437.64	II
130	6308.77	I	260	2960.21	II	170	5022.91	I	120	6457.96	I
55	6326.13	I	300	2991.33	II	110	5029.54	I	1400	6645.11	II
55	6492.35	I	100 c	3023.93	III	170	5114.37	I	50	6666.35	III
60	6583.48	I	200 c	3026.79	III	170	5129.10	I	140	6802.72	I
70	6601.11	I	320 cw	3054.94	II	210	5133.52	I	360	6864.54	I
70	6759.87	I	120	3058.98	I	270	5160.07	I	120	7040.20	I
35	6790.92	I	220	3077.36	II	210	5166.70	I	330	7077.10	II
70	6848.10	I	120	3097.45	II	200	5199.85	I	570	7194.81	II
55	6865.13	I	320	3106.18	I	110	5200.96	I	570	7217.55	II
55	7459.55	I	950	3111.43	I	120	5206.44	I	540	7301.17	II
120	7469.51	I	120	3130.73	II	750	5215.10	I	720	7370.22	II
35	7680.01	I	50 c	3171.00	III	300	5223.49	I	300	7426.57	II
35	7797.47	I	50 c	3183.78	III	120	5239.24	I	160	7583.91	I
35	7921.85	I	420	3210.57	I	200	5266.40	I	60 cw	7742.57	I
30	7937.84	I	1000	3212.81	I	390	5271.96	I	70	7746.19	I
35	8312.82	I	420	3213.75	I	110	5272.48	I	35	7887.99	I
55	8409.90	I	150	3272.77	II	150	5282.82	I	24 cw	8209.80	I
9	8866.84	II	210	3277.78	II	120	5291.26	I	21 cw	8642.67	I
Europium Eu Z = 63			150	3301.95	II	120	5294.64	I	18	8870.30	I
30	2124.69	III	140	3308.02	II	540	5357.61	I	Fluorine F Z = 9		
200	2350.51	III	140	3313.33	II	120	5361.61	I	50	148.00	V
4000	2375.46	III	950	3334.33	I	110	5376.94	I	50	163.56	V
100 d	2435.14	III	110	3350.40	I	120	5392.94	I	90	165.98	V
1000	2444.38	III	140	3369.06	II	450	5402.77	I	100	166.18	V
4000	2445.99	III	190	3391.99	II	380	5451.51	I	50	186.84	V
2000	2513.76	III	280	3396.58	II	260	5452.94	I	60	190.57	V
200	2522.14	III	150	3425.02	II	120	5488.65	I	70	190.84	V
160	2564.17	II	150	3441.00	II	120	5510.52	I	50	196.39	IV
110	2568.17	II	130	3461.38	II	200	5547.44	I	60	196.45	IV
230	2577.14	II	470 cw	3521.09	II	150	5570.33	I	70	200.09	IV
1000	2638.77	II	150	3542.15	II	200	5577.14	I	80	201.16	IV
380	2641.27	II	180	3552.52	II	120	5580.03	I	90	208.25	IV
640	2668.34	II	150	3603.20	II	210	5645.80	I	90	240.08	IV
110	2673.42	II	6400	3688.42	II	330	5765.20	I	100	251.03	IV
250	2678.29	II	20000 cw	3724.94	II	180	5783.69	I	140	419.65	IV
250	2685.66	II	350	3741.31	II	170	5818.74	II	150	420.05	IV
550	2692.03	II	260	3761.12	II	600 cw	5830.98	I	160	420.73	IV
700	2701.14	II	39000 cw	3819.67	II	330	5966.07	II	100	429.51	III
800	2701.90	II	140	3844.23	II	480 cw	5967.10	I	110	430.15	III
240	2705.28	II	190	3865.57	I	170	5972.75	I	150	430.76	IV
180	2709.99	I	150	3884.75	I	240	5992.83	I	90	464.29	III
700	2716.98	II	28000 cw	3907.10	II	110	6012.56	I	120	465.98	V
4200	2727.78	II	32000 cw	3930.48	II	420	6018.15	I	130	490.57	IV
160	2740.62	II	30000 cw	3971.96	II	170	6029.00	I	160	491.00	IV
120	2744.26	II	180	4011.69	II	420	6049.51	II	50	497.38	IV
480	2781.89	II	150	4017.58	II	140	6057.36	I	60	497.83	IV
1900	2802.84	II	120	4039.19	I	240	6083.84	I	70	498.80	IV
220	2811.75	II	120	4085.38	II	240	6099.35	I	90	506.16	V
3400	2813.94	II	33000 cw	4129.70	II	120	6118.78	I	100	508.08	V
550	2816.18	II	60000 cw	4205.05	II	330	6173.05	II	120	508.39	III
2000	2820.78	II	150	4298.73	I	110	6178.76	I	60	514.08	V
400 cw	2828.72	II	240	4355.09	II	260 cw	6188.13	I	90	525.29	V
260	2859.67	II	14000 cw	4435.56	II	140	6195.07	I	100	526.30	V
280	2862.57	II	3000	4522.57	II	240	6262.25	I	120	567.69	III
200	2892.54	I	11000	4594.03	I	170	6299.77	I	110	567.75	III

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
<i>Gadolinium Gd Z = 64</i>			2000	3684.13	I	700	4694.33	I	50	6752.67	II
1200	1007.24	IV	3100	3687.74	II	410	4743.65	I	26	6786.33	II
1200	1063.84	IV	2000	3697.73	II	470	4767.24	I	100	6828.25	I
1600	1476.98	IV	1300	3699.73	II	300	4784.62	I	100	6916.57	I
1500	1705.03	IV	2700	3712.70	II	320	4821.69	I	50	6985.89	II
1600	1706.01	IV	2000	3713.57	I	280	4934.12	I	75	6991.92	I
2000	1736.24	IV	1400	3716.36	II	750	5015.04	I	60	6996.76	II
1500	1815.32	IV	2000	3717.48	I	75	5039.09	I	45	7006.16	II
2200	1975.24	III	1800 d	3719.45	II	5000	5091.70	III	35	7122.57	I
3400	2018.07	III	1500	3730.84	II	130	5098.38	II	170	7168.37	I
2800	2359.31	III	4500	3743.47	II	910	5103.45	I	28	7189.57	II
1400	2397.87	IV	1400	3758.31	II	180	5108.91	II	28	7262.66	I
2800	2697.39	III	8700	3768.39	II	120	5125.56	II	35	7441.85	I
2800	2703.28	III	1400	3770.69	II	860	5155.84	I	40	7464.36	I
2700	2727.89	III	2900	3783.05	I	190	5176.28	II	55	7562.97	I
9000	2904.73	III	5100	3796.37	II	410	5197.77	I	80	7733.50	I
9500	2955.53	III	3700	3813.97	II	280	5219.40	I	35	7846.35	II
1200	2999.04	II	3300	3850.69	II	130	5233.93	I	35	7856.93	I
2100	3010.13	II	5100	3850.97	II	320	5251.18	I	25	7930.25	II
1900	3027.60	II	4300	3852.45	II	120	5252.14	II	18	8146.15	I
2100	3032.84	II	1600	3866.99	I	140	5255.80	I	21	8668.63	I
1600	3034.05	II	1500	3894.70	II	280	5283.08	I	21 h	8832.06	II
2100	3081.99	II	2200	3916.51	II	280	5301.67	I	14 h	8849.14	I
3500	3100.50	II	1200	3934.79	I	220	5302.76	I	18 h	8867.31	I
930	3145.00	II	1400	3945.54	I	280	5307.30	I	5000	14332.88	III
980	3156.53	II	1200	3957.67	II	130	5321.50	I	<i>Gallium Ga Z = 31</i>		
980	3161.37	II	1100	4023.14	I	280	5321.78	I	14	294.53	IV
4000	3176.66	III	1100	4028.15	I	110	5327.32	I	61	295.67	IV
1400	3331.38	II	1400	4037.33	II	170	5333.30	I	30	298.44	V
1100	3336.18	II	1600	4045.01	I	300	5343.00	I	30	300.01	V
5400	3350.47	II	1300	4049.43	II	200	5348.67	I	30	302.86	V
4300	3358.62	II	2200	4049.86	II	300	5350.38	I	41	304.99	IV
5400	3362.23	II	2600	4053.64	I	240	5353.26	I	30	307.03	V
1100	3392.53	II	2600	4058.22	I	3000	5365.96	III	30	308.26	V
1100 d	3407.56	II	1900	4063.39	II	150	5370.63	I	30	311.79	V
6900	3422.47	II	1300	4078.44	II	4000	5553.30	III	30	313.68	V
1700	3439.21	II	2800	4078.70	I	3000	5587.88	III	30	319.41	V
2700	3439.99	II	1500	4085.56	II	190	5617.91	I	40	322.31	V
1400	3450.38	II	1100	4092.71	I	110	5632.25	I	40	322.99	V
1100	3451.23	II	2600	4098.61	II	260	5643.24	I	50	322.99	V
2700	3463.98	II	2200	4130.37	II	3000	5658.98	III	30	323.10	V
1700	3467.27	II	1100	4132.28	II	390	5696.22	I	40	324.25	V
1700	3468.99	II	2400	4175.54	I	120	5733.86	II	40	324.95	V
1400	3473.22	II	2400	4184.25	II	240	5791.38	I	40	326.14	V
2200	3481.28	II	2200	4190.78	I	220	5851.63	I	30	326.77	V
1700	3481.80	II	1300	4212.00	II	280	5856.22	I	30	328.65	V
1700	3494.40	II	4800	4225.85	I	110	5904.56	I	25	423.18	IV
1400	3505.51	II	1700	4251.73	II	170	5911.45	II	16	439.92	IV
1100	3512.50	II	1600	4262.09	I	85	5930.29	I	50	620.00	III
4300	3545.80	II	1100	4306.34	I	85	5936.84	I	40	622.01	III
3900	3549.36	II	1800	4313.84	I	65	5937.71	I	90	806.51	III
1400	3557.05	II	2600 d	4325.57	II	110 h	5988.02	I	90	817.30	III
5400	3584.96	II	1900	4327.12	I	430	6114.07	I	50	828.70	III
1100	3592.71	II	1000	4344.30	II	75	6305.15	II	20	878.17	V
1100	3604.87	I	2200	4346.46	I	40	6331.35	I	40	973.21	V
6100	3646.19	II	1400	4401.86	I	40	6380.95	II	40	989.75	V
3900	3654.62	II	1400	4422.41	I	40 h	6538.15	I	90	1014.47	V
3100	3656.15	II	1100	4430.63	I	55	6564.78	I	90	1019.71	V
1400	3662.26	II	1100	4519.66	I	50	6634.36	II	120	1050.48	V
2700	3664.60	II	910	4537.81	I	35	6681.23	II	80	1054.56	V
2000	3671.20	II	520	4614.50	I	85	6730.73	I	90	1058.12	V
									80	1066.69	V

