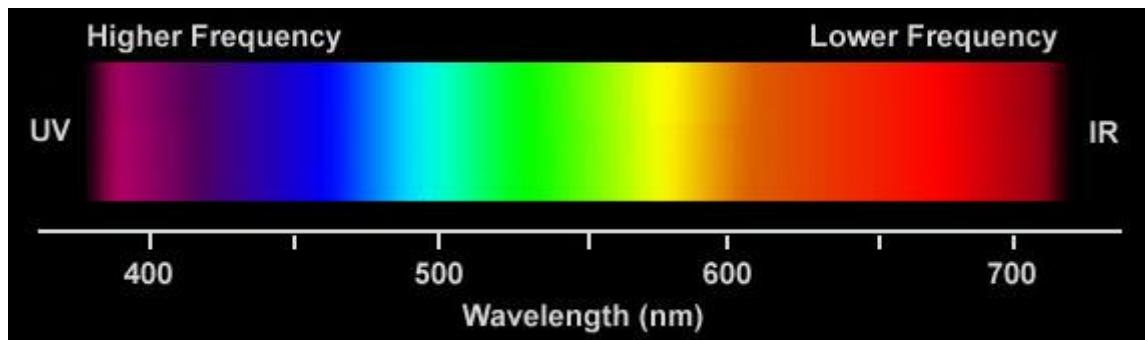


Physics 115L, Spring 2018

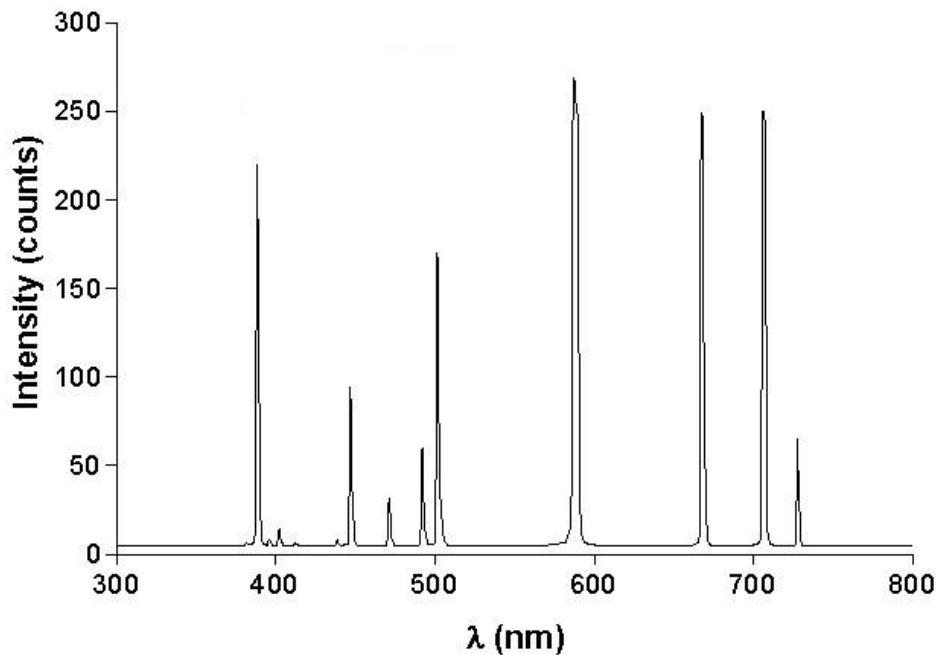
Spectral Lines Data

The following figure shows the visible spectrum – *i.e.* color vs. wavelength. This information may be helpful for quickly estimating the wavelength of spectral lines that you see in this experiment. (When comparing these wavelengths to those in the wavelength tables, remember that 1 nm is equal to 10 Å. Image from <https://www.wou.edu/las/physci/ch462/tmcolors.htm>.)

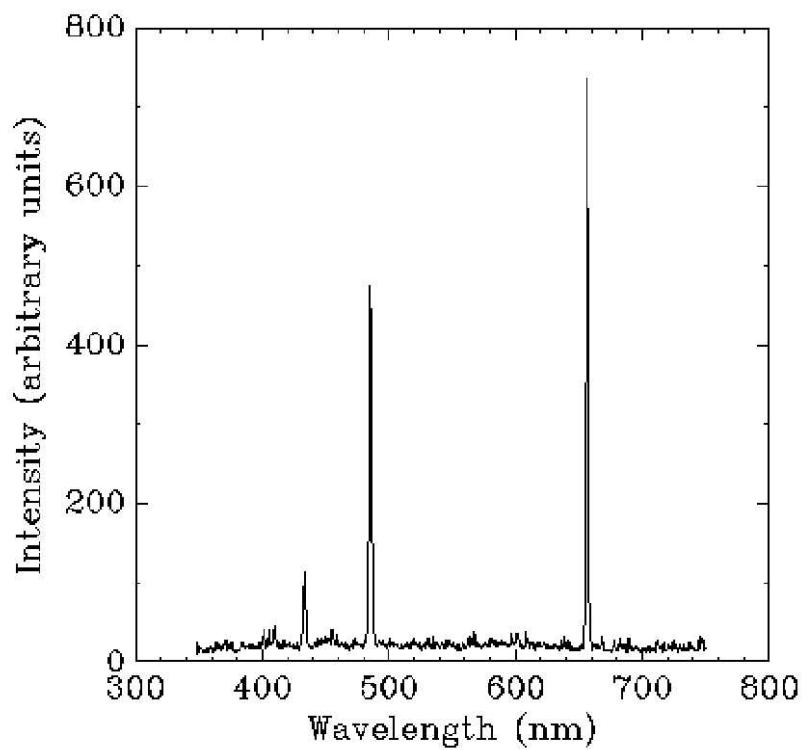


The following pages contain graphs of a number of atomic emission spectra (emitted light intensity *vs.* wavelength). After that, you'll find selected pages from the CRC Handbook of Physics and Chemistry, 71st Ed. (CRC Press, 1990), with tables of the atomic spectral lines of argon, helium, hydrogen, mercury, neon, and sodium. You may find this information useful for this week's experiment.