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
60	1069.60	V	85	1338.09	IV	<i>Germanium Ge Z = 32</i>					
80	1073.77	V	77	1347.03	IV	700	294.51	V	100	1742.195	I
90	1078.83	V	76	1351.06	IV	1000	295.64	V	50	1746.065	I
110	1079.60	V	70	1353.92	III	200	304.98	V	200	1750.043	I
60	1080.99	V	74	1364.63	IV	20	621.52	V	100	1758.279	I
80	1085.00	III	60	1395.54	IV	50	724.21	V	100 h	1764.185	I
250	1085.01	V	77	1402.55	IV	60	746.88	V	100 h	1765.284	I
80	1087.37	V	70	1405.32	IV	60	760.05	V	50 h	1766.433	I
90	1091.71	V	73	1465.87	IV	10	862.234	II	200	1774.176	I
100	1094.36	V	90	1495.07	III	15	875.493	II	200	1785.046	I
80	1095.10	V	50	1534.46	III	15	905.977	II	100 h	1793.071	I
160	1102.83	V	10	1813.98	II	20	920.554	II	75 h	1801.432	I
140	1103.03	V	15	1845.30	II	300	971.35	V	200 h	1841.328	I
60	1105.61	III	20	2091.34	II	300	990.66	V	200 h	1842.410	I
75	1105.62	V	90	2417.70	III	50	999.101	II	100 h	1844.410	I
70	1106.17	V	90	2423.98	III	300	1004.38	V	100 h	1845.872	I
80	1118.34	V	15	2424.36	III	100	1016.638	II	100 h	1846.958	I
120	1126.40	V	10	2632.66	I	900	1045.71	V	200	1853.134	I
130	1128.10	V	10	2665.05	I	700	1072.66	V	500 r	1860.086	I
120	1128.53	V	20	2700.47	II	100	1075.072	II	100	1865.052	I
100	1129.94	V	15	2780.15	II	300	1085.51	II	300 r	1874.256	I
130	1136.07	V	50	3521.77	III	40	1088.45	III	100	1895.197	I
67	1137.06	IV	80	3581.19	III	800	1089.49	V	500 r	1904.702	I
130	1150.23	V	100	3589.34	III	200	1098.71	II	50 h	1908.434	I
90	1150.27	III	10	3731.10	III	500	1106.74	II	30	1912.409	I
70	1156.10	IV	10	3806.60	III	1000	1116.94	V	300 r	1917.592	I
120	1156.51	V	10	4032.99	I	500	1120.46	II	100 h	1923.467	I
35	1157.74	V	10	4172.04	I	700	1163.39	V	500 r	1929.826	I
70	1163.60	IV	15	4251.16	II	200	1164.27	V	10 h	1934.048	I
25	1169.40	V	10 h	4254.04	II	500	1181.19	II	100 r	1937.483	I
75	1170.58	IV	10	4255.77	II	500	1181.65	II	500	1938.008	II
48	1171.71	IV	40	4262.00	II	200	1188.73	II	100 r	1938.300	I
40	1178.95	V	100	4380.69	III	20	1188.99	IV	500	1938.891	II
68	1185.23	IV	150	4381.76	III	300	1191.26	II	30 s	1944.116	I
40	1186.06	IV	100	4863.00	III	700	1222.30	V	200	1944.731	I
73	1190.89	IV	150	4993.78	III	20	1229.81	IV	200	1955.115	I
73	1193.02	IV	10	5808.28	III	500	1237.059	II	500	1962.013	I
75	1195.02	IV	20	5848.25	III	500	1261.905	II	30 h	1963.373	I
69	1201.54	IV	15	5993.51	III	100	1264.710	II	30	1965.383	I
72	1206.89	IV	10	6334.2	II	200	1401.24	II	200	1970.880	I
80	1213.17	V	2000	6396.56	I	200	1538.091	II	200	1979.274	II
63	1216.15	IV	1000	6413.44	I	500	1576.855	II	300 h	1987.849	I
50	1228.03	IV	10 h	7251.4	I	75	1581.070	II	300	1988.267	I
60	1236.38	IV	20 h	7403.0	I	100	1602.486	II	500 r	1998.887	I
60	1238.59	IV	30 h	7464.0	I	3 r	1615.57	I	200	2011.29	I
75	1245.53	IV	10 h	7620.5	I	2 r	1624.130	I	1700	2019.068	I
83	1258.77	IV	50 h	7734.77	I	2 r	1630.173	I	2400 r	2041.712	I
81	1264.66	IV	100 h	7800.01	I	3 r	1636.31	I	1600 r	2043.770	I
82	1267.15	IV	15 h	8002.55	I	4 r	1639.730	I	420	2054.461	I
90	1267.16	III	20 h	8074.25	I	2	1647.531	I	220 h	2057.238	I
81	1279.24	IV	100 h	8311.86	I	200	1649.194	II	750 r	2065.215	I
15	1283.64	V	200 h	8386.49	I	2	1651.528	I	2600 r	2068.656	I
80	1285.33	IV	200 h	9492.92	I	4 r	1651.955	I	420	2086.021	I
80	1293.46	III	200 h	9493.12	I	3	1661.345	I	2000 r	2094.258	I
60	1295.36	III	300 h	9589.36	I	4 r	1663.539	I	25	2104.45	III
82	1295.86	IV	100 h	10905.95	I	10 h	1665.275	I	240	2105.824	I
83	1299.46	IV	400	11949.12	I	4	1667.802	I	95 h	2124.744	I
82	1303.53	IV	200	12109.78	I	3 r	1670.608	I	50 h	2186.451	I
80	1309.68	IV	60	14996.64	I	100 r	1691.090	I	340 r	2198.714	I
80	1314.82	IV	60	22016.81	I	200 r	1716.784	I	15	2220.375	I
60	1323.15	III	70	22568.71	I	100 h	1739.102	I	18	2256.001	I
									18	2314.201	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
24	2327.918	I	1000	5893.389	II	60	1368.62	I	100	1624.34	I
15	2359.233	I	500	6021.041	II	70	1374.82	I	300 d	1629.13	III
20	2379.144	I	75	6283.452	II	50	1375.76	I	250	1638.88	III
10	2389.472	I	100	6336.377	II	180	1377.73	III	50	1639.90	I
15	2397.885	I	100	6484.181	II	150	1378.69	III	100	1644.17	III
130	2417.367	I	6	6557.488	I	150	1379.98	III	150	1646.67	I
30	2436.412	I	50	7049.369	II	125	1380.53	III	250	1652.74	III
30	2488.25	IV	30	7145.390	II	200	1381.36	III	250	1664.77	III
90	2497.962	I	5	7353.334	I	80	1382.75	I	100	1665.76	I
500	2500.54	II	7	7384.208	I	50	1385.33	I	100	1668.11	III
70	2533.230	I	10	7833.575	I	300	1385.79	III	125	1673.93	III
20	2542.44	IV	10	8031.039	I	100	1389.41	III	1000	1693.94	III
3	2556.298	I	6	8044.165	I	180	1391.46	III	150	1697.09	III
28	2589.188	I	10	8256.013	I	60	1392.27	I	200	1698.98	III
500	2592.534	I	10	8482.21	I	180	1396.00	III	200	1699.34	I
8	2644.184	I	9	8700.60	I	50	1402.12	I	200	1700.00	III
1200	2651.172	I	5	9068.785	I	100	1402.91	III	200	1702.25	III
500	2651.568	I	5	9095.957	I	70	1407.38	I	100	1707.53	III
500	2691.341	I	6	9398.868	I	100	1408.45	I	250	1710.16	III
850	2709.624	I	20	9474.993	II	225	1409.50	III	200	1715.69	III
400	2729.78	II	20	9475.645	II	250	1413.80	III	100	1716.71	III
40	2740.426	I	4	9492.559	I	100	1414.27	III	300	1717.83	III
650	2754.588	I	7	9625.664	I	100	1417.09	III	500	1727.31	III
70	2793.925	I	5	10039.436	I	125	1417.39	III	100 d	1733.17	III
80	2829.008	I	4	10200.952	I	150	1427.42	III	300	1738.48	III
1000	2831.843	II	10	10382.427	I	300	1428.93	III	150	1744.39	III
1000	2845.527	II	10	10404.913	I	80	1429.19	I	500	1746.10	III
750	3039.067	I	8	10734.068	I	250	1430.06	III	500	1756.92	III
600	3067.021	I	8	10947.416	I	275	1433.37	III	500	1761.95	III
20	3124.816	I	10	11125.130	I	50	1435.79	I	300	1767.42	III
35	3211.86	III	230	11252.83	I	250	1435.81	III	100	1774.42	III
40	3255.05	III	600	11714.76	I	300	1439.12	III	800	1775.17	III
110	3269.489	I	1300	12069.20	I	200	1441.21	III	200	1776.40	III
40	3434.03	III	1050	12391.58	I	150	1446.37	III	100	1780.57	III
300	3499.21	II	235	13107.61	I	250	1448.42	III	60	1783.22	II
60	3554.19	IV	470	14822.38	I	250	1454.95	III	300	1786.11	III
50	3676.65	IV	150	16759.79	I	100	1464.72	III	150	1792.65	III
200	4178.96	III	135	17214.34	I	150	1471.28	III	500	1793.76	III
70	4226.562	I	70	18811.86	I	100	1474.73	III	200	1801.98	III
200	4260.85	III	62	19279.24	I	150	1481.10	III	400	1805.24	III
150	4291.71	III	28	20673.64	I	100	1481.76	I	100	1809.81	III
10	4685.829	I				300	1487.15	III	400	1821.17	III
1000	4741.806	II	<i>Gold Au Z = 79</i>			250	1487.91	III	400	1844.89	III
1000	4814.608	II	100	843.44	III	200	1489.47	III	150	1848.83	III
50	4824.097	II	100	845.14	III	250	1500.37	III	500	1861.80	III
100	5131.752	II	200	945.10	III	200	1502.47	III	150	1871.92	III
200	5178.648	II	100	1040.63	III	200	1503.74	III	100	1879.83	I
3	5194.583	I	80	1044.49	III	100	1542.00	III	150	1918.28	III
6	5265.892	I	80	1046.81	III	100	1548.50	III	100	1932.04	III
6	5513.263	I	100 h	1239.96	III	100	1567.54	III	100	1935.42	III
8	5564.741	I	100	1278.51	III	200	1574.85	III	200	1948.79	III
8	5607.010	I	100	1314.84	III	200	1579.44	III	100	1958.47	III
6	5616.135	I	100 h	1328.37	I	200	1579.44	III	100	1958.47	III
7	5621.426	I	200	1336.72	III	150	1584.10	III	400	1989.63	III
6	5664.226	I	180	1341.68	III	200	1587.16	I	150	1996.85	III
5	5664.842	I	100	1348.89	III	200	1589.56	III	11000	2012.00	I
9	5691.954	I	150	1350.32	III	150	1593.41	III	2600	2021.38	I
6	5701.776	I	150	1355.61	III	70	1598.24	I	150	2082.09	II
5	5717.877	I	150	1356.13	III	200	1600.51	III	300	2083.09	III
6	5801.029	I	150	1356.13	III	250	1617.16	III	60	2110.68	II
9	5802.093	I	50	1363.98	I	100	1617.78	III	100	2159.08	III
			500	1365.40	III	500	1621.93	III	80	2167.33	III
			200	1367.17	III						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
200	2172.20	III	100	3927.69	I	370	1437.27	V	200	2537.33	II
100	2184.11	III	400	4040.93	I	500	1437.73	V	320	2551.40	II
500	2188.97	III	700	4065.07	I	370	1445.40	V	400 h	2560.74	III
70	2248.56	II	100	4084.10	I	270	1457.91	V	250	2563.61	II
80	2263.62	II	100	4241.80	I	100	1717.21	IV	300 h	2567.46	III
300	2322.27	III	200	4315.11	I	270	1719.32	V	890	2571.67	II
180	2352.65	I	120 h	4437.27	I	550	1729.08	V	320	2573.90	II
100	2382.40	III	250	4488.25	I	750	1731.83	V	320	2576.82	II
120	2387.75	I	900 h	4607.51	I	750	1733.96	V	300	2578.14	II
150	2402.71	III	100 h	4620.56	I	440	1741.74	V	320	2582.54	II
150	2405.12	III	500	4792.58	I	1000	1749.11	V	390	2606.37	II
2600	2427.95	I	100	4811.60	I	1000	1750.19	V	450	2607.03	II
60	2533.52	II	100	5147.44	I	500	1760.89	V	230	2613.60	II
250	2641.48	I	300	5230.26	I	370	1765.62	V	450	2622.74	II
3400	2675.95	I	100 h	5261.76	I	270	1774.02	V	160	2637.00	I
1100	2748.25	I	100	5655.77	I	6200	2012.78	II	1100	2638.71	II
100	2780.82	I	100 h	5721.36	I	8500	2028.18	II	1100	2641.41	II
1000	2802.04	II	300	5837.37	I	300	2070.94	III	160	2642.75	I
300	2819.79	II	100 h	5862.93	I	1200	2096.18	II	670	2647.29	II
100	2822.55	II	300 h	5956.96	I	200 h	2099.30	III	160	2657.84	II
100 h	2825.44	II	600	6278.17	I	200 h	2110.31	III	210	2661.88	II
300	2837.85	II	100	6562.68	I	200	2155.66	III	290	2683.35	II
100	2846.92	II	600	7510.73	I	200	2183.50	III	200	2687.22	III
100	2856.74	II	10	8145.06	I	200	2195.44	III	670	2705.61	I
300	2883.45	I	10	9254.28	I	540	2210.82	II	210	2712.42	II
300	2891.96	I				200	2234.59	III	250	2718.59	I
100	2893.25	II	<i>Hafnium Hf Z = 72</i>			320	2254.01	II	710	2738.76	II
100	2907.04	II	220	545.41	V	160	2255.15	II	200	2743.64	I
300	2913.52	II	180	600.00	V	250	2266.83	II	360	2751.81	II
300	2918.24	II	200	618.27	IV	620	2277.16	II	500	2753.60	III
100	2954.22	II	200	644.54	IV	200 h	2313.44	III	450	2761.63	I
100 h	2990.27	II	400	647.39	IV	230	2321.14	II	160	2766.96	I
300	2994.80	II	600	665.65	IV	580	2322.47	II	170	2773.02	I
320	3029.20	I	200	673.49	IV	300	2323.25	II	980	2773.36	II
300	3065.42	I	270	867.25	V	300	2324.89	II	180	2774.02	II
100	3122.50	II	180	875.88	V	200	2332.97	II	390	2779.37	I
1600	3122.78	I	180	885.58	V	300	2336.47	III	230	2808.00	II
100	3194.72	I	180	896.14	V	200	2337.33	II	230	2813.86	II
100	3227.99	III	180	901.54	V	230	2343.32	II	170	2814.48	II
300	3230.63	I	180	919.10	V	320	2347.44	II	230	2817.68	I
300	3308.30	I	270	921.67	V	540	2351.22	II	200	2819.74	I
300	3309.64	I	245	951.62	V	250	2380.30	II	1200	2820.22	II
100	3309.86	III	180	960.12	V	250	2383.540	III	490	2822.68	II
100	3320.12	I	180	964.74	V	170	2393.18	II	180	2833.28	I
100	3355.15	I	160	971.51	V	450	2393.36	II	410	2845.83	I
100 h	3391.31	I	160	1092.76	V	670	2393.83	II	270	2849.21	II
100	3395.40	I	160	1201.76	V	540	2405.42	II	270	2850.96	I
100	3467.21	I	270	1232.03	V	370	2410.14	II	180	2851.21	II
300	3557.36	I	200	1233.59	V	320	2417.69	II	180	2860.56	I
300	3586.73	I	160	1237.42	V	390	2447.25	II	760	2861.01	II
100	3611.57	I	160	1239.53	V	450	2460.49	II	760	2861.70	II
100 h	3631.31	I	160	1244.46	V	400	2461.74	III	2100	2866.37	I
300	3637.90	I	440	1396.66	V	430	2464.19	II	210	2887.14	I
100 h	3645.02	I	270	1400.09	V	210	2469.18	II	800	2889.62	I
100	3650.74	I	160	1401.70	V	2000	2495.16	III	1800	2898.26	I
100	3709.62	I	370	1407.17	V	290	2496.99	II	1200	2904.41	I
100	3796.01	I	370	1408.38	V	580	2512.69	II	890	2904.75	I
100	3874.73	I	270	1412.28	V	580	2513.03	II	2000	2916.48	I
100 h	3892.26	I	270	1413.51	V	1000	2515.16	III	580	2918.58	I
400	3897.86	I	160	1421.96	V	890	2516.88	II	320	2919.59	II
300	3909.38	I	220	1422.53	V	340	2531.19	II	180	2924.62	I
			370	1433.43	V						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
490	2929.63	II	670	3312.86	I	650	3793.37	II	160	5719.18	I
450	2929.90	I	180	3317.99	II	850 d	3800.38	I	95	6098.67	I
710	2937.80	II	890	3332.73	I	320	3811.78	I	95	6185.13	I
2000	2940.77	I	370	3352.06	II	1300	3820.73	I	85	6789.27	I
160	2944.71	I	230	3358.91	I	280	3830.02	I	160	6818.94	I
1200	2950.68	I	180	3360.06	I	800	3849.18	I	160	7063.83	I
1100	2954.20	I	180	3378.93	I	600	3858.31	I	570	7131.81	I
540	2958.02	I	230	3384.70	II	230	3860.91	I	650	7237.10	I
1400	2964.88	I	170	3386.21	I	200	3872.55	II	410	7240.87	I
620	2966.93	I	800	3389.83	II	160	3877.10	II	360	7624.40	I
710	2968.81	II	230	3392.81	I	380	3880.82	II	110	7740.17	I
890	2975.88	II	230	3394.59	II	200	3882.52	I	310	7845.35	I
1100	2980.81	I	230	3397.26	I	200	3889.23	I	130	7920.71	I
210	2982.72	I	230	3397.60	I	200	3889.33	I	250	7994.73	I
170	3000.10	II	2300	3399.80	II	620	3899.94	I	130	8204.58	I
800	3005.56	I	170	3400.21	I	620	3918.09	II	150	8546.48	I
1100	3012.90	II	180	3402.51	I	200	3923.90	II	160	8640.06	I
540	3016.78	I	230	3410.17	II	320	3931.38	I	40	8711.24	I
1100	3016.94	II	230	3417.34	I	410	3951.83	I	65	9004.73	I
980	3018.31	I	410	3419.18	I	160	3968.01	I	<i>Helium He Z = 2</i>		
1200	3020.53	I	200	3428.37	II	200	3973.48	I	15	231.454	II
410	3031.16	II	250	3438.24	II	180	4032.27	I	20	232.584	II
710	3050.76	I	710	3472.40	I	230	4062.84	I	30	234.347	II
1100	3057.02	I	200	3478.99	II	180	4083.35	I	50	237.331	II
850	3067.41	I	480	3479.28	II	540	4093.16	II	100	243.027	II
2100	3072.88	I	250	3495.75	II	1100	4174.34	I	300	256.317	II
170	3074.10	I	250	3497.16	I	160	4206.58	II	1000	303.780	II
250	3074.79	I	980	3497.49	I	190	4209.70	I	500	303.786	II
430	3080.84	I	1200	3505.23	II	170	4228.08	I	10	320.293	I
200	3096.76	I	980	3523.02	I	170	4232.44	II	2	505.500	I
340	3101.40	II	980	3535.54	II	170	4260.98	I	3	505.684	I
710	3109.12	II	760	3536.62	I	200	4263.39	I	4	505.912	I
710	3131.81	I	180	3548.81	I	170	4272.85	II	5	506.200	I
850	3134.72	II	540	3552.70	II	320	4294.79	I	7	506.570	I
170	3139.65	II	1300	3561.66	II	160	4330.27	I	10	507.058	I
220	3145.32	II	270	3567.36	I	180	4336.66	II	15	507.718	I
220	3148.41	I	1100	3569.04	II	250	4356.33	I	20	508.643	I
450	3156.63	I	210	3597.42	II	180	4370.97	II	25	509.998	I
270	3159.82	I	540	3599.87	I	160	4417.91	I	35	512.098	I
710	3162.61	II	800	3616.89	I	200	4438.04	I	50	515.616	I
450	3168.39	I	320	3630.87	II	250	4565.94	I	100	522.213	I
890	3172.94	I	800	3644.36	II	500 d	4598.80	I	400	537.030	I
450	3176.86	II	320	3649.10	I	230	4620.86	I	1000	584.334	I
220	3181.01	I	200	3651.84	I	210	4655.19	I	50	591.412	I
360	3193.53	II	220	3665.35	II	120	4699.01	I	5	958.70	II
670	3194.19	II	200	3672.27	I	160	4782.74	I	6	972.11	II
200	3196.93	I	480	3675.74	I	310	4800.50	I	8	992.36	II
310	3206.11	I	2200	3682.24	I	130	4859.24	I	15	1025.27	II
180	3210.98	I	280	3696.51	I	120	4975.25	I	30	1084.94	II
180	3217.30	II	240	3699.72	II	95	5018.20	I	35	1215.09	II
180	3220.61	II	340	3701.15	II	95	5047.45	I	50	1215.17	II
360	3247.66	I	1000	3717.80	I	75	5170.18	I	120	1640.34	II
220	3249.53	I	650	3719.28	II	230	5181.86	I	180	1640.47	II
890	3253.70	II	160	3729.10	I	110	5243.99	I	7	2385.40	II
270	3255.28	II	460	3733.79	I	120	5294.87	I	9	2511.20	II
180	3273.66	II	160	3737.88	II	110	5354.73	I	50	2577.6	I
200 h	3279.67	III	400	3746.80	I	110	5373.86	I	1	2723.19	I
270	3279.98	II	170	3766.92	II	75	5452.92	I	12	2733.30	II
160	3291.05	I	200	3768.25	I	230	5550.60	I	2	2763.80	I
210	3306.12	I	1400	3777.64	I	230	5552.12	I	10	2818.2	I
340	3310.27	I	1400	3785.46	I	95	5613.27	I	4	2829.08	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
10	2945.11	I	2000	10830.34	I	1600	3461.97	II	1300	4125.65	I
40	3013.7	I	9	10913.05	I	810 c	3473.91	II	4300	4127.16	I
20	3187.74	I	3	10917.10	I	5400 c	3474.26	II	1500	4136.22	I
3	3202.96	II	4	11626.4	II	6300	3484.84	II	980 cw	4152.61	II
15	3203.10	II	30	11969.12	I	2500 c	3494.76	II	8100	4163.03	I
1	3354.55	I	20	12527.52	I	810 c	3498.88	II	2500	4173.23	I
2	3447.59	I	50	12784.99	I	810	3510.73	I	540	4194.35	I
1	3587.27	I	20	12790.57	I	4100 c	3515.59	II	2000	4227.04	I
3	3613.64	I	7	12845.96	I	410 c	3519.94	II	1300 cw	4254.43	I
2	3634.23	I	10	12968.45	I	630	3540.76	II	490	4264.05	I
3	3705.00	I	2	12984.89	I	1600	3546.05	II	1300	4350.73	I
1	3732.86	I	12	15083.64	I	1100 c	3556.78	II	300	4477.64	II
10	3819.607	I	200	17002.47	I	410	3560.15	II	290	4629.10	II
1	3819.76	I	1	18555.55	I	410 c	3573.24	II	80	4701.69	II
500	3888.65	I	6	18636.8	II	630 c	3574.80	II	130	4709.84	II
20	3964.729	I	500	18685.34	I	810	3579.12	I	130 c	4717.52	I
1	4009.27	I	200	18697.23	I	410	3580.75	II	290	4742.04	II
50	4026.191	I	100	19089.38	I	410	3581.83	II	100 c	4757.01	I
5	4026.36	I	20	19543.08	I	630 c	3592.23	II	65	4782.92	I
12	4120.82	I	1000	20581.30	I	1100 cw	3598.77	II	290	4939.01	I
2	4120.99	I	80	21120.07	I	540 c	3600.95	II	250 c	4967.21	II
3	4143.76	I	10	21121.43	I	410	3618.43	I	220	4979.97	I
10	4387.929	I	20	21132.03	I	430 c	3626.69	II	90	4995.05	I
3	4437.55	I	3	30908.5	II	490	3627.25	II	130	5042.37	I
200	4471.479	I	4	40478.90	I	430 c	3631.76	II	80	5093.07	I
25	4471.68	I				430 c	3638.30	II	140	5127.81	I
6	4685.4	II	<i>Holmium Ho Z = 67</i>			1600 c	3662.29	I	130	5142.59	II
30	4685.7	II	170	2502.91	II	1400	3667.97	I	110	5143.22	II
30	4713.146	I	170	2533.80	I	720	3679.19	I	160	5149.59	II
4	4713.38	I	190	2605.86	II	670	3679.70	I	90 c	5167.88	I
20	4921.931	I	270	2750.35	II	720	3682.65	I	130 c	5182.11	I
100	5015.678	I	270	2769.89	II	580	3690.65	I	90	5190.11	II
10	5047.74	I	300	2824.20	II	410	3700.04	I	65	5251.82	I
5	5411.52	II	270 c	2831.69	II	490 c	3702.35	II	90	5301.25	I
500	5875.62	I	270	2849.10	II	430	3712.88	I	80	5330.11	I
100	5875.97	I	360	2880.26	II	450	3720.72	I	90	5359.99	I
8	6560.10	II	460	2880.98	II	1100	3731.40	I	100	5407.08	I
100	6678.15	I	570 c	2909.41	II	810	3736.35	I	70	5566.52	I
3	6867.48	I	410 c	2979.63	II	3200 cw	3748.17	II	65	5627.60	I
200	7065.19	I	410	2987.64	II	8900 c	3796.75	II	140	5659.58	I
30	7065.71	I	480 c	3049.38	II	8900 c	3810.73	II	140 c	5691.47	I
50	7281.35	I	410 c	3054.00	II	410 c	3835.35	II	140 c	5696.57	I
1	7816.15	I	500 c	3057.45	II	1300 cw	3837.51	II	140 c	5860.28	I
2	8361.69	I	500 c	3082.34	II	410 c	3842.05	II	70 c	5882.99	I
2	9063.27	I	910	3084.36	II	1100	3843.86	II	70	5921.76	I
2	9210.34	I	430 c	3086.54	II	490 c	3846.73	II	70 cw	5948.03	I
10	9463.61	I	760	3118.50	II	1800 c	3854.07	II	70	5972.76	I
4	9516.60	I	580 c	3166.62	II	2700 c	3861.68	II	90	5973.52	I
3	9526.17	I	810	3173.78	II	3000 c	3888.96	II	230 c	5982.90	I
1	9529.27	I	810 c	3181.50	II	13000 c	3891.02	II	120	6081.79	I
1	9603.42	I	980 c	3281.97	II	1300 cw	3905.68	II	70	6208.65	I
3	9702.60	I	630 c	3337.23	II	580	3955.73	I	70 c	6305.36	I
6	10027.73	I	980 c	3343.58	II	490	3959.68	I	70	6550.97	I
2	10031.16	I	8100 c	3398.98	II	2700	4040.81	I	260	6604.94	I
15	10123.6	II	810 c	3410.26	II	5400 c	4045.44	II	120	6628.99	I
1	10138.50	I	1400 c	3414.90	II	8100	4053.93	I	55 cw	6694.32	I
10	10311.23	I	5400	3416.46	II	1700	4065.09	II	55 c	6785.43	I
2	10311.54	I	1200	3421.63	II	720	4068.05	I	40 cw	6939.49	I
3	10667.65	I	2000 c	3425.34	II	8900	4103.84	I	45 cw	6950.39	I
300	10829.09	I	2000 c	3428.13	II	2900	4108.62	I	140	7555.09	I
1000	10830.25	I	3200	3453.14	II	1500	4120.20	I	40 c	7628.42	I
			16000 c	3456.00	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
50 c	7693.15	I	82	1096.81	IV	80	2865.68	II	380 c	4638.16	II
60 cw	7815.48	I	84	1097.18	IV	120 d	2890.18	II	220 c	4644.58	II
60	7894.64	I	85	1116.10	IV	1100	2932.63	I	360 c	4655.62	II
50	8512.94	I	80	1124.06	IV	100	2941.05	II	320 w	4656.74	II
40	8670.19	I	90	1131.46	IV	100	2982.80	III	190 c	4681.11	II
90	8915.98	II	85	1144.43	IV	110 c	2999.40	II	450 w	4684.8	II
<i>Hydrogen H Z = 1</i>			80	1145.41	IV	100	3008.08	III	90 d	4907.06	II
15	926.226	I	89	1146.62	IV	8000	3039.36	I	150 c	4973.77	II
20	930.748	I	83	1154.11	IV	110 d	3099.80	II	80 h	5109.36	II
30	937.803	I	84	1154.60	IV	180 c	3101.8	II	100 w	5115.14	II
50	949.743	I	90	1157.71	IV	130 c	3138.60	II	140 c	5117.40	II
100	972.537	I	90	1157.82	IV	80 c	3142.75	II	270 c	5120.80	II
300	1025.722	I	85	1159.78	IV	130 d	3146.70	II	200 w	5121.75	II
1000	1215.668	I	88	1176.50	IV	150	3155.77	II	80 d	5129.85	II
500	1215.674	I	85	1191.58	IV	100 c	3158.40	II	240 c	5175.42	II
5	3835.384	I	83	1204.87	IV	90 c	3176.30	II	140 c	5184.44	II
6	3889.049	I	90	1206.55	IV	90 d	3198.11	II	200	5248.77	III
8	3970.072	I	88	1221.50	IV	13000	3256.09	I	150 c	5309.45	II
15	4101.74	I	85	1221.90	IV	3000	3258.56	I	80	5411.41	II
30	4340.47	I	85	1233.58	IV	90 c	3338.50	II	140 c	5418.45	II
80	4861.33	I	87	1235.84	IV	100 c	3404.28	II	220 w	5436.70	II
120	6562.72	I	90	1373.20	IV	110 d	3438.40	II	130 c	5497.50	II
180	6562.852	I	88	1398.77	IV	180 c	3693.91	II	140 c	5507.08	II
5	9545.97	I	81	1412.09	IV	95 c	3708.13	II	320 c	5513.00	II
7	10049.4	I	100	1625.42	III	380 w	3716.14	II	250 w	5523.28	II
12	10938.1	I	100	1748.83	III	120 c	3718.30	II	130 c	5536.50	II
20	12818.1	I	30	1842.41	III	160 c	3718.72	II	190 w	5555.45	II
40	18751.0	I	40	1850.30	III	160 c	3723.40	II	240 c	5576.90	II
5	21655.3	I	30	2154.08	III	170 w	3795.21	II	200 w	5636.70	II
8	26251.5	I	50	2205.28	II	230 c	3799.21	II	100	5645.15	III
15	40511.6	I	40	2281.64	II	250 c	3834.65	II	160 c	5708.50	II
4	46525.1	I	100 c	2306.05	II	200 c	3842.18	II	100 c	5721.80	II
6	74578.	I	90 d	2313.21	II	100	3852.82	III	100	5819.50	III
<i>Indium In Z = 49</i>			70 d	2327.95	II	100	3889.78	II	210 c	5853.15	II
17	378.61	V	80 h	2334.57	II	100 c	3902.07	II	490 w	5903.4	II
17	386.21	V	110 d	2382.63	II	250 w	3962.35	II	260 w	5915.4	II
14	388.91	V	70 h	2427.20	II	120 c	4004.66	II	120 c	5918.78	II
25	393.89	V	100	2447.90	II	140 d	4013.92	II	130 c	6062.9	II
25	400.57	V	110 d	2488.62	II	100	4023.77	III	250 c	6095.95	II
25	402.39	V	90	2488.95	II	150	4032.32	III	210 c	6108.66	II
622	472.71	IV	80	2498.59	II	410 w	4056.94	II	180 w	6115.9	II
689	479.39	IV	100	2499.60	II	100	4071.57	III	230 w	6128.7	II
709	498.62	IV	90 d	2500.99	II	100	4072.93	III	240 w	6129.4	II
10	882.24	III	110 d	2512.31	II	17000	4101.76	I	320 w	6132.1	II
10	890.84	III	100	2521.37	I	140 c	4205.14	II	150 c	6140.0	II
10	915.87	III	100	2527.41	III	100 d	4213.04	II	90	6143.23	II
85	954.67	IV	160 d	2554.44	II	110 d	4219.66	II	140 c	6148.10	II
87	973.50	IV	1100	2560.15	I	100	4252.68	III	190 w	6149.5	II
86	991.60	IV	200	2601.76	I	150 d	4372.87	II	80	6161.15	II
89	1024.68	IV	90 d	2654.70	II	150 c	4500.78	II	180 w	6162.45	II
85	1024.79	IV	100 d	2662.63	II	18000	4511.31	I	200	6197.72	III
88	1031.45	IV	140 d	2668.65	II	110 c	4549.01	II	100 c	6224.28	II
82	1031.98	IV	140 d	2674.56	II	140 c	4570.85	II	280 w	6228.3	II
80	1054.43	IV	80	2683.12	II	180 w	4578.02	II	140 w	6231.1	II
84	1063.03	IV	1600	2710.26	I	180 w	4578.40	II	270 w	6304.8	II
83	1068.25	IV	300	2713.94	I	140 c	4616.08	II	290 w	6362.3	II
82	1069.82	IV	80	2726.15	III	170 c	4617.17	II	300 w	6469.0	II
86	1077.64	IV	130 d	2749.75	II	250 c	4620.14	II	210 c	6541.20	II
90	1082.10	IV	700	2753.88	I	150 w	4620.70	II	190 c	6751.88	II
83	1086.33	IV	90 d	2818.97	II	170 c	4627.30	II	180 c	6765.9	II
			180 c	2836.92	I	140 c	4637.04	II	100 c	6783.72	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
10	34295.73	I	540	2333.30	I	230	2572.70	I	330	3039.26	I
9	34513.11	I	740	2333.84	I	740	2577.26	I	300	3047.16	I
3	40228.54	I	580	2334.50	I	740	2592.06	I	300	3049.44	I
2	41633.80	I	1600	2343.18	I	740	2599.04	I	300	3057.28	I
<i>Iridium Ir Z = 77</i>											
9900	2010.65	I	740	2343.61	I	700	2608.25	I	1600	3068.89	I
8700	2022.35	I	580	2355.00	I	1800	2611.30	I	320	3083.22	I
15000	2033.57	I	230	2357.53	II	210	2614.98	I	240	3086.44	I
6200	2052.22	I	410	2358.16	I	330	2617.78	I	390	3088.04	I
5000	2060.64	I	500	2360.73	I	210	2619.88	I	510	3100.29	I
3700	2083.22	I	2500	2363.04	I	250	2625.32	I	510	3100.45	I
3100	2085.74	I	370	2368.04	II	700	2634.17	I	340	3120.76	I
17000	2088.82	I	3500	2372.77	I	250	2639.42	I	200	3121.78	I
14000	2092.63	I	290	2375.09	II	3500	2639.71	I	3400	3133.32	I
2700	2112.68	I	250	2377.28	I	210	2644.19	I	490	3168.88	I
1800	2119.54	I	250	2377.98	I	1800	2661.98	I	370	3177.58	I
2000	2125.44	I	500	2379.38	I	350	2662.63	I	370	3198.92	I
4500	2126.81	II	540	2381.62	I	2700	2664.79	I	610	3212.12	I
2000	2127.52	I	210	2383.17	I	520	2669.91	I	370	3219.51	I
4500	2127.94	I	1300	2386.89	I	520	2671.84	I	5100	3220.78	I
3700	2148.22	I	2500	2390.62	I	330	2673.61	I	300	3229.28	I
2500	2150.54	I	2700	2391.18	I	270	2692.34	I	470	3241.52	I
3500	2152.68	II	230	2407.59	I	3000	2694.23	I	200	3262.01	I
2900	2155.81	I	290	2409.37	I	330	2772.46	I	390	3266.44	I
7900	2158.05	I	290	2410.17	I	250	2775.55	I	200	3322.60	I
2100	2162.88	I	290	2410.73	I	520	2781.29	I	560	3368.48	I
5800	2169.42	II	540	2413.31	I	330	2785.22	I	660	3437.02	I
4500	2175.24	I	370	2415.86	I	540	2797.35	I	410	3448.97	I
2700	2178.17	I	620	2418.11	I	1600	2797.70	I	3200	3513.64	I
1600	2187.43	II	210	2424.89	I	380	2798.18	I	220	3515.95	I
1100	2190.38	II	370	2424.99	I	410	2800.82	I	410	3522.03	I
740	2191.64	I	290	2425.66	I	680	2823.18	I	320	3558.99	I
910	2208.09	II	540	2427.61	I	1200	2824.45	I	1200	3573.72	I
1300	2220.37	I	540	2431.24	I	820	2836.40	I	320	3594.39	I
790	2221.07	II	1300	2431.94	I	1100	2839.16	I	220	3609.77	I
2500	2242.68	II	270	2435.14	I	820	2840.22	I	660	3628.67	I
620	2245.76	II	250	2445.34	I	3800	2849.72	I	220	3636.20	I
2100	2253.38	I	250	2447.76	I	380	2875.60	I	300	3661.71	I
2100	2255.10	I	910	2452.81	I	380	2875.98	I	300	3664.62	I
1400	2255.81	I	1300	2455.61	I	270	2877.68	I	320	3674.98	I
350	2258.51	I	230	2455.87	I	820	2882.64	I	200	3687.08	I
1400	2258.86	I	210	2457.03	I	650	2897.15	I	200	3731.36	II
830	2264.61	I	210	2457.23	I	260	2901.95	I	530	3747.20	I
1100	2266.33	I	870	2467.30	I	260	2904.80	I	3100	3800.12	I
1000	2268.90	I	3300	2475.12	I	200	2907.24	I	230	3817.24	I
660	2280.00	I	210	2478.11	I	440	2916.36	I	480	3902.51	I
950	2281.02	II	2100	2481.18	I	230	2918.57	I	480	3915.38	I
660	2281.91	I	620	2493.08	I	4400	2924.79	I	400	3934.84	I
330	2284.60	I	210	2496.27	I	1200	2934.64	I	590	3976.31	I
330	2295.08	I	250	2502.63	I	880	2936.68	I	460	3992.12	I
790	2298.05	I	4100	2502.98	I	250	2938.47	I	350	4033.76	I
460	2299.53	I	210	2513.71	I	2700	2943.15	I	370	4069.92	I
910	2300.50	I	990	2533.13	I	230	2946.97	I	150	4070.68	I
2700	2304.22	I	1100	2534.46	I	200	2949.76	I	100	4092.61	I
410	2305.47	I	580	2537.22	I	1200	2951.22	I	140	4115.78	I
210	2307.27	I	580	2542.02	I	200	2974.95	I	90	4172.56	I
910	2308.93	I	7900	2543.97	I	440	2980.65	I	260	4268.10	I
460	2315.38	I	790	2546.03	I	300	2996.08	I	220	4311.50	I
410	2321.45	I	210	2551.40	I	220	3002.25	I	160	4399.47	I
410	2321.58	I	210	2555.35	I	600	3003.63	I	65	4403.78	I
210	2327.98	I	910	2564.18	I	270	3017.31	I	110	4426.27	I
			210	2569.88	I	380	3029.36	I	55	4478.48	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
11	1952.65	III	60	2264.389	I	80	2406.97	II	500	2493.26	II
30	1953.005	I	80	2267.085	I	300	2410.52	II	60	2494.000	I
13	1953.32	III	10	2267.42	III	200	2411.07	II	50	2494.251	I
10	1953.49	III	80	2267.469	I	150	2413.31	II	100	2495.87	I
10 w	1954.22	III	50	2270.862	I	80	2417.87	II	600	2496.533	I
60	1957.823	I	150	2272.070	I	60	2420.396	I	150	2498.90	I
11	1958.58	III	150	2276.026	I	60	2423.089	I	1000	2501.132	I
60	1960.144	I	80	2279.937	I	150	2424.14	II	50	2501.693	I
13	1960.32	III	150	2284.086	I	120	2428.36	II	80	2506.09	II
30	1961.25	I	150	2287.250	I	120	2430.08	II	500	2507.900	I
50	1962.111	I	300	2292.524	I	80	2432.26	II	50	2508.753	I
12	1963.11	II	10	2293.06	III	60	2438.182	I	1000	2510.835	I
15	1987.50	III	15	2295.86	III	150	2439.30	II	120	2511.76	II
14	1991.61	III	200	2297.787	I	150	2439.74	I	80	2512.275	I
13	1994.07	III	600	2298.169	I	100	2442.57	I	400	2512.365	I
12	1995.56	III	80	2299.220	I	250	2443.872	I	80	2516.570	I
12	1996.42	III	300	2300.142	I	100	2444.51	II	300	2517.661	I
10	2061.55	III	50	2301.684	I	50	2445.212	I	800	2518.102	I
12	2068.24	III	100	2303.424	I	100	2445.57	II	150	2519.629	I
14	2078.99	III	150	2303.581	I	60	2447.709	I	50	2522.480	I
100	2084.122	I	120	2308.999	I	100	2453.476	I	4000	2522.849	I
10	2084.35	III	150	2313.104	I	1500	2457.598	I	200	2523.66	I
12	2090.14	III	10 p	2317.70	III	150	2458.78	II	500	2524.293	I
15	2097.48	III	10	2319.22	III	80	2461.28	II	100	2525.02	I
12	2097.69	III	200	2320.358	I	100	2461.86	II	200	2525.39	II
12	2103.80	III	10 p	2321.71	III	100	2462.181	I	300	2526.29	II
10	2107.32	III	10	2326.95	III	1500	2462.647	I	2000	2527.435	I
15	2151.78	III	100	2327.40	II	50	2463.730	I	800	2529.135	I
12	2157.71	III	100	2331.31	II	800	2465.149	I	250	2529.55	II
50	2157.794	I	300	2332.80	II	60	2467.732	I	150	2529.836	I
12	2158.47	III	10 p	2336.77	III	600	2468.879	I	200	2530.687	I
10	2161.27	III	200	2338.01	II	80	2470.67	II	120	2533.63	II
40	2166.773	I	10	2338.96	III	80	2470.965	I	100	2534.42	II
12	2166.95	III	600	2343.49	II	800	2472.336	I	120	2535.49	II
12	2171.04	III	80	2343.96	II	1000	2472.895	I	400	2535.607	I
15	2174.66	III	150	2344.28	II	200	2473.16	I	200	2536.792	I
300	2178.118	I	200	2348.11	II	600	2474.814	I	200	2536.80	II
12	2180.41	III	250	2348.30	II	60	2476.657	I	100	2538.80	II
250	2186.486	I	200	2359.12	II	120	2479.480	I	100	2538.91	II
60	2186.892	I	150	2360.00	II	1200	2479.776	I	150	2538.99	II
120	2187.195	I	120	2360.29	II	100	2480.16	II	50	2539.357	I
250	2191.839	I	200	2364.83	II	80	2482.12	II	200	2540.66	II
150	2196.043	I	80	2365.76	II	100	2482.66	II	600	2540.972	I
80	2200.390	I	80	2368.59	II	10000	2483.271	I	80	2541.10	II
80	2200.724	I	80	2369.456	I	300	2483.533	I	300	2542.10	I
15	2208.41	II	80	2369.95	II	1000	2484.185	I	250	2543.92	I
10 p	2208.85	III	120	2371.430	I	50	2485.990	I	150	2544.70	I
20	2213.65	II	300	2373.624	I	800	2486.373	I	800	2545.978	I
12	2218.26	II	150	2373.74	II	100	2486.691	I	80	2546.67	II
20	2220.38	II	120	2374.518	I	100	2487.066	I	100	2548.74	II
10	2221.83	III	120	2376.43	II	120	2487.370	I	80	2549.08	II
10	2229.27	III	80	2379.27	II	4000	2488.143	I	80	2549.39	II
10	2232.43	III	120	2380.76	II	100	2488.945	I	600	2549.613	I
10	2232.69	III	150	2381.835	I	80	2489.48	II	400	2562.53	II
10	2235.91	III	1000	2382.04	II	1000	2489.750	I	200	2563.48	II
10	2238.16	III	300	2388.63	II	50	2489.913	I	150	2574.36	II
12 p	2241.54	III	200	2389.973	I	3000	2490.644	I	300	2576.691	I
50	2250.790	I	1000	2395.62	II	100	2490.71	II	100	2582.58	II
60	2251.874	I	300	2399.24	II	2000	2491.155	I	1500	2584.54	I
300	2259.511	I	800	2404.88	II	100	2491.40	II	650	2585.88	II
12	2261.59	III	250	2406.66	II	100	2493.18	II	90	2591.54	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
90	2593.73	II	80	2744.527	I	500	2999.512	I	80	3246.005	I
650	2598.37	II	300	2746.48	II	120	3000.451	I	80	3265.046	I
2000	2599.40	II	100	2749.32	II	800	3000.948	I	50	3265.617	I
300	2599.57	I	500	2749.48	II	12	3001.62	III	13	3266.88	III
60	2605.657	I	1200	2750.140	I	60	3001.655	I	50	3271.000	I
300	2606.51	II	80	2753.29	II	12 h	3007.28	III	11	3276.08	III
800	2606.827	I	150	2754.032	I	200	3007.282	I	150	3286.75	I
650	2607.09	II	100	2754.426	I	500	3008.14	I	10	3288.81	III
600	2611.87	II	800	2755.73	II	120	3009.569	I	120	3305.97	I
320	2613.82	II	250	2756.328	I	15	3013.17	III	200	3306.343	I
320	2617.62	II	100	2757.316	I	60	3017.627	I	400	3355.227	I
250	2618.018	I	120	2761.780	I	60	3018.983	I	80	3355.517	I
90	2620.41	II	150	2761.81	II	500	3020.491	I	60	3369.546	I
400	2623.53	I	150	2762.026	I	1500	3020.639	I	120	3370.783	I
200	2625.67	II	120	2762.772	I	600	3021.073	I	50	3378.678	I
150	2628.29	II	120	2763.109	I	500	3024.032	I	50	3380.110	I
250	2631.05	II	80	2766.910	I	150	3025.638	I	60	3383.978	I
250	2631.32	II	250	2767.522	I	500	3025.842	I	50	3392.304	I
100	2632.237	I	300	2772.07	I	80	3030.148	I	150	3392.651	I
300	2635.809	I	600	2778.220	I	60	3031.214	I	150	3399.333	I
50	2641.646	I	3000	2788.10	I	60	3034.484	I	80	3404.353	I
200	2643.998	I	200	2797.78	I	800	3037.389	I	500	3407.458	I
300	2666.812	I	400	2804.521	I	80	3041.637	I	250	3413.131	I
60	2666.965	I	1500	2806.98	I	800	3047.604	I	60	3424.284	I
600	2679.062	I	10 p	2813.24	III	600	3057.446	I	500	3427.119	I
500	2684.75	II	2500	2813.287	I	1000	3059.086	I	60	3428.748	I
400	2689.212	I	300	2823.276	I	250	3067.244	I	6000	3440.606	I
10 h	2695.13	III	600	2825.56	I	120	3075.719	I	2500	3440.989	I
200	2699.106	I	50	2825.687	I	120	3091.577	I	1000	3443.876	I
80	2706.012	I	120	2828.808	I	80	3098.189	I	200	3445.149	I
400	2706.582	I	1500	2832.436	I	100	3099.895	I	1200	3465.860	I
60	2708.571	I	120	2835.950	I	100	3099.968	I	2000	3475.450	I
200	2711.655	I	200	2838.119	I	60	3100.303	I	500	3476.702	I
80	2714.41	II	200	2843.631	I	100	3100.665	I	2500	3490.574	I
50	2716.257	I	1000	2843.977	I	10 p	3136.43	III	500	3497.840	I
50	2717.786	I	100	2845.594	I	10	3174.09	III	10	3501.76	III
250	2718.436	I	800	2851.797	I	80	3175.445	I	250	3513.817	I
4000	2719.027	I	50	2869.307	I	10	3175.99	III	300	3521.261	I
100	2719.420	I	50	2872.334	I	10	3178.01	III	400	3526.040	I
50	2720.197	I	80	2874.172	I	150	3184.895	I	100	3526.166	I
1500	2720.903	I	50	2894.504	I	250	3191.659	I	60	3526.237	I
400	2723.578	I	12	2904.43	III	500	3193.226	I	60	3526.381	I
150	2724.953	I	10	2907.50	III	800	3193.299	I	60	3526.467	I
50	2726.235	I	12	2907.70	III	200	3196.928	I	100	3533.199	I
80	2727.54	II	120	2912.157	I	80	3199.500	I	200	3536.556	I
200	2728.020	I	120	2929.007	I	50	3205.398	I	300	3541.083	I
50	2728.820	I	1200	2936.903	I	100	3211.88	I	250	3542.075	I
80	2728.90	II	60	2941.343	I	200	3214.011	I	80	3553.739	I
1000	2733.581	I	1000	2947.876	I	200	3214.396	I	400	3554.925	I
60	2734.005	I	600	2953.940	I	60	3215.938	I	200	3556.878	I
50	2734.268	I	250	2957.364	I	50	3217.377	I	400	3558.515	I
500	2735.475	I	150	2965.254	I	80	3219.583	I	1000	3565.379	I
50	2735.612	I	1500	2966.898	I	60	3219.766	I	1200	3570.097	I
500	2737.310	I	120	2969.36	I	300	3222.045	I	800	3570.25	I
120	2737.83	I	800	2970.099	I	600	3225.78	I	120	3571.996	I
400	2739.55	II	1200	2973.132	I	80	3227.796	I	100	3573.393	I
250	2742.254	I	500	2973.235	I	50	3233.967	I	60	3573.829	I
800	2742.405	I	600	2981.445	I	120	3234.613	I	60	3573.888	I
200	2743.20	II	1000	2983.570	I	300	3236.222	I	4000	3581.19	I
150	2743.565	I	1000	2994.427	I	100	3239.433	I	150	3582.199	I
200	2744.068	I	250	2994.502	I	80	3244.187	I	150	3584.660	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
120	3584.929	I	6000	3737.131	I	1200	3927.920	I	40	4195.329	I
300	3585.319	I	100	3738.306	I	2000	3930.296	I	150	4198.304	I
150	3585.705	I	400	3743.362	I	60	3948.774	I	40	4199.095	I
10	3586.04	III	6000	3745.561	I	60	3949.953	I	300	4202.029	I
200	3586.103	I	1200	3745.899	I	50	3951.164	I	40	4203.984	I
400	3586.984	I	3000	3748.262	I	50	3952.601	I	80	4206.696	I
100	3594.633	I	80	3748.964	I	16	3954.33	III	80	4210.343	I
11	3600.94	III	3000	3749.485	I	60	3956.454	I	400	4216.183	I
150	3603.204	I	1500	3758.232	I	250	3956.68	I	100	4219.360	I
11	3603.88	III	400	3760.05	I	60	3966.614	I	50	4222.212	I
200	3605.454	I	1500	3763.788	I	11	3968.72	III	11	4222.27	III
500	3606.680	I	400	3765.54	I	100	3969.257	I	50	4225.956	I
1500	3608.859	I	600	3767.191	I	80	3977.741	I	200	4227.423	I
250	3610.16	I	60	3776.452	I	10 w	3979.42	III	100	4233.602	I
60	3612.068	I	250	3785.95	I	40	3981.771	I	13	4235.56	III
150	3617.788	I	100	3786.68	I	50	3983.956	I	250	4235.936	I
1500	3618.768	I	250	3787.880	I	60	3994.114	I	50	4238.809	I
200	3621.462	I	250	3790.092	I	200	3997.392	I	12	4243.75	III
150	3622.004	I	150	3794.34	I	40	3998.053	I	50	4247.425	I
150	3623.19	I	400	3795.002	I	400	4005.241	I	200	4250.118	I
100	3631.096	I	120	3797.518	I	60	4009.713	I	300	4250.787	I
1200	3631.463	I	250	3798.511	I	100	4021.867	I	40	4258.315	I
60	3632.041	I	400	3799.547	I	10	4035.42	III	800	4260.473	I
100	3638.298	I	200	3805.345	I	50	4040.638	I	250	4271.153	I
200	3640.389	I	80	3806.696	I	4000	4045.813	I	1200	4271.759	I
80	3643.717	I	600	3812.964	I	11	4053.11	III	12 h	4273.40	III
1500	3647.842	I	60	3813.059	I	1500	4063.594	I	12	4279.72	III
250	3649.506	I	1500	3815.840	I	50	4066.975	I	1200	4282.402	I
80	3650.279	I	2500	3820.425	I	50	4067.977	I	14 h	4286.16	III
200	3651.467	I	150	3821.179	I	1200	4071.737	I	80	4291.462	I
120	3670.024	I	80	3824.306	I	40	4076.629	I	16 h	4296.85	III
150	3670.089	I	2500	3824.444	I	12	4081.00	III	250	4299.234	I
100	3676.311	I	1500	3825.880	I	40	4100.737	I	18 h	4304.78	III
150	3677.629	I	1200	3827.823	I	40	4107.489	I	1200	4307.901	I
1500	3679.913	I	1000	3834.222	I	150	4118.544	I	20 h	4310.36	III
200	3682.242	I	120	3839.257	I	10	4120.90	III	150	4315.084	I
120	3683.054	I	500	3840.437	I	11	4122.02	III	1500	4325.761	I
150	3684.107	I	800	3841.047	I	11	4122.78	III	80	4352.734	I
120	3685.998	I	120	3843.256	I	40	4127.608	I	80	4369.771	I
500	3687.456	I	80	3846.800	I	400	4132.058	I	11 h	4372.31	III
120	3689.477	I	200	3849.96	I	80	4134.676	I	14 h	4372.53	III
150	3694.008	I	120	3850.817	I	40	4136.997	I	18 h	4372.81	III
120	3695.051	I	2500	3856.372	I	15	4137.76	III	800	4375.929	I
150	3701.086	I	150	3859.212	I	13	4139.35	III	3000	4383.544	I
80	3704.462	I	10000	3859.911	I	200	4143.415	I	1200	4404.750	I
1200	3705.566	I	150	3865.523	I	800	4143.869	I	300	4415.122	I
60	3707.041	I	60	3867.215	I	40	4153.898	I	12	4419.60	III
150	3707.821	I	250	3872.501	I	50	4154.500	I	600	4427.299	I
300	3707.919	I	150	3873.761	I	60	4156.799	I	400	4461.652	I
600	3709.246	I	250	3878.018	I	18	4164.73	III	120	4466.551	I
120	3716.442	I	2000	3878.573	I	13	4166.84	III	80	4476.017	I
8000	3719.935	I	4000	3886.282	I	50	4172.744	I	80	4482.169	I
1500	3722.563	I	200	3887.048	I	13	4174.26	III	200	4482.252	I
120	3724.377	I	300	3888.513	I	60	4174.912	I	50	4489.739	I
60	3725.491	I	800	3895.656	I	50	4175.635	I	50	4528.613	I
60	3727.093	I	1200	3899.707	I	50	4177.593	I	30	4647.433	I
500	3727.619	I	400	3902.945	I	120	4181.754	I	30	4736.771	I
150	3732.396	I	250	3906.479	I	50	4184.891	I	50	4859.741	I
1200	3733.317	I	80	3916.731	I	120	4187.038	I	120	4871.317	I
5000	3734.864	I	600	3920.258	I	120	4187.795	I	60	4872.136	I
120	3735.324	I	1200	3922.911	I	80	4191.430	I	30	4878.208	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	4890.754	I	10	5368.06	III	80	7187.313	I	50	625.02	III
250	4891.492	I	400	5371.489	I	30	7207.381	I	30	625.76	III
30	4903.309	I	11 I	5375.47	III	30	7445.746	I	45	628.59	III
150	4918.992	I	40	5393.167	I	40	7495.059	I	50	630.04	III
500	4920.502	I	300	5397.127	I	60	7511.045	I	35	633.09	III
1500	4957.597	I	250	5405.774	I	80	7937.131	I	120	637.87	V
80	5001.862	I	250	5429.695	I	60	7945.984	I	50	639.98	III
30	5005.711	I	100	5434.523	I	80	7998.939	I	60	646.41	III
100	5006.117	I	200	5446.871	I	60	8046.047	I	50	651.20	III
60	5012.067	I	120	5455.609	I	50	8085.176	I	50	659.72	III
30	5014.941	I	25	5497.516	I	150	8220.41	I	30	664.86	III
150	5041.755	I	20	5501.464	I	120	8327.053	I	40	672.34	III
30	5049.819	I	30	5506.778	I	20	8331.908	I	35	672.85	III
30	5051.634	I	30	5569.618	I	120	8387.770	I	35	676.57	III
25	5074.748	I	60	5572.841	I	30	8468.404	I	35	680.13	III
150	5110.357	I	120	5586.755	I	15	8514.069	I	35	683.68	III
40	5139.251	I	200	5615.644	I	60	8661.898	I	45	686.25	III
100	5139.462	I	20	5624.541	I	150	8688.621	I	45	687.98	III
25	5151.910	I	50	5662.515	I	52	11422.32	I		690.86	V
12	5156.12	III	11	5719.88	III	87	11439.12	I		691.75	V
80	5166.281	I	10	5756.38	III	91	11593.59	I	45	691.93	III
2500	5167.487	I	20	5762.990	I	255	11607.57	I	50	695.61	III
80	5168.897	I	18	5833.93	III	160	11638.26	I	30	698.05	III
500	5171.595	I	10	5854.62	III	230	11689.98	I	50	708.36	III
50	5191.454	I	30	5862.353	I	160	11783.26	I	600	708.85	V
80	5192.343	I	15	5891.91	III	580	11882.84	I	50	714.00	III
200	5194.941	I	30	5914.114	I	225	11884.08	I	100 p	722.04	III
10	5199.08	III	10 p	5920.13	III	1030	11973.05	I	60	729.40	II
30	5204.582	I	18 p	5929.69	III	96	14400.56	I	30	746.70	III
25	5215.179	I	10	5952.31	III	72	14512.23	I	200	761.18	II
150	5216.274	I	14	5953.62	III	50	14555.06	I	100	763.98	II
60	5226.862	I	12	5979.32	III	40	14826.43	I	60	766.20	II
1000	5227.150	I	30	5986.956	I	94	15294.58	I	200	771.03	II
250	5232.939	I	12 h	5989.08	III	41	15769.42	I	60 p	773.69	II
10	5235.66	III	18	5999.54	III	105	18856.65	I	200	782.10	II
18	5243.31	III	16	6032.59	III				100	783.72	II
13 I	5260.34	III	13	6036.56	III	<i>Krypton Kr Z = 36</i>			60	785.97	III
100	5266.555	I	11	6048.72	III	30	467.35	III		793.44	IV
1200	5269.537	I	11	6054.18	III	150	472.16	V		794.11	IV
800	5270.357	I	40	6065.482	I	100	484.39	V	7	805.76	IV
14	5272.98	III	30	6102.159	I	250	496.25	V		810.70	V
15	5276.48	III	40	6136.614	I	120	500.77	V		816.82	IV
30	5281.789	I	40	6137.694	I	200	507.20	V	18	818.15	II
16	5282.30	III	40	6191.558	I	30	540.86	III	60	818.15	II
60	5283.621	I	30	6213.429	I	60	548.04	V	60	830.38	II
12	5284.83	III	30	6219.279	I	30	565.64	III	50	837.66	III
11	5298.12	III	40	6230.726	I	30	569.16	III	22	842.04	IV
12	5299.93	III	40	6230.726	I	30	571.98	III	100	844.06	II
25	5302.299	I	20	6246.317	I	30	579.83	III	50	854.73	III
14 w	5302.60	III	80	6247.56	II	30	585.14	III	60	862.58	III
10	5306.76	III	30	6252.554	I	30	585.96	III	60	864.82	II
10	5322.74	III	20	6393.602	I	30	593.70	III	60	868.87	II
150	5324.178	I	30	6399.999	I	30	593.70	III	40	870.84	III
800	5328.038	I	20	6411.647	I	30	594.10	III	40	870.84	III
300	5328.531	I	20	6421.349	I	30	596.41	III	50	876.08	III
100	5332.899	I	30	6430.844	I	40	600.17	III	200	884.14	II
80	5339.928	I	200	6456.38	II	30	603.67	III	1000	886.30	II
500	5341.023	I	60	6494.981	I	50	605.86	III	400	891.01	II
11	5346.88	III	20	6546.239	I	35	606.47	III	75	897.81	III
12	5353.77	III	20	6592.913	I	50	611.12	III	200	911.39	II
12	5363.76	III	40	6677.989	I	35	616.72	III	2000	917.43	II
			25	7164.443	I	40	621.45	III	50	945.44	I
						45	622.80	III	50	946.54	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
20	951.06	I	60	2992.22	III	300	4057.037	II	200	5468.17	II
50	953.40	I	50	3022.30	III	300	4065.128	II	10	5501.43	III
50	963.37	I	80	3024.45	III	50	4067.37	III	500	5562.224	I
2000	964.97	II	50	3046.93	III	500	4088.337	II	2000	5570.288	I
50	987.29	III	30	3056.72	III	250	4098.729	II	80	5580.386	I
100	1001.06	I	60	3063.13	III	100	4109.248	II	100	5649.561	I
100	1003.55	I	40	3097.16	III	40	4131.33	III	400	5681.89	II
100	1030.02	I	60	3112.25	III	250	4145.122	II	200 h	5690.35	II
30	1158.74	III	30	3120.61	III	40	4154.46	III	100	5832.855	I
200	1164.87	I	100	3124.39	III	150	4250.580	II	3000	5870.914	I
650	1235.84	I	60	3141.35	III	1000	4273.969	I	200	5992.22	II
6	1638.82	III	3	3142.01	IV	100	4282.967	I	60	5993.849	I
6	1914.09	III	100	3189.11	III	600	4292.923	II	10 h	6037.17	III
3	2237.34	IV	80	3191.21	III	200	4300.49	II	60	6056.125	I
6	2291.26	IV	6	3224.99	IV	500 h	4317.81	II	10 h	6078.38	III
3	2329.3	IV	40	3239.52	III	400	4318.551	I	10	6310.22	III
4	2336.75	IV	40	3240.44	III	1000	4319.579	I	300	6420.18	II
4	2348.27	IV	300	3245.69	III	150 h	4322.98	II	100	6421.026	I
3	2358.5	IV	3	3261.70	IV	100	4351.359	I	200	6456.288	I
3	2388.05	IV	150	3264.81	III	3000	4355.477	II	150	6570.07	II
40	2393.94	III	100	3268.48	III	500	4362.641	I	60	6699.228	I
4	2416.9	IV	30	3271.65	III	200	4369.69	II	100	6904.678	I
3	2428.04	IV	30	3285.89	III	800	4376.121	I	250	7213.13	II
5	2442.68	IV	30	3304.75	III	300 h	4386.54	II	100	7224.104	I
4	2451.7	IV	50	3311.47	III	200	4399.965	I	80	7287.258	I
6	2459.74	IV	200	3325.75	III	100	4425.189	I	400	7289.78	II
100 h	2464.77	II	60	3330.76	III	500	4431.685	II	400	7407.02	II
5	2474.06	IV	50	3342.48	III	600	4436.812	II	60	7425.541	I
60	2492.48	II	100	3351.93	III	600	4453.917	I	200	7435.78	II
40	2494.01	III	40	3374.96	III	800	4463.689	I	100	7486.862	I
4	2517.0	IV	100	3439.46	III	800	4475.014	II	300	7524.46	II
5	2518.02	IV	70	3474.65	III	400 h	4489.88	II	1000	7587.411	I
6	2519.38	IV	100	3488.59	III	600	4502.353	I	2000	7601.544	I
5	2524.5	IV	200	3507.42	III	400 h	4523.14	II	150	7641.16	II
5	2546.0	IV	100	3564.23	III	200 h	4556.61	II	1000	7685.244	I
6	2547.0	IV	100 h	3607.88	II	800	4577.209	II	1200	7694.538	I
4	2558.08	IV	200	3631.889	II	300	4582.978	II	250	7735.69	II
30	2563.25	III	30	3641.34	III	150 h	4592.80	II	150	7746.827	I
3	2586.9	IV	250	3653.928	II	500	4615.292	II	800	7854.821	I
5	2606.17	IV	80	3665.324	I	1000	4619.166	II	200	7913.423	I
10	2609.5	IV	150	3669.01	II	800	4633.885	II	180	7928.597	I
8	2615.3	IV	100	3679.559	I	2000	4658.876	II	200	7933.22	II
7	2621.11	IV	80	3686.182	II	500	4680.406	II	120	7973.62	II
60	2639.76	III	30	3690.65	III	100	4691.301	II	100	7982.401	I
30	2680.32	III	300 h	3718.02	II	200	4694.360	II	1500	8059.503	I
40	2681.19	III	200	3718.595	II	3000	4739.002	II	4000	8104.364	I
80 h	2712.40	II	150	3721.350	II	300	4762.435	II	6000	8112.899	I
3	2730.55	IV	200	3741.638	II	1000	4765.744	II	60	8132.967	I
8	2748.18	IV	150	3744.80	II	300	4811.76	II	3000	8190.054	I
6	2774.70	IV	80	3754.245	II	300	4825.18	II	200	8202.72	II
3	2829.60	IV	500	3778.089	II	800	4832.077	II	80	8218.365	I
100	2833.00	II	500	3783.095	II	700	4846.612	II	3000	8263.240	I
3	2836.08	IV	3	3809.30	IV	150	4857.20	II	100	8272.353	I
30	2841.00	III	5	3860.58	IV	300	4945.59	II	1500	8281.050	I
30	2851.16	III	40 h	3868.70	III	20 h	5016.45	III	5000	8298.107	I
5	2853.0	IV	150 h	3875.44	II	200	5022.40	II	100	8412.430	I
3	2859.3	IV	150	3906.177	II	250	5086.52	II	3000	8508.870	I
50	2870.61	III	200	3920.081	II	400 h	5125.73	II	150	8764.110	I
100	2892.18	III	5	3934.29	IV	500	5208.32	II	6000	8776.748	I
30	2909.17	III	100	3994.840	II	200	5308.66	II	2000	8928.692	I
50	2952.56	III	100 h	3997.793	II	500	5333.41	II	500	9238.48	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
500 hl	9293.82	II	2600	18167.315	I	10000	1523.79	III	410	4619.88	II
200 h	9320.99	II	100	18399.786	I	4000	1808.66	IV	540	4655.50	II
300	9361.95	II	150	18580.896	I	5000	1902.97	IV	360	4662.51	II
100	9362.082	I	300	18696.294	I	4000 c	2197.45	IV	230	4692.50	II
200 h	9402.82	II	170	18785.460	I	770	2256.76	II	230	4728.42	II
200 h	9470.93	II	200	18797.703	I	25000 w	2417.58	IV	500	4740.28	II
500	9577.52	II	140	20209.878	I	50000	2532.75	IV	390	4743.09	II
500 h	9605.80	II	300	20423.964	I	45000	2582.05	IV	320	4748.73	II
400 h	9619.61	II	140	20446.971	I	95000 w	2597.50	IV	320	4860.91	II
200	9663.34	II	600	21165.471	I	70000 w	2662.75	IV	850	4899.92	II
200 h	9711.60	II	1800	21902.513	I	420	2808.39	II	1000	4920.98	II
2000	9751.758	I	120	22485.775	I	50000 w	2848.30	IV	1000	4921.79	II
500	9803.14	II	180	23340.416	I	30000 c	2962.58	IV	370	4949.77	I
500	9856.314	I	120	24260.506	I	70000 w	3009.51	IV	340	4970.39	II
1000	10221.46	II	180	24292.221	I	90000 c	3056.68	IV	370	4986.83	II
100	11187.108	I	600	25233.820	I	1000	3171.63	III	720	4999.47	II
200	11257.711	I	180	28610.55	I	1500	3171.74	III	210	5050.57	I
150	11259.126	I	1000	28655.72	I	510	3245.13	II	470	5114.56	II
500	11457.481	I	150	28769.71	I	550	3265.67	II	470	5122.99	II
150	11792.425	I	140	28822.49	I	800	3303.11	II	450	5145.42	I
1500	11819.377	I	300	29236.69	I	1500	3337.49	II	290	5158.69	I
600	11997.105	I	300	30663.54	I	870	3344.56	II	580	5177.31	I
160	12077.224	I	300	30979.16	I	1500	3380.91	II	850	5183.42	II
100	12861.892	I	500	39300.6	I	320	3628.83	II	260	5188.22	II
1100	13177.412	I	1100	39486.52	I	1000	3645.42	II	720	5211.86	I
1000	13622.415	I	220	39557.25	I	550	3713.54	II	520	5234.27	I
2400	13634.220	I	100	39572.60	I	2400	3759.08	II	340	5253.46	I
800	13658.394	I	1400	39588.4	I	3700	3790.83	II	370	5271.19	I
200	13711.036	I	1100	39589.6	I	3900	3794.78	II	370	5301.98	II
600	13738.851	I	500	39954.8	I	600	3840.72	II	180	5303.55	II
150	13974.027	I	300	39966.6	I	1600	3849.02	II	500	5455.15	I
550	14045.657	I	1300	40306.1	I	3400	3871.64	II	470	5501.34	I
140	14104.298	I	250	40685.16	I	1700	3886.37	II	240	5648.25	I
180	14402.22	I	<i>Lanthanum La Z = 57</i>			1300	3916.05	II	180	5740.66	I
2000	14426.793	I	100	344.12	IV	1100	3921.54	II	370	5769.34	I
100	14517.84	I	400	390.72	V	2200	3929.22	II	320	5789.24	I
1600	14734.436	I	1000	432.11	V	9000	3949.10	II	450	5791.34	I
550	14762.672	I	2500	435.28	V	4400	3988.52	II	140	5821.99	I
450	14765.472	I	10000	463.14	IV	3600	3995.75	II	320	5930.62	I
400	14961.894	I	5000	482.16	V	2800	4031.69	II	720	6249.93	I
120	15005.307	I	7000	498.08	V	3000	4042.91	II	260 d	6262.30	II
140	15209.526	I	15000	499.54	IV	850	4067.39	II	450	6394.23	I
1700	15239.615	I	10000	503.58	V	2800	4077.35	II	250	6455.99	I
130	15326.480	I	12000	526.76	V	5500	4086.72	II	180	6709.50	I
1500	15334.958	I	10000	531.07	V	4400	4123.23	II	110	7045.96	I
700	15372.037	I	15000	533.23	V	550	4141.74	II	160	7066.23	II
200	15474.026	I	8000	547.44	V	1100	4151.97	II	50	7161.25	I
180	15681.02	I	40000	552.02	IV	1500	4196.55	II	110 w	7282.34	II
120	15820.09	I	5000	600.24	V	1600	4238.38	II	110 w	7334.18	I
200	16726.513	I	30000	631.26	IV	480	4269.50	II	75 cw	7483.50	II
2000	16785.128	I	400	796.99	III	600	4286.97	II	50	7498.83	I
1000	16853.488	I	2000	870.40	III	600	4296.05	II	85	7539.23	I
2400	16890.441	I	1000	882.34	III	440	4322.51	II	40	7964.83	I
1600	16896.753	I	400	942.86	III	4600	4333.74	II	75	8086.05	I
1800	16935.806	I	50000	1081.61	III	550	4354.40	II	85	8324.69	I
600	17098.771	I	95000	1099.73	III	2000	4429.90	II	95	8346.53	I
700	17367.606	I	2000	1255.63	III	850	4522.37	II	65	8545.44	I
120	17404.443	I	10000	1349.18	III	420	4526.12	II	300	8583.45	III
150	17616.854	I	25000	1368.04	IV	400	4558.46	II	40	8674.43	I
650	17842.737	I	20000	1463.47	IV	400	4574.88	II	35	8825.82	I
700	18002.229	I	15000	1507.87	IV	410	4613.39	II	120	9184.38	III

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	9212.63	III	15	1056.53	IV	20	2259.01	V	100	5006.572	I
140	10284.79	III	10	1060.66	II	150	2332.418	I	50	5089.484	I
<i>Lead Pb Z = 82</i>			12	1072.09	IV	16	2359.53	IV	10	5107.242	I
10	496.38	IV	18	1080.81	IV	180	2388.797	I	2000	5201.437	I
12	499.94	IV	20	1084.17	IV	550 r	2393.792	I	10	5372.099	II
14	529.78	IV	10	1088.86	V	140	2399.597	I	40	5692.346	I
20	570.16	IV	10	1103.94	II	320 r	2401.940	I	200	5895.624	I
10	648.50	IV	10	1108.43	II	320 r	2411.734	I	2000	6001.862	I
20	703.73	V	10	1109.84	II	16	2417.61	IV	500	6011.667	I
12	749.46	V	20	1116.08	IV	15	2424.81	V	500	6059.356	I
10	752.52	V	10	1119.57	II	150 r	2443.829	I	40	6081.409	II
10	761.09	IV	10	1121.36	II	160 r	2446.181	I	50	6110.520	I
18	767.45	V	10	1133.14	II	130 r	2476.378	I	100	6235.266	I
18	769.49	V	18	1137.84	IV	80 r	2577.260	I	50 c	6660.20	II
14	771.42	V	14	1144.93	IV	500 r	2613.655	I	20000	7228.965	I
14	782.79	V	12	1157.88	V	900 r	2614.175	I	10	7346.676	I
15	797.02	V	14	1185.43	V	160	2628.262	I	20	7809.259	I
18	802.07	IV	20	1189.95	IV	4	2634.256	II	5	7896.737	I
12	802.82	IV	10	1203.63	II	10	2657.094	I	10	8168.001	I
18	809.63	V	10	1231.20	II	700	2663.154	I	6	8191.886	I
10	812.59	IV	11	1233.50	V	10	2697.541	I	5	8217.711	I
10	827.41	IV	10	1291.10	IV	25000 r	2801.995	I	40	8272.690	I
12	832.60	IV	20	1313.05	IV	100	2822.58	I	20	8409.384	I
12	845.94	IV	10	1331.65	II	14000 r	2823.189	I	10	8478.492	I
18	857.64	IV	10	1335.20	II	35000 r	2833.053	I	5	8722.810	I
16	862.33	IV	12	1343.06	IV	6	2840.557	II	10	8857.457	I
20	863.97	V	10	1348.37	II	14000 r	2873.311	I	8	9293.476	I
14	870.44	IV	16	1388.94	IV	3	2914.442	II	15	9438.05	I
6	873.71	II	18	1400.26	IV	15	2966.460	I	15	9604.297	I
12	879.96	IV	10	1404.34	IV	15	2972.991	I	15	9674.351	I
18	883.90	V	10	1433.96	II	15	2980.157	I	200	10290.458	I
14	884.96	IV	10	1512.42	II	4	2986.876	II	100	10498.965	I
14	884.99	IV	14	1535.71	IV	10	3043.85	III	50	10649.249	I
14	888.37	V	20	1553.1	III	150	3118.894	I	15	10886.688	I
8	889.68	II	10	1671.53	II	10	3137.81	III	40	10969.53	I
16	890.72	IV	10	1682.15	II	10	3176.50	III		13512.6	I
14	894.40	V	20	1726.75	II	600	3220.528	I		14743.0	I
12	896.08	V	10	1796.670	II	100	3229.613	I		15349.6	I
12	908.51	IV	10	1822.050	II	400	3240.186	I		39039.4	I
14	915.71	V	10	1904.77	I	200	3262.355	I	<i>Lithium Li Z = 3</i>		
12	917.90	IV	7	1921.471	II	35000	3572.729	I		102.9	III
12	918.09	V	12	1959.34	IV	50000 r	3639.568	I		103.4	III
12	920.28	V	16	1973.16	IV	20000	3671.491	I		104.1	III
12	920.66	V	10	1998.83	V	70000 r	3683.462	I		105.5	III
10	922.12	IV	5 r	2022.02	I	10	3713.982	II		108.0	III
12	922.49	IV	10	2042.58	IV	25000	3739.935	I		113.9	III
10	927.64	IV	12	2049.34	IV	12	3854.08	III		125.5	II
14	932.20	IV	8 r	2053.28	I	15000	4019.632	I		135.0	III
12	954.35	V	12	2079.22	IV	95000	4057.807	I		136.5	II
10	967.23	II	6	2111.758	I	14000	4062.136	I		140.5	II
10	986.71	II	10	2115.066	I	10	4157.814	I		167.21	II
10	995.89	II	15	2154.01	IV	10000	4168.033	I		168.74	II
10	1016.61	II	500 r	2170.00	I	8	4272.66	III		171.58	II
14	1028.61	IV	7	2175.580	I	200	4340.413	I		178.02	II
20	1032.05	IV	12	2177.46	IV	10	4496.15	IV		199.28	II
16	1041.24	IV	7	2187.888	I	6	4499.34	III		207.5	II
18	1044.14	IV	8	2189.603	I	16	4534.60	IV		456.	II
12	1048.9	III	10	2203.534	II	7	4571.21	III		483.	II
10	1049.82	II	20	2237.425	I	10	4579.051	II		540.	II
10	1050.77	II	20	2246.86	I	6	4761.12	III		540.0	III
10	1051.26	V	25	2246.89	I	1000	5005.416	I		729.	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
	729.1	III		2313.49	I	5	3199.33	II	48	8126.23	I
	800.	II		2315.08	I	2	3199.43	II	48	8126.45	I
	820.	II		2316.95	I	17	3232.66	I		8517.37	II
	861.	II		2319.18	I		3249.87	II		9581.42	II
	905.5	II		2321.88	I		3306.28	II		10120.	II
	917.5	II		2325.11	I		3488.	I		12232.	I
	936.	II		2329.02	I		3579.8	I		12782.	I
	945.	II		2329.84	II		3618.	I		13566.	I
	965.	II		2333.94	I		3662.	I		17552.	I
	972.	II	3	2336.88	II		3684.32	II		18697.	I
	988.	II	5	2336.91	II	1	3714.00	II		19290.	I
	1018.	II	2	2337.00	II	5	3714.16	II		24467.	I
	1032.	II		2340.15	I	6 d	3714.27	II		40475.	I
	1036.	II		2348.22	I	8	3714.29	II			
	1093.	II		2358.93	I	7 d	3714.40	II		<i>Lutetium Lu Z = 71</i>	
	1103.	II		2373.54	I	10	3714.41	II	100	563.72	V
	1109.	II		2381.54	II	1	3714.51	II	500	810.73	III
	1116.	II		2383.20	II		3714.58	II	2000	832.28	III
	1132.1	II	1	2394.39	I	3	3718.7	I	100	861.92	V
	1141.	II		2402.33	II	6	3794.72	I	400	876.80	IV
	1166.4	II		2410.84	II	20	3915.30	I	100	880.32	V
	1198.09	II	3	2425.43	I	20	3915.35	I	100	891.81	V
	1215.	II		2429.81	II	10	3985.48	I	100	914.72	V
	1238.	II		2460.2	I	10	3985.54	I	400	1001.18	III
	1253.8	II	10	2475.06	I	40	4132.56	I	100	1272.42	IV
	1420.89	II		2506.94	II	40	4132.62	I	800	1333.79	IV
	1424.	II		2508.78	II		4196.	I	400	1429.38	IV
3	1492.93	II		2518.	I	20	4273.07	I	200	1441.76	V
5	1492.97	II		2539.49	II	20	4273.13	I	200	1453.35	V
1	1493.04	II	24	2551.7	II	5	4325.42	II	200	1468.99	V
	1555.	II		2559.	II	5	4325.47	II	400	1472.12	V
3	1653.08	II	15	2562.31	I	1	4325.54	II	200	1473.71	V
5	1653.13	II		2605.08	II		4516.45	II	200	1485.58	V
1	1653.21	II	2	2657.29	II	13	4602.83	I	400	1511.26	IV
	1681.66	II	3	2657.30	II	13	4602.89	I	600	1772.57	IV
	1755.33	II		2674.46	II		4607.34	II	100 c	1786.25	V
	2009.	II		2728.24	II		4671.51	II	1000	1854.57	III
	2039.	I	5	2728.29	II	6	4671.65	II	1500	2065.35	III
	2068.	II	2	2728.32	II	2	4671.70	II	1500 c	2070.56	III
	2131.	II	3	2730.47	II	3	4678.06	II	600 c	2086.47	IV
	2164.	II	1	2730.55	II	1	4678.29	II	1000 c	2104.41	IV
	2173.4	I	5	2741.20	I		4760.	I	1000 c	2108.31	IV
	2183.	II		2766.99	II		4763.	II	1700 h	2195.54	II
	2214.	II		2790.31	II		4788.36	II	1000	2236.14	III
	2222.	II		2801.	I		4843.0	II	2000	2236.22	III
	2237.	II		2846.	I	4	4881.32	II	95	2276.94	II
h	2249.21	II		2868.	I	4	4881.39	II	190	2297.41	II
	2286.82	II		2895.	I	1	4881.49	II	1300	2392.19	II
	2302.57	II	2	2934.02	II	8	4971.66	I	120	2399.14	II
	2303.33	II	2	2934.07	II	8	4971.75	I	80	2419.21	II
	2304.59	I	5	2934.12	II		5037.92	II	130	2459.64	II
	2304.92	I	1	2934.25	II		5271.	I	370	2536.95	II
	2305.36	I		2968.	I		5315.	I	930	2571.23	II
	2305.83	I	3	3029.12	II		5395.	I	1700	2578.79	II
	2306.29	I	3	3029.14	II		5440.	I	4500 c	2603.35	III
	2306.82	I		3144.	I	600 c	5483.55	II	1800	2613.40	II
	2307.44	I	3	3155.31	II	600 c	5485.65	II	18000	2615.42	II
	2308.97	I	4	3155.33	II	320	6103.54	I	1800	2619.26	II
	2309.88	I	1	3196.26	II	320	6103.65	I	2700	2657.80	II
	2310.94	I	9	3196.33	II	3600	6707.76	I	570 h	2685.08	I
	2312.11	I	4	3196.36	II	3600	6707.91	I	4200	2701.71	II
									180 d	2719.09	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
480 h	2728.95	I	250	4281.03	I	3000	323.31	IV	1	2613.36	I
3600	2754.17	II	330 d	4295.97	I	30	353.09	V	2	2614.73	I
750 h	2765.74	I	150	4309.57	I	150	857.29	IV	3	2617.51	I
2000	2772.55	III	190 c	4430.48	I	50	919.03	IV	3	2628.66	I
2700	2796.63	II	190	4450.81	I	250	1037.41	IV	6	2630.05	I
270 c	2834.35	II	3300	4518.57	I	300	1210.99	IV	8	2632.87	I
330 h	2845.13	I	100 h	4648.21	I	300	1342.19	IV	2	2644.80	I
3000	2847.51	II	1000	4658.02	I	800	1346.57	IV	3	2646.21	I
570 h	2885.14	I	85 h	4659.03	I	300	1346.68	IV	4	2649.06	I
6300	2894.84	II	150	4785.42	II	600	1352.05	IV	8	2660.76	II
4500	2900.30	II	85	4815.05	I	900	1384.46	IV	8	2660.82	II
300	2903.05	I	460	4904.88	I	500	1385.77	IV	6	2668.12	I
9000	2911.39	II	180	4942.34	I	800	1387.53	IV	8	2669.55	I
270 h	2949.73	I	800	4994.13	II	300	1404.68	IV	10	2672.46	I
1200	2951.69	II	800	5001.14	I	1000	1409.36	IV	3	2693.72	I
4200	2963.32	II	140	5134.05	I	500	1437.53	IV	5	2695.18	I
2400	2969.82	II	2700	5135.09	I	1000	1437.64	IV	6	2698.14	I
1800	2989.27	I	170	5196.61	I	300	1447.42	IV	8	2731.99	I
3000	3020.54	II	500	5402.57	I	300	1459.54	IV	10	2733.49	I
2100	3056.72	II	140 c	5421.90	I	400	1459.62	IV	12	2736.53	I
1000	3057.86	III	100	5437.88	I	400	1481.51	IV	5	2765.22	I
7500	3077.60	II	2100	5476.69	II	350	1490.45	IV	7	2768.34	I
390	3080.11	I	550	5736.55	I	300	1495.50	IV	38	2776.69	I
5100 h	3081.47	I	80	5800.59	I	300	1607.11	IV	32	2778.27	I
3000	3118.43	I	690 cw	5983.9	II	5	1668.43	I	90	2779.83	I
2400	3171.36	I	140	5997.13	I	500	1683.02	IV	8	2781.29	I
260	3191.80	II	1400	6004.52	I	10	1683.41	I	32	2781.42	I
1400	3198.12	II	440	6055.03	I	400	1698.81	IV	36	2782.97	I
4800	3254.31	II	150	6159.94	II	15	1707.06	I	1000	2795.53	II
3800	3278.97	I	600	6198.13	III	40	1734.84	II	600	2802.70	II
7600	3281.74	I	160	6199.66	II	50	1737.62	II	3	2809.76	I
6200	3312.11	I	2100	6221.87	II	20	1747.80	I	2	2811.11	I
7600	3359.56	I	80	6235.36	II	40	1750.65	II	1	2811.78	I
6200	3376.50	I	160	6242.34	II	50	1753.46	II	12	2846.72	I
950	3385.50	I	70 h	6345.35	I	30	1827.93	I	12	2846.75	I
160 h	3391.55	I	1100	6463.12	II	300	1844.17	IV	14	2848.34	I
1400	3396.82	I	29	6477.67	I	9	2025.82	I	14	2848.42	I
4100	3397.07	II	55 c	6523.18	I	25	2064.90	III	16	2851.65	I
4800	3472.48	II	35 cw	6611.28	II	20	2091.96	III	16	2851.66	I
8300 c	3507.39	II	23 c	6677.14	I	20	2177.70	III	6000	2852.13	I
1600	3508.42	I	30 c	6793.77	I	3	2329.58	II	2	2902.92	I
4800	3554.43	II	45	6917.31	I	20	2395.15	III	4	2906.36	I
4800	3567.84	I	23	7031.24	I	6	2449.57	II	3	2915.45	I
340	3596.34	I	45	7125.84	II	1	2557.23	I	10	2936.74	I
800	3623.99	II	14 ch	7237.98	I	1	2560.94	I	12	2938.47	I
680	3636.25	I	11 c	7441.52	I	1	2562.26	I	2	2942.00	I
2600	3647.77	I	9 c	8178.16	I	1	2564.94	I	13	2942.00	I
110	3756.70	I	17	8382.08	I	1	2570.91	I	20	3091.08	I
110	3756.79	I	35	8459.19	II	1	2572.25	I	22	3092.99	I
150	3800.67	I	10 d	8478.50	I	2	2574.94	I	14	3096.90	I
2700	3841.18	I	29 c	8508.08	I	1	2577.89	I	9	3104.71	II
530	3876.65	II	35 c	8610.98	I	1	2580.59	I	8	3104.81	II
50	3918.86	I				1	2584.22	I	6	3168.98	II
480	3968.46	I	<i>Magnesium Mg Z = 12</i>			2	2585.56	I	6	3172.71	II
670	4054.45	I	400	146.95	IV	3	2588.28	I	7	3175.78	II
310	4122.49	I	20	186.51	III	1	2591.89	I	2	3197.62	I
3100	4124.73	I	20	187.20	III	1	2593.23	I	17	3329.93	I
150 c	4131.79	I	10	188.53	III	2	2595.97	I	6	3332.15	I
460	4154.08	I	100	231.73	III	2	2602.50	I	9	3336.68	I
1600	4184.25	II	80	234.26	III	4	2603.85	I	7	3535.04	II
150	4277.50	I	35	276.58	V	5	2606.62	I	8	3538.86	II
			4000	320.99	IV						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
7	3549.52	II	12	8712.69	I	90	1264.41	IV	500	2066.38	III
8	3553.37	II	13	8717.83	I	500	1283.58	III	1000	2069.02	III
140	3829.30	I	10	8734.99	II	400	1287.59	III	30	2076.21	II
300	3832.30	I	17	8736.02	I	300	1291.62	III	900	2077.38	III
500	3838.29	I	11	8745.66	II	1000	1360.72	III	800	2084.23	III
8	3848.24	II	14	8806.76	I	800	1365.20	III	600	2090.05	III
7	3850.40	II	10	8824.32	II	500 h	1609.17	III	1500	2092.16	I
3	3878.31	I	11	8835.08	II	1000	1614.14	III	500	2094.78	III
3	3895.57	I	20	8923.57	I	2000	1620.60	III	20	2097.46	II
4	3903.86	I	10	8997.16	I	500	1633.80	III	500	2097.93	III
6	3938.40	I	14	9218.25	II	80	1667.00	IV	500	2099.97	III
8	3986.75	I	13	9244.27	II	80	1698.30	IV	20	2102.50	II
10	4057.50	I	12	9246.50	I	20	1726.47	II	1700	2109.58	I
15	4167.27	I	30	9255.78	I	30	1732.70	II	30	2113.96	II
20	4351.91	I	10	9327.54	II	50	1733.55	II	1000	2169.78	III
9	4384.64	II	10	9340.54	II	40	1734.49	II	700	2174.15	III
10	4390.59	II	25	9414.96	I	30	1737.93	II	900	2176.87	III
8	4428.00	II	17	9429.81	I	20	1740.16	II	800	2181.86	III
9	4433.99	II	19	9432.76	I	20	1742.00	II	800	2184.87	III
14	4481.16	II	20	9438.78	I	85	1742.10	IV	290	2208.81	I
13	4481.33	II	12	9631.89	II	85	1766.27	IV	540	2213.85	I
28	4571.10	I	11	9632.43	II	80	1795.65	IV	900	2220.55	III
10	4730.03	I	15	9953.20	I	80	1795.79	IV	770	2221.84	I
7	4851.10	II	15	9983.20	I	30	1853.27	II	1000	2227.42	III
75	5167.33	I	17	9986.47	I	20	1857.92	II	20	2373.36	II
220	5172.68	I	18	9993.21	I	50	1902.95	II	20	2427.38	II
400	5183.61	I	14	10092.16	II	20	1907.84	II	50	2427.72	II
8	5264.21	II	35	10811.08	I	75	1910.25	IV	30	2427.94	II
7	5264.37	II	11	10914.23	II	30	1911.41	II	30	2437.37	II
9	5401.54	II	10	10951.78	II	20 d	1914.68	II	20	2437.84	II
6	5528.41	I	25	10953.32	I	100	1915.10	II	30	2452.49	II
30	5711.09	I	27	10957.30	I	20	1918.64	II	50	2499.00	II
10	6318.72	I	28	10965.45	I	30	1919.64	II	30	2507.60	II
9	6319.24	I	15	11032.10	I	80	1921.25	II	20	2516.60	II
7	6319.49	I	14	11033.66	I	20	1923.07	II	30	2516.74	II
10	6346.74	II	45	11828.18	I	20	1923.34	II	20	2521.66	II
9	6346.96	II	30	12083.66	I	30	1925.52	II	20	2530.72	II
11	6545.97	II	28	14877.62	I	50	1926.59	II	20	2531.80	II
7	6781.45	II	35	15024.99	I	30	1931.40	II	50	2532.78	II
8	6787.85	II	30	15040.24	I	500	1941.28	III	50	2533.33	II
7	6812.86	II	25	15047.70	I	800	1943.21	III	30	2534.10	II
8	6819.27	II	10	15765.84	I	20	1945.15	II	80	2534.22	II
10	7193.17	I	30	17108.66	I	20	1947.93	II	100	2535.66	II
10	7291.06	I	5	26392.90	I	20	1950.14	II	30	2535.98	II
12	7387.69	I				500	1952.36	III	100	2537.92	II
20	7657.60	I	<i>Manganese Mn Z = 25</i>			1000	1952.52	III	50	2541.11	II
19	7659.15	I	600	410.30	V	30	1953.23	II	80	2542.92	II
17	7659.90	I	600	410.60	V	20 d	1954.81	II	50	2543.45	II
15	7691.55	I	600	415.62	V	30	1959.25	II	100	2548.75	II
12	7877.05	II	650	415.98	V	20	1969.24	II	50	2551.85	II
13	7896.37	II	600	428.59	V	500	1978.95	III	30	2553.27	II
10	8098.72	I	600	435.67	V	30	1994.23	II	75	2556.57	II
9	8115.22	II	1000	441.72	V	9700	1996.06	I	30	2556.89	II
8	8120.43	II	850	442.49	V	14000	1999.51	I	95	2558.59	II
10	8209.84	I	60	579.79	IV	18000	2003.85	I	30	2559.41	II
20	8213.03	I	60	581.44	IV	1000 w	2027.83	III	150	2563.65	II
10	8213.99	II	60	581.65	IV	500 w	2028.14	III	30	2565.22	II
11	8234.64	II	60	585.21	IV	50	2037.31	II	580	2572.76	I
10	8310.26	I	90	1242.25	IV	40	2037.64	II	480	2575.51	I
15	8346.12	I	90	1244.50	IV	40	2039.97	II	12000	2576.10	II
10	8710.18	I	95	1251.93	IV	500	2049.68	III	550	2584.31	I
			95	1257.28	IV						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
30	2588.97	II	70	2886.68	II	290	3619.28	I	800	4451.59	I
45	2589.71	II	160	2889.58	II	220	3623.79	I	160	4453.00	I
250	2592.94	I	55	2892.39	II	140	3629.74	I	130	4455.01	I
6200	2593.73	II	50	2898.70	II	100	3660.40	I	160	4455.32	I
250	2595.76	I	80	2900.16	II	280	3693.67	I	110	4455.82	I
95	2598.90	II	140 h	2914.60	I	180	3696.57	I	210	4457.55	I
30	2602.72	II	190 h	2925.57	I	210	3706.08	I	270	4458.26	I
45	2603.72	II	1100	2933.06	II	130	3718.93	I	150	4461.08	I
4300	2605.69	II	1500	2939.30	II	130	3731.93	I	510	4462.02	I
190	2610.20	II	250 h	2940.39	I	260	3790.22	I	290	4464.68	I
500	2618.14	II	1900	2949.20	II	110	3800.55	I	200	4470.14	I
140	2622.90	I	30	3019.92	II	3200	3806.72	I	130	4472.79	I
150	2624.04	I	55	3031.06	II	700	3809.59	I	170	4490.08	I
40	2624.80	II	30	3035.35	II	2100	3823.51	I	240	4498.90	I
200	2625.58	II	330	3044.57	I	390	3823.89	I	240	4502.22	I
190	2632.35	II	120	3045.59	I	200	3829.68	I	160	4709.72	I
130	2638.17	II	200	3047.04	I	480	3833.86	I	180	4727.48	I
80	2639.84	II	30	3050.65	II	1300	3834.36	I	130	4739.11	I
27	2650.99	II	250	3054.36	I	350	3839.78	I	1000	4754.04	I
60	2655.91	II	140	3062.12	I	670	3841.08	I	180	4761.53	I
30	2666.77	II	170	3066.02	I	350	3843.98	I	750	4762.38	I
30	2667.03	II	170	3070.27	I	120	3926.47	I	300	4765.86	I
110	2672.59	II	160	3073.13	I	130	3982.58	I	500	4766.43	I
55	2673.37	II	140 h	3178.50	I	150	3985.24	I	940	4783.42	I
55	2674.43	II	220	3212.88	I	190	3986.83	I	1000	4823.52	I
45	2680.34	II	1000	3228.09	I	150	3987.10	I	19	5004.91	I
30	2680.68	II	300	3230.72	I	1500	4018.10	I	30	5074.79	I
30	2681.25	II	850	3236.78	I	150	4026.44	I	200	5079.20	III
55	2684.55	II	330	3243.78	I	27000	4030.76	I	150	5100.03	III
55	2685.94	II	650	3248.52	I	19000	4033.07	I	60	5117.94	I
110	2688.25	II	100	3251.14	I	11000	4034.49	I	50	5150.89	I
27	2693.19	II	310	3252.95	I	1500	4035.73	I	50	5196.59	I
55	2695.36	II	310	3256.14	I	5600	4041.36	I	85	5255.32	I
27	2698.97	II	220	3258.41	I	210 d	4045.13	I	160	5341.06	I
85	2701.00	II	180	3260.23	I	1100	4048.76	I	19	5349.88	I
50	2701.17	II	180	3264.71	I	150	4055.21	I	95	5377.63	I
160	2701.70	II	200	3330.78	II	1900	4055.54	I	95	5394.67	I
100	2703.98	II	720	3441.99	II	210	4057.95	I	50	5399.49	I
130	2705.74	II	50	3460.03	II	1100	4058.93	I	95	5407.42	I
80	2707.53	II	360	3460.33	II	150	4059.39	I	35	5413.69	I
110	2708.45	II	360 h	3474.04	II	730	4061.74	I	85	5420.36	I
45	2709.96	II		3474.13	II	730	4063.53	I	35	5432.55	I
80	2710.33	II	290	3482.91	II	290	4070.28	I	150	5454.07	III
110	2711.58	II	180	3488.68	II	730	4079.24	I	12	5457.47	I
30	2716.80	II	140	3495.84	II	730	4079.42	I	60	5470.64	I
30	2717.53	II	50	3496.81	II	1100	4082.94	I	200	5474.68	III
30	2719.01	II	100	3497.54	II	1100	4083.63	I	40	5481.40	I
50	2719.74	II	360	3531.85	I	200	4110.90	I	30	5505.87	I
30	2722.10	II	1100	3532.12	I	150	4131.12	I	50	5516.77	I
30	2724.46	II	1300	3547.80	I	120	4135.04	I	40	5537.76	I
55	2728.61	II	1100	3548.03	I	150	4176.60	I	21	5551.98	I
6200	2794.82	I	390	3548.20	I	120	4189.99	I	200	5946.65	III
5100	2798.27	I	2200	3569.49	I	370	4235.14	I	140	6013.50	I
220	2799.84	I	720	3569.80	I	510	4235.29	I	200	6016.64	I
3700	2801.06	I	1400	3577.88	I	190	4239.72	I	290	6021.80	I
110	2809.11	I	720	3586.54	I	290	4257.66	I	200	6231.21	III
60	2815.02	II	290	3595.12	I	290	4265.92	I	17	6440.97	I
30	2816.33	II	150	3601.72	III	270	4281.10	I	24	6491.71	I
60	2870.08	II	420	3607.54	I	50	4323.63	II	14 h	6942.52	I
30	2872.94	II	420	3608.49	I	350	4414.88	I	12	6989.96	I
80	2879.49	II	360	3610.30	I	210	4436.35	I	14	7069.84	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
12	7184.25	I	30	3801.660	I	40	1783.70	II	50	2698.83	I
24 h	7283.82	I	20	3901.867	I	30	1796.22	II	50	2699.38	I
35 h	7302.89	I	60	3906.372	I	200	1796.90	II	80	2705.36	II
50	7326.51	I	200	3983.839	II	60	1798.74	II	70	2724.43	III
12	7680.20	I	1800	4046.572	I	30	1803.89	II	80	2752.78	I
12 h	8672.06	I	150	4077.838	I	40	1808.29	II	20	2759.71	I
12 h	8701.05	I	40	4108.057	I	400	1820.34	II	6	2769.22	III
17 h	8703.76	I	250	4339.224	I	5	1832.74	I	40	2803.46	I
30 h	8740.93	I	400	4347.496	I	1000	1849.50	I	30	2804.43	I
			4000	4358.337	I	160	1869.23	II	2	2805.34	I
<i>Mercury 198 Hg Z = 80</i>			80	4916.068	I	300	1870.55	II	2	2806.77	I
80	1250.564	I	1100	5460.753	I	200	1875.54	II	150	2814.93	II
8	1259.242	I	160	5675.922	I	1	1894.77	III	3	2844.76	III
100	1268.825	I	240	5769.598	I	20	1900.28	II	750	2847.68	II
5	1307.751	I	280	5790.663	I	30	1927.60	II	50	2856.94	I
20	1402.619	I	20	6072.713	I	300	1942.27	II	150	2893.60	I
10	1435.503	I	30	6234.402	I	100	1972.94	II	150	2916.27	II
1000	1849.492	I	160	6716.429	I	200	1973.89	II	60	2925.41	I
60	2262.210	II	250	6907.461	I	150	1987.98	II	150	2935.94	II
20	2302.065	I	240	11287.407	I	90	2026.97	II	400	2947.08	II
20	2345.440	I				90	2052.93	II	1200	2967.28	I
100	2378.325	I	<i>Mercury Hg Z = 80</i>			70	2148.00	II	300	3021.50	I
20	2380.004	I	3	621.44	III	5	2247.55	I	120	3023.47	I
40	2399.349	I	2	679.68	III	60	2262.23	II	30	3025.61	I
20	2399.729	I	2	878.59	III	20	2302.06	I	50	3027.49	I
20	2446.900	I	1	886.48	III	7	2314.15	III	15	3090.05	III
15	2464.064	I	400	893.08	II	15	2323.20	I	400	3125.67	I
40	2481.999	I	300	915.83	II	5	2340.57	I	320	3131.55	I
30	2482.713	I	150	923.39	II	20	2345.43	I	320	3131.84	I
40	2483.821	I	200	940.80	II	20	2352.48	I	400	3208.20	II
90	2534.769	I	100	962.74	II	100	2378.32	I	400	3264.06	II
15000	2536.506	I	50	969.13	II	20	2380.00	I	5	3283.02	III
25	2563.861	I	1	988.89	III	4	2380.55	III	12	3312.28	III
25	2576.290	I	2	1009.29	III	40	2399.38	I	80	3341.48	I
250	2652.043	I	5	1068.03	III	20	2399.73	I	100	3385.25	II
400	2653.683	I	800	1099.26	II	10	2400.49	I	8	3389.01	III
100	2655.130	I	2	1161.95	III	60	2407.35	II	5	3450.77	III
50	2698.831	I	80	1250.58	I	50	2414.13	II	400	3451.69	II
80	2752.783	I	8	1259.24	I	8	2431.65	III	3	3500.35	III
20	2759.710	I	100	1268.82	I	5	2441.06	I	4	3538.88	III
40	2803.471	I	5	1307.75	I	20	2446.90	I	200	3549.42	II
30	2804.438	I	300	1307.93	II	15	2464.06	I	5	3557.24	III
750	2847.675	II	400	1321.71	II	5	2480.56	III	2800	3650.15	I
50	2856.939	I	400	1331.74	II	40	2482.00	I	300	3654.84	I
150	2893.598	I	80	1350.07	II	30	2482.72	I	80	3662.88	I
150	2916.227	II	200	1361.27	II	40	2483.82	I	240	3663.28	I
60	2925.413	I	20	1402.62	I	7	2484.50	III	30	3701.44	I
1200	2967.283	I	200	1414.43	II	90	2534.77	I	35	3704.17	I
300	3021.500	I	10	1435.51	I	15000	2536.52	I	30	3801.66	I
120	3023.476	I	15	1619.46	II	25	2563.86	I	15	3803.51	III
30	3025.608	I	120	1623.95	II	25	2576.29	I	100	3806.38	II
50	3027.490	I	20	1628.25	II	5	2578.91	I	20	3901.87	I
400	3125.670	I	150	1649.94	II	2	2612.92	III	60	3906.37	I
320	3131.551	I	50	1653.64	II	4	2617.97	III	100	3918.92	II
320	3131.842	I	200	1672.41	II	15	2625.19	I	200	3983.96	II
80	3341.481	I	9	1681.40	III	5	2639.78	I	1800	4046.56	I
2800	3650.157	I	100	1702.73	II	250	2652.04	I	150	4077.83	I
300	3654.839	I	100	1707.40	II	400	2653.69	I	40	4108.05	I
80	3662.883	I	120	1727.18	II	100	2655.13	I	70	4122.07	III
240	3663.281	I	250	1732.14	II	3	2670.49	III	10	4140.34	III
30	3701.432	I	15	1759.75	III	5	2674.91	I	100	4216.74	III
35	3704.170	I	20	1775.68	I						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
250	4339.22	I	120	13209.95	I	150	2269.71	III	80	2834.39	II
400	4347.49	I	140	13426.57	I	200	2294.97	III	80	2835.33	II
4000	4358.33	I	60	13468.38	I	160	2304.25	II	160	2842.15	II
100	4398.62	II	80	13505.58	I	160	2306.97	II	1700	2848.23	II
15	4470.58	III	500	13570.21	I	150	2330.93	III	370	2853.23	II
12	4552.84	III	450	13673.51	I	110	2332.12	II	370	2863.81	II
90	4660.28	II	200	13950.55	I	190	2341.59	II	220	2866.69	II
50	4797.01	III	500	15295.82	I	100	2359.76	III	1700	2871.51	II
80	4855.72	II	100	16881.48	I	110	2389.20	II	85	2872.88	II
10	4869.85	III	400	16920.16	I	140	2403.61	II	220	2879.05	II
5	4883.00	I	300	16942.00	I	120	2413.01	II	65	2888.15	II
5	4889.91	I	500	17072.79	I	85	2498.28	II	1300	2890.99	II
80	4916.07	I	400	17109.93	I	200	2506.19	III	95	2891.28	II
5	4970.37	I	20	17116.75	I	440	2538.46	II	190	2892.81	II
80	4973.57	III	20	17198.67	I	330	2542.67	II	950	2894.45	II
5	4980.64	I	20	17213.20	I	80	2558.88	II	140	2897.63	II
20	5102.70	I	70	17329.41	I	85	2564.34	II	70	2900.80	II
40	5120.64	I	30	17436.18	I	250	2593.70	II	290	2903.07	II
100	5128.45	II	50	18130.38	I	250	2602.80	II	80	2907.12	II
20	5137.94	I	40	19700.17	I	400	2616.78	I	600	2909.12	II
30	5210.82	III		22493.28	I	440	2629.85	I	1100	2911.92	II
20	5290.74	I	250	23253.07	I	330	2636.67	II	120	2918.83	II
5	5316.78	I		32148.06	I	720	2638.76	II	1300	2923.39	II
60	5354.05	I		36303.03	I	410	2640.99	I	140	2924.32	II
30	5384.63	I	<i>Molybdenum Mo Z = 42</i>			600	2644.35	II	1100	2930.50	II
1100	5460.74	I	50	867.92	IV	370	2646.49	II	800	2934.30	II
30	5549.63	I	100	884.19	IV	640	2649.46	I	95	2940.10	II
160	5675.86	I	60	886.05	IV	480	2653.35	II	110	2941.22	II
6	5695.71	III	50	891.74	IV	560 h	2655.03	I	150	2944.82	II
240	5769.60	I	100	1169.33	III	640	2660.58	II	140	2946.69	II
100	5789.66	I	100	1254.93	III	720	2672.84	II	95	2947.28	II
280	5790.66	I	100	1258.52	III	250	2673.27	II	125	2947.32	III
140	5803.78	I	100	1262.21	III	1000	2679.85	I	95	2955.84	II
60	5859.25	I	100	1263.74	III	95	2681.36	II	240	2956.06	II
60	5871.73	II	100	1274.37	III	640	2683.23	II	70	2956.90	II
20	5871.98	I	100	1276.40	III	880	2684.14	II	95	2960.24	II
20	6072.72	I	100	1277.40	III	560	2687.99	II	250	2963.79	II
1000	6149.50	II	200	1277.58	III	480	2701.42	II	210	2965.27	II
25	6220.35	III	200	1278.40	III	190	2713.51	II	70	2971.91	II
30	6234.40	I	150	1281.90	III	290	2717.35	II	250	2972.61	II
35	6418.98	III	150	1283.60	III	85	2726.97	II	80	2975.40	II
40	6501.38	III	100	1854.73	III	140	2729.68	II	95	2992.84	II
80	6521.13	II	80	1926.26	IV	80	2730.20	II	95	3027.77	II
10	6584.26	III	100	1929.24	IV	330	2732.88	II	100	3060.78	II
6	6610.12	III	80	1971.06	IV	160	2736.96	II	800	3064.28	I
30	6709.29	III	70	2010.92	IV	80 h	2737.88	II	250	3065.04	II
160	6716.43	I	19000	2015.11	II	290	2746.30	II	800	3074.37	I
250	6907.52	I	40000	2020.30	II	110	2756.07	II	85	3077.66	II
250	7081.90	I	21000	2038.44	II	220	2763.62	II	800	3085.62	I
200	7091.86	I	17000	2045.98	II	240	2769.76	II	270	3087.62	II
40	7346.37	II	50	2060.38	IV	160	2773.78	II	190	3092.07	II
100	7485.87	II	4800	2081.68	II	190	2774.39	II	560	3094.66	I
12	7517.46	III	2400	2089.52	II	1700	2775.40	II	560	3101.34	I
20	7728.82	I	2200	2092.50	II	65	2777.86	II	1400	3112.12	I
7	7808.10	III	4000	2093.11	II	880	2780.04	II	290	3122.00	II
100	7944.66	II	2700	2100.84	II	400	2784.99	II	14000	3132.59	I
25	7946.75	III	1500	2104.29	II	100	2807.74	III	110	3138.72	II
50	7984.51	III	1400	2108.02	II	400	2807.76	II	220	3152.82	II
5	8151.64	III	100	2184.37	III	1700	2816.15	II	55	3155.64	II
2000	10139.75	I	100	2211.02	III	220	2817.44	II	6000	3158.16	I
240	11287.40	I	400	2269.69	II	80	2827.74	II	8700	3170.35	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
95	3172.03	II	580	3886.82	I	65	5279.65	I	95	3007.97	II
160	3172.74	II	19000	3902.96	I	210	5280.86	I	95	3014.19	II
120 d	3187.59	II	65	3941.48	II	55	5292.08	I	95	3018.35	II
7600	3193.97	I	1400	4062.08	I	55	5295.47	I	140	3056.71	II
880	3205.88	I	2300	4069.88	I	55	5313.89	I	130	3069.73	II
3000	3208.83	I	1300	4081.44	I	80	5354.88	I	160	3075.38	II
560	3215.07	I	940	4084.38	I	65	5356.48	I	240	3092.92	II
880	3228.22	I	730	4107.47	I	560 hl	5360.56	I	260	3115.18	II
600	3229.79	I	630	4120.10	I	110 hl	5364.28	I	290	3133.60	II
1100	3233.14	I	2900	4143.55	I	65	5394.52	I	220	3134.90	II
950	3237.08	I	480	4185.82	I	50	5400.47	I	170	3141.46	II
65	3240.71	II	2500	4188.32	I	55	5435.68	I	170	3142.44	II
950	3256.21	I	1500	4232.59	I	65	5437.75	I	150	3203.47	II
480	3264.40	I	890	4276.91	I	50	5501.54	I	220	3259.24	II
800	3270.90	I	1200	4277.24	I	7800	5506.49	I	220	3265.12	II
200	3271.69	III	1400	4288.64	I	5200	5533.05	I	320	3275.22	II
1100	3289.02	I	680	4292.13	I	50	5543.12	I	290	3285.10	II
950	3290.82	I	890	4293.21	I	55	5556.28	I	410	3328.28	II
190	3292.31	II	840	4326.14	I	2500	5570.45	I	320	3353.59	II
100	3313.62	II	1900	4381.64	I	100	5610.93	I	410	3560.75	II
190	3320.90	II	2500	4411.57	I	330	5632.47	I	470	3587.51	II
640	3323.95	I	990	4434.95	I	50	5634.86	I	370	3615.82	II
1300	3344.75	I	480	4457.36	I	230	5650.13	I	410	3653.15	II
95	3346.40	II	630	4474.56	I	55	5674.47	I	470	3662.26	II
1600	3358.12	I	400	4536.80	I	460	5689.14	I	540	3665.18	II
950	3363.78	I	460	4626.47	I	80	5705.72	I	540	3672.36	II
950	3379.97	I	640	4707.26	I	210	5722.74	I	580	3673.54	II
1900	3384.62	I	700	4731.44	I	620	5751.40	I	1200	3685.80	II
130	3395.36	II	770	4760.19	I	520	5791.85	I	440	3687.30	II
640	3404.34	I	410	4819.25	I	55 h	5849.73	I	410	3689.69	II
1300	3405.94	I	410	4830.51	I	50 h	5851.52	I	410	3697.56	II
640	3437.22	I	180	5014.60	I	520	5858.27	I	470	3713.70	II
130	3446.08	II	80	5029.00	I	50	5869.33	I	640 d	3714.73	II
3200	3447.12	I	65	5030.78	I	820	5888.33	I	470	3715.68	II
640	3449.07	I	100	5047.71	I	50 h	5893.38	I	410	3718.54	II
950	3456.39	I	50	5055.00	I	160 h	5928.88	I	410	3721.35	II
640	3460.78	I	200	5059.88	I	35	6025.49	I	780	3723.50	II
800	3504.41	I	100	5080.02	I	1300	6030.66	I	410	3724.87	II
560	3508.12	I	100	5096.65	I	40	6101.87	I	710	3728.13	II
480	3521.41	I	130	5097.52	I	40	6357.22	I	470	3730.58	II
640	3537.28	I	130	5109.71	I	35	6401.07	I	1000 d	3735.54	II
520	3558.10	I	80	5114.97	I	100	6424.37	I	440	3737.10	II
400	3563.14	I	150	5145.38	I	230	6619.13	I	1000	3738.06	II
1400	3581.89	I	110	5147.39	I	50	6650.38	I	580	3752.49	II
1400	3624.46	I	80	5163.19	I	110	6733.98	I	510	3757.82	II
1000	3635.43	I	100	5167.76	I	50	6746.27	I	930	3758.95	II
400	3657.35	I	160 d	5171.08	I	35	6753.97	I	930	3763.47	II
540	3664.81	I	230 h	5172.94	I	40	6838.88	I	510	3769.65	II
590	3672.82	I	160 h	5174.18	I	35	6914.01	I	1400	3775.50	II
1300	3680.60	I	110	5200.17	I	110	7109.87	I	710	3779.47	II
65	3688.31	II	50	5200.74	I	150	7242.50	I	580	3780.40	II
180	3692.64	II	50	5211.86	I	40	7245.85	I	510	3781.32	II
1400	3694.94	I	80	5219.40	I	40	7391.36	I	2400	3784.25	II
500	3727.69	I	65	5231.06	I	140	7485.74	I	370	3801.12	II
80	3744.37	II	100	5234.26	I	27	7720.77	I	1200	3803.47	II
29000	3798.25	I	460 h	5238.20	I	40 h	8328.44	I	2500	3805.36	II
520	3826.70	I	230 h	5240.88	I	45 h	8389.32	I	470	3807.23	II
940	3828.87	I	110 h	5242.81	I	45 h	8483.39	I	540	3808.77	II
1700	3833.75	I	100	5245.51	I	<i>Neodymium Nd Z = 60</i>			440	3809.06	II
29000	3864.11	I	150	5259.04	I	75	2764.98	I	580	3810.49	II
580	3869.08	I	65	5261.14	I	80	2993.20	II	710	3814.73	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
410	3822.47	II	1000	4021.78	II	240	4719.02	I	20	7192.01	II
1200	3826.42	II	1200	4023.00	II	240	4811.34	II	15	7236.54	II
540	3828.85	II	410	4030.47	II	350	4825.48	II	12	7316.81	II
440	3829.16	II	1200	4031.82	II	280	4859.02	II	10	7406.62	II
510	3830.47	II	3000	4040.80	II	350	4883.81	I	10	7418.18	II
740	3836.54	II	410	4043.59	II	220	4890.70	II	12	7511.16	II
1700	3838.98	II	410	4048.81	II	240	4891.07	I	17	7513.73	II
410 d	3841.82	II	850	4051.15	II	280	4896.93	I	12	7528.99	II
1700 d	3848.24	II	850	4059.96	II	210	4901.84	I	10	7538.26	II
1500	3848.52	II	4700	4061.09	II	330	4920.68	II	12	7696.56	II
470	3850.22	II	1100	4069.28	II	470	4924.53	I	10	7750.95	II
2400 d	3851.66	II	710	4075.12	II	260	4944.83	I	10	7808.47	II
3700 d	3863.33	II	470	4075.28	II	290	4954.78	I	12	7863.04	II
850	3869.07	II	470	4080.23	II	290	4959.13	II	12	7917.01	II
470	3875.87	II	1400	4109.08	II	250	4989.94	II	12	7958.95	I
1100	3878.58	II	2500	4109.46	II	360	5076.59	II	12	7965.73	II
1000	3879.55	II	510	4110.48	II	360	5092.80	II	15	7982.09	II
780	3880.38	II	410	4123.88	II	360	5107.59	II	12	7982.68	II
1200	3880.78	II	470	4133.36	II	340	5123.79	II	12	8000.76	II
540	3887.87	II	510	4135.33	II	680	5130.60	II	10	8120.93	II
1300	3889.93	II	3000	4156.08	II	500	5191.45	II	12	8122.07	II
1300	3890.58	II	510	4156.26	II	630	5192.62	II	12	8141.75	II
1300	3890.94	II	410	4168.00	II	330	5200.12	II	12	8143.27	II
580	3891.51	II	810	4175.61	II	310	5212.37	II	10	8231.52	II
470	3892.06	II	2400	4177.32	II	450	5234.20	II	10	8307.72	II
810	3894.63	II	640	4179.59	II	250	5239.79	II	12	8346.36	II
440	3897.63	II	470	4205.60	II	720	5249.59	II	17	8839.10	II
2000	3900.21	II	470	4211.29	II	360	5255.51	II			
1300	3901.84	II	440	4227.73	II	590	5273.43	II	<i>Neon Ne Z = 10</i>		
1700	3905.89	II	1300	4232.38	II	680	5293.17	II	66	119.01	V
510	3907.84	II	2000	4247.38	II	220	5311.46	II	200	122.52	V
2000	3911.16	II	850	4252.44	II	500	5319.82	II	66	125.12	V
850	3912.23	II	410	4261.84	II	290	5361.47	II	45	131.99	V
440	3915.13	II	470	4282.44	II	160	5431.53	II	50	132.04	V
610	3915.95	II	710	4284.52	II	240	5594.43	II	150	140.76	V
1100	3920.96	II	5400	4303.58	II	220	5620.54	I	150	140.79	V
510	3927.10	II	470	4314.52	II	140 d	5675.97	I	100	142.44	V
610	3934.82	II	1100	4325.76	II	220	5688.53	II	100	142.50	V
410	3936.11	II	510	4327.93	II	130	5702.24	II	150	142.72	V
510	3938.86	II	540	4338.70	II	160	5708.28	II	100	143.27	V
2000	3941.51	II	680	4351.29	II	100	5729.29	I	150	143.34	V
2000	3951.16	II	850	4358.17	II	160	5804.02	II	150	147.13	V
810	3952.20	II	470 d	4374.93	II	80	5811.57	II	66	151.23	V
590	3958.00	II	710	4385.66	II	70	5825.87	II	120	151.42	V
510	3962.21	II	540	4400.83	II	80	5842.39	II	15	151.82	IV
1400	3963.12	II	510	4411.06	II	55	5858.91	I	15	152.23	IV
1100	3973.30	II	580	4446.39	II	45	6007.67	I	45	154.50	V
740	3973.69	II	1400	4451.57	II	45	6034.24	II	15	158.65	IV
740	3976.85	II	740	4462.99	II	55	6066.03	I	15	158.82	IV
740	3979.49	II	410	4501.82	II	45	6178.59	I	100	164.02	V
470	3986.25	II	250	4516.36	II	45	6223.39	I	100	164.14	V
1400	3990.10	II	340	4541.27	II	55	6310.49	I	80	172.62	IV
1000	3991.74	II	340	4542.61	II	65	6385.20	II	500	173.93	V
1100	3994.68	II	340	4563.22	II	45	6630.14	I	80	177.16	IV
410	4000.50	II	300	4621.94	I	45	6650.57	II	150	186.58	IV
540	4004.02	II	510	4634.24	I	40	6740.11	II	100	194.28	IV
410	4007.43	II	340	4641.10	I	40	6900.43	II	100	208.48	IV
3700	4012.25	II	250	4645.77	II	35	7037.30	II	100	208.73	IV
540	4012.70	II	300	4649.67	I	40	7066.89	II	80	208.90	IV
1000	4020.87	II	310	4683.45	I	29	7129.35	II	150	212.56	IV
1000	4021.34	II	470	4706.54	II	24	7189.42	II	140	223.24	IV
									120	223.60	IV

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
140	234.32	IV	100	542.07	IV	300	2216.07	III	150	2963.24	II
120	234.70	IV	150	543.89	IV	10	2220.81	IV	150	2967.18	II
20	251.14	III	400	568.42	V	75	2227.42	V	100	2973.10	II
20	251.56	III	250	569.76	V	110	2232.41	V	15	2974.72	I
20	251.73	III	500	569.83	V	65	2245.48	V	100	2979.46	II
40	267.06	III	250	572.11	V	250	2258.02	IV	12	2982.67	I
40	267.52	III	800	572.34	V	65	2259.57	V	150	3001.67	II
20	267.71	III	35	587.213	I	175	2262.08	IV	120 p	3017.31	II
40	283.18	III	35	589.179	I	240	2263.21	III	300	3027.02	II
160	283.21	III	35	589.911	I	65	2263.39	V	300	3028.86	II
110	283.69	III	70	591.830	I	110	2264.54	IV	100	3030.79	II
40	283.89	III	100	595.920	I	200	2264.91	III	120	3034.46	II
220	301.12	III	75	598.706	I	250	2265.71	V	100	3035.92	II
220	313.05	III	35	598.891	I	550	2285.79	IV	100	3037.72	II
220	313.68	III	70	600.036	I	30	2293.14	IV	100	3039.59	II
40	313.95	III	170	602.726	I	250	2293.49	IV	100	3044.09	II
90	352.956	I	170	615.628	I	250	2350.84	IV	100	3045.56	II
60	354.962	I	170	618.672	I	450	2352.52	IV	120	3047.56	II
50	357.83	IV	120	619.102	I	700	2357.96	IV	100	3054.34	II
400	357.96	V	200	626.823	I	250	2362.68	IV	100	3054.68	II
500	358.47	V	200	629.739	I	250	2363.28	IV	100	3059.11	II
200	358.72	IV	1000	735.896	I	110	2365.49	IV	100	3062.49	II
500	359.38	V	400	743.720	I	350	2372.16	IV	100	3063.30	II
90	361.433	II	60	993.88	I	65	2384.20	IV	100	3070.89	II
60	362.455	II	70	1068.65	I	350	2384.95	IV	100	3071.53	II
1000	365.59	V	90	1131.72	I	300	2412.73	III	100	3075.73	II
220	379.31	III	100	1131.85	II	240	2412.94	III	120	3088.17	II
125	387.14	IV	90	1229.83	I	200	2413.78	III	100	3092.09	II
100	388.22	IV	20	1255.03	III	200	2473.40	III	120	3092.90	II
150	405.854	II	110	1255.68	III	80 p	2562.12	II	100	3094.01	II
120	407.138	II	160	1257.19	III	90 w	2567.12	II	100	3095.10	II
800	416.20	V	90	1418.38	I	800	2590.04	III	100	3097.13	II
150	421.61	IV	90	1428.58	I	600	2593.60	III	100	3117.98	II
200	445.040	II	90	1436.09	I	400	2595.68	III	120	3118.16	II
300	446.256	II	120	1681.68	II	300	2610.03	III	10	3126.199	I
250	446.590	II	180	1688.36	II	240	2613.41	III	300	3141.33	II
180	447.815	II	100	1888.11	II	200	2615.87	III	100	3143.72	II
150	454.654	II	100	1889.71	II	80	2623.11	II	100 p	3148.68	II
200	455.274	II	200	1907.49	II	80	2629.89	II	100	3164.43	II
10	456.275	II	500	1916.08	II	90 w	2636.07	II	100	3165.65	II
120	456.348	II	300	1930.03	II	80	2638.29	II	100	3188.74	II
90	456.896	II	200	1938.83	II	200	2638.70	III	120	3194.58	II
1000	460.728	II	100 c	1945.46	II	200	2641.07	III	500	3198.59	II
500	462.391	II	80	2007.01	II	80	2644.10	II	60	3208.96	II
140	469.77	IV	65	2018.44	IV	600	2677.90	III	120	3209.36	II
200	469.82	IV	110	2022.19	IV	500	2678.64	III	120	3213.74	II
180	469.87	IV	80	2025.56	II	80	2762.92	II	150	3214.33	II
140	469.92	IV	150	2085.47	II	90	2792.02	II	150	3218.19	II
250	480.41	V	200	2086.96	III	80	2794.22	II	120	3224.82	II
150	481.28	V	300	2089.43	III	100	2809.48	II	120	3229.57	II
250	481.36	V	240	2092.44	III	80	2906.59	II	200	3230.07	II
500	482.99	V	400	2095.54	III	80	2906.82	II	120	3230.42	II
285	488.10	III	180	2096.11	II	90	2910.06	II	120	3232.02	II
220	488.87	III	120	2096.25	II	90	2910.41	II	150	3232.37	II
450	489.50	III	200	2161.22	III	80	2911.14	II	100	3243.40	II
70	489.64	III	300	2163.77	III	80	2915.12	II	100	3244.10	II
220	490.31	III	200	2180.89	III	80	2925.62	II	100	3248.34	II
360	491.05	III	30	2203.88	IV	80 w	2932.10	II	100	3250.36	II
120	521.74	IV	200	2209.35	III	80	2940.65	II	150	3297.73	II
140	521.82	IV	200	2211.85	III	90	2946.04	II	150	3309.74	II
80	541.13	IV	240	2213.76	III	150	2955.72	II	300	3319.72	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1000	3323.74	II	250	3727.11	II	100	6074.338	I	1000	8571.352	I
150	3327.15	II	800	3766.26	II	80	6096.163	I	4000	8591.259	I
100	3329.16	II	1000	3777.13	II	60	6128.450	I	6000	8634.647	I
200	3334.84	II	100	3818.43	II	100	6143.063	I	3000	8647.041	I
150	3344.40	II	120	3829.75	II	120	6163.594	I	15000	8654.383	I
300	3345.45	II	150	4219.74	II	250	6182.146	I	4000	8655.522	I
150	3345.83	II	100	4233.85	II	150	6217.281	I	100	8668.26	II
200	3355.02	II	120	4250.65	II	150	6266.495	I	5000	8679.492	I
120	3357.82	II	120	4369.86	II	60	6304.789	I	5000	8681.921	I
200	3360.60	II	70	4379.40	II	100	6334.428	I	2000	8704.112	I
120	3362.16	II	150	4379.55	II	120	6382.992	I	4000	8771.656	I
100	3362.71	II	100	4385.06	II	200	6402.246	I	12000	8780.621	I
120	3367.22	II	200	4391.99	II	150	6506.528	I	10000	8783.753	I
12	3369.808	I	150	4397.99	II	60	6532.882	I	500	8830.907	I
40	3369.908	I	150	4409.30	II	150	6598.953	I	7000	8853.867	I
100	3371.80	II	100	4413.22	II	70	6652.093	I	1000	8865.306	I
500	3378.22	II	100	4421.39	II	90	6678.276	I	1000	8865.755	I
150	3388.42	II	100 p	4428.52	II	20	6717.043	I	3000	8919.501	I
120	3388.94	II	100 p	4428.63	II	100	6929.467	I	2000	8988.57	I
300	3392.80	II	150 p	4430.90	II	90	7024.050	I	100	9079.46	II
100	3404.82	II	150 p	4430.94	II	100	7032.413	I	6000	9148.67	I
120	3406.95	II	120	4457.05	II	50	7051.292	I	6000	9201.76	I
100	3413.15	II	100	4522.72	II	80	7059.107	I	4000	9220.06	I
120	3416.91	II	10	4537.754	I	100	7173.938	I	2000	9221.58	I
120	3417.69	II	10	4540.380	I	150	7213.20	II	2000	9226.69	I
50	3417.904	I	100	4569.06	II	150	7235.19	II	1000	9275.52	I
15	3418.006	I	15	4704.395	I	100	7245.167	I	200	9287.56	II
120	3428.69	II	12	4708.862	I	150	7343.94	II	6000	9300.85	I
60	3447.703	I	10	4710.067	I	40	7472.439	I	1500	9310.58	I
50	3454.195	I	10	4712.066	I	90	7488.871	I	3000	9313.97	I
100	3456.61	II	15	4715.347	I	100	7492.10	II	6000	9326.51	I
100	3459.32	II	10	4752.732	I	150	7522.82	II	2000	9373.31	I
25	3460.524	I	12	4788.927	I	80	7535.774	I	5000	9425.38	I
30	3464.339	I	10	4790.22	I	60	7544.044	I	3000	9459.21	I
30	3466.579	I	10	4827.344	I	100	7724.628	I	5000	9486.68	I
60	3472.571	I	10	4884.917	I	120	7740.74	II	5000	9534.16	I
150	3479.52	II	4	5005.159	I	300	7839.055	I	3000	9547.40	I
200	3480.72	II	10	5037.751	I	120	7926.20	II	120	9577.01	II
200	3481.93	II	10	5144.938	I	400	7927.118	I	1000	9665.42	I
25	3498.064	I	25	5330.778	I	700	7936.996	I	100	9808.86	II
30	3501.216	I	20	5341.094	I	2000	7943.181	I	800	10295.42	I
25	3515.191	I	8	5343.283	I	2000	8082.458	I	2000	10562.41	I
150	3520.472	I	60	5400.562	I	100	8084.34	II	1500	10798.07	I
120	3542.85	II	5	5562.766	I	1000	8118.549	I	2000	10844.48	I
120	3557.80	II	10	5656.659	I	600	8128.911	I	3000	11143.020	I
100	3561.20	II	5	5719.225	I	3000	8136.406	I	3500	11177.528	I
250	3568.50	II	12	5748.298	I	2500	8259.379	I	1600	11390.434	I
100	3574.18	II	80	5764.419	I	100	8264.81	II	1100	11409.134	I
200	3574.61	II	12	5804.450	I	2500	8266.077	I	3000	11522.746	I
50	3593.526	I	40	5820.156	I	800	8267.117	I	1500	11525.020	I
30	3593.640	I	500	5852.488	I	6000	8300.326	I	950	11536.344	I
15	3600.169	I	100	5872.828	I	100	8315.00	II	500	11601.537	I
20	3633.665	I	100	5881.895	I	1500	8365.749	I	1200	11614.081	I
150	3643.93	II	60	5902.462	I	100	8372.11	II	300	11688.002	I
200	3664.07	II	60	5906.429	I	8000	8377.606	I	2000	11766.792	I
20	3682.243	I	100	5944.834	I	1000	8417.159	I	1500	11789.044	I
12	3685.736	I	100	5965.471	I	4000	8418.427	I	500	11789.889	I
200	3694.21	II	100	5974.627	I	1500	8463.358	I	1000	11984.912	I
10	3701.225	I	120	5975.534	I	800	8484.444	I	3000	12066.334	I
150	3709.62	II	80	5987.907	I	5000	8495.360	I	800	12459.389	I
250	3713.08	II	100	6029.997	I	600	8544.696	I	1000	12689.201	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1400	2313.66	I	530	3612.74	I	500 w	9900.92	II	100	2362.06	III
1400	2313.98	I	6600	3619.39	I				80	2362.50	III
1000	2316.04	II	200	3664.10	I	<i>Niobium Nb Z = 41</i>					
1400	2317.16	I	130	3669.24	I	80	464.55	V	80	2365.70	III
2600	2320.03	I	180	3670.43	I	80	468.32	V	100	2372.73	III
1900	2321.38	I	260	3674.15	I	80	763.77	V	170	2376.40	II
1400	2325.79	I	160	3688.42	I	80	774.02	V	110	2387.09	II
940	2329.96	I	80	3693.93	I	60	993.54	IV	100	2387.41	III
1200	2345.54	I	120	3722.48	I	400	1005.72	IV	140	2387.52	II
400	2347.52	I	150	3736.81	I	500	1007.05	IV	80	2388.23	III
1000	2375.42	II	60	3739.23	I	500	1010.19	IV	45	2388.27	II
240	2386.58	I	600	3775.57	I	100	1116.08	IV	160	2398.48	II
1000	2394.52	II	700	3783.53	I	150	1120.02	IV	80	2404.89	III
2000	2416.13	II	700	3807.14	I	100	1258.87	V	55	2405.34	II
240	2419.31	I	110	3831.69	I	100	1258.87	V	55	2405.85	II
160	2472.06	I	1200	3858.30	I	60	1314.56	III	140	2412.46	II
150	2798.65	I	110	3973.56	I	80	1445.43	III	100	2413.94	III
250	2821.29	I	110	4401.55	I	80	1445.98	III	160	2416.99	II
500	2943.91	I	85	4459.04	I	80	1447.09	III	140	2418.69	II
570	2981.65	I	55	4470.48	I	100	1456.68	III	100	2421.91	III
500	2992.60	I	65	4605.00	I	80	1484.73	III	75	2433.80	II
1000	2994.46	I	75	4648.66	I	100	1495.94	III	40	2435.95	II
4000	3002.49	I	110	4714.42	I	80	1498.02	III	45	2437.42	II
2200	3003.63	I	45	4786.54	I	80	1499.45	III	40	2442.14	II
3700	3012.00	I	45	4855.41	I	100	1501.99	III	28	2442.68	II
1700	3037.94	I	40	4904.41	I	60	1502.30	IV	65	2451.87	II
3500	3050.82	I	40	4904.41	I	80	1513.81	III	65	2453.95	II
1500	3054.32	I	45	4980.16	I	60	1524.36	IV	100	2456.99	III
1900	3057.64	I	45	4984.13	I	100	1524.91	III	55	2458.09	II
500	3064.62	I	50	5017.59	I	100	1590.21	III	65	2462.89	I
2600	3101.55	I	100	5035.37	I	80	1598.86	III	80	2468.72	III
1300	3101.88	I	100	5080.52	I	80	1604.72	III	80	2475.87	III
2900	3134.11	I	65	5081.11	I	80	1639.51	III	110	2477.38	II
1100	3232.96	I	40 h	5146.48	I	100	1682.77	III	65	2478.29	II
600	3243.06	I	40 h	5155.76	I	100	1705.44	III	65	2479.94	II
660	3315.66	I	180	5476.91	I	100	1707.14	III	35	2483.88	II
2000	3331.88	II	23	5709.56	I	100	1758.33	V	100	2499.73	III
2900	3369.57	I	16	5754.68	I	100	1877.34	V	110	2511.00	II
3300	3380.57	I	10	5857.76	I	100	1892.92	III	110	2521.40	II
1300	3391.05	I	10	5892.88	I	60	1922.41	IV	390	2544.80	II
3300	3392.99	I	10	6108.12	I	100	1938.84	III	100	2545.64	III
8200	3414.76	I	10	6176.81	I	60	1978.22	IV	110	2551.38	II
1600	3423.71	I	10	6191.18	I	3300	2029.32	II	130	2556.94	II
2600	3433.56	I	13	6256.36	I	65	2032.53	IV	80	2557.94	III
990	3437.28	I	16	6643.64	I	3000	2032.99	II	130	2562.41	II
4800	3446.26	I	22	6767.77	I	2000	2109.42	II	110	2571.33	II
1300	3452.89	I	10	6914.56	I	1700	2125.21	II	390	2583.99	II
5000	3458.47	I	26	7122.20	I	1100	2126.54	II	390	2590.94	II
5000	3461.65	I	16	7393.60	I	80 h	2130.24	III	80	2598.86	III
1600	3472.54	I	16	7409.35	I	1500	2131.18	II	80	2633.17	III
550	3483.77	I	23	7422.28	I	80	2273.92	III	200	2642.24	II
5500	3492.96	I	13	7522.76	I	100	2275.23	III	320	2646.26	II
660	3500.85	I	19	7555.60	I	80	2279.36	III	330	2647.50	I
2600	3510.34	I	23	7617.00	I	100	2281.51	III	330	2654.45	I
6600	3515.05	I	16	7714.32	I	80	2284.40	III	310	2656.08	II
660	3519.77	I	19	7727.61	I	100	2290.36	III	80	2657.99	III
8200	3524.54	I	19	7748.89	I	370	2295.68	II	110	2665.25	II
5000	3566.37	I	10	7788.94	I	280	2302.08	II	110	2666.59	II
990	3571.87	I	13	7797.59	I	100	2313.30	III	110	2667.30	II
1300	3597.70	I	1000	8096.75	II	100	2338.09	III	400	2671.93	II
1300	3610.46	I	700	8121.48	II	80	2344.12	III	200	2673.57	II
			9	8862.55	I	90	2349.21	III	200	2675.94	II
						80	2355.54	III			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
160	2691.77	II	80	3142.26	III	500	3584.97	I	350	4143.21	I
1000	2697.06	II	390	3145.40	II	750	3589.11	I	870	4150.12	I
320	2698.86	II	1200	3163.40	II	500	3589.36	I	4400	4152.58	I
320	2702.20	II	150	3175.78	II	500	3593.97	I	870	4163.47	I
150	2702.52	II	390	3180.29	II	500	3602.56	I	4400	4163.66	I
470	2716.62	II	300	3191.10	II	300	3619.51	II	4000	4164.66	I
470	2721.98	II	150	3191.43	II	420	3649.85	I	3500	4168.13	I
310	2733.26	II	1000	3194.98	II	400	3651.19	II	310	4184.44	I
110	2737.09	II	120	3203.35	II	200	3659.61	II	1200	4190.88	I
240	2768.13	II	300	3206.34	II	630	3660.37	I	870	4192.07	I
310	2773.20	I	390	3215.60	II	900	3664.70	I	870	4195.09	I
270	2780.24	II	800	3225.48	II	1500	3697.85	I	1300	4195.66	I
110	2793.05	II	140	3229.56	II	330	3711.34	I	310	4198.51	I
190	2827.08	II	400	3236.40	II	3300	3713.01	I	350	4201.52	I
250	2841.15	II	200	3247.47	II	480	3716.99	I	870	4205.31	I
280	2842.65	II	120	3248.94	II	2700	3726.24	I	350	4214.73	I
160	2846.28	II	320	3254.07	II	2700	3739.80	I	420	4217.94	I
240	2861.09	II	230	3260.56	II	670	3740.73	II	420	4229.15	I
100	2865.61	II	160	3263.37	II	1700	3742.39	I	770	4262.05	I
500	2868.52	II	200	3283.46	II	530	3763.49	I	420	4266.02	I
800	2875.39	II	160	3292.02	II	350	3765.08	I	400	4286.99	I
270	2876.95	II	320	3296.01	I	530	3771.85	I	580	4299.60	I
530	2877.03	II	400	3312.60	I	870	3781.01	I	580	4300.99	I
100	2880.72	II	120	3319.58	II	1700	3787.06	I	390	4311.27	I
570	2883.18	II	130	3341.60	II	1300	3790.15	I	350	4326.33	I
280	2888.83	II	1300	3341.97	I	3500	3791.21	I	390	4331.37	I
470	2897.81	II	1300	3343.71	I	2700	3798.12	I	330	4410.21	I
400	2899.24	II	1700	3349.06	I	2700	3802.92	I	150	4503.04	I
470	2908.24	II	420	3349.52	I	670	3803.88	I	530	4523.41	I
670	2910.59	II	340	3354.74	I	530	3804.74	I	480	4546.82	I
470	2911.74	II	1700	3358.42	I	670	3810.49	I	370	4564.53	I
1100	2927.81	II	130	3365.58	II	530	3811.03	I	720	4573.08	I
110	2931.47	II	340	3366.96	I	530	3815.51	I	480	4581.62	I
870	2941.54	II	130	3369.16	II	210	3818.86	II	1200	4606.77	I
110 h	2945.88	II	350	3374.92	I	670	3824.88	I	170	4616.17	I
110	2946.12	II	170	3386.24	II	350	3835.18	I	450	4630.11	I
110	2946.90	II	350	3392.34	I	350	3863.38	I	450	4648.95	I
1100	2950.88	II	230	3408.68	II	530	3877.56	I	450	4663.83	I
400	2972.57	II	180	3409.19	II	870	3878.82	I	340	4666.24	I
320	2974.10	II	230	3412.94	II	670	3883.14	I	240	4667.22	I
210	2977.68	II	230	3425.42	II	1100	3885.44	I	580	4672.09	I
200	2982.11	II	230	3426.57	II	670	3885.68	I	530	4675.37	I
330	2990.26	II	180	3432.70	II	580	3891.30	I	320	4685.14	I
470	2994.73	II	180	3440.59	II	670	3914.70	I	130 c	4706.14	I
80	3001.84	III	200	3479.56	II	530	3920.20	I	260	4708.29	I
140	3024.74	II	100	3484.05	II	670	3937.44	I	150	4713.50	I
350	3028.44	II	500	3498.63	I	520	3943.67	I	220 c	4749.70	I
300	3032.77	II	460	3507.96	I	910 d	3966.09	I	130 c	4967.78	I
100	3044.76	II	200	3510.26	II	1100	4032.52	I	190	4988.97	I
100	3055.52	II	200	3515.42	II	16000 c	4058.94	I	230	5017.75	I
220	3064.53	II	200	3517.67	II	350	4060.79	I	150	5026.36	I
110	3069.68	II	2000	3535.30	I	12000	4079.73	I	210	5039.04	I
100	3070.90	II	1300	3537.48	I	440	4100.40	I	170	5058.01	I
110	3071.56	II	250	3540.96	II	6700	4100.92	I	130	5065.25	I
100	3073.24	II	500	3544.02	I	310	4116.90	I	750	5078.96	I
400	3076.87	II	300	3550.45	I	5300	4123.81	I	420	5095.30	I
110	3080.35	II	1000	3554.66	I	670	4129.43	I	170	5100.16	I
1800	3094.18	II	630	3563.50	I	770	4129.93	I	170	5120.30	I
140	3099.19	II	630	3563.62	I	2300	4137.10	I	210	5134.75	I
270	3127.53	II	1500	3575.85	I	440	4139.44	I	250	5160.33	I
1500	3130.79	II	5000	3580.27	I	2700	4139.71	I	250	5164.38	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
150	1919.55	III	360	3919.00	II	185	5281.20	I	450	7762.24	II
150	1919.77	III	90	3938.52	III	140	5292.68	I	400	8184.87	I
300	1920.65	III	450	3955.85	II	90	5314.35	III	400	8188.02	I
150	1920.84	III	1000	3995.00	II	200	5320.82	III	250	8200.36	I
200	1921.30	III	150	3998.63	III	150	5327.18	III	300	8210.72	I
200	2064.01	III	200	4003.58	III	450	5495.67	II	570	8216.34	I
250	2064.42	III	360	4035.08	II	285	5535.36	II	400	8223.14	I
120	2068.68	III	550	4041.31	II	650	5666.63	II	400	8242.39	I
90	2071.09	III	360	4043.53	II	550	5676.02	II	550	8438.74	II
90	2080.34	IV	150	4057.76	IV	870	5679.56	II	500	8567.74	I
160	2095.53	II	250	4097.33	III	450	5686.21	II	570	8594.00	I
70	2096.20	II	140	4099.94	I	450	5710.77	II	650	8629.24	I
110	2096.86	II	200	4103.43	III	285	5747.30	II	500	8655.89	I
90	2117.59	III	185	4109.95	I	700	5752.50	I	220	8676.08	II
90	2121.50	III	285	4176.16	II	240	5764.75	I	700	8680.28	I
110	2130.18	II	120	4195.76	III	265	5829.54	I	650	8683.40	I
160	2142.78	II	150	4200.10	III	235	5854.04	I	500	8686.15	I
90	2147.31	III	285	4227.74	II	360	5927.81	II	110	8687.43	II
200	2188.20	III	285	4236.91	II	550	5931.78	II	110 h	8699.00	II
150	2188.38	III	220	4237.05	II	285	5940.24	II	500	8703.25	I
160	2206.09	II	450	4241.78	II	650	5941.65	II	160 h	8710.54	II
160	2286.69	II	90	4332.91	III	285	5952.39	II	570	8711.70	I
110	2288.44	II	120	4345.68	III	160	5999.43	I	500	8718.83	I
220	2316.49	II	300	4379.11	III	210	6008.47	I	250	8728.89	I
160	2316.69	II	285	4432.74	II	285	6167.76	II	200	8747.36	I
285	2317.05	II	650	4447.03	II	360	6379.62	II	500	9386.80	I
90 w	2318.09	IV	90	4510.91	III	150	6380.77	IV	570	9392.79	I
160	2461.27	II	120	4514.86	III	185	6411.65	I	250	9460.68	I
150	2477.69	IV	360	4530.41	II	210	6420.64	I	200	9863.33	I
110	2496.83	II	550	4601.48	II	210	6423.02	I	160 h	9865.41	II
70	2496.97	II	350	4603.73	V	210	6428.32	I	110 h	9868.21	II
110	2520.22	II	90	4606.33	IV	185	6437.68	I	160 h	9887.39	II
160	2520.79	II	450	4607.16	II	235	6440.94	I	220 h	9891.09	II
220	2522.23	II	360	4613.87	II	90	6454.11	III	160 h	9961.86	II
110	2590.94	II	250	4619.98	V	185	6457.90	I	220 h	9969.34	II
250	2645.65	IV	450	4621.39	II	120	6467.02	III	285 h	10023.27	II
300	2646.18	IV	870	4630.54	II	300	6468.44	I	220 h	10035.45	II
350	2646.96	IV	90	4634.14	III	265	6481.71	I	220 h	10065.15	II
250 w	2682.18	III	120	4640.64	III	750	6482.05	II	160 h	10070.12	II
90	2689.20	III	550	4643.08	II	360	6482.70	I	250	10105.13	I
160	2709.84	II	285	4788.13	II	300	6483.75	I	300	10108.89	I
110	2799.22	II	450	4803.29	II	325	6484.80	I	350	10112.48	I
110	2823.64	II	180	4847.38	I	160	6491.22	I	400	10114.64	I
60 l	2859.16	V	90	4858.82	III	210	6499.54	I	110 h	10126.27	II
160	2885.27	II	150	4867.15	III	185	6506.31	I	250	10539.57	I
90 l	2974.52	V	285	4895.11	II	750	6610.56	II	200	12074.51	I
150 w	2980.78	V	160	4914.94	I	185	6622.54	I	380	12186.82	I
250 w	2981.31	V	210	4935.12	I	185	6636.94	I	225	12288.97	I
60 w	2998.43	V	200 w	4944.56	V	235	6644.96	I	290	12328.76	I
220	3006.83	II	160	4950.23	I	185	6646.50	I	310	12381.65	I
90	3078.25	IV	350	4963.98	I	235	6653.46	I	180	12438.40	I
120	3367.34	III	285	4987.37	II	210	6656.51	I	510	12461.25	I
360	3437.15	II	450	4994.36	II	185	6722.62	I	920	12469.62	I
90	3463.37	IV	650	5001.48	II	210	7398.64	I	500	13429.61	I
570	3478.71	IV	360	5002.70	II	160	7406.12	I	840	13581.33	I
500	3482.99	IV	870	5005.15	II	265	7406.24	I	180	13587.73	I
400	3484.96	IV	550	5007.32	II	685	7423.64	I	180	13602.27	I
90	3747.54	IV	450	5010.62	II	785	7442.29	I	290	13624.18	I
90	3754.67	III	360	5016.39	II	900	7468.31	I	250	14757.07	I
120	3771.05	III	360	5025.66	II	185	7608.80	I	100	14868.87	I
285	3838.37	II	550	5045.10	II	60 w	7618.46	V	160	14966.60	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
180	15582.27	I	960	2770.71	I	35	5203.23	I	150	202.393	V
120 s	17516.58	I	2800	2806.91	I	45	5255.82	I	110	203.78	V
100 l	17584.86	I	5100	2838.63	I	55	5265.15	I	150	203.82	V
100	17878.26	I	2300	2844.40	I	40	5298.78	I	100	203.85	V
<i>Osmium Os Z = 76</i>			1500	2850.76	I	110	5376.79	I	200	203.89	V
9600	2001.45	I	1500	2860.96	I	120	5416.34	I	100	203.94	V
13000	2003.73	I	9600	2909.06	I	45	5416.69	I	110	207.18	IV
17000	2010.15	I	2100	2912.33	I	28	5417.51	I	150	207.24	IV
29000	2018.14	I	2100	2919.79	I	55	5443.31	I	300	207.794	V
14000	2022.76	I	1100 h	2948.23	I	22	5446.93	I	150	215.040	V
14000	2028.23	I	1400	2949.53	I	22	5457.30	I	200	215.103	V
18000	2034.44	I	4400	3018.04	I	28	5470.00	I	250	215.245	V
26000	2045.36	I	1100	3030.70	I	22	5509.33	I	250	216.018	V
8600	2058.69	I	2900	3040.90	I	270	5523.53	I	520	220.352	V
13000	2061.69	I	120	3042.74	II	22	5546.82	I	80	227.372	V
7800	2067.21	II	8600	3058.66	I	80	5584.44	I	80	227.469	V
4200	2070.67	II	1100	3077.72	I	35	5620.08	I	150	227.511	V
7200	2076.95	I	3100	3156.25	I	22	5642.56	I	80	227.549	V
14000	2079.97	I	180	3173.93	II	28	5645.25	I	80	227.634	V
2900	2082.54	I	150	3213.31	II	28	5680.88	I	80	227.689	V
2900	2089.03	I	1900	3232.06	I	170	5721.93	I	150	231.823	V
2900	2089.21	I	3100	3262.29	I	22	5765.05	I	140	233.46	IV
6000	2097.60	I	3100	3267.94	I	170	5780.82	I	150	233.50	IV
5300	2100.63	I	1200	3290.26	I	40	5800.60	I	110	233.52	IV
2100	2117.66	I	7600	3301.56	I	110	5857.76	I	200	233.56	IV
4800	2117.96	I	960	3336.15	I	28	5860.64	I	110	233.60	IV
5300	2137.11	I	960	3370.59	I	65	5996.00	I	90	238.36	IV
2600	2154.59	I	620	3387.84	I	35	6227.70	I	180	238.57	IV
1300	2157.84	I	620	3401.86	I	22	6269.41	I	110	248.459	V
1200	2158.53	I	620	3504.66	I	22	6403.15	I	110	252.56	IV
3100	2166.90	I	1200	3528.60	I	27	6729.56	I	110	252.95	IV
1100	2167.75	I	1200	3560.86	I	22	7145.54	I	150	253.08	IV
2100	2171.65	I	620	3598.11	I	26	7602.95	I	300	260.39	IV
1100	2234.61	I	95	3604.48	II	7	8041.29	I	250	260.56	IV
1300	2252.15	I	480	3670.89	I	<i>Oxygen O Z = 8</i>					
2000	2255.85	II	3700	3752.52	I	80	124.616	V	80 d	264.34	III
1400	2264.60	I	2100	3782.20	I	110	135.523	V	110	264.48	III
1400	2282.26	II	730	3876.77	I	80	138.109	V	110	266.97	III
500	2367.35	II	1000	3963.63	I	110	139.029	V	150	266.98	III
2600	2377.03	I	730	3977.23	I	80	151.447	V	150	267.03	III
1700	2387.29	I	960	4066.69	I	110	151.477	V	150	277.38	III
1100	2395.88	I	1200	4112.02	I	150	151.546	V	300	279.63	IV
200	2423.07	II	2500	4135.78	I	80	164.574	V	375	279.94	IV
1400	2424.97	I	1200	4173.23	I	110	164.657	V	110	285.71	IV
110	2454.91	II	1200	4211.86	I	80	164.709	V	150	285.84	IV
1800	2461.42	I	4900	4260.85	I	80	166.235	V	110	286.448	V
110	2468.90	II	560	4293.95	I	150	167.99	V	80	295.62	III
530	2486.24	II	560	4311.40	I	110	170.219	V	110	295.66	III
4500	2488.55	I	4900	4420.47	I	450	172.169	V	120	295.72	III
2600	2498.41	I	540	4550.41	I	250	185.745	V	150	303.41	III
2400	2513.25	I	670	4793.99	I	375	192.751	V	150	303.46	III
780	2538.00	II	55	5031.83	I	450	192.799	V	140	303.52	III
1000	2542.51	I	45	5039.12	I	520	192.906	V	160	303.62	III
1000	2590.76	I	35	5072.88	I	80	193.003	V	160	303.69	III
1800	2613.06	I	35	5074.77	I	200	194.593	V	250	303.80	III
3800	2637.13	I	35	5079.09	I	150	195.86	IV	200	305.60	III
1900	2644.11	I	90	5103.50	I	200	196.01	IV	250	305.66	III
1900	2658.60	I	55	5110.81	I	80	202.161	V	190	305.70	III
2100	2689.82	I	140	5149.74	I	80	202.224	V	300	305.77	III
3000	2714.64	I	40	5193.52	I	80	202.283	V	190	305.84	III
1300	2720.04	I	270	5202.63	I	80	202.334	V	200	306.62	IV
									150	306.88	IV

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
450	320.979	III	775	760.445	V	220	1763.22	III	775	2789.85	V
300	328.45	III	640	761.128	V	220	1764.48	III	160	2836.26	IV
250	328.74	III	700	762.003	V	750	1767.78	III	160	2921.45	IV
300	345.31	III	70	770.793	I	550	1768.24	III	200	2941.33	V
110	355.14	III	90	771.056	I	360	1771.67	III	210	2941.65	V
90	355.33	III	520	774.518	V	110	1773.00	III	80	2959.68	III
80	355.47	III	70	775.321	I	110	1773.85	III	265	2972.29	I
200	359.02	III	200	779.734	IV	220	1779.16	III	250	2983.78	III
190	359.22	III	315	779.821	IV	160	1781.03	III	80	3017.63	III
150	359.38	III	360	779.912	IV	160	1784.85	III	80	3023.45	III
210	373.80	III	200	779.997	IV	220	1789.66	III	80	3043.02	III
200	374.00	III	640	787.711	IV	110	1848.26	III	200	3047.13	III
300	374.08	III	520	790.109	IV	110	1856.62	III	110	3059.30	III
190	374.16	III	700	790.199	IV	285	1872.78	III	460	3063.42	IV
200	374.33	III	70	791.973	I	285	1872.87	III	410	3071.61	IV
210	374.44	III	300	796.66	II	285	1874.94	III	80	3121.71	III
450	395.558	III	200	802.200	IV	160	1920.04	III	160	3122.62	II
300	434.98	III	160	802.255	IV	110	1920.75	III	220	3129.44	II
800	507.391	III	90	804.267	I	110	1921.52	III	110	3132.86	III
900	507.683	III	70	804.848	I	220	1923.49	III	450	3134.82	II
1000	508.182	III	70	805.295	I	110	1923.82	III	285	3138.44	II
1000	525.795	III	80	805.810	I	110	1926.94	III	160	3144.66	V
250	537.83	II	240	832.762	II	360	2013.27	III	160	3209.66	IV
300	538.26	II	600	832.927	III	160	2026.96	III	80	3238.57	III
220	539.09	II	450	833.332	II	220	2045.67	III	200	3260.98	III
200	539.55	II	780	833.742	III	160	2052.74	III	300	3265.46	III
150	539.85	II	600	834.467	II	30 d	2283.42	II	80	3267.31	III
700	553.330	IV	600	835.096	III	30 d	2284.89	II	220	3270.98	II
775	554.075	IV	800	835.292	III	110	2293.32	II	220	3273.52	II
850	554.514	IV	40	877.879	I	200	2300.35	II	220	3277.69	II
700	555.261	IV	130	921.296	IV	30 d	2313.05	II	360	3287.59	II
700	597.818	III	160	921.366	IV	30 d	2316.12	II	160	3305.15	II
1000	599.598	III	80	922.008	I	30 d	2316.79	II	160	3306.60	II
580	608.398	IV	200	923.367	IV	50 d	2319.68	II	80	3312.30	III
110	609.70	III	130	923.433	IV	30 d	2322.15	II	110	3340.74	III
640	609.829	IV	90	935.193	I	30 d	2339.31	II	230	3348.08	IV
160	610.04	III	40	948.686	I	200 d	2390.44	III	270	3349.11	IV
200	610.75	III	90	971.738	I	80	2394.33	III	160	3354.27	IV
100	610.85	III	40	976.448	I	110	2411.60	II	200	3375.40	IV
270	616.952	IV	160	988.773	I	80	2422.84	III	220	3377.20	II
150	617.005	IV	40	990.204	I	80	2425.55	II	130	3378.06	IV
200	617.036	IV	250	1025.762	I	250	2433.56	II	360	3381.20	IV
520	624.617	IV	90	1027.431	I	80 d	2436.06	II	360	3385.52	IV
580	625.130	IV	160	1039.230	I	80 d	2438.83	III	285	3390.25	II
640	625.852	IV	60	1040.942	I	80	2444.26	II	270	3396.79	IV
1000	629.730	V	40	1152.152	I	300	2445.55	II	360	3403.52	IV
150	644.148	II	900	1302.168	I	200	2449.372	IV	220	3407.38	II
200	672.95	II	600	1304.858	I	200	2450.040	IV	230	3409.66	IV
150	673.77	II	300	1306.029	I	200	2454.99	III	160	3409.84	II
230	681.272	V	200	1338.612	IV	200	2493.44	IV	410	3411.69	IV
70	685.544	I	130	1342.992	IV	200	2493.77	IV	230	3413.64	IV
800	702.332	III	230	1343.512	IV	200	2507.73	IV	80	3444.10	III
800	702.822	III	640	1371.292	V	230	2509.19	IV	80	3455.12	III
900	702.899	III	160	1476.89	III	200	2517.2	IV	285	3470.81	II
1000	703.850	III	160 w	1506.72	V	200	2558.06	III	200	3489.83	IV
900	718.484	II	285	1590.01	III	80	2687.53	III	160	3492.24	IV
600	718.562	II	160	1591.33	III	110	2695.49	III	230	3560.39	IV
70	744.794	I	315 w	1643.68	V	300	2733.34	II	270	3563.33	IV
700	758.678	V	160	1707.996	V	110	2747.46	II	80	3698.70	III
640	759.441	V	220	1760.12	III	1000	2781.01	V	80	3702.75	III
580	760.228	V	110	1760.42	III	920	2786.99	V	80	3703.37	III

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
110	3707.24	III	50	4469.41	II	235	7947.55	I	540	11297.68	I
220	3712.75	II	360	4590.97	II	210	7950.80	I	590	11302.38	I
110	3715.08	III	285	4596.17	II	185	7952.16	I	265	11358.69	I
315 w	3725.93	IV	80 d	4609.39	II	110	7981.94	I	490	12464.02	I
285	3727.33	II	160	4638.85	II	135	7982.40	I	450	12570.04	I
360	3729.03	IV	360	4641.81	II	190	7986.98	I	120	12990.77	I
410	3736.85	IV	450	4649.14	II	135	7987.33	I	160	13076.91	I
160	3739.92	II	160	4650.84	II	250	7995.07	I	700	13163.89	I
110	3744.00	III	360	4661.64	II	400	8221.82	I	750	13164.85	I
230	3744.89	IV	285	4676.23	II	265	8227.65	I	640	13165.11	I
360	3749.49	II	220	4699.21	II	265	8230.02	I	160	16212.06	I
150	3754.67	III	285	4705.36	II	325	8233.00	I	120	17966.70	I
80	3757.21	III	160	4924.60	II	120	8235.35	I	590	18021.21	I
250	3759.87	III	230 w	4930.27	V	120	8426.16	I	120	18041.48	I
110	3791.26	III	220	4943.06	II	810	8446.25	I	120	18042.19	I
160	3803.14	II	135	5329.10	I	1000	8446.36	I	120	18046.23	I
120	3823.41	I	160	5329.68	I	935	8446.76	I	140	18229.23	I
450	3911.96	II	190	5330.74	I	325	8820.43	I	540	18243.63	I
160	3919.29	II	90	5435.18	I	160 d	9057.01	I	140	26173.56	I
185	3947.29	I	110	5435.78	I	120	9118.29	I	<i>Palladium Pd Z = 46</i>		
160	3947.48	I	135	5436.86	I	80	9134.71	I	200	705.49	III
140	3947.59	I	120	5577.34	I	80	9150.14	I	200	727.72	III
220	3954.37	II	110	5592.37	III	80	9151.48	I	500	763.06	III
100	3954.61	I	130	5597.91	V	235	9156.01	I	500	766.42	III
200	3961.59	III	160	5958.39	I	450	9260.81	I	2000	781.02	III
450	3973.26	II	190	5958.58	I	490	9260.84	I	500	794.08	III
220	3982.20	II	80	5995.28	I	450	9260.94	I	500	797.52	III
160	4069.90	II	160	6046.23	I	400	9262.58	I	500	800.03	III
285	4072.16	II	190	6046.44	I	540	9262.67	I	500	800.10	III
450	4075.87	II	110	6046.49	I	590	9262.77	I	500	803.67	III
80 d	4083.91	II	100	6106.27	I	490	9265.94	I	500	825.35	III
50 d	4087.14	II	400	6155.98	I	640	9266.01	I	500	840.58	III
150 d	4089.27	II	450	6156.77	I	185	9399.19	I	500	856.47	III
110	4097.24	II	490	6158.18	I	120	9481.16	I	500	864.04	III
220	4105.00	II	80	6256.83	I	120 d	9482.88	I	500	880.59	III
285	4119.22	II	100	6261.55	I	235	9487.43	I	500	888.84	III
100	4123.99	V	100	6366.34	I	140	9492.71	I	1000	889.29	III
160	4132.81	II	100	6374.32	I	265	9497.97	I	300	1596.89	III
50	4146.06	II	320	6453.60	I	160	9499.30	I	500	1741.62	III
220	4153.30	II	360	6454.44	I	235	9505.59	I	4000	1782.55	III
285	4185.46	II	400	6455.98	I	210	9521.96	I	400	1843.49	III
450	4189.79	II	130	6500.24	V	120	9523.36	I	1500	1851.59	III
80	4233.27	I	80	6604.91	I	120	9523.96	I	2000	1852.27	III
50 d	4253.74	II	100	6653.83	I	100	9528.28	I	1000	1859.21	III
50 d	4253.98	II	360	7001.92	I	100	9622.13	I	1500	1874.63	III
50 d	4275.47	II	450	7002.23	I	120	9625.29	I	2000	1885.83	III
50 d	4303.78	II	210	7156.70	I	160	9677.38	I	1000	1887.40	III
285	4317.14	II	400	7254.15	I	80	9694.66	I	1500	1891.34	III
160	4336.86	II	450	7254.45	I	65	9694.91	I	4000	1914.62	III
220	4345.56	II	320	7254.53	I	235	9741.50	I	1000	1930.33	III
285	4349.43	II	210	7476.44	I	235	9760.65	I	2000	1941.64	III
220	4366.90	II	100	7477.24	I	120	9909.05	I	800	2002.16	III
100	4368.25	I	120	7479.08	I	140	9936.98	I	1000	2004.47	III
220	4395.95	II	120	7480.67	I	120	9940.41	I	500	2055.11	III
450	4414.91	II	100	7706.75	I	160	9995.31	I	500	2149.82	III
285	4416.98	II	870	7771.94	I	120 d	10421.18	I	500	2177.55	III
160	4448.21	II	810	7774.17	I	590	11286.34	I	500	2177.63	III
160	4452.38	II	750	7775.39	I	640	11286.91	I	100 r	2231.59	II
50	4465.45	II	80	7886.27	I	490	11287.02	I	200 r	2296.53	II
50 d	4466.28	II	100	7943.15	I	490	11287.32	I	100	2426.87	II
50	4467.83	II	100	7947.17	I	490	11295.10	I	100	2430.94	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	2433.11	II	45	7915.80	I	25	1379.429	I	700	3175.09	V
100	2435.32	II	55	8132.82	I	25	1381.469	I	520	3204.04	V
150	2446.17	II	45	8300.83	I	15	1381.637	I	300	3219.307	III
1100	2447.91	I	65	8761.35	I	500	1484.507	IV	400	3233.602	III
100	2457.29	II	<i>Phosphorus P Z = 15</i>			400	1487.788	IV	650	3347.736	IV
150	2469.29	II	250	328.78	V	350	1502.228	III	570	3364.467	IV
100	2471.18	II	150	359.899	IV	80	1532.51	II	400	3371.122	IV
1700	2476.42	I	500	388.318	IV	120	1535.90	II	300	3957.641	III
250	2486.52	II	250	389.50	V	450	1610.50	V	350	3978.307	III
300	2488.92	II	300	390.70	V	150	1618.632	III	400	4059.312	III
200	2498.81	II	300	445.158	IV	200	1618.907	III	300	4080.084	III
150	2505.73	II	375	475.60	V	140	1671.070	I	500	4222.195	III
150	2551.84	II	120	498.180	III	100	1671.510	I	350	4246.720	III
150	2565.51	II	520	542.57	V	180	1671.680	I	400	4420.71	II
100	2569.56	II	600	544.92	V	140	1672.035	I	250	4479.776	III
150	2658.75	II	200	569.853	III	140	1672.474	I	250	4540.288	IV
1900	2763.09	I	200	581.831	III	600	1674.591	I	250	4541.112	IV
150 h	2776.85	II	350	629.008	IV	600	1679.695	I	500	4588.04	II
100 h	2787.92	II	400	629.914	IV	140	1685.976	I	500	4589.86	II
200	2854.59	II	500	631.779	IV	100	1694.028	I	600	4602.08	II
100 h	2871.37	II	450	673.90	V	100	1694.486	I	300	4626.70	II
100 h	2878.01	II	10	810.24	II	100	1706.376	I	300	4658.31	II
520	2922.49	I	650	823.179	IV	100	1707.553	I	500	4943.53	II
650	3002.65	I	700	824.730	IV	600	1774.951	I	300	4954.39	II
1500	3027.91	I	800	827.932	IV	500	1782.838	I	300	4969.71	II
1100	3065.31	I	300	847.669	III	400	1787.656	I	100	5079.381	I
2600	3114.04	I	350	855.624	III	140	1834.801	I	100	5098.221	I
11000	3242.70	I	500	859.652	III	140	1847.165	I	100	5100.974	I
2700	3251.64	I	10	865.44	II	100	1849.820	I	140	5109.628	I
3500	3258.78	I	450	865.45	V	140	1851.194	I	140	5154.844	I
3600	3302.13	I	600	871.39	V	100	1852.069	I	180	5162.290	I
5000	3373.00	I	700	877.476	IV	500	1858.886	I	300	5253.52	II
24000	3404.58	I	300	913.971	III	400	1859.393	I	140	5293.539	I
13000	3421.24	I	300	917.120	III	140	1864.348	I	400	5296.13	II
5000	3433.45	I	350	918.665	III	650	1888.523	IV	250	5316.07	II
6400	3441.40	I	1000	950.655	IV	180	1905.481	I	300	5344.75	II
7700	3460.77	I	250	1003.598	III	140	1906.403	I	180	5345.851	I
10000	3481.15	I	570	1025.563	IV	280	1907.665	I	100	5364.631	I
2000	3489.77	I	500	1028.096	IV	280	2023.489	I	250	5378.20	II
12000	3516.94	I	570	1030.517	IV	180	2024.516	I	300	5386.88	II
12000	3553.08	I	500	1033.111	IV	400	2032.432	I	400	5425.91	II
4500	3571.16	I	500	1035.517	IV	400	2033.477	I	100	5428.094	I
20000	3609.55	I	900	1117.98	V	400	2135.465	I	400	5450.74	II
20000	3634.70	I	570	1118.551	IV	400	2136.182	I	140	5458.305	I
5500	3690.34	I	700	1128.01	V	400	2149.145	I	180	5477.672	I
1400	3718.91	I	20	1249.82	II	280	2152.940	I	140	5477.860	I
1500	3799.19	I	20	1301.87	II	500	2154.080	I	140	5478.267	I
1500	3832.29	I	20	1304.47	II	180	2235.732	I	100	5514.774	I
2200	3894.20	I	15	1304.68	II	450	2440.93	V	100	5516.997	I
1500	3958.64	I	35	1305.48	II	250	2478.256	IV	250	5588.34	II
290	4087.34	I	60	1310.70	II	750	2533.976	I	500	6024.18	II
2500	4212.95	I	500	1334.808	III	950	2535.603	I	400	6034.04	II
180	4473.59	I	650	1344.327	III	750	2553.262	I	500	6043.12	II
160	5163.84	I	300	1344.845	III	500	2554.915	I	250	6055.50	II
120	5295.63	I	500	1366.695	IV	250	2605.506	IV	150	6083.409	III
55	5542.80	I	15	1372.033	I	300	2632.713	III	350	6087.82	II
75	5670.07	I	400	1372.674	IV	400	2644.295	IV	180	6097.690	I
55 h	5695.09	I	15	1373.500	I	400	2728.770	IV	350	6165.59	II
65	6784.52	I	10	1374.732	I	500	2739.309	IV	500	6199.024	I
75	7368.12	I	15	1377.080	I	250	2739.872	IV	180	6210.499	I
120	7764.03	I	15	1377.937	I	450	2978.55	V	140	6375.681	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100	6388.579	I	228	15962.53	I	240	2308.04	I	70	2738.48	I
250	6435.32	II	296	16254.77	I	50	2310.96	II	70	2747.61	I
600	6459.99	II	203	16292.97	I	90	2315.50	I	80	2753.86	I
600	6503.46	II	1627	16482.92	I	220	2318.29	I	200	2754.92	I
600	6507.97	II	588	16590.07	I	100	2326.10	I	30	2769.84	I
100	6717.411	I	225	16613.05	I	170	2340.18	I	500	2771.67	I
150	6992.690	III	221	16738.68	I	280	2357.10	I	40	2773.24	I
100	7102.200	I	419	16803.39	I	180	2368.28	I	20	2774.00	I
100	7158.367	I	471	17112.48	I	50	2377.28	II	50	2774.77	II
180	7165.465	I	289	17286.91	I	130	2383.64	I	50	2793.27	I
180	7175.102	I	299	17423.67	I	40	2386.81	I	100	2794.21	II
180	7176.660	I	287	23844.97	I	120	2389.53	I	40 h	2799.98	II
200	7443.657	IV	311	29097.16	I	35	2396.17	I	140	2803.24	I
250	7845.63	II	<i>Platinum Pt Z = 78</i>			70	2401.87	I	10	2808.51	I
100	8046.801	I	30	1621.66	II	200	2403.09	I	50	2818.25	I
150	8113.528	III	30	1723.13	II	100	2418.06	I	30 h	2822.27	II
140	8278.058	I	30	1751.70	II	50	2424.87	II	1400	2830.30	I
100	8367.856	I	30	1777.09	II	80	2428.04	I	70	2834.71	I
140	8531.475	I	50 r	1777.09	II	50	2428.20	I	16	2853.11	I
140	8613.835	I	30	1781.86	II	25	2429.10	I	80 h	2860.68	II
180	8637.578	I	30	1879.09	II	180	2436.69	I	40 h	2865.05	II
400	8741.529	I	40	1883.05	II	650	2440.06	I	40 h	2875.85	II
100	8872.174	I	50	1889.52	II	60	2450.97	I	100 h	2877.52	II
180	9175.819	I	50	1911.70	II	440	2467.44	I	25	2888.20	I
950	9193.85	I	30	1929.25	II	35	2471.01	I	25	2893.22	I
600	9278.88	I	30	1929.68	II	1000	2487.17	I	600	2893.86	I
1250	9304.94	I	30	1939.80	II	25	2488.74	II	300	2897.87	I
500	9323.50	I	30	1949.90	II	200	2490.12	I	60	2905.90	I
950	9435.069	I	30	1983.74	II	160	2495.82	I	120	2912.26	I
950	9441.86	I	40	2014.93	II	240	2498.50	I	120	2913.54	I
600	9452.83	I	3200	2030.63	I	50	2505.93	I	70	2919.34	I
1250	9493.56	I	4400	2032.41	I	120	2508.50	I	30	2921.38	I
1700	9525.73	I	100	2036.46	II	50	2514.07	I	1700	2929.79	I
1500	9545.18	I	40	2041.57	II	60	2515.03	I	30	2942.76	I
280	9556.81	I	5500	2049.37	I	240	2515.58	I	30	2944.75	I
1700	9563.439	I	1500	2067.50	I	140	2524.30	I	25	2959.10	I
280	9593.50	I	3000	2084.59	I	40	2529.41	I	60	2960.75	I
750	9609.04	I	1000	2103.33	I	50	2536.49	I	1800	2997.97	I
400	9638.939	I	30	2115.57	II	160	2539.20	I	35	3001.17	II
500	9676.24	I	950	2128.61	I	18	2549.46	I	220	3002.27	I
180	9706.533	I	30	2130.69	II	50	2552.25	I	30	3017.88	I
1500	9734.750	I	1900	2144.23	I	50	2596.00	I	30 h	3031.22	II
280	9736.680	I	100	2144.24	II	70	2603.14	I	130	3036.45	I
1500	9750.77	I	600	2165.17	I	30	2616.76	II	800	3042.64	I
600	9790.21	I	1500	2174.67	I	50	2619.57	I	3200	3064.71	I
1700	9796.85	I	30	2190.32	II	30	2625.34	II	30	3071.94	I
280	9834.80	I	400	2202.22	I	1100	2628.03	I	130	3100.04	I
400	9903.68	I	50 h	2202.58	II	130	2639.35	I	320	3139.39	I
280	9976.67	I	320	2222.61	I	1000	2646.89	I	140	3156.56	I
229	10084.27	I	50 h	2233.11	II	500	2650.86	I	120	3200.71	I
458	10511.58	I	30 h	2240.99	II	20	2658.17	I	320	3204.04	I
962	10529.52	I	100	2245.52	II	2800	2659.45	I	30	3230.29	I
1235	10581.57	I	150	2249.30	I	40	2674.57	I	20	3233.42	I
415	10596.90	I	30	2251.52	II	440	2677.15	I	20	3250.36	I
435	10681.40	I	30 h	2251.92	II	200	2698.43	I	40	3251.98	I
265	10813.13	I	190	2268.84	I	2000	2702.40	I	160	3255.92	I
764	11183.23	I	30 h	2271.72	II	1600	2705.89	I	25	3268.42	I
402	11186.75	I	280	2274.38	I	60	2713.13	I	25	3281.97	I
479	14241.64	I	50 h	2287.50	II	1300	2719.04	I	120	3290.22	I
256	14307.83	I	30	2288.20	II	130	2729.92	I	500	3301.86	I
714	15711.52	I	150	2289.27	I	1800	2733.96	I	60	3315.05	I
			150	2292.40	I						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
4	4740.91	I	8	10487.11	I	680	3880.47	II	620	4171.82	II
6	4744.35	I	17	11019.87	I	440 c	3885.19	II	730	4172.25	II
5	4753.93	I	16	11022.67	I	440 c	3889.34	II	5200	4179.39	II
7	4757.39	I	17	11690.21	I	770 c	3908.05	II	2500	4189.48	II
5	4786.49	I	16	11769.62	I	630	3912.90	II	560 c	4191.60	II
7	4791.05	I	17	11772.83	I	310	3913.55	II	2500 c	4206.72	II
6	4799.75	I		12522.11	I	1300 c	3918.85	II	500	4208.32	II
8	4804.35	I		13377.86	I	420	3919.63	II	320	4211.86	II
7	4849.86	I		13397.09	I	960	3925.47	II	320	4217.81	II
8	4856.09	I		15163.08	I	480	3927.46	II	3800	4222.93	II
8	4863.48	I		15168.40	I	370	3929.29	II	3800	4225.35	II
9	4869.76	I		40158.37	I	370	3935.82	II	320	4233.11	II
8	4942.02	I	<i>Praseodymium Pr Z = 59</i>			730 c	3947.63	II	320 c	4236.15	II
9	4950.82	I	7000	865.90	V	900 c	3949.43	II	960	4241.01	II
9	4956.15	I	5000	869.17	V	900 c	3953.51	II	340	4243.51	II
10	4965.03	I	2000	1228.59	IV	380	3956.75	II	840 c	4247.63	II
10	5084.23	I	5000	1228.59	IV	470	3962.45	II	500	4254.40	II
11	5097.17	I	5000	1293.22	IV	560	3964.26	II	320	4269.09	II
11	5099.20	I	5000	1295.28	IV	1600 c	3964.81	II	790 c	4272.27	II
12	5112.25	I	5000	1321.36	IV	560 c	3966.57	II	470 c	4280.07	II
12	5323.28	I	5000	1333.57	IV	500	3971.16	II	790 c	4282.42	II
13	5339.69	I	5000	1354.66	IV	320	3971.67	II	450 c	4298.98	II
12	5342.97	I	2000	1360.64	IV	620 c	3972.14	II	1500	4305.76	II
14	5359.57	I	2000	1365.77	IV	320	3974.85	II	1300	4333.97	II
16	5782.38	I	5000	1374.41	IV	1300 c	3989.68	II	360	4338.70	II
17	5801.75	I	5000	1435.56	IV	340	3992.16	II	620 cw	4344.30	II
15	5812.15	I	2000	1520.98	IV	1600	3994.79	II	470 c	4347.49	II
17	5831.89	I	5000	1574.55	IV	560 c	3997.04	II	340	4350.40	II
8	6120.27	II	5000	1575.10	IV	320	3999.12	II	450	4354.91	II
7	6307.29	II	3000	1578.38	IV	620 c	4000.17	II	410 c	4359.79	II
19	6911.08	I	2000	1622.30	IV	730	4004.70	II	1200	4368.33	II
12	6936.28	I	10000	1884.87	IV	1900	4008.69	II	320	4371.62	II
20	6938.77	I	2000	2083.23	IV	620	4010.60	II	430	4405.83	II
7	6964.18	I	3300	2246.20	V	730	4015.39	II	1700	4408.82	II
12	6964.67	I	2000 c	2378.98	IV	620	4020.96	II	410	4413.77	II
25	7664.90	I	40 h	2598.04	II	470	4022.71	II	1200 c	4429.13	II
24	7698.96	I	100 h	2707.37	II	360	4025.54	II	730	4449.83	II
5	7955.37	I	60	2760.35	II	360 c	4029.72	II	960	4468.66	II
4	7956.83	I	270	3168.24	II	730 c	4031.75	II	1100	4496.46	II
7	8078.11	I	200 d	3195.99	II	960	4033.83	II	790	4510.15	II
6	8079.62	I	190	3219.48	II	730	4038.45	II	340 c	4534.15	II
9	8250.18	I	200	3584.21	II	470	4039.34	II	340	4535.92	II
8	8251.74	I	250	3645.66	II	1300	4044.81	II	270 c	4628.74	II
3	8390.22	I	250	3646.30	II	340	4047.08	II	270 c	4672.09	II
11	8503.45	I	370	3668.83	II	450	4051.13	II	290	4695.77	I
10	8505.11	I	290	3714.05	II	2200	4054.88	II	250	4736.69	I
4	8763.96	I	410	3739.18	II	2200	4056.54	II	200	4924.60	I
3	8767.05	I	680	3761.87	II	450	4058.80	II	320	4939.74	I
13	8902.19	I	680	3800.30	II	3400	4062.81	II	380	4951.37	I
12	8904.02	I	390	3811.84	II	500 c	4079.77	II	270	5034.41	II
5	8923.31	I	1300 h	3816.02	II	500 c	4080.98	II	320	5045.52	I
4	8925.44	I	680	3818.28	II	790	4081.85	II	360	5110.38	II
7	9347.24	I	310	3821.80	II	500	4083.34	II	560	5110.76	II
3	9349.25	I	960	3830.72	II	560	4096.82	II	410	5129.52	II
6	9351.59	I	480	3840.99	II	380	4098.40	II	620	5173.90	II
15	9595.70	I	580	3846.59	II	2900 c	4100.72	II	360	5206.55	II
14	9597.83	I	1200	3850.79	II	1700 c	4118.46	II	360	5219.05	II
6	9949.67	I	720 c	3851.55	II	340	4130.77	II	560	5220.11	II
5	9954.14	I	960	3852.80	II	1500 c	4141.22	II	680	5259.73	II
9	10479.63	I	480 c	3865.45	II	2700	4143.11	II	340 c	5292.02	II
5	10482.15	I	480	3876.19	II	1700 c	4164.16	II	340	5292.62	II
			1700 c	3877.18	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1000	2556.51	I	320	3069.94	I	240	3453.50	I	110 c	5752.93	I
250	2559.08	I	260	3071.16	I	55000 c	3460.46	I	110 cw	5776.83	I
340	2564.19	I	550	3082.43	I	40000 c	3464.73	I	550	5834.31	I
540	2568.64	II	340	3088.76	I	400	3467.96	I	200	6307.70	I
370	2571.81	II	700	3100.67	I	240	3476.44	I	200	6321.90	I
380	2586.79	I	700	3108.81	I	400	3480.38	I	100 cw	6605.19	I
290	2599.86	I	340	3110.86	I	320	3480.85	I	180 c	6813.41	I
290	2603.89	I	340 c	3118.19	I	240	3482.23	I	260	6829.90	I
660	2608.50	II	340	3121.36	I	560	3503.06	I	50 cw	7640.94	I
610 d	2611.54	I	420	3128.94	I	320	3516.65	I	65 cw	7912.94	I
310	2635.83	II	260	3134.02	I	320	3517.33	I	<i>Rhodium Rh Z = 45</i>		
550	2636.64	I	250	3141.38	I	320	3537.46	I	50	813.44	III
270	2642.75	I	440	3151.64	I	240	3549.89	I	80	882.51	III
270	2649.05	I	330	3153.79	I	240	3570.26	I	100	925.75	III
660	2651.90	I	360 c	3158.31	I	360	3579.12	I	150	937.28	III
400	2654.12	I	220	3164.52	I	810 c	3580.15	II	500	991.62	III
220	2663.63	I	700	3168.37	I	650	3580.97	I	400	992.48	III
940	2674.34	I	220	3174.61	I	810	3583.02	I	500 d	1009.60	III
220	2688.53	I	440	3177.71	I	320	3617.08	I	200	1012.22	III
1300	2715.47	I	260	3178.61	I	810	3637.84	I	200	1015.17	III
220	2732.21	I	600	3182.87	I	440	3651.97	I	200	1073.87	III
610	2733.04	II	1100	3184.76	I	320	3670.53	I	150	1784.24	III
220	2758.00	I	1100	3185.57	I	860 c	3689.50	I	200	1784.94	III
210	2763.79	I	260	3190.78	I	1500 c	3691.48	I	150	1796.50	III
310	2767.74	I	260	3192.36	I	520	3703.24	I	200	1816.03	III
220	2768.85	I	220	3198.58	I	240	3709.93	I	1000	1832.05	III
220	2769.32	I	1100 c	3204.25	I	360 c	3717.28	I	500	1859.85	III
350	2770.42	I	380	3235.94	I	4000	3725.76	I	800	1880.66	III
550	2783.57	I	600	3258.85	I	240 c	3735.01	I	500	1884.91	III
220	2791.29	I	600	3259.55	I	810	3735.31	I	500	1887.36	III
220	2814.68	I	300	3268.89	I	910	3740.10	I	700	1888.62	III
880	2819.95	I	280	3296.70	I	300 cw	3745.44	I	800	1901.32	III
310	2834.08	I	280	3296.99	I	700	3787.52	I	500	1910.16	III
220	2843.00	I	280	3301.60	I	240	3869.94	I	600	1919.37	III
270	2850.98	I	240	3302.23	I	240	3875.26	I	500	1927.07	III
240	2867.19	I	320	3303.21	II	240	3876.86	I	700	1931.79	III
2900	2887.68	I	280	3303.75	I	380 c	3917.27	I	500	1954.25	III
490	2896.01	I	240	3313.95	I	550	3929.85	I	500	1994.26	III
830 c	2902.48	I	600	3322.48	I	280	3961.04	I	800	2013.71	III
210	2905.58	I	2000	3338.18	I	350 c	3962.48	I	500	2017.47	III
550	2909.82	I	1600	3342.24	I	220	4033.31	I	500	2028.53	III
830 c	2927.42	I	810	3344.32	I	240	4081.43	I	800	2036.72	III
270	2930.61	I	320	3346.20	I	240 c	4110.89	I	600	2037.61	III
440	2943.14	I	240 d	3356.33	I	240 cw	4133.42	I	1000	2040.18	III
270	2962.27	I	240	3377.74	I	1800	4136.45	I	3000	2048.67	III
720	2965.11	I	320	3379.06	II	700	4144.36	I	2000	2064.11	III
1500	2965.76	I	320	3379.70	I	220	4182.90	I	800	2076.84	III
310	2976.29	I	240	3389.43	I	220	4183.06	I	1000	2118.53	III
210	2978.15	I	4000	3399.30	I	650	4221.08	I	1000	2118.63	III
220	2980.82	I	650	3404.72	I	3600 c	4227.46	I	1000	2139.44	III
220	2982.19	I	650	3405.89	I	260 c	4257.60	I	1000	2152.23	III
220	2988.47	I	240	3408.67	I	380	4358.69	I	3000	2158.17	III
1800	2992.36	I	320	3409.83	I	360 cw	4394.38	I	3000	2163.19	III
5500	2999.60	I	320	3417.77	I	2600	4513.31	I	3000	2167.33	III
350	3001.14	I	810	3419.41	I	260	4516.64	I	150	2276.21	II
220	3004.14	I	8000	3424.62	I	500	4522.73	I	140	2288.57	I
500	3016.02	I	400	3426.19	I	2200 cw	4889.14	I	110	2309.82	I
300	3016.49	I	300	3427.61	I	220	4923.90	I	350	2322.58	I
380	3030.45	I	320	3437.71	I	1300	5270.95	I	140	2326.47	I
240	3047.25	I	400	3449.37	I	1600 cw	5275.56	I	190	2334.77	II
1600	3067.40	I	16000 c	3451.88	I	100	5667.88	I	300	2361.92	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
110	2368.34	I	2300	3280.55	I	240	3754.12	I	16	6253.72	I
270	2382.89	I	2300	3283.57	I	380	3754.27	I	29	6319.53	I
230	2383.40	I	280	3289.14	I	490	3755.58	I	40	6752.35	I
270	2386.14	II	210	3294.28	I	1000	3760.40	I	13	6827.33	I
80	2415.84	II	260	3300.46	I	2300	3765.08	I	11	6857.68	I
130	2427.68	I	50	3310.69	III	490	3769.97	I	20	6879.94	I
230	2429.52	I	4200	3323.09	I	380	3778.13	I	65	6965.67	I
110	2437.90	I	330	3338.54	I	1000	3788.47	I	16	6979.15	I
330	2440.34	I	280	3360.80	I	1300	3792.18	I	16	7001.58	I
90	2461.04	II	420	3368.38	I	3800	3793.22	I	18	7101.64	I
130	2473.09	I	1100	3372.25	I	4900	3799.31	I	15	7104.45	I
150	2487.47	I	110	3377.14	I	760	3805.92	I	18	7268.18	I
100	2490.77	II	110	3385.78	I	1300	3806.76	I	35	7270.82	I
130	2502.46	I	5600	3396.82	I	470	3815.01	I	18 h	7442.39	I
300	2504.29	II	820	3399.70	I	760	3816.47	I	12	7475.74	I
150	2505.67	I	160	3406.55	I	1300	3818.19	I	12	7495.24	I
350	2509.70	I	820	3412.27	I	3800	3822.26	I	11	7557.67	I
300	2511.03	II	330	3421.22	I	2300	3828.48	I	29	7791.61	I
200	2515.75	I	120 d	3424.38	I	2000	3833.89	I	55	7824.91	I
130	2520.53	II	8200	3434.89	I	5900	3856.52	I	21	8029.91	I
110	2537.04	II	1400	3440.53	I	490	3870.01	I	29	8045.36	I
350	2545.70	I	120	3447.74	I	380	3877.34	I	15	8136.20	I
550	2555.36	I	120	3450.29	I	120	3913.51	I	8	8425.59	I
150	2622.58	I	400	3455.22	I	240	3922.19	I			
230	2625.88	I	180	3457.07	I	2000	3934.23	I	<i>Rubidium Rb Z = 37</i>		
100	2630.42	I	220	3457.93	I	590	3942.72	I	30	465.85	III
110	2647.28	I	5900	3462.04	I	3800	3958.86	I	40	481.118	II
400	2652.66	I	180	3469.62	I	45	3964.54	II	500	482.83	III
100	2680.63	I	4700	3470.66	I	380	3975.31	I	500	489.66	III
400	2703.73	I	120	3472.25	I	240	3984.40	I	600	493.48	III
100	2715.31	II	4700	3474.78	I	240	3995.61	I	90	497.430	II
180	2718.54	I	2100	3478.91	I	380	3996.15	I	20	508.434	II
160	2728.94	I	110	3494.44	I	120	4023.14	I	150	513.266	II
100	2771.51	I	1200	3498.73	I	560	4082.78	I	300	530.173	II
130	2783.03	I	5900	3502.52	I	140	4097.52	I	75	533.801	II
150	2826.43	I	2800	3507.32	I	120	4119.68	I	1200	535.86	III
180	2826.68	I	8800	3528.02	I	1100	4121.68	I	40	542.887	II
280	2862.94	I	880 d	3538.14	I	1500	4128.87	I	200	555.036	II
110	2878.66	I	280	3541.91	I	2100	4135.27	I	1200	556.19	III
140	2882.37	I	1200	3543.95	I	240	4154.37	I	1500	566.71	III
160	2907.21	I	1800	3549.54	I	330	4196.50	I	1000	572.82	III
65	2910.17	II	1200	3570.18	I	3300	4211.14	I	1500	576.65	III
180	2924.02	I	4700	3583.10	I	820	4288.71	I	2500	579.63	III
130	2929.11	I	4700	3596.19	I	4200	4374.80	I	1500	581.26	III
130	2931.94	I	5900	3597.15	I	130	4569.00	I	2500	589.419	II
230	2968.66	I	3100	3612.47	I	150	4675.03	I	1000	594.94	III
160	2977.68	I	1800	3626.59	I	70	4745.11	I	1300	595.88	III
450	2986.20	I	8200	3657.99	I	70	5090.63	I	1200	598.49	III
110	3004.46	I	1300	3666.22	I	60	5155.54	I	1500	643.878	II
50	3006.43	III	560	3681.04	I	60	5175.97	I	25	663.76	IV
130	3023.91	I	1900	3690.70	I	95	5193.14	I	3000	697.049	II
50	3052.44	III	9400	3692.36	I	130	5354.40	I	6000	711.187	II
180	3083.96	I	940	3695.52	I	95	5390.44	I	25	716.24	IV
140	3121.76	I	280	3698.26	I	160	5599.42	I	50	740.85	IV
240	3123.70	I	380	3698.60	I	40	5686.38	I	10000	741.456	II
130	3155.78	I	7600	3700.91	I	29	5792.66	I	5000	769.04	III
140	3189.05	I	940	3713.02	I	40	5806.91	I	25	776.89	IV
470	3191.19	I	650	3735.28	I	35	5831.58	I	2500	815.28	III
190	3197.13	I	420	3737.27	I	130	5983.60	I	15	850.18	IV
520	3263.14	I	420	3744.17	I	35	6102.72	I	1000	1604.12	II
520	3271.61	I	1200	3748.22	I	14	6199.99	I	5000	1760.50	II
									2000	2068.92	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
10000	2075.95	II	40 l	8271.41	I	110	2517.32	II	650	3669.49	I
30000	2143.83	II	30	8271.71	I	150	2535.59	II	550	3726.10	I
10000	2217.08	II	40 l	8868.512	I	550	2549.58	I	8700	3726.93	I
5000	2291.71	II	30	8868.852	I	370	2609.06	I	11000	3728.03	I
50000	2472.20	II	30 l	9522.65	I	830	2612.07	I	7100	3730.43	I
1000	2631.75	III	20 l	9540.18	I	460	2642.96	I	3500	3742.28	I
2000	2956.07	III	2000 c	9689.05	II	330	2651.84	I	870	3742.78	I
500	3086.84	III	35 l	10075.282	I	400	2659.62	I	2800	3745.59	I
500	3111.36	III	30 l	10075.708	I	330	2661.61	II	760	3753.54	I
5000 c	3148.90	II	100	13235.17	I	690	2678.76	II	870	3755.93	I
25	3157.54	I	20	13442.81	I	330	2692.06	II	1200	3759.84	I
50	3227.98	I	30	13443.57	I	200	2712.41	II	600	3761.51	I
500	3286.41	III	75	13665.01	I	690	2719.52	I	600	3767.35	I
60	3348.72	I	1000	14752.41	I	140	2725.47	II	1500	3777.59	I
75	3350.82	I	800	15288.43	I	310	2734.35	II	600	3782.74	I
100	3587.05	I	150	15289.48	I	1800	2735.72	I	3900	3786.06	I
40	3591.57	I	20	22529.65	I	100	2778.38	II	6000	3790.51	I
5000	3600.60	II	4	27314.31	I	110	2787.83	II	760	3798.05	I
10000	3600.64	II				350	2810.03	I	7600	3798.90	I
25000	3940.51	II	<i>Ruthenium Ru Z = 44</i>			1700	2810.55	I	7600	3799.35	I
1000	4201.80	I	250	850.09	III	350	2818.36	I	600	3812.72	I
500	4215.53	I	200	850.30	III	400	2829.16	I	760	3817.27	I
90000	4244.40	II	250	919.74	III	640	2854.07	I	760	3819.03	I
15000	4273.14	II	500	940.09	III	420	2861.41	I	650	3822.09	I
20000	4571.77	II	500	966.54	III	550	2866.64	I	550	3824.93	I
10000	4648.57	II	750	974.14	III	1800	2874.98	I	760	3831.80	I
30000	4775.95	II	900	979.43	III	740	2886.54	I	930	3839.70	I
2	5087.987	I	500	981.35	III	370	2908.88	I	760	3850.43	I
2	5132.471	I	900	986.84	III	1100	2916.26	I	1300	3857.55	I
10	5150.134	I	900	994.56	III	180	2945.67	II	650	3862.69	I
10000	5152.08	II	300	1001.65	III	370	2949.50	I	1300	3867.84	I
1	5165.023	I	500	1009.13	III	550	2965.16	I	650	3892.21	I
2	5165.142	I	900	1009.87	III	170	2965.55	II	760	3909.08	I
15	5195.278	I	500	1014.68	III	140	2976.59	II	1500	3923.47	I
2	5233.968	I	800	1190.51	III	550	2976.92	I	3300	3925.92	I
20	5260.034	I	500	1200.07	III	1400	2988.95	I	600	3931.76	I
1	5260.228	I	500	1207.17	III	460	2994.96	I	760	3945.57	I
3	5322.380	I	500	1209.77	III	440	3006.59	I	600	3978.44	I
40	5362.601	I	300	1211.31	III	330	3017.24	I	600	3979.42	I
4	5390.568	I	500	1941.35	III	310	3020.88	I	870	3984.86	I
75	5431.532	I	500	2009.28	III	390	3064.84	I	1500	4022.16	I
3	5431.830	I	2400	2076.43	I	330	3096.57	I	600	4023.83	I
6	5578.788	I	2600	2083.77	I	830	3099.28	I	1400	4051.40	I
40	5647.774	I	2400	2090.89	I	740	3100.84	I	710	4054.05	I
20	5653.750	I	690	2255.52	I	490	3294.11	I	760	4068.37	I
60	5724.121	I	780	2272.09	I	370	3301.59	I	980	4076.73	I
3	5724.614	I	780	2279.57	I	930	3339.55	I	6000	4080.60	I
75	6070.755	I	480	2317.80	I	3100	3417.35	I	930	4097.79	I
30 c	6159.626	I	120	2334.96	II	4900	3428.31	I	1900	4112.74	I
75 c	6206.309	I	190 h	2342.85	II	6400	3436.74	I	2000	4144.16	I
120 c	6298.325	I	310	2351.33	I	8300	3498.94	I	650	4145.74	I
5	6299.224	I	170	2357.91	II	640	3514.49	I	870	4167.51	I
10000	6458.33	II	780	2402.72	II	790	3539.37	I	550	4197.58	I
5000	6560.81	II	150	2407.92	II	690	3570.59	I	550	4198.88	I
100 l	7279.997	I	180	2455.53	II	6400	3589.22	I	7600	4199.90	I
150	7408.173	I	150	2456.44	II	6900	3593.02	I	1500	4206.02	I
200 l	7618.933	I	370	2456.57	II	6400	3596.18	I	5400	4212.06	I
300	7757.651	I	280	2478.93	II	1300	3599.76	I	760	4214.44	I
60	7759.436	I	140	2498.42	II	3100	3634.93	I	930	4217.27	I
90000 c	7800.27	I	140	2498.57	II	6200	3661.35	I	550	4230.31	I
45000 c	7947.60	I	260	2507.01	II	830	3663.37	I	760	4241.05	I
			110	2513.32	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
760	4243.06	I	26	6982.01	I	480	3854.56	I	730	4716.10	I
760	4284.33	I	26	7027.98	I	400	3858.74	I	770	4728.42	I
550	4295.93	I	35	7238.92	I	3700	3885.29	II	470	4745.68	II
3700	4297.71	I	16	7393.93	I	1600	3896.98	II	730	4760.27	I
930	4307.60	I	18	7468.91	I	1300	3903.42	II	580	4783.10	I
550	4319.87	I	26	7485.79	I	2500	3922.40	II	350	4785.86	I
550	4342.07	I	70	7499.75	I	1900	3928.28	II	970	4841.70	I
710	4354.13	I	26	7559.61	I	1300	3941.87	II	730	4883.97	I
870	4361.21	I	18	7621.50	I	470	3951.89	I	630	4910.40	I
2400	4372.21	I	18	7722.87	I	1500	3963.00	II	350	4913.25	II
870	4385.39	I	22	7791.86	I	1500	3971.40	II	430	4918.99	I
1300	4385.65	I	30	7847.80	I	620	3974.66	I	400	5044.28	I
1700	4390.44	I	80	7881.49	I	1000	3976.43	II	540	5071.20	I
1600	4410.03	I	18	8264.96	I	1500	3990.00	II	510	5117.16	I
1100	4460.04	I	22	8710.84	I	1400	4064.58	II	350	5122.14	I
5400	4554.51	I	<i>Samarium Sm Z = 62</i>			1000	4092.27	II	360	5155.03	II
1700	4584.44	I	150	2789.38	II	1900	4118.55	II	470	5175.42	I
720	4647.61	I	410	3152.52	II	1200	4152.21	II	250	5200.59	I
1400	4709.48	I	720	3183.92	II	1000	4188.13	II	260	5251.92	I
500	4757.84	I	600	3211.73	II	1100	4203.05	II	400	5271.40	I
550	4869.15	I	530	3216.85	II	1000	4225.33	II	250	5282.91	I
160	5011.23	I	600	3218.61	II	1200	4236.74	II	220	5453.00	I
450	5057.33	I	720	3230.56	II	2100	4256.39	II	230	5493.72	I
120	5076.32	I	720	3236.64	II	1300	4262.68	II	230	5516.09	I
200	5093.83	I	720	3239.66	II	1200	4279.68	II	140	5550.40	I
530	5136.55	I	720	3250.37	II	2200	4280.79	II	140	5659.86	I
170	5142.76	I	850	3254.38	II	710	4282.21	I	120	5696.73	I
250	5147.24	I	1700	3306.39	II	470	4282.83	I	85	5706.20	I
110	5151.07	I	1200	3321.18	II	1600	4296.74	I	70	5773.77	I
500	5155.14	I	1200	3365.86	II	1900	4318.94	II	60	5778.33	I
920	5171.03	I	1200	3382.40	II	470	4319.53	I	70 d	5786.98	II
180	5195.02	I	4200	3568.27	II	1800	4329.02	II	60	5788.38	I
130	5284.08	I	4200	3592.60	II	440	4330.02	I	60	5800.52	I
260	5309.27	I	1700	3604.28	II	1300	4334.15	II	65	5802.84	I
110	5335.93	I	3400	3609.49	II	880	4336.14	I	65	5867.79	I
130	5361.77	I	1700	3621.23	II	1100	4347.80	II	50	5874.21	I
110 h	5401.04	I	3400	3634.29	II	440	4362.91	I	50	5898.96	I
80	5484.32	I	2200	3661.36	II	530	4380.42	I	65	5965.71	II
130	5510.71	I	2200	3670.84	II	1600	4390.86	II	50	6045.00	I
90	5559.75	I	1100	3693.99	II	410	4401.17	I	50	6070.06	I
290	5636.24	I	1600	3728.47	II	470	4419.33	I	45	6084.12	I
180	5699.05	I	2100	3731.26	II	1500	4420.53	II	45 h	6159.56	I
65	5814.98	I	1600	3735.98	II	2900	4424.34	II	45	6256.54	I
55	5919.34	I	2900	3739.12	II	470	4429.66	I	100	6267.28	II
80	5921.45	I	1200	3743.87	II	1600	4433.88	II	140	6569.31	II
21 h	5973.38	I	930	3745.46	I	1800	4434.32	II	110	6589.72	II
16	5988.67	I	800	3756.41	I	530	4441.81	I	50	6671.51	I
35	5993.65	I	1200	3757.53	II	440	4442.28	I	120 d	6731.84	II
18	6116.77	I	1900	3760.69	II	710	4445.15	I	95	6794.20	II
26	6199.42	I	1100	3764.37	II	1300	4452.73	II	120	6860.93	I
26	6225.20	I	370 d	3773.33	I	1200	4454.63	II	120	6955.29	II
18	6295.22	I	1100	3778.14	II	1000	4458.52	II	90	7020.44	II
16	6390.23	I	1500	3788.12	II	2200	4467.34	II	90	7039.22	II
26 h	6444.84	I	1600	3793.97	II	810	4470.89	I	90	7042.24	II
21	6663.14	I	1600	3797.73	II	370	4499.11	I	90	7051.52	II
55	6690.00	I	1600	3826.20	II	440	4581.73	I	90	7082.37	II
21	6766.95	I	1100	3831.50	II	380	4649.49	I	26	7088.30	I
30	6775.02	I	560	3834.48	I	470 d	4670.75	I	30	7095.50	I
21	6824.17	I	1600	3843.50	II	1100	4674.60	II	30	7104.54	I
26	6911.48	I	530	3853.30	I	370	4688.73	I	26	7115.96	I
110	6923.23	I	2700	3854.21	II	530	4704.40	II	85 d	7149.60	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
23	7213.82	I	1200	2974.01	I	2700	4047.79	I	270	5089.89	I
60	7240.90	II	1400	2980.75	I	120	4049.95	I	390	5096.73	I
26	7347.30	I	340	2988.95	I	5500	4054.55	I	620	5099.23	I
30	7444.56	I	2200	3015.36	I	220	4056.59	I	370	5101.12	I
26	7445.41	I	2700	3019.34	I	100	4068.66	III	180	5109.06	I
13	7470.76	I	360	3030.76	I	160 h	4074.97	I	150	5112.86	I
45	7645.09	II	120 h	3056.31	I	160	4078.57	I	320	5116.69	I
12	7645.82	I	130	3065.11	II	6100	4082.40	I	390	5210.52	I
40 w	7835.08	II	990	3251.32	II	200	4086.67	I	280	5219.67	I
16	7895.96	I	1500	3255.69	I	400	4087.16	I	350	5239.82	II
90	7928.14	II	4400	3269.91	I	440 h	4133.00	I	280	5258.33	I
40	8048.70	II	5500	3273.63	I	530 h	4140.30	I	210	5285.76	I
16	8065.16	I	110 d	3343.28	II	720	4152.36	I	120	5341.05	I
45	8068.46	II	270	3352.05	II	1100 h	4165.19	I	350	5349.30	I
40 w	8305.79	II	9900	3353.73	II	110 h	4218.26	I	120	5349.71	I
19	8383.71	I	2000	3359.68	II	110 h	4219.73	I	210	5355.75	I
45 w	8485.99	II	1700	3361.27	II	180	4231.93	I	530	5356.10	I
45 w	8708.43	II	1700	3361.94	II	200	4233.61	I	270	5375.35	I
95	8913.66	II	4000	3368.95	II	400	4238.05	I	370	5392.08	I
<i>Scandium Sc Z = 21</i>			6600	3372.15	II	15000	4246.83	II	270	5446.20	I
350	180.14	V	130	3418.51	I	290	4294.77	II	120	5451.34	I
500	243.87	V	200	3429.21	I	350	4305.71	II	750	5481.99	I
500	252.85	V	200	3429.48	I	4200	4314.09	II	530	5484.62	I
500	253.73	V	270	3431.36	I	3300	4320.74	II	570	5514.22	I
900	283.91	V	530	3435.56	I	2400	4325.01	II	660	5520.50	I
800	284.45	V	270	3457.45	I	180	4354.61	II	660	5526.82	II
600	288.29	V	180	3462.19	I	110	4358.64	I	70	5564.86	I
900	289.59	V	130 d	3469.65	I	2000	4374.46	II	110	5591.33	I
15	289.85	IV	110	3471.13	I	130	4384.81	II	80	5640.98	II
1000 d	291.93	V	200	3498.91	I	1100	4400.37	II	250	5657.88	II
800	293.25	V	2700	3535.73	II	880	4415.56	II	1500	5671.81	I
15	296.31	IV	6600	3558.55	II	120 h	4557.24	I	1200	5686.84	I
15	299.04	IV	6100	3567.70	II	160 h	4573.99	I	1100	5700.21	I
700	300.00	V	13000	3572.53	II	350	4670.40	II	10	5706.82	IV
1000	573.36	V	9900	3576.35	II	120	4706.97	I	190	5708.61	I
600	587.94	V	7700	3580.94	II	120	4709.34	I	880	5711.75	I
10	785.12	IV	4000	3589.64	II	200	4728.77	I	230	5717.28	I
25	1168.61	III	4000	3590.48	II	490	4729.23	I	180	5724.08	I
15	1550.80	IV	28000	3613.84	II	590	4734.10	I	14	5771.63	IV
180	1603.06	III	110	3617.43	I	690	4737.65	I	620	6210.68	I
150	1610.19	III	20000	3630.75	II	790	4741.02	I	320	6239.78	I
160	2010.42	III	13000	3642.79	II	1200	4743.81	I	120	6245.63	II
12	2118.97	IV	6600	3645.31	II	200	4753.16	I	110	6249.96	I
11	2185.43	IV	110	3646.90	I	220	4779.35	I	80	6256.01	III
11	2205.46	IV	5300	3651.80	II	170	4839.44	I	250	6258.96	I
14	2222.22	IV	110	3664.25	II	90	4909.76	I	750	6305.67	I
11	2271.33	IV	290	3666.54	II	90	4922.84	I	60	6378.82	I
110	2438.62	I	75 h	3717.10	I	90	4934.25	I	90	6413.35	I
560	2545.22	II	270	3833.07	II	170	4954.06	I	60	6604.60	II
2900	2552.37	II	610	3843.03	II	120	4973.66	I	65	6737.87	I
560	2555.82	II	20000	3907.49	I	150	4980.37	I	50	6819.52	I
2300	2560.25	II	23000	3911.81	I	140	4991.92	I	50	6835.03	I
1100	2563.21	II	4400	3933.38	I	530	5031.02	II	90	7449.16	III
11	2586.93	IV	5500	3996.61	I	250	5064.32	I	55 h	7741.17	I
120	2692.78	I	530	4014.49	II	530	5070.23	I	30	7800.44	I
350	2699.07	III	20000	4020.40	I	250	5075.81	I	19 h	8761.40	I
360	2706.77	I	20000	4023.69	I	2100	5081.56	I	50	8829.78	III
210	2707.95	I	220	4030.67	I	1200	5083.72	I	30 h	8834.35	I
580	2711.35	I	140	4031.39	I	1100	5085.55	I	400	22051.86	I
230	2734.05	III	220	4043.80	I	750	5086.95	I	150	22065.05	I
340	2965.86	I	200	4046.48	I	390	5087.14	I			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å				
<i>Selenium Se Z = 34</i>														
360	613.0	V	285	2057.5	III	150	8440.47	I	100	1190.42	II			
360	652.7	IV	500	2074.8	I	150	8450.38	I	200	1193.28	II			
450	670.1	IV	285	2136.6	IV	150	8742.33	I	250	1194.50	II			
360	724.3	III	500	2164.2	I	300	8918.86	I	100	1197.39	II			
450	746.4	IV	600	2413.5	I	200	9001.97	I	30	1206.51	III			
450	759.1	V	300	2548.0	I	200	9038.61	I	30	1206.53	III			
360	808.7	V	360	2665.5	IV	100	9432.50	I	9	1207.52	III			
360	830.3	V	285	2724.3	IV	200	10217.25	I	10	1210.46	III			
360	832.7	II	285	2767.2	III	377	10307.45	I	50	1226.81	II			
450	839.5	V	220	2773.8	III	900	10327.26	I	100	1227.60	II			
360	843.0	III	160	2951.6	IV	640	10386.36	I	150	1228.75	II			
360	845.8	V	450	3387.2	III	275	11946.87	I	200	1229.39	II			
360	912.9	II	450	3413.9	III	170	11952.64	I	100	1246.74	II			
360	959.6	IV	450	3457.8	III	205	11972.93	I	150	1248.43	II			
360	974.8	III	450	3637.6	III	315	14817.93	I	100	1250.09	II			
450	996.7	IV	450	3738.7	III	410	14917.47	I	150	1250.43	II			
360	1013.4	II	450	3800.9	III	500	15151.44	I	200	1251.16	II			
360	1014.0	II	450	4169.1	III	320	15471.00	I	40	1256.49	I			
450	1033.6	II	360	4175.3	II	265	15520.97	I	50	1258.80	I			
450	1049.6	II	450	4180.9	II	395	15618.40	I	1000	1260.42	II			
360	1057.4	II	285	4382.9	II	360	16659.44	I	2000	1264.73	II			
360	1094.7	V	285	4446.0	II	505	16813.78	I	200	1265.02	II			
360	1099.1	III	220	4449.2	II	205	16866.54	I	17	1294.54	III			
450	1119.2	III	285	4467.6	II	235	21374.24	I	14	1296.73	III			
360	1141.9	II	500	4730.8	I	680	21442.56	I	15	1298.89	III			
450	1192.3	II	400	4739.0	I	415	21473.48	I	18	1298.96	III			
450	1227.6	V	300	4742.2	I	270	21716.36	I	14	1301.15	III			
285	1291.0	II	285	4840.6	II	240	21730.60	I	16	1303.32	III			
285	1308.9	II	360	4845.0	II	150	23388.85	I	100	1304.37	II			
285	1314.4	IV	450	5227.5	II	265	24148.18	I	50 h	1305.59	II			
120	1435.3	I	360	5305.4	II	375	24385.99	I	200	1309.27	II			
120	1435.8	I	100	5365.5	I	255	25017.51	I	13	1312.59	III			
150	1449.2	I	120	5369.9	I	510	25127.43	I	100	1346.87	II			
150	1500.9	I	110	5374.1	I	<i>Silicon Si Z = 14</i>						100	1348.54	II
250	1530.4	I	285	5522.4	II	10	85.18	V	150	1350.06	II			
150	1531.3	I	285	5566.9	II	15	96.44	V	100	1352.64	II			
200	1531.8	I	285	5866.3	II	10	97.14	V	100	1353.72	II			
150	1575.3	I	450	6056.0	II	20	117.86	V	15	1393.76	IV			
150	1577.6	I	285	6303.8	III	20	118.97	V	12	1402.77	IV			
150	1577.9	I	200	6325.6	I	4	457.82	IV	13	1417.24	III			
150	1579.5	I	360	6444.2	II	8	566.61	III	90 h	1485.02	II			
200	1580.0	I	285	6490.5	II	8	653.33	III	100 h	1485.51	II			
150	1587.5	I	285	6535.0	II	7	815.05	IV	12	1500.24	III			
150	1593.2	I	150	6831.3	I	8	818.13	IV	10	1501.19	III			
250	1606.5	I	120	6990.690	I	9	823.41	III	9	1501.87	III			
200	1617.4	I	100	6991.792	I	40 h	845.77	II	100 h	1509.10	II			
150	1621.2	I	200	7010.809	I	100	889.72	II	50 h	1512.07	II			
150	1643.4	I	150	7013.875	I	200	892.00	II	60 p	1516.91	II			
250	1671.2	I	300	7062.065	I	9	967.95	III	500	1526.72	II			
250	1675.3	I	200	7575.1	I	100	989.87	II	1000	1533.45	II			
250	1690.7	I	250	7583.4	I	200	992.68	II	150	1594.55	I			
250	1793.3	I	150	7592.2	I	10	993.52	III	100	1622.87	I			
300	1795.3	I	300	8001.0	I	13	994.79	III	300	1629.43	I			
300	1855.2	I	200	8036.4	I	16	997.39	III	200	1629.92	I			
250	1858.8	I	150	8093.2	I	50	1023.69	II	100	1667.62	I			
400	1898.6	I	150	8094.7	I	8	1066.63	IV	100	1668.52	I			
350	1913.8	I	180	8149.3	I	14	1108.37	III	100	1672.59	I			
300	1919.2	I	150	8152.0	I	16	1109.97	III	200	1675.20	I			
500	1960.9	I	200	8157.7	I	18	1113.23	III	200	1696.20	I			
500	2039.8	I	180	8163.1	I	8	1122.49	IV	200	1697.94	I			
			150	8182.9	I	10	1128.34	IV	100 h	1770.92	I			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100 h	1776.83	I	300	2904.28	II	16	4716.65	III	90	6131.850	I
100 h	1799.12	I	500	2905.69	II	50	4782.991	I	100	6142.487	I
150	1808.00	II	55	2970.355	I	35	4792.212	I	100	6145.015	I
500 h	1814.07	I	150	2987.645	I	80	4792.324	I	160	6155.134	I
200	1816.92	II	50	3006.739	I	15	4813.33	III	160	6237.320	I
200	1836.51	I	75	3020.004	I	16	4819.72	III	40	6238.287	I
200	1841.44	I	100 h	3030.00	II	18	4828.97	III	125	6243.813	I
9	1842.55	III	9	3040.93	III	30	4947.607	I	125	6244.468	I
200	1843.77	I	100 h	3043.69	II	40	5006.061	I	180	6254.188	I
300	1845.51	I	50 h	3048.30	II	1000	5041.03	II	45	6331.954	I
400	1847.47	I	150 h	3053.18	II	1000	5055.98	II	1000	6347.10	II
200	1848.14	I	25	3086.24	III	10 h	5091.42	III	1000	6371.36	II
500	1850.67	I	20	3093.42	III	100	5181.90	II	45	6526.609	I
200	1852.46	I	16	3096.83	III	100 h	5185.25	II	45	6527.199	I
500 h	1874.84	I	9	3165.71	IV	200 h	5192.86	II	45	6555.462	I
200	1881.85	I	16	3185.13	III	500 h	5202.41	II	50 h	6660.52	II
200	1887.70	I	13	3186.02	III	100 h	5405.34	II	100	6671.88	II
200 h	1893.25	I	150	3188.97	II	100 h	5438.62	II	7	6701.21	IV
1000 h	1901.33	I	150	3193.09	II	100 h	5456.45	II	50 h	6717.04	II
100 h	1902.46	II	100	3195.41	II	500 h	5466.43	II	100	6721.853	I
50 h	1910.62	II	14	3196.50	III	500 h	5466.87	II	50	6829.82	II
50	1941.67	II	200	3199.51	II	100 h	5469.21	II	30	6848.568	I
100	1949.56	II	100 h	3203.87	II	200 h	5496.45	II	80	6976.523	I
100	1954.97	I	200 h	3210.03	II	35	5517.535	I	180	7003.567	I
50	2058.65	II	15	3210.55	III	100 h	5540.74	II	180	7005.883	I
50	2059.01	II	75	3214.66	II	150 h	5576.66	II	90	7017.646	I
200	2072.02	II	12	3230.50	III	30	5622.221	I	250	7034.903	I
200	2072.70	II	14	3233.95	III	100 h	5632.97	II	6 h	7047.94	IV
100	2124.12	I	15	3241.62	III	200 h	5639.48	II	200	7165.545	I
50 h	2136.56	II	12	3258.66	III	90	5645.611	I	100	7226.206	I
110	2207.98	I	10	3276.26	III	150 h	5660.66	II	100	7235.326	I
115	2210.89	I	300	3333.14	II	80	5665.554	I	180	7250.625	I
110	2211.74	I	500	3339.82	II	1000 h	5669.56	II	160	7275.294	I
120	2216.67	I	15	3486.91	III	120	5684.484	I	400	7289.173	I
120	2218.06	I	9	3525.94	III	300 h	5688.81	II	375	7405.774	I
10	2296.87	III	20	3590.47	III	100	5690.425	I	200	7409.082	I
10	2308.19	III	8	3762.44	IV	90	5701.105	I	275	7415.946	I
100 h	2356.30	II	20 c	3791.41	III	200 h	5701.37	II	425	7423.497	I
30 h	2357.18	II	25	3796.11	III	100 h	5706.37	II	9 h	7466.32	III
50 h	2357.97	II	30	3806.54	III	160	5708.397	I	12 h	7612.36	III
300	2435.15	I	100 h	3853.66	II	20	5739.73	III	100	7680.267	I
11	2449.48	III	500 h	3856.02	II	45	5747.667	I	6 h	7723.82	IV
425	2506.90	I	200 h	3862.60	II	45	5753.625	I	30	7800.008	I
375	2514.32	I	300	3905.523	I	45	5754.220	I	400	7848.80	II
500	2516.113	I	20	3924.47	III	45	5762.977	I	500	7849.72	II
7	2517.51	IV	10	4088.85	IV	70	5772.145	I	30	7849.967	I
350	2519.202	I	70	4102.936	I	70	5780.384	I	90	7918.386	I
425	2524.108	I	9	4116.10	IV	90	5793.071	I	120	7932.349	I
450	2528.509	I	300 h	4128.07	II	100	5797.859	I	140	7944.001	I
110	2532.381	I	500 h	4130.89	II	150 h	5800.47	II	35	7970.306	I
25	2541.82	III	100 h	4190.72	II	200	5806.74	II	35	8035.619	I
10	2546.09	III	50	4198.13	II	50	5846.13	II	70	8093.241	I
14	2559.21	III	9	4338.50	III	300 h	5868.40	II	9 h	8102.86	III
30	2563.679	I	30	4552.62	III	40	5873.764	I	11 h	8103.45	III
85	2568.641	I	25	4567.82	III	10 h	5898.79	III	35	8230.642	I
45	2577.151	I	20	4574.76	III	150	5915.22	II	9 h	8262.57	III
190	2631.282	I	100	4621.42	II	200	5948.545	I	40	8443.982	I
11	2640.79	III	150	4621.72	II	500	5957.56	II	40	8501.547	I
14	2655.51	III	9 h	4631.24	IV	500	5978.93	II	60	8502.221	I
9	2817.11	III	10 h	4654.32	IV	90	6125.021	I	40	8536.165	I
1000	2881.579	I	9	4683.02	III	85	6131.574	I	120	8556.780	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
50	8648.462	I	95	1432.60	II	28000 r	3382.89	I	12	162.448	IV
40	8728.011	I	100	1464.72	II	30	3469.16	I	10	163.190	IV
75	8742.451	I	50	1466.23	II	70	3475.82	II	12	168.411	IV
100	8752.009	I	50 r	1507.37	I	80	3495.28	II	10	168.546	IV
35	8790.389	I	100 r	1515.63	I	50	3542.61	I	5	183.95	III
100	9412.72	II	50 r	1548.58	I	50 h	3624.68	I	10	190.445	IV
100	9413.506	I	100	1555.16	II	75	3682.46	II	10	199.772	IV
30	10371.269	I	100	1644.50	II	30	3682.50	I	8	202.49	III
120	10585.141	I	60	1651.52	I	80	3683.34	II	8	202.76	III
120	10603.431	I	50	1652.10	I	50 h	3709.20	I	8 p	203.06	III
120	10660.975	I	700	1656.18	III	200	3810.94	I	8	203.28	III
30	10694.251	I	120	1682.82	II	50	3811.78	I	8	203.33	III
30	10727.408	I	500	1693.51	III	100 h	3840.74	I	15	229.87	III
60	10749.384	I	10	1708.11	I	50 h	3907.41	I	50 c	250.52	III
30	10784.550	I	50	1709.27	I	50	3909.31	II	30	251.37	III
80	10786.856	I	125	1736.44	II	50 h	3914.40	I	25	266.90	III
140	10827.091	I	750	1751.03	III	70	3920.10	II	70	267.65	III
60	10843.854	I	10 h	1766.14	I	60	3949.43	II	50	267.87	III
130	10869.541	I	75	1790.37	II	100 h	3981.58	I	50	268.63	III
30	10882.802	I	600	1917.08	III	70	3985.19	II	20 p	272.08	III
30	10885.336	I	700	1957.62	III	100 h	4055.48	I	20	272.45	III
80	10979.308	I	100	1967.38	II	80	4085.91	II	10	319.644	IV
30	10982.061	I	600	1975.92	III	100	4185.48	II	300	372.08	II
80	11017.965	I	500	1977.03	III	90 h	4210.96	I	350	376.38	II
370	11984.19	I	600	2000.24	III	100	4212.82	I	100	378.14	III
220	11991.57	I	150	2015.96	II	50	4311.07	I	70	380.10	III
440	12031.51	I	150	2033.98	II	50 h	4476.04	I	12	408.684	IV
190	15888.39	I	200	2061.17	I	30 h	4615.69	I	10	409.614	IV
95	16060.03	I	100	2069.85	I	80	4620.04	II	15	410.372	IV
110	19722.50	I	80 r	2113.82	II	50	4620.46	II	10	411.334	IV
<i>Silver Ag Z = 47</i>			60	2145.60	II	60 h	4668.48	I	13	412.242	IV
25	730.83	II	600	2161.89	III	30 h	4677.60	I	11	1582.18	IV
30	752.80	II	50	2186.76	II	100	4788.40	II	11 d	1583.98	IV
400	799.41	III	60	2229.53	II	30 h	4847.82	I	12	1584.14	IV
15	1005.32	II	100 r	2246.43	II	100	4874.10	I	12 d	1587.05	IV
10	1065.49	II	500	2246.51	III	80	5027.35	II	11	1615.92	IV
12	1072.23	II	75 r	2248.74	II	1000	5209.08	I	12	1618.57	IV
250	1074.22	II	75	2280.03	II	1000	5465.50	I	11	1655.47	IV
150	1107.03	II	30 h	2309.56	I	100	5471.55	I	15 c	1701.97	IV
150	1112.46	II	700	2310.04	III	100	5667.34	I	20 d	1887.47	III
60	1195.83	II	70 r	2317.05	II	10 h	6268.50	I	12	1960.76	IV
50	1223.33	II	80 r	2320.29	II	320	7687.78	I	11	1965.08	IV
50	1240.80	II	70 r	2324.68	II	25	8005.4	II	12 d	2106.33	IV
50	1246.87	II	80 r	2331.40	II	500	8273.52	I	30	2230.33	III
55	1256.81	II	70	2357.92	II	25	8403.8	II	16	2232.19	III
55	1257.55	II	50 h	2375.02	I	30 h	8645.70	I	20 h	2246.70	III
50	1266.63	II	75	2411.41	II	10 h	8704.85	I	300	2315.65	II
70	1273.67	II	90 r	2413.23	II	12	8747.6	II	18	2386.99	III
65	1297.51	II	100 r	2437.81	II	15	9000.9	II	17	2394.03	III
85	1311.20	II	80	2447.93	II	10	12551.0	I	300	2420.99	II
55	1313.81	II	80	2473.84	II	60	16819.5	I	300	2424.73	II
50	1314.61	II	60	2506.63	II	20	17416.7	I	25	2459.31	III
60	1323.84	II	50 h	2575.63	I	15	18307.9	I	18	2468.85	III
60	1342.09	II	60	2660.49	II	15	18382.3	I	20	2474.73	III
50	1342.57	II	60	2721.77	I	<i>Sodium Na Z = 11</i>					
70	1346.62	II	75	2767.54	II	7	142.232	IV	1000	2493.15	II
50	1353.54	II	100 h	2824.39	I	8	146.064	IV	25	2497.03	III
150	1364.50	II	30 h	3130.02	I	8	150.298	IV	17	2510.26	III
100	1396.00	II	90	3180.70	II	9	150.687	IV	20	2543.84	I
100	1410.93	II	100	3267.35	II	8	155.510	IV	10	2543.87	I
90	1419.72	II	55000 r	3280.68	I	8	155.510	IV	70	2593.87	I
						8	156.537	IV	35	2593.92	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
850	2611.81	II	20	4747.941	I	1875	491.79	III	40	5257.71	III
850	2661.00	II	30	4751.822	I	1250	507.04	III	40	5443.48	III
1000	2671.83	II	200	4978.541	I	3750	514.38	III	1500	5450.84	I
200	2680.34	I	400	4982.813	I	10	517.28	V	7000	5480.84	I
100	2680.43	I	40	5148.838	I	2500	562.75	III	3500	5504.17	I
1000	2841.72	II	80	5153.402	I	25	578.01	V	2600	5521.83	I
400	2852.81	I	280	5682.633	I	30	624.93	V	2000	5534.81	I
200	2853.01	I	70	5688.193	I	25	642.23	V	2000	5540.05	I
2	2893.62	I	560	5688.205	I	50	649.21	V	1000	6380.75	I
1100	2904.92	II	80000	5889.950	I	25	660.94	V	900 h	6386.50	I
1100	2917.52	II	40000	5895.924	I	200	664.43	IV	600 h	6388.24	I
1100	2919.05	II	120	6154.225	I	35	686.23	V	9000	6408.47	I
1200	2919.85	II	240	6160.747	I	100	710.35	IV	5500	6504.00	I
1300	2920.95	II	130	6530.70	II	12	747.82	V	1000	6546.79	I
1000	2923.49	II	130	6544.04	II	50	1025.23	III	1700	6550.26	I
1200	2951.24	II	130	6545.75	II	35	1125.49	III	3000	6617.26	I
1100	2952.40	II	20	7373.23	I	50	1236.23	III	1800	6791.05	I
1000	2977.13	II	10	7373.49	I	1400	2152.84	II	4800	6878.38	I
1100	2979.66	II	50	7809.78	I	1400	2165.96	II	1200	6892.59	I
1100	2980.63	II	25	7810.24	I	100	2273.71	III	5500	7070.10	I
1300	2984.19	II	4400	8183.256	I	100	2340.13	III	2500	7309.41	I
1700	3124.42	II	800	8194.790	I	50	2346.97	IV	500	7621.50	I
2500	3135.48	II	8800	8194.824	I	160	2428.10	I	400 h	7673.06	I
1700	3137.86	II	100	8649.92	I	100	2486.52	III	200 h	8422.80	I
2000	3149.28	II	60	8650.89	I	40	2555.60	IV	120	8505.69	II
2000	3163.74	II	25	8942.96	I	40	2571.04	IV	200	8688.91	II
1000	3179.06	II	40	9153.88	I	100	3002.61	III	100	9294.10	I
1700	3189.79	II	60	9465.94	I	200	3012.32	III	400 h	9448.95	I
1600	3212.19	II	80	9961.28	I	10	3019.29	IV	600	9596.00	I
1500	3257.96	II	20	10566.00	I	100	3021.73	III	300	9624.70	I
1700	3285.60	II	60	10572.28	I	50	3061.43	III	100	9638.10	I
1700	3301.35	II	200	10746.44	I	50	3182.61	III	100 h	9647.70	II
1200	3302.37	I	80	10749.29	I	100	3235.39	III	300	10036.66	II
600	3302.98	I	120	10834.87	I	400	3351.25	I	1000	10327.31	II
1500	3304.96	II	35	11190.19	I	650	3380.71	II	200	10914.88	II
1000	3318.04	II	50	11197.21	I	50	3430.76	III	700	11241.25	I
50	3426.86	I	400	11381.45	I	950	3464.46	II	100	12014.76	II
1500	3533.05	II	1000	11403.78	I	600	3969.26	I	60	12445.90	II
1200	3631.27	II	400	12679.17	I	1300	4030.38	I	40	12495.00	I
6	4238.99	I	60	14767.48	I	46000	4077.71	II	75	12974.70	II
10	4242.08	I	100	14779.73	I	32000	4215.52	II	100	13123.80	II
1	4249.41	I	60	16373.85	I	9	4298.57	IV	50	17447.40	I
2	4252.52	I	100	16388.85	I	340	4305.45	II	230	20261.40	I
15	4273.64	I	400	18465.25	I	65000	4607.33	I	120	20700.70	I
20	4276.79	I	50	22056.44	I	9	4685.08	IV	30	26023.60	I
2	4287.84	I	25	22083.67	I	3200	4722.28	I			
3	4291.01	I	60	23348.41	I	2200	4741.92	I	<i>Sulfur S Z = 16</i>		
30	4321.40	I	100	23379.13	I	1400	4784.32	I	5	437.4	V
40	4324.62	I				4800	4811.88	I	5	438.2	V
3	4341.49	I	<i>Strontium Sr Z = 38</i>			3600	4832.08	I	5	439.6	V
5	4344.74	I	15	298.12	IV	3000	4872.49	I	20	519.3	IV
40	4390.03	I	15	300.12	IV	2000	4876.32	I	20	520.1	IV
60	4393.34	I	125	330.67	III	1000	4891.98	I	40	520.8	IV
5	4419.88	I	500	351.62	III	8000	4962.26	I	20	522.0	IV
8	4423.25	I	75	358.80	III	1300	4967.94	I	20	522.5	IV
60	4494.18	I	250	363.49	III	800 h	5156.07	I	20	551.2	IV
100	4497.66	I	150	371.21	III	1400	5222.20	I	40	652.5	IV
10	4541.63	I	20	378.53	IV	2000	5225.11	I	40	653.0	IV
15	4545.19	I	75	392.44	IV	2000	5229.27	I	70	653.6	IV
120	4664.811	I	50	393.00	IV	2800	5238.55	I	40	654.0	IV
200	4668.560	I	50	396.22	IV	4800	5256.90	I	70	655.6	IV
			1000	437.24	III				20	655.9	IV

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
110	657.3	IV	355	1316.542	I	285	3902.0	I	160	9035.9	I
40	658.3	V	290	1316.618	I	160	3928.6	III	450	9212.9	I
70	659.8	V	375	1323.515	I	360	3933.3	II	450	9228.1	I
40	660.9	IV	355	1326.643	I	450	4120.8	I	450	9237.5	I
160	661.4	IV	775	1381.552	I	280	4142.3	II	285	9413.5	I
110	663.2	V	710	1385.510	I	360	4145.1	II	285	9421.9	I
40	663.7	IV	960	1388.435	I	450	4153.1	II	285	9437.1	I
40	664.8	IV	640	1389.154	I	450	4162.7	II	650	9649.9	I
70	666.1	IV	775	1392.588	I	360	4253.6	III	450	9672.3	I
20	678.1	V	1000	1396.112	I	450	4694.1	I	450	9680.8	I
40	680.3	V	300	1409.337	I	285	4695.4	I	450	9693.7	I
110	680.9	V	510	1425.030	I	160	4696.2	I	285	9697.3	I
40	681.6	V	425	1433.280	I	280	4716.2	II	285	9739.7	I
20	693.5	V	300	1436.968	I	450	4815.5	II	285	9932.3	I
70	729.5	III	300	1448.229	I	360	4924.1	II	285	9949.8	I
110	732.42	III	425	1472.972	I	450	4925.3	II	285	9958.9	I
70	735.2	III	550	1473.995	I	285	4993.5	I	285	10455.5	I
70	738.5	III	300	1474.380	I	360	5428.6	II	285	10459.5	I
110	744.9	IV	355	1481.665	I	650	5432.8	II			
110	748.4	IV	485	1483.039	I	1000	5453.8	II	<i>Tantalum Ta Z = 73</i>		
110	750.2	IV	300	1483.233	I	1000	5473.6	II	60	493.07	V
110	753.8	IV	330	1485.622	I	1000	5509.7	II	1000	890.87	V
285	786.5	V	390	1487.150	I	280	5564.9	II	500	947.30	V
70	789.0	III	20	1624.0	IV	1000	5606.1	II	67	999.34	IV
70	796.7	III	20	1629.2	IV	450	5640.0	II	79	1116.10	IV
70	800.5	IV	680	1666.688	I	450	5640.3	II	78	1136.17	IV
70	804.0	IV	640	1687.530	I	280	5647.0	II	85	1175.51	IV
70	809.7	IV	710	1807.311	I	650	5659.9	II	80	1189.28	IV
110	816.0	IV	680	1820.343	I	450	5664.7	II	80	1192.67	IV
70	824.9	III	640	1826.245	I	160	5706.1	I	85	1213.09	IV
70	836.3	III	710	1900.286	I	450	5819.2	II	500	1213.42	V
160	849.2	V	550	1914.698	I	450	6052.7	I	85	1215.53	IV
110	852.2	V	20	2387.0	IV	280	6286.4	II	90	1223.73	IV
220	854.8	V	40	2398.9	IV	450	6287.1	II	88	1238.12	IV
110	857.9	V	110	2460.5	III	450	6305.5	II	95	1240.06	IV
110	860.5	V	110	2489.6	III	450	6312.7	II	87	1258.34	IV
40	906.9	II	160	2496.2	III	280	6384.9	II	94	1264.91	IV
40	910.5	II	160	2499.1	III	280	6397.3	II	98	1272.42	IV
40	912.7	II	220	2508.2	III	280	6398.0	II	94	1275.48	IV
40	937.4	II	70	2636.9	III	360	6413.7	II	86	1275.94	IV
40	937.7	II	220	2665.4	III	160	6743.6	I	92	1308.51	IV
160	1062.7	IV	110	2691.8	III	285	6748.8	I	87	1315.58	IV
160	1073.0	IV	110	2702.8	III	450	6757.2	I	92	1332.38	IV
70	1073.5	IV	220	2718.9	III	450	7579.0	I	86	1343.30	IV
285	1077.1	III	110	2721.4	III	450	7629.8	I	92	1365.88	IV
40	1102.3	II	220	2726.8	III	285	7686.1	I	5000	1392.56	V
70	1194.0	III	220	2731.1	III	450	7696.7	I	91	1398.78	IV
70	1201.0	III	110	2741.0	III	1000	7924.0	I	93	1413.40	IV
40	1234.1	II	285	2756.9	III	160	7928.8	I	91	1454.32	IV
40	1250.5	II	110	2775.2	III	285	7930.3	I	92	1464.41	IV
110	1253.8	II	160	2785.5	III	450	7931.7	I	93	1469.82	IV
110	1259.5	II	110	2863.5	III	450	7967.4	I	90	1495.25	IV
275	1270.782	I	160	2904.3	III	450	7967.4	II	95	1514.19	IV
250	1277.216	I	160	2986.0	III	450	8314.7	I	85	1607.70	IV
280	1295.653	I	110	3097.5	IV	450	8314.7	II	7000	1709.10	V
275	1302.337	I	110	3497.3	III	450	8585.6	I	85	1712.16	IV
235	1302.863	I	160	3632.0	III	285	8680.5	I	85	1716.13	IV
235	1303.110	I	110	3709.4	III	450	8694.7	I	85	2055.75	IV
245	1303.430	I	160	3717.8	III	360	8874.5	I	1100	2140.13	II
260	1305.883	I	160	3838.3	III	110	8882.5	I	1500	2146.87	II
265	1310.194	I	285	3867.6	I	220	8884.2	I	1200	2182.71	II
									1100	2193.88	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1500	2196.03	II	770	2775.88	I	200	5037.37	I	75	7006.96	I
90	2199.58	IV	680	2796.34	I	100	5067.87	I	150	7148.63	I
1500	2199.67	II	680	2797.76	II	110	5115.84	I	110	7172.90	I
90	2207.64	IV	510	2806.58	I	100	5141.62	I	140	7301.74	I
1400 d	2210.03	II	640	2844.25	I	100	5143.69	I	160	7346.41	I
1400	2239.48	II	560	2848.52	I	330	5156.56	I	140 c	7352.86	I
1200	2250.76	II	1500	2850.49	I	110	5212.74	I	100	7356.96	I
840	2261.42	II	1900	2850.98	I	110 d	5218.45	I	90 cw	7369.09	I
990	2262.30	II	360	2861.98	I	140	5341.05	I	160	7407.89	I
990	2272.59	II	470	2871.42	I	200	5402.51	I	100	7882.37	I
790	2285.25	II	380	2880.02	I	130	5419.19	I	75	8026.50	I
600	2286.59	II	770	2891.84	I	90	5518.91	I	75	8281.62	I
990	2289.16	II	560	2902.05	I	150	5645.91	I			
440	2302.24	II	310	2915.49	I	130	5664.90	I	<i>Technetium Tc Z = 43</i>		
440	2302.93	II	410	2925.19	I	130	5776.77	I	10000 c	3636.07	I
440	2312.60	II	310	2932.70	I	90	5780.71	I	20000 c	4031.63	I
420	2315.46	II	1700	2933.55	I	130	5811.10	I	15000	4095.67	I
690	2331.98	II	470	2940.06	I	240	5877.36	I	20000	4262.27	I
550	2332.19	II	1200	2940.22	I	130	5882.30	I	30000	4297.06	I
250	2357.30	I	510	2951.92	I	90	5901.91	I	20000	4853.59	I
260	2361.09	I	340	2953.56	I	90	5918.95	I	<i>Tellurium Te Z = 52</i>		
600	2364.24	II	1500	2963.32	I	130	5939.76	I	8	802.28	II
320	2371.58	I	770	2965.13	II	240	5944.02	I	8	1059.51	II
1400	2387.06	II	770	2965.54	I	190 c	5997.23	I	8	1077.66	II
2400	2400.63	II	340	2969.47	I	100	6020.72	I	10	1161.42	II
320	2416.89	II	430	2975.56	I	250	6045.39	I	10	1174.34	II
360	2427.64	I	1800	3012.54	II	100	6047.25	I	12	1175.79	II
360	2429.71	II	290 d	3027.48	I	100	6101.58	I	9	1208.54	II
480	2432.70	II	530	3049.56	I	65	6144.56	I	9	1220.98	II
380	2470.90	II	530	3069.24	I	130	6154.50	I	9	1253.62	II
600	2474.62	I	360	3077.24	I	150	6256.68	I	9	1270.52	II
500	2484.95	I	560	3103.25	I	150	6268.70	I	10	1324.92	II
600	2488.70	II	380	3124.97	I	150	6309.58	I	9	1363.24	II
500	2490.46	I	380	3130.58	I	75	6325.08	I	8	1366.73	II
600	2504.45	I	270	3132.64	I	65	6341.17	I	10	1374.80	II
600	2507.45	I	320	3170.29	I	75	6356.16	I	10	1608.41	II
1200 d	2526.35	I	270	3173.59	I	65	6360.84	I	10	1613.15	II
600	2532.12	II	600	3180.95	I	90	6389.45	I	5	1655.4	I
1200	2559.43	I	300	3223.83	I	65	6428.60	I	5	1688.5	I
460	2562.10	I	1100	3311.16	I	250	6430.79	I	6	1700.0	I
600	2577.37	II	680	3318.84	I	200	6450.36	I	5	1708.0	I
600	2603.49	II	330 d	3330.99	II	380	6485.37	I	10	1822.4	I
1400	2608.63	I	640	3371.54	I	65	6505.52	I	26000	2002.02	I
1200	2635.58	II	360	3385.05	I	100	6514.39	I	6500	2081.16	I
860	2636.90	I	450	3406.94	I	100	6516.10	I	18000	2142.81	I
2400	2647.47	I	490	3480.52	I	100	6574.84	I	3200	2147.25	I
2600	2653.27	I	380	3497.85	I	110	6611.95	I	500	2259.02	I
1900	2656.61	I	490	3511.04	I	75	6621.30	I	1200	2383.26	I
1500	2661.34	I	750	3607.41	I	100	6673.73	I	1500	2385.78	I
770	2675.90	II	980	3626.62	I	180	6675.53	I	50	2438.69	II
1500	2685.17	II	500	3642.06	I	75 c	6740.73	I	120	2530.72	I
470	2694.52	II	210	3918.51	I	75	6771.74	I	100	2649.66	II
1000	2698.30	I	210	3970.10	I	160 c	6813.25	I	80	2661.10	II
1200	2710.13	I	210	3996.17	I	210	6866.23	I	110	2677.13	I
2600	2714.67	I	410	4061.40	I	180	6875.27	I	100	2858.29	II
470	2727.44	II	310	4067.91	I	150	6902.10	I	150	2895.41	II
1200	2748.78	I	300	4205.88	I	140	6927.38	I	70	2967.29	II
860	2749.83	I	360 c	4510.98	I	140	6928.54	I	70	3047.00	II
410	2752.49	II	340	4574.31	I	65	6951.26	I	100	3175.14	I
1000	2758.31	I	260	4619.51	I	180	6966.13	I	60	3256.80	II
430	2761.68	II	450	4681.88	I	110 d	6995.22	I	60	3329.22	II

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
150	3406.79	II	689	9956.30	I	810 d	3472.79	II	390	4196.74	I
50	3442.25	II	325	9977.13	I	810	3500.84	II	650	4203.74	I
50	3521.11	II	5950	10051.41	I	5700	3509.17	II	600	4206.49	I
50	3552.19	II	4097	10091.01	I	1300	3523.66	II	480	4215.09	I
100	3611.78	II	381	10118.08	I	1100	3540.24	II	480	4232.82	I
50	3617.57	II	397	10300.56	I	810	3543.89	II	650	4266.34	I
50	4006.52	II	745	10493.57	I	3200	3561.74	II	760 cw	4278.52	II
70	4127.32	II	1880	10918.34	I	810	3567.35	II	450	4310.42	I
100	4169.77	II	10200	11089.56	I	4200	3568.52	II	2200	4318.83	I
80	4225.73	II	508	11163.74	I	1600	3568.98	II	600	4322.23	I
100	4261.11	II	6620	11487.23	I	1100	3579.20	II	600	4325.83	II
60	4273.43	II	1580	13247.75	I	710	3585.03	II	3000	4326.43	I
80	4285.85	II	1050	14513.51	I	810	3596.38	II	600	4332.12	I
150	4364.00	II	1480	15452.45	I	1600	3600.44	II	870	4336.43	I
75	4385.10	II	2430	15546.23	I	810	3625.54	II	600	4337.64	I
170	4478.63	II	3760	16403.90	I	2300	3650.40	II	1700	4338.41	I
80	4537.07	II	1960	17303.54	I	810	3654.88	II	700	4340.62	I
100	4557.78	II	2780	18291.59	I	2000	3658.88	II	870	4356.81	I
70	4630.62	II	1020	21043.73	I	3800	3676.35	II	330	4382.45	I
100	4641.12	II	464	21602.50	I	810	3682.26	II	300	4388.23	I
180	4654.37	II	74	22555.29	I	450	3693.58	I	260	4390.91	I
200	4686.91	II	38	26539.17	I	450	3700.12	I	350	4423.10	I
100	4696.38	II				4700	3702.86	II	240	4436.12	I
100	4706.53	II	<i>Terbium Tb Z = 65</i>			2400	3703.92	II	240	4448.04	I
100	4766.05	II	1000	1259.40	IV	1000 d	3711.76	II	430	4493.07	I
100	4784.87	II	1000	1327.67	IV	650	3745.04	I	75	4514.31	II
100	4827.14	II	1000	1373.86	IV	870	3747.17	II	110	4549.07	I
150	4831.28	II	5000	1595.39	IV	870	3747.34	II	110	4550.45	I
150	4842.90	II	2000	1633.19	IV	1100	3755.24	II	110	4556.46	I
130	4865.12	II	2000	2027.79	IV	650	3759.35	I	110	4563.69	II
200	4866.24	II	1000	2089.98	IV	1700	3765.14	I	210	4578.69	II
8	5083.0	I	1000	2332.54	IV	2100	3776.49	II	65	4584.84	II
50	5449.84	II	110	2584.61	II	600	3783.53	I	65	4591.56	II
50	5487.95	II	110	2608.57	II	410	3789.92	I	75 d	4626.32	II
150	5576.35	II	130	2628.69	II	760 d	3806.85	II	95	4626.94	II
150	5649.26	II	140	2669.29	II	1500	3830.26	I	65	4632.07	I
100	5666.20	II	190	2704.07	II	540	3833.42	I	65 h	4636.59	I
200	5708.12	II	270	2769.53	II	920 d	3842.50	II	85	4641.00	II
150	5755.85	II	320	2897.44	II	3700	3848.73	II	210	4641.98	II
100	5974.68	II	250	2956.21	II	3500 w	3874.17	II	260 cw	4645.31	II
50	6367.13	II	230	3010.59	II	480	3888.22	I	80	4647.23	I
10 h	6790.0	I	230	3016.18	II	490	3894.64	I	80	4662.79	I
20 h	6837.6	I	460	3053.55	II	2400	3899.20	II	80	4676.90	I
20 h	6854.7	I	460	3070.05	II	1600	3901.33	I	70 c	4681.87	I
15 h	7191.1	I	670	3078.86	II	480	3908.06	I	80	4688.63	II
20 h	7263.5	I	480	3082.36	II	650	3915.43	I	80	4693.11	II
12	7460.98	II	480	3089.58	II	760	3925.45	II	200	4702.41	II
15	7468.75	II	480	3102.96	II	810 d	3939.52	II	110	4707.94	II
15	7921.69	II	440	3139.64	II	2200 d	3976.84	II	80	4739.93	I
15	7943.14	II	480	3187.26	II	1800	3981.87	II	70	4747.80	I
10	7950.34	II	480	3199.56	II	970	4002.59	II	410 cw	4752.53	II
30 h	8061.4	I	1100	3218.93	II	1900	4005.47	II	180	4786.78	I
10	8122.44	II	1200	3219.98	II	760	4012.75	II	100	4813.77	I
20	8186.44	II	480	3252.32	II	870	4032.28	I	80	4875.57	II
15	8273.53	II	760	3280.31	II	2100	4033.03	II	80	4881.15	II
15	8672.95	II	760	3281.40	II	430	4054.12	I	95	4915.90	I
10	8733.81	II	1000	3285.04	II	410	4060.37	I	65	4931.79	I
205	8758.18	I	1500	3293.07	II	1300	4061.58	I	85	4993.82	II
81	9004.37	I	3800	3324.40	II	650	4105.37	I	110	5078.25	I
5660	9722.74	I	760	3349.42	II	1100	4144.41	II	75	5089.12	II
532	9868.92	I	760	3364.93	II	350	4158.53	I	85	5186.13	I
			810	3454.06	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å				
120	5228.12	I	20	1034.73	IV	15	4981.35	II	910	3256.274	II			
75	5248.71	I	20	1036.61	IV	25	5078.54	II	180	3257.366	I			
75 w	5262.11	II	10 r	1049.73	II	25	5152.14	II	910	3262.668	II			
75	5281.05	I	8 r	1050.30	II	18000	5350.46	I	620	3287.789	II			
65	5304.72	I	5 r	1074.97	II	15 d	5384.85	II	910	3291.739	II			
110	5319.23	I	30	1079.68	IV	10	5410.97	II	620	3292.520	II			
65 w	5337.90	I	10 r	1130.17	II	25	5949.48	II	240	3301.650	I			
160	5354.88	I	15 r	1162.55	II	10	6179.98	II	480	3304.238	I			
75	5369.72	I	10 r	1167.43	II	10	6378.32	II	510	3321.450	II			
75	5375.98	I	10 r	1183.41	II	16 h	6549.84	I	840	3325.120	II			
50	5424.10	II	12 r	1194.84	II	10	6966.5	II	250	3330.476	I			
55	5459.81	I	5 r	1246.00	II	10	7815.80	I	620	3334.604	II			
55	5509.61	I	10	1266.33	III	20	8373.6	I	620	3337.870	II			
50	5514.54	I	15 r	1307.50	II	10	8474.27	I	310	3348.768	I			
65	5524.12	I	8 r	1310.20	II	10	8664.1	II	980	3351.228	II			
85 c	5747.58	I	25 r	1321.71	II	20	9130.	II	620	3358.602	II			
75	5795.64	I	8 r	1330.40	II	20	9130.5	I	250	3374.974	I			
75	5803.13	II	10 r	1373.52	II	40	9509.4	I	1300	3392.035	II			
65	5815.36	I	10	1477.14	III	20	9930.4	I	200	3396.727	I			
65	5851.07	I	8 r	1489.65	I	30	10011.9	I	250	3398.544	I			
65	5870.62	I	10 r	1499.30	II	40	10488.80	I	200	3405.558	I			
65 c	5920.78	I	10 r	1507.82	II	1000	11512.82	I	250	3413.012	I			
75	5967.34	II	15 r	1561.58	II	150	12736.4	I	390	3421.210	I			
35	6331.68	II	10 r	1568.57	II	700	13013.2	I	270	3423.989	I			
35 cw	6518.68	I	7 r	1593.26	II	<i>Thorium Th Z = 90</i>						980	3433.998	II
35	6581.82	I	5 h	1616.	I	150	1707.37	IV	770	3435.976	II			
90	6677.94	II	5	1685.40	I	200	1959.02	IV	1300	3469.920	II			
40 cw	6702.61	I	10 r	1792.76	II	200	2002.34	IV	170	3471.218	I			
130	6794.58	II	12 r	1814.85	II	200	2413.50	III	200	3486.552	I			
55	6896.37	II	25 r	1908.64	II	200	2427.94	III	670	3539.587	II			
45 h	6899.95	I	100 r	2007.56	I	200	2431.68	III	180	3544.018	I			
40	6901.98	I	100 r	2210.71	I	200	2441.24	III	170	3549.595	I			
65	7204.28	I	30	2298.04	II	200	2441.24	III	200	3555.013	I			
40	7257.73	I	140	2315.98	I	500	2565.593	II	530	3559.451	II			
45	7348.88	II	900 h	2379.69	I	480	2692.415	II	200	3576.557	I			
45	7496.12	I	20	2530.86	II	520	2747.156	II	270	3592.780	I			
27 h	7582.03	II	700	2580.14	I	410	2752.166	II	270	3598.120	I			
45	7590.24	I	420	2709.23	I	800	2832.315	II	980	3609.445	II			
65	7596.44	I	4400 d	2767.87	I	1200	2837.295	II	200	3612.427	I			
30	7627.81	I	10	2849.80	II	100	2848.084	I	480	3615.133	II			
30	7737.63	I	2800	2918.32	I	550	2870.406	II	270	3635.943	I			
30	7855.79	II	20	3091.56	II	100	2936.086	I	210	3642.248	I			
27	7927.90	II	15	3185.51	II	100	2943.729	I	170	3649.735	I			
30	8025.42	II	15	3186.56	II	420	3049.092	II	220	3663.202	I			
30	8085.06	II	15	3187.74	II	450	3067.729	II	280	3669.968	I			
65	8194.82	II	1200	3229.75	I	670	3078.828	II	700	3675.567	II			
95	8212.57	I	15	3291.01	II	480	3080.217	II	150	3682.486	I			
40	8450.06	II	15	3369.15	II	510	3108.296	II	170	3692.566	I			
30 h	8511.80	I	9	3456.34	III	100	3116.263	I	180	3698.105	I			
45	8583.45	II	20000	3519.24	I	510	3119.526	II	340	3706.767	I			
30	8603.40	I	5000	3529.43	I	510	3122.963	II	590	3719.435	I			
65	8765.74	II	8	3540.08	II	480	3125.507	II	770	3721.825	II			
<i>Thallium Tl Z = 81</i>			9	3560.68	II	100	3136.216	I	1300	3741.183	II			
10	570.49	IV	12000 w	3775.72	I	420	3139.306	II	310	3747.539	I			
5 r	670.87	II	10	3832.30	II	420	3142.835	II	650	3752.569	II			
15 r	696.30	II	10	3887.15	II	420	3175.726	II	180	3770.056	I			
5 r	709.23	II	7	4109.85	III	1100	3180.193	II	590	3803.075	I			
10 r	817.18	II	6	4269.81	III	770	3188.233	II	450	3828.384	I			
5 r	836.34	II	20	4274.98	II	560	3221.292	II	840	3839.746	II			
8 r	1018.85	II	40	4306.80	II	560	3229.009	II	450	3863.405	II			
30	1028.69	IV	20	4737.05	II	480	3235.84	II	210	3875.374	I			
						590	3238.116	II						

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
340	3895.419	I	40	7191.132	II	1900	3151.04	II	6800	3883.13	I
590	3929.669	II	35	7208.006	I	1500	3157.34	II	1800	3883.44	II
200	3932.911	I	50	7525.508	II	450	3172.65	I	5400	3887.35	I
390	3967.392	I	30	7647.380	I	2300	3172.83	II	440	3896.62	I
200	3972.155	I	30	8330.451	I	1200	3236.81	II	3500	3916.48	I
150	3980.089	I	40	8967.641	I	1600	3240.23	II	1500	3949.27	I
530	3994.549	II	20	9833.42	I	2300	3241.54	II	1500	3958.10	II
220	4008.210	I	20	10726.93	I	320	3246.96	I	1800	3996.52	II
220	4009.056	I	20	10942.24	II	1900	3258.05	II	220	4024.23	I
280	4012.495	I	30	11230.259	I	1600	3266.64	II	380	4044.47	I
4200	4019.129	II	20	11984.67	II	1200	3267.40	II	10000	4094.19	I
250	4030.842	I	20	17208.22	II	1100	3276.81	II	9500	4105.84	I
250	4036.047	I	15	18811.88	I	1200	3283.40	II	1100	4138.33	I
250	4063.407	I	10	22264.35	II	1200	3285.61	II	8800	4187.62	I
700	4086.520	II	<i>Thulium Tm Z = 69</i>			2300	3291.00	II	6000	4203.73	I
700	4094.747	II	5000	2185.94	III	2000	3302.46	II	380	4222.67	I
150	4100.341	I	360	2284.79	II	1200	3309.80	II	3000	4242.15	II
840	4108.421	II	20000	2296.21	III	230	3349.99	I	270	4271.71	I
240	4112.754	I	5000	2305.03	III	4000	3362.61	II	150	4298.36	I
280	4115.758	I	20000	2311.16	III	1700	3397.50	II	2700	4359.93	I
1100	4116.713	II	5000	2312.72	III	850	3410.05	I	1400	4386.43	I
200	4127.411	I	5000	2326.19	III	340	3412.59	I	200	4394.42	I
200	4134.067	I	6000	2328.50	III	340	3416.59	I	140	4396.50	I
450	4149.986	II	6000	2329.29	III	6400	3425.08	II	120	4454.03	I
620	4178.060	II	3000	2331.80	III	340	3429.33	I	540	4481.26	II
620	4208.890	II	3000	2357.05	III	4900	3441.50	II	150	4519.60	I
110	4253.538	I	4000	2406.63	III	4900	3453.66	II	260	4522.57	II
110	4260.333	I	450	2409.02	II	8500	3462.20	II	110	4548.60	I
480	4277.313	II	450	2426.17	II	210	3467.51	I	270	4599.02	I
700	4282.042	II	770	2480.13	II	340	3476.69	I	300	4615.94	II
130	4337.277	I	30000	2489.44	III	340	3480.98	I	80	4626.33	II
1300	4381.860	II	2000	2504.71	III	420	3487.38	I	95	4626.56	II
1100	4391.110	II	1300	2509.08	II	340	3499.95	I	110	4634.26	II
110	4498.940	I	3000	2519.78	III	250	3517.60	I	120	4655.09	I
280	4510.527	II	130	2527.02	I	1700	3535.52	II	160	4681.92	I
90	4723.438	I	10000	2552.46	III	420	3537.91	I	120	4691.11	I
50	4840.843	I	360	2552.76	I	210	3555.82	I	110	4724.26	I
280	4863.163	II	540	2561.65	II	340	3560.92	I	680	4733.34	I
260	5017.255	II	430	2588.27	II	420	3563.88	I	70	4759.90	I
110	5067.974	I	170 h	2596.49	I	1300	3566.47	II	80	4831.20	II
120	5148.211	II	810	2607.06	II	420	3567.36	I	140	4957.18	I
95	5216.596	II	730	2624.33	II	280	3586.07	I	160	5009.77	II
110	5231.160	I	5000	2682.32	III	2100	3608.77	II	160	5034.22	II
95	5247.654	II	2000	2707.03	III	1000	3629.09	III	150	5060.90	I
60	5343.581	I	3000	2719.47	III	380	3638.41	I	95	5113.97	I
60	5587.026	I	540	2721.19	II	1100	3668.09	II	80	5213.38	I
95	5707.103	II	3000	2724.44	III	4800	3700.26	II	650	5307.12	I
70	5760.551	I	4000	2727.56	III	3800	3701.36	II	80	5346.49	II
85	5989.044	II	680	2794.60	II	7700	3717.91	I	270	5631.41	I
60	6169.822	I	730	2797.27	II	2400	3734.12	II	520	5675.84	I
50	6182.622	I	2000	2806.77	III	5000	3744.06	I	40	5684.76	II
50	6274.116	II	580	2827.92	II	1700	3751.81	I	35	5709.97	II
50	6274.117	II	200	2854.17	I	6000	3761.33	II	190	5764.29	I
50	6355.911	II	1600	2869.23	II	4800	3761.91	II	35	5838.76	II
60	6457.283	I	1000	2947.72	III	7100	3795.75	II	240	5895.63	I
50	6462.614	I	490	2973.22	I	770	3798.54	I	140	5971.26	I
50 h	6531.342	I	1000	2998.28	III	600	3807.72	I	200	6460.26	I
55	6989.656	I	1500	3015.30	II	290	3826.39	I	95	6604.96	I
30	7045.795	II	360	3081.12	I	1300	3838.20	II	110	6779.77	I
30	7084.171	I	7400	3131.26	II	290	3840.87	I	120	6844.26	I
30	7168.896	I	2300	3133.89	II	8900	3848.02	II	80	6845.76	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
10	6937.37	I	120 r	1823.00	I	110	3330.62	I	15	498.26	V
10	7017.90	I	9	1831.89	II	60	3351.97	II	14	502.08	V
12	7034.34	I	50 r	1848.75	I	10	3472.46	II	13	526.57	V
10	7106.14	I	200 r	1860.32	I	11	3575.45	II	18	779.07	IV
17	7272.62	I	80	1886.05	I	280 r	3801.02	I	20	1298.66	III
14	7310.51	I	100	1891.40	I	10	5332.36	II	20	1298.97	III
14	7432.18	I	12	1899.91	II	20	5561.95	II	23	1455.19	III
75	7481.08	I	50	1909.30	I	25	5588.92	II	20	1467.34	IV
75	7490.20	I	80	1925.31	I	500	5631.71	I	11	1717.40	V
140	7558.33	I	500	1941.86	III	15	5799.18	II	10	1841.49	V
80	7731.53	I	150	1952.15	I	50	5925.44	I	20	2067.56	IV
40	7856.08	I	50 h	1977.6	I	100	5970.30	I	18	2103.16	IV
55	7927.51	I	80	1984.20	I	150	6037.70	I	180	2273.28	I
110	7930.84	I	50	2040.66	I	250	6069.00	I	190	2279.96	I
95	8017.90	I	50	2054.03	I	100	6073.46	I	190	2305.67	I
27	8472.01	II	70	2058.31	I	400	6149.71	I	22	2413.99	III
			80	2068.58	I	200	6154.60	I	25	2516.05	III
			100	2072.89	I	150	6171.50	I	360	2525.60	II
			100	2073.08	I	100	6310.78	I	24	2527.84	III
			200	2096.39	I	70	6453.50	II	210	2529.85	I
			100	2100.93	I	25	6844.05	II	190	2531.25	II
			100 r	2113.93	I	20	7191.40	II	190	2534.62	II
			50	2121.26	I	10	7387.79	II	130	2535.87	II
			40 r	2148.73	I	13	7741.80	II	23	2540.06	III
			20 r	2151.43	I	100	7754.97	I	24	2563.44	III
			30	2151.54	II	100 h	8030.5	I	23	2565.42	III
			80	2171.32	I	200	8114.09	I	22	2567.56	III
			150 r	2194.49	I	80	8357.04	I	270	2599.92	I
			300 r	2199.34	I	300	8422.72	I	340	2605.15	I
			400 r	2209.65	I	400	8552.60	I	510	2611.28	I
			80 r	2231.72	I	50 h	8681.7	I	300	2619.94	I
			400 r	2246.05	I	50 h	9410.86	I	640	2641.10	I
			60	2251.17	I	80 h	9415.37	I	800	2644.26	I
			400 r	2268.91	I	150	9616.40	I	950	2646.64	I
			200 r	2286.68	I	50	9741.1	I	250	2742.32	I
			600 r	2317.23	I	100 h	9742.8	I	250	2802.50	I
			300 r	2334.80	I	300 h	9805.38	I	190	2841.94	II
			1000 r	2354.84	I	500	9850.52	I	180	2877.44	II
			22	2368.33	II	54	10894.00	I	280	2884.11	II
			100	2408.15	I	70	11191.85	I	450	2912.08	I
			800 r	2421.70	I	56	11277.66	I	340	2928.34	I
			1000 r	2429.49	I	200	11454.59	I	1100	2942.00	I
			15	2448.98	II	200	11616.26	I	1300	2948.26	I
			300	2483.39	I	258	11739.78	I	1600	2956.13	I
			13	2483.48	II	96	11825.18	I	22	2984.75	III
			10	2486.99	II	106	11835.82	I	1300 d	3066.22	II
			200	2495.70	I	254	11932.99	I	1100	3072.97	II
			400	2546.55	I	48	12009.50	I	1600	3075.22	II
			500 r	2571.58	I	111	12313.24	I	2300	3078.64	II
			200	2594.42	I	42	12530.87	I	3600	3088.02	II
			200 r	2661.24	I	42	12536.5	I	720	3119.72	I
			700 r	2706.51	I	89	12888.5	I	500	3161.20	II
			150	2779.81	I	187	12981.7	I	780	3161.77	II
			1400 r	2839.99	I	187	13018.5	I	1000	3162.57	II
			1000 r	2863.32	I	68	13081.5	I	1600	3168.52	II
			700 r	3009.14	I	378	13460.2	I	2400	3186.45	I
			850 r	3034.12	I	144	13608.2	I	1000	3190.87	II
			12	3047.50	II	40	20861.7	I	3100	3191.99	I
			550 r	3175.05	I	4	24738.2	I	3800	3199.92	I
			550 r	3262.34	I				780	3202.54	II
			50	3283.21	II				1100	3217.06	II
						<i>Titanium Ti Z = 22</i>					
						17	252.96	V			

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
1300	3222.84	II	950	3962.85	I	840	5020.03	I	20	8466.87	III
6600	3234.52	II	950	3964.27	I	840	5022.87	I	90	8675.39	I
5200	3236.57	II	4800	3981.76	I	1200	5035.91	I	<i>Tungsten W Z = 74</i>		
4100	3239.04	II	570	3982.48	I	840	5036.47	I	5800	2001.71	II
2600	3241.99	II	5700	3989.76	I	740	5038.40	I	13000	2008.07	II
1200	3248.60	II	7800	3998.64	I	1200	5039.95	I	5100	2009.98	II
1200	3252.91	II	950	4008.93	I	1400	5064.66	I	4100	2010.23	II
1200	3254.25	II	1200	4024.57	I	1100	5173.75	I	4100	2014.23	II
1200	3261.60	II	840	4078.47	I	1300	5192.98	I	7300	2026.08	II
840	3314.42	I	890	4286.01	I	1400	5210.39	I	15000	2029.98	II
2900	3322.94	II	840	4287.40	I	17	5278.12	III	5300	2049.63	II
2100	3329.46	II	950	4289.07	I	20	5398.93	IV	9700	2079.11	II
1800	3335.20	II	840	4290.94	I	340	5512.53	I	6100	2094.75	II
1100	3340.34	II	840	4295.76	I	270	5514.35	I	2100	2118.87	II
5700	3341.88	I	2000	4298.66	I	320	5514.54	I	2400	2121.59	II
4300	3349.04	II	200	4300.05	II	250	5644.14	I	1500	2166.32	II
12000	3349.41	II	2900	4300.56	I	130	5675.44	I	1300	2204.48	II
4100	3354.64	I	4100	4301.09	I	95	5689.47	I	460	2249.80	I
7200	3361.21	II	6000	4305.92	I	95	5715.13	I	510	2277.58	I
1100	3370.44	I	1200	4314.80	I	85	5739.51	I	530 d	2294.49	I
4300	3371.45	I	330	4395.04	II	400	5866.46	I	340	2309.02	I
5700	3372.80	II	890	4427.10	I	230	5899.32	I	440	2313.17	I
2900 d	3377.48	I	230	4443.80	II	120	5918.55	I	460	2321.63	I
1400	3380.28	II	840	4449.15	I	150	5922.12	I	390 d	2326.56	I
5700	3383.76	II	550	4450.90	I	120	5941.76	I	320	2354.61	I
1400	3385.95	I	840	4453.32	I	300	5953.17	I	580	2360.44	I
1400	3387.84	II	950	4455.33	I	200	5965.84	I	850	2363.07	I
1100	3394.58	II	1100	4457.43	I	270	5978.56	I	510	2374.47	I
890	3444.31	II	240	4468.50	II	340	5999.04	I	670	2384.82	I
600	3461.50	II	530	4481.26	I	110	6064.63	I	730	2397.09	II
600	3477.18	II	780	4512.74	I	120	6085.23	I	560	2397.73	I
480	3491.05	II	1000	4518.03	I	120	6091.17	I	560	2397.98	I
890	3504.89	II	1000	4522.80	I	120	6126.22	I	1700 d	2405.58	I
600	3510.84	II	780	4527.31	I	17	6246.65	IV	610	2415.68	I
17	3576.44	IV	6000	4533.24	I	380	6258.10	I	870	2424.21	I
600	3610.16	I	240	4533.97	II	380	6258.70	I	1800	2435.96	I
4800	3635.46	I	3600	4534.78	I	300	6261.10	I	580	2444.06	I
6600	3642.68	I	2400	4535.58	I	55	6546.28	I	780	2451.48	II
7200	3653.50	I	1200	4535.92	I	65	6554.23	I	870	2452.00	I
600	3671.67	I	1200	4536.05	I	75	6556.07	I	630	2454.98	I
3100	3685.20	II	720	4544.69	I	18	6621.58	III	780	2455.51	I
600	3689.91	I	950	4548.77	I	18	6667.99	III	780	2456.53	I
2900	3729.82	I	240	4549.63	II	80	6743.12	I	1100	2459.30	I
3300	3741.06	I	15	4549.84	III	20	7072.64	III	1400	2466.85	I
330	3741.64	II	950	4552.46	I	18	7084.57	III	480	2472.51	I
5200	3752.86	I	720	4555.49	I	260	7209.44	I	1200	2474.15	I
3300	3759.30	II	240	4571.98	II	130	7244.86	I	870	2480.13	I
2900	3761.32	II	15 d	4572.20	III	130	7251.72	I	1500	2481.44	I
840	3786.04	I	950	4617.27	I	120	7344.72	I	480 d	2482.10	I
500	3882.89	I	480	4623.09	I	90	7357.74	I	580	2484.74	I
530	3900.54	II	720	4656.47	I	60	7364.11	I	390	2487.50	I
2600	3904.78	I	840	4667.59	I	60	7978.88	I	390	2489.23	II
500	3913.46	II	950	4681.92	I	55	8024.84	I	630	2495.26	I
500	3914.34	I	470	4840.87	I	75	8364.24	I	680	2504.70	I
15	3915.47	III	400	4885.08	I	100	8377.85	I	75	2510.47	II
1100	3924.53	I	380	4899.91	I	100	8382.54	I	310	2520.46	I
890	3929.88	I	5800	4981.73	I	75	8396.87	I	780	2521.32	I
1100	3947.78	I	4600	4991.07	I	120	8412.36	I	270	2522.04	II
4500	3948.67	I	4000	4999.51	I	170	8426.52	I	780	2523.41	I
4500	3956.34	I	3600	5007.21	I	490	8434.94	I	430	2527.76	I
5200	3958.21	I	3200 d	5014.19	I	240	8435.70	I	780	2533.64	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		
1200	2547.14	I	440	3046.44	I	2200	4302.11	I	580	2931.41	II	
780	2550.38	I	810	3049.69	I	200	4378.48	I	530 p	2940.37	II	
2700	2551.35	I	180	3073.28	I	180	4384.85	I	1300	2941.92	II	
730	2561.97	I	180 d	3084.83	I	200	4408.28	I	830	2943.90	II	
870	2580.49	I	370	3093.50	I	640	4484.19	I	580	2956.06	II	
390	2584.39	I	240	3107.23	I	170	4588.73	I	580	2967.94	II	
390	2589.17	II	240	3108.02	I	640	4659.87	I	580	2971.06	II	
370	2601.96	I	230	3117.57	I	640	4680.51	I	530	2984.61	II	
680	2606.39	I	260	3120.18	I	790	4843.81	I	630	3022.21	II	
370	2608.32	I	290	3163.42	I	380	4886.90	I	630	3031.99	II	
970	2613.08	I	320	3176.60	I	220	4982.59	I	580	3050.20	II	
480	2613.82	I	190	3181.82	I	820	5053.28	I	630	3057.91	II	
400	2620.25	I	390	3191.57	I	770	5224.66	I	630	3062.54	II	
400	2622.21	I	390	3198.84	I	220	5514.68	I	580	3072.78	II	
400	2625.22	I	520	3207.25	I	65	5648.37	I	580	3093.01	II	
400	2632.48	I	1000	3215.56	I	55	5735.09	I	580	3102.39	II	
400	2632.70	I	190	3232.49	I	45	5804.85	I	970	3111.62	II	
810	2633.13	I	210	3254.36	I	40	5902.64	I	530	3119.35	II	
400 d	2638.62	I	210	3259.66	I	55	5947.57	I	680	3124.95	II	
650	2646.18	I	210 d	3266.62	I	55	5965.86	I	530	3139.61	II	
400	2646.73	I	730	3300.82	I	55	6012.78	I	680	3149.24	II	
1600	2656.54	I	440	3311.38	I	40	6021.52	I	530	3153.11	II	
810	2662.84	I	440	3326.20	I	45	6292.02	I	730	3229.50	II	
810	2671.47	I	440	3331.69	I	35	6404.21	I	680	3232.16	II	
650	2677.28	I	390	3373.75	I	40	6445.12	I	730	3291.33	II	
2100	2681.42	I	230	3429.59	I	17	6611.62	I	1100	3305.89	II	
650	2695.67	I	240	3443.00	I	13	6678.42	I	730	3390.38	I	
650	2699.59	I	400	3495.24	I	15	6693.08	I	580	3424.56	II	
400	2700.01	I	650	3545.22	I	13	6984.27	I	580	3435.49	I	
400	2706.58	I	240	3570.65	I	15	7140.52	I	630	3466.30	I	
400	2708.59	I	1900	3617.52	I	9	7162.64	I	680	3482.49	II	
400 d	2708.80	I	650	3682.08	I	11	7200.16	I	1600	3489.37	I	
400	2715.50	I	400	3683.30	I	10	7278.24	I	530	3496.41	II	
2100	2718.91	I	570	3688.06	I	15	7285.81	I	630	3500.08	I	
2600	2724.35	I	810	3707.92	I	15	7296.55	I	780	3507.34	I	
400	2725.03	I	510	3757.92	I	10	7509.00	I	1600	3514.61	I	
650	2748.84	I	680	3760.13	I	17	7569.92	I	630	3533.57	II	
400	2762.34	I	1000	3768.45	I	17	7614.15	I	530	3540.47	II	
400	2764.27	II	340	3773.71	I	13	7688.97	I	1200	3550.82	II	
400	2769.74	I	1000	3780.77	I	11	7784.15	I	680	3555.32	I	
810	2770.88	I	290	3809.22	I	22	8017.19	I	1200	3561.80	I	
810	2774.00	I	190	3810.38	I	22	8055.64	I	2300	3566.59	I	
810	2774.48	I	260	3810.79	I	13	8123.82	I	530	3569.08	I	
810	2792.70	I	1400	3817.48	I	10	8338.08	I	630	3578.72	II	
400	2799.93	I	1100	3835.06	I	27	8585.11	I	3200	3584.88	I	
810	2818.06	I	730	3846.22	I	10	8594.42	I	840	3638.20	I	
1600	2831.38	I	1800	3867.99	I	13	8865.53	I	2800	3670.07	II	
810	2833.63	I	730	3881.41	I	<i>Uranium U Z = 92</i>				1100	3701.52	II
810	2848.02	I	8600	4008.75	I	440	2565.41	II	600	3738.04	II	
1500	2896.44	I	540	4015.22	I	610	2635.53	II	680	3746.42	II	
690	2935.00	I	910	4045.59	I	830	2793.94	II	950	3748.68	II	
2400	2944.40	I	730	4069.95	I	870	2802.56	II	600	3751.17	I	
2400	2946.99	I	5000	4074.36	I	630	2807.05	II	1900	3782.84	II	
730 d	2979.71	I	1000	4102.70	I	630	2817.96	II	570	3793.10	II	
360	3013.79	I	540	4137.46	I	630	2817.96	II	1900	3811.99	I	
520	3016.47	I	450	4171.17	I	870	2821.12	II	750	3826.51	II	
770	3017.44	I	220	4207.05	I	680	2828.90	II	2000	3831.46	II	
210	3024.93	I	250	4219.37	I	920	2832.06	II	1200	3839.63	I	
310 d	3026.67	I	540	4244.36	I	970	2865.68	II	2400	3854.64	II	
440 d	3041.73	I	1400	4269.38	I	1200	2889.62	II	4900	3859.57	II	
270	3043.80	I	4100	4294.61	I	780	2906.80	II	1900	3865.92	II	
						780	2908.28	II				

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
100 I	5494.86	II	200	6528.65	II	300	8739.39	I	500	30794.18	I
40	5524.4	III	100	6533.16	I	100	8758.20	I	6000	31069.23	I
200	5525.53	II	1000	6595.01	II	5000	8819.41	I	125	31336.01	I
600	5531.07	II	100	6595.56	I	300	8862.32	I	550	31607.91	I
100	5566.62	I	400	6597.25	II	200	8908.73	I	100	32293.08	I
300	5616.67	II	100	6598.84	II	200	8930.83	I	1800	32739.26	I
300	5659.38	II	150	6668.92	I	1000	8952.25	I	3500	33666.69	I
600	5667.56	II	300	6694.32	II	100	8981.05	I	150	34014.67	I
150	5670.91	II	200	6728.01	I	200	8987.57	I	450	34335.27	I
100	5695.75	I	150	6788.71	II	400	9045.45	I	170	34744.00	I
200	5699.61	II	100	6790.37	II	500	9162.65	I	5000	35070.25	I
200	5716.10	II	1000	6805.74	II	100	9167.52	I	110	35246.92	I
500	5726.91	II	200	6827.32	I	100	9374.76	I	250	36209.21	I
500	5751.03	II	100	6872.11	I	200	9513.38	I	150	36231.74	I
300	5758.65	II	300	6882.16	I	50 h	9591.35	II	450	36508.36	I
300	5776.39	II	80	6910.22	II	150	9685.32	I	850	36788.83	I
100	5815.96	II	100	6925.53	I	50 I	9698.68	II	140	38685.98	I
300	5823.89	I	800 h	6942.11	II	100	9718.16	I	175	38737.82	I
150	5824.80	I	100	6976.18	I	2000	9799.70	I	270	38939.60	I
100	5875.02	I	2000	6990.88	II	3000	9923.19	I	120	39955.14	I
300	5893.29	II	150	7082.15	II	100	10838.37	I	<i>Ytterbium Yb Z = 70</i>		
100	5894.99	I	500	7119.60	I	90	11742.01	I	1000	1050.24	IV
200	5905.13	II	50 s	7147.50	II	375	12235.24	I	1000	1054.46	IV
100	5934.17	I	200	7149.03	II	100	12257.76	I	5000	1134.43	IV
500	5945.53	II	500	7164.83	II	300	12590.20	I	900	1316.04	IV
300	5971.13	II	100	7284.34	II	2500	12623.391	I	800	1326.36	IV
2000	5976.46	II	200	7301.80	II	250	13544.15	I	900	1350.26	IV
200	6008.92	II	200	7339.30	II	2000	13657.055	I	80	1561.42	III
1000	6036.20	II	100	7386.00	I	1250	14142.444	I	80 h	1765.21	III
2000	6051.15	II	150	7393.79	I	800	14240.96	I	800	1791.06	IV
600	6093.50	II	300	7548.45	II	375	14364.99	I	100	1863.32	III
1500	6097.59	II	200	7584.68	I	140	14660.81	I	800	1873.91	III
400	6101.43	II	80	7618.57	II	3000	14732.806	I	500	1898.25	III
100	6115.08	II	500	7642.02	I	100	15099.72	I	500	1998.82	III
100	6146.45	II	100	7643.91	I	2500	15418.394	I	900	2116.65	IV
150	6178.30	I	200	7670.66	II	150	15557.13	I	2500	2116.67	II
120	6179.66	I	60	7787.04	II	250	15979.54	I	800	2123.32	IV
300	6182.42	I	100	7802.65	I	100	16039.90	I	3000	2126.74	II
500	6194.07	II	100	7881.32	I	1000	16053.28	I	800	2139.99	IV
100	6198.26	I	300	7887.40	I	125	16554.49	I	20000	2144.77	IV
60	6205.97	III	500	7967.34	I	1500	16728.15	I	15000	2154.18	IV
100	6220.02	II	100	8029.67	I	1500	17325.77	I	370	2161.60	II
25	6221.7	III	200	8057.26	I	350	18788.13	I	850	2185.71	II
60	6238.2	III	150	8061.34	I	150	20187.19	I	640	2224.46	II
60	6259.05	III	100	8101.98	I	3000	20262.242	I	300	2240.11	III
500	6270.82	II	150 h	8151.80	II	250	21470.09	I	300	2305.32	III
400	6277.54	II	100	8171.02	I	1250	23193.33	I	140	2320.81	II
100	6284.41	II	700	8206.34	I	110	23279.54	I	170	2390.74	II
100	6286.01	I	10000	8231.635	I	1800	24824.71	I	460	2464.50	I
250	6300.86	II	500	8266.52	I	175	25145.84	I	140	2512.06	II
500	6318.06	I	7000	8280.116	I	2000	26269.08	I	270	2538.67	II
400	6343.96	II	2000	8346.82	I	2500	26510.86	I	2000	2567.61	III
600	6356.35	II	100	8347.24	II	250	28381.54	I	1000	2579.57	III
200	6375.28	II	2000	8409.19	I	750	28582.25	I	800	2599.14	III
100	6397.99	II	50 h	8515.19	II	300	29384.41	I	600	2621.11	III
300	6469.70	I	200	8576.01	I	150	29448.06	I	1000	2642.56	III
150	6472.84	I	50 h	8604.23	II	100	29649.58	I	1000	2651.74	III
120	6487.76	I	250	8648.54	I	100	29813.62	I	700	2652.25	III
100	6498.72	I	100	8692.20	I	600	30253.14	I	990	2653.75	II
200 h	6504.18	I	200	8696.86	I	1500	30475.46	I	200	2665.04	II
300	6512.83	II	50 h	8716.19	II	100	30504.12	I	2000	2666.13	III

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
2000	2666.99	III	140	3418.39	I	170	4786.61	II	500	344.59	V
390	2671.96	I	360	3426.04	I	35	4816.43	I	900	355.86	IV
390	2672.66	II	240	3431.11	I	40	4837.46	I	300	370.42	IV
170	2718.35	II	85	3452.40	I	40 h	4894.60	I	300	372.05	V
230	2748.66	II	500	3454.08	II	27	4912.36	I	400	379.96	V
1300	2750.48	II	190 d	3458.29	II	710	4935.50	I	500	386.82	IV
170	2776.28	II	360	3460.27	I	140	4966.90	I	300	403.45	V
600	2795.60	III	2400	3464.37	I	30	5067.80	I	300	420.74	V
1000	2803.43	III	500	3476.30	II	70	5069.14	I	600	425.03	IV
600	2816.92	III	500	3478.84	II	220	5074.34	I	300	473.10	IV
1000	2818.72	III	50	3517.00	I	50	5076.74	I	4000	584.98	V
140	2821.15	II	230	3520.29	II	60	5196.08	I	2000	630.97	V
190	2830.99	II	35	3559.03	I	85	5211.60	I	5000	805.20	III
230 h	2847.18	II	200	3560.33	II	100	5244.11	I	7000	809.92	III
360	2851.13	II	170	3560.70	II	150 h	5277.04	I	15000	989.21	III
430	2859.80	II	360	3585.47	II	170	5335.15	II	25000	996.37	III
140	2861.21	II	200	3619.80	II	30 h	5351.29	I	5000	1314.51	III
200	2867.06	II	240	3637.76	II	150	5352.95	II	4000	1334.04	III
45	2873.49	I	70	3648.15	I	30	5363.66	I	4000	2068.98	III
200	2888.04	II	90	3655.73	I	40	5449.27	II	10000	2127.98	III
3600	2891.38	II	240	3669.69	II	60	5481.92	I	16000	2191.16	III
600	2898.30	III	140	3675.08	II	40	5505.49	I	350	2243.06	II
1000	2906.31	III	32000	3694.19	II	17	5524.54	I	10000	2284.34	III
170	2914.21	II	70	3700.58	I	85 h	5539.05	I	10000	2327.31	III
140	2915.28	II	400	3711.91	III	2400	5556.47	I	50	2354.20	I
280	2919.35	II	180	3734.69	I	60	5651.98	II	50000	2367.23	III
35	2934.36	I	550	3770.10	I	220	5719.99	I	40000	2414.64	III
140	2945.91	II	80	3774.32	I	27	5771.66	II	560	2422.20	II
2000	2970.56	II	60 h	3791.74	I	35	5833.99	II	60	2694.21	I
200	2983.99	II	170	3839.91	I	35	5837.14	II	95	2723.00	I
170	2994.80	II	340	3872.85	I	27	5854.51	I	70	2742.53	I
800	2998.00	III	340	3900.85	I	17	5989.33	I	140	2760.10	I
310	3005.77	II	140	3911.27	I	40	5991.51	II	90000	2817.04	III
160	3017.56	II	500	3931.23	III	60	6152.57	II	45	2822.56	I
160	3026.67	II	32000	3987.99	I	60	6274.78	II	70	2854.43	II
2000	3029.49	III	930	3990.88	I	200	6328.52	III	95	2886.48	I
920	3031.11	II	50	4007.36	I	35 h	6400.35	I	160	2919.05	I
3000	3092.50	III	2000	4028.14	III	35 h	6417.91	I	99000	2946.01	III
28	3100.74	I	70	4052.28	I	340	6489.06	I	390	2948.40	I
170	3107.90	II	440	4089.68	I	180	6667.82	I	350	2964.96	I
190	3117.81	II	470	4149.07	I	25	6727.61	II	480	2974.59	I
4000	3126.01	III	120	4174.56	I	690	6799.60	I	750	2984.26	I
1000	3138.58	III	340	4180.81	II	9 h	7244.41	I	140	2996.94	I
230	3140.94	II	300	4213.64	III	8 h	7305.22	I	130	3021.73	I
28	3162.29	I	150 d	4218.56	II	10 h	7313.05	I	190	3045.37	I
800	3191.35	III	120	4231.97	I	16 h	7350.04	I	95	3095.88	II
390	3192.88	II	70	4277.74	I	25	7448.28	I	110	3173.06	II
240	3201.16	II	120	4305.97	I	30 h	7527.46	I	220	3179.41	II
2000	3228.58	III	60 h	4393.69	I	750	7699.48	I	70	3191.31	I
35	3239.58	I	60 h	4430.21	I	100	7971.46	III	2300	3195.62	II
18000	3289.37	II	440	4439.19	I	70 h	8922.56	II	2200	3200.27	II
130	3305.25	I	85 h	4482.42	I	200	10110.60	III	2200	3203.32	II
140	3305.73	II	100	4517.58	III	100	10830.36	III	3900	3216.69	II
80	3319.41	I	85 h	4563.95	I	<i>Yttrium Y Z = 39</i>			6200	3242.28	II
2000	3325.51	III	640	4576.21	I	150	264.64	IV	4700	3327.89	II
240	3337.17	II	200	4582.36	I	150	273.03	IV	85	3388.59	I
280 d	3342.93	II	70	4589.21	I	900	333.09	V	85	3412.47	I
240	3375.48	II	140	4590.83	I	500	333.80	V	170	3485.73	I
2000	3384.01	III	40	4684.27	I	400	335.14	V	1700	3496.09	II
140	3387.50	I	190	4726.08	II	500	336.62	V	3900	3549.01	II
50	3412.45	I	170 h	4781.87	I	500	339.02	V	130	3551.80	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
540	3552.69	I	300	4487.47	I	160	5706.73	I	100	1767.69	III
170	3558.76	I	500	4505.95	I	90	5743.85	I	100	1797.64	II
190	3571.43	I	890	4527.25	I	75	5765.64	I	100 d	1811.05	II
260	3576.05	I	440	4527.80	I	100	5781.69	II	100 d	1833.57	II
3300	3584.52	II	100	4544.32	I	120	6009.19	I	100	1864.12	II
300	3587.75	I	100	4559.37	I	120	6023.41	I	100	1866.08	II
100	3589.69	I	130	4596.55	I	120	6135.04	I	100	1872.13	II
2800	3592.92	I	95	4604.80	I	150	6138.43	I	100 d	1918.96	II
10000	3600.73	II	2000	4643.70	I	1200	6191.73	I	100 d	1929.67	II
6200	3601.92	II	200 h	4658.32	I	300	6222.59	I	100	1969.40	II
7800	3611.05	II	2000	4674.84	I	1000	6435.00	I	100	1982.11	II
4300	3620.94	I	180	4696.81	I	90	6538.60	I	100	1986.99	II
1900	3628.71	II	170	4728.53	I	70	6557.39	I	500	2025.48	II
7800	3633.12	II	160	4752.79	I	95	6613.75	II	500	2062.00	II
3000	3664.61	II	410	4760.98	I	40	6650.61	I	200	2064.23	II
170	3692.53	I	120	4781.04	I	150	6687.58	I	120	2079.08	I
13000	3710.30	II	170	4786.89	I	70	6700.71	I	300	2099.94	II
1200	3747.55	II	180	4799.30	I	190	6793.71	I	200	2102.18	II
10000	3774.33	II	140	4819.64	I	21	6815.16	I	800 r	2138.56	I
1400	3776.56	II	120	4822.13	I	45	6845.24	I	1000	2501.99	II
7400	3788.70	II	770	4839.87	I	29	6887.22	I	150	2515.81	I
1300	3818.35	II	550	4845.68	I	24 h	6950.31	I	1000	2557.95	II
4000	3832.88	II	410	4852.69	I	24	6979.88	I	300	2582.49	I
80	3876.82	I	120	4854.25	I	29	7052.94	I	200	2608.56	I
480	3878.28	II	890	4854.87	II	35	7191.66	I	300	2608.64	I
4400	3950.36	II	330	4859.84	I	35	7264.17	II	200	2670.53	I
3600	3982.60	II	1900	4883.69	II	50	7346.46	I	300	2684.16	I
940	4039.83	I	95	4893.44	I	29	7450.30	II	300	2712.49	I
2400	4047.64	I	1100	4900.12	II	9000	7558.71	III	200	2756.45	I
9400	4077.38	I	100	4906.11	I	35	7563.13	I	300	2770.86	I
2000	4083.71	I	150	4921.87	I	29	7855.52	I	300	2770.98	I
9900	4102.38	I	120	4974.30	I	110	7881.90	II	400	2800.87	I
8900	4128.31	I	100	5006.97	I	10000	7991.43	III	100	2801.06	I
7500	4142.85	I	75	5070.21	I	24	8344.43	I	200	3035.78	I
100 h	4157.63	I	75	5072.19	I	10000	8796.21	III	200	3072.06	I
2400	4167.52	I	1100	5087.42	II	95	8800.62	I	300	3196.31	II
2000	4174.14	I	180	5135.20	I	19 h	8835.85	II	500 r	3282.33	I
8000	4177.54	II	960	5200.41	II	<i>Zinc Zn Z = 30</i>			800	3302.58	I
160	4217.80	I	1500	5205.72	II	200	425.90	IV	700 r	3302.94	I
280 h	4220.63	I	10000	5238.10	III	200	428.54	IV	800	3345.02	I
600	4235.73	II	180	5240.81	I	200	430.59	IV	500	3345.57	I
2200	4235.94	I	75	5380.62	I	1000	677.63	III	50	3883.34	I
300	4251.20	I	220	5402.78	II	750	677.96	III	300	4680.14	I
360 h	4302.30	I	90	5424.37	I	200	713.90	III	400	4722.15	I
2800	4309.63	II	190	5438.24	I	60	1193.23	II	400	4810.53	I
110	4330.78	I	710	5466.46	I	50	1239.12	IV	800	4911.62	II
440 h	4348.79	I	100	5468.47	I	50	1249.69	IV	500	4924.03	II
120	4357.73	I	240	5497.41	II	500	1265.74	IV	200	5181.98	I
800	4358.73	II	300	5503.45	I	500	1306.66	IV	500	5894.33	II
120	4366.03	I	250	5509.90	II	200	1456.72	III	500	6021.18	II
12000	4374.94	II	120	5521.63	I	200	1459.98	IV	500	6102.49	II
150 h	4375.61	I	740	5527.54	I	300	1499.42	III	500	6214.61	II
100	4387.74	I	120	5544.50	I	300	1500.42	III	1000 h	6362.34	I
1800	4398.02	II	180	5577.42	I	300	1505.92	III	300	7588.5	II
890	4422.59	II	620	5581.87	I	300	1515.85	III	300	7732.5	II
100	4443.66	I	120	5606.33	I	300	1552.30	III	100	11054.25	I
130	4446.63	I	560	5630.13	I	90	1572.99	II	100	13053.63	I
170	4475.72	I	120	5644.69	I	200	1629.19	III	100	13150.59	I
180	4476.96	I	120	5648.47	I	200	1639.33	III	100	14038.70	I
160	4477.45	I	740	5662.94	II	200	1673.05	III	20	16483.45	I
110	4487.28	I	90	5675.27	I	80 d	1735.61	II	20	16491.98	I

Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å		Intensity	Wavelength/Å	
20	16505.23	I	620	2814.90	I	1000	3430.53	II	770	3998.97	II
10	24375.02	I	390	2818.74	II	4700	3438.23	II	400	4023.98	I
<i>Zirconium Zr Z = 40</i>											
500	304.01	V	530	2825.56	II	600	3447.36	I	770	4024.92	I
60	480.66	IV	710	2837.23	I	410	3457.56	II	990	4027.20	I
60	497.23	IV	660	2844.58	II	820	3463.02	II	400	4029.68	II
60	500.22	IV	350	2848.52	I	600	3471.19	I	490	4030.04	I
600	628.66	IV	350	2851.97	II	1200	3479.39	II	400	4035.89	I
500	633.56	IV	340	2869.81	II	1300	3481.15	II	610	4043.58	I
50	690.39	III	490	2875.98	I	4100	3496.21	II	490	4044.56	I
2000	740.61	V	300	2915.99	II	820	3505.67	II	400	4045.61	II
10000	800.00	V	270	2918.24	II	1000	3509.32	I	610	4048.67	II
10000	806.89	V	320	2926.99	II	2000	3519.60	I	770	4055.03	I
10000	812.05	V	320	2948.94	II	440	3525.81	II	600	4055.71	I
3000	841.40	V	320	2955.78	II	440	3533.22	I	1500	4064.16	I
300	863.65	IV	320	2960.87	I	630	3542.62	II	2000	4072.70	I
500	864.59	IV	320	2962.68	II	1800	3547.68	I	240	4078.31	I
9000	1183.97	IV	320	2968.96	II	630	3550.46	I	2000	4081.22	I
9000	1201.77	IV	320	2978.05	II	1800	3551.95	II	400	4121.46	I
10000	1219.86	IV	820	2985.39	I	2100	3556.60	II	1200	4149.20	II
500	1303.93	V	320	3003.74	II	1100	3566.10	I	400	4161.21	II
500 p	1323.81	V	820	3011.75	I	2100	3572.47	II	400	4166.36	I
1000	1469.47	IV	350	3020.47	II	1100	3575.79	I	660	4187.56	I
10000	1546.17	IV	500	3028.04	II	1300	3576.85	II	400	4194.76	I
10000	1598.95	IV	880	3029.52	I	880	3586.29	I	610	4199.09	I
5000	1607.95	IV	350 d	3036.39	II	3500	3601.19	I	610	4201.46	I
100	1612.38	III	690	3054.84	II	690	3611.89	II	610	4208.98	II
700	1725.02	V	690	3106.58	II	1100	3613.10	II	400	4213.86	I
200	1790.19	III	350	3120.74	I	1100	3614.77	II	2000	4227.76	I
150	1793.56	III	500	3129.18	II	1100	3623.86	I	2000	4239.31	I
125	1798.13	III	500	3129.76	II	1100	3663.65	I	770	4240.34	I
600	1860.86	V	350	3132.07	I	390	3671.27	II	770	4241.20	I
200	1940.25	III	690	3138.68	II	800	3674.72	II	1200	4241.69	I
600	2028.54	V	540	3164.31	II	390	3697.46	II	550	4282.20	I
125	2070.43	III	880	3165.97	II	960	3698.17	II	550	4294.79	I
200	2086.78	III	880	3182.86	II	720	3709.26	II	550	4341.13	I
10000	2091.49	IV	540	3191.21	I	560	3745.98	II	1000	4347.89	I
10000	2092.36	IV	540	3212.01	I	880	3751.60	II	290	4359.74	II
600	2132.42	V	760	3214.19	II	480	3764.39	I	310	4360.81	I
10000	2163.68	IV	630	3231.69	II	480	3766.72	I	350	4366.45	I
100	2175.80	III	630	3234.12	I	340	3766.82	II	550	4507.12	I
100	2191.15	III	760	3241.05	II	720	3780.54	I	610	4535.75	I
10000	2286.67	IV	1000	3273.05	II	560	3791.40	I	490	4542.22	I
100	2301.60	III	1300	3279.26	II	560	3822.41	I	490	4575.52	I
90	2539.65	I	880	3284.71	II	2200	3835.96	I	350	4602.57	I
570	2567.64	II	540	3305.15	II	1300	3836.76	II	700	4633.98	I
1600	2568.87	II	880	3306.28	II	550	3843.02	II	2300	4687.80	I
2100	2571.39	II	380	3322.99	II	550	3847.01	I	510	4688.45	I
250	2620.56	III	380	3326.80	II	550	3849.25	I	1900	4710.08	I
200	2643.79	III	380	3334.25	II	2900	3863.87	I	1400	4739.48	I
150	2664.26	III	760	3340.56	II	770	3864.34	I	870	4772.31	I
1800	2678.63	II	380	3344.79	II	990	3877.60	I	700	4815.63	I
90	2687.75	I	760	3356.09	II	1500	3885.42	I	250	5046.58	I
750	2700.13	II	540	3357.26	II	2900	3890.32	I	360	5064.91	I
1300	2722.61	II	380	3374.73	II	2000	3891.38	I	470	5078.25	I
800	2726.49	II	570	3387.87	II	610	3921.79	I	300	5155.45	I
1400	2734.86	II	760	3388.30	II	1200	3929.53	I	200	5158.00	I
1100	2742.56	II	5700	3391.98	II	940	3958.22	II	100	5191.60	II
660	2745.86	II	570	3393.12	II	490	3966.66	I	270	5385.14	I
660	2752.21	II	570	3404.83	II	990	3968.26	I	160	5664.51	I
530	2758.81	II	760	3410.25	II	660	3973.50	I	160	5797.74	I
			380	3414.66	I	770	3991.13	II	340	5879.80	I

Intensity	Wavelength/Å	Intensity	Wavelength/Å	Intensity	Wavelength/Å	Intensity	Wavelength/Å	
170	6045.85	I	300	6313.02	I	170	7103.72	I
170	6121.91	I	150	6953.84	I	590	7169.09	I
680	6127.44	I	150	6990.84	I	160	7944.61	I
340	6134.55	I	540	7097.70	I	160	8005.27	I
440	6143.20	I	280	7102.91	I	150	8063.09	I

Sources of Data for Each Element

Numbers following the element name refer to the references on the following pages.

Actinium: 193

Aluminum: 6,8,81,89,127,144,146,227,228,282

Americium: 92

Antimony: 164,167,194,386,406

Argon: 190,203,204,219,367,368,372,373,374,375,414,421

Arsenic: 163,168,197,244,280

Astatine: 188

Barium: 1,78,111,252,259,277,279

Berkelium: 53,339

Beryllium: 15,44,73,102,115,134,135,171,175,198,335

Bismuth: 1,357,358,359,360,361

Boron: 66,69,74,94,104,171,221,222

Bromine: 42,122,124,139,142,240,243,246,248,249,250,316

Cadmium: 44,285,296,353,399

Calcium: 16,25,70,150,270

Californium: 52,331

Carbon: 22,66,211

Cerium: 1,136,166,261,305

Cesium: 78,82,154,155,200,201,259,263,325

Chlorine: 11,28,30,31,85,233,238,239

Chromium: 1,379,380,412

Cobalt: 1,100,125,159,236,276,291

Copper: 199,273,290,295,324

Curium: 51,332

Dysprosium: 1

Einsteinium: 333

Erbium: 1,301

Europium: 1,312

Fluorine: 68,169,224,225,226

Francium: 408

Gadolinium: 1,46,137,151,152

Gallium: 2,19,62,132,140,141,143,195,281

Germanium: 5,119,293,340,341,342

Gold: 38,72,234,393,395

Hafnium: 1,369,404,410,425

Helium: 16,94,173,183,317

Holmium: 1

Hydrogen: 214

Indium: 1,132,348,349,350,351,352,353,435,436

Iodine: 20,21,58,84,124,153,161,176,184

Iridium: 1

Iron: 56,63,71,101,105,138,174,278,381,382

Krypton: 61,121,123,147,208,232,366,390,409,417,421

Lanthanum: 1,78,79,220,309

Lead: 54,64,106,256,274,297,283,329,330

Lithium: 3,15,17,18,37,44,112,284,321,335

Lutetium: 1,148,310,401

Magnesium: 4,7,49,83,103,128,129,177,217,269,315,335

Manganese: 1,126,385,405,433

Mercury (198): 43,50,69,145,229,242

Mercury (Natural): 34,45,90,117,133,189,235,304,327,328,343

Molybdenum: 1,383,420

Neodymium: 1

Neon: 56,58,69,118,150,230,364,365,371,388,389,400,402,413,430

Neptunium: 93

Nickel: 1,294,415,416,422

Niobium: 1,392,407,431

Nitrogen: 66,107,108,212,213,318

Osmium: 1

Oxygen: 23,24,36,66,69,209,210,215

Palladium: 1,287,424

Phosphorus: 179,180,182,336

Platinum: 1,288

Plutonium: 91

Polonium: 47,48

Potassium: 32,59,60,75,76,86,150,160,172,268,314,322

Praseodymium: 1,149,306,308,337,338

Promethium: 196,260

Protactinium: 96

Radium: 253,254

Radon: 251

Rhenium: 1

Rhodium: 1,396

Rubidium: 12,109,130,241,257,258,262,264

Ruthenium: 1,423

Samarium: 1

Scandium: 1,88,150,298,323

Selenium: 9,80,181,216,245,247,275

Silicon: 87,170,237,292,319,320

Silver: 13,99,255,286,289,363,387,398

Sodium: 178,205,206,207,268,299,334

Strontium: 1,109,110,218,231,265,279,313

Sulfur: 29,144,202,209,210,266

Tantalum: 1,411,426

Technetium: 35

Tellurium: 1,344,345,346,347

Terbium: 1,302

Thallium: 1,195,348,354,355,356

Thorium: 1,97,98,156,157,165,434

Thulium: 1,307

Tin: 187,191,399,423

Titanium: 1,378,427,428

Tungsten: 1

Uranium: 1,303

Vanadium: 1,394,397,432

Xenon: 33,116,118,120,232,384,391,429

Ytterbium: 1,40,192,311

Yttrium: 1,77,265,419

Zinc: 39,55,113,131,185,186,370,376,377

Zirconium: 1,362,403,418

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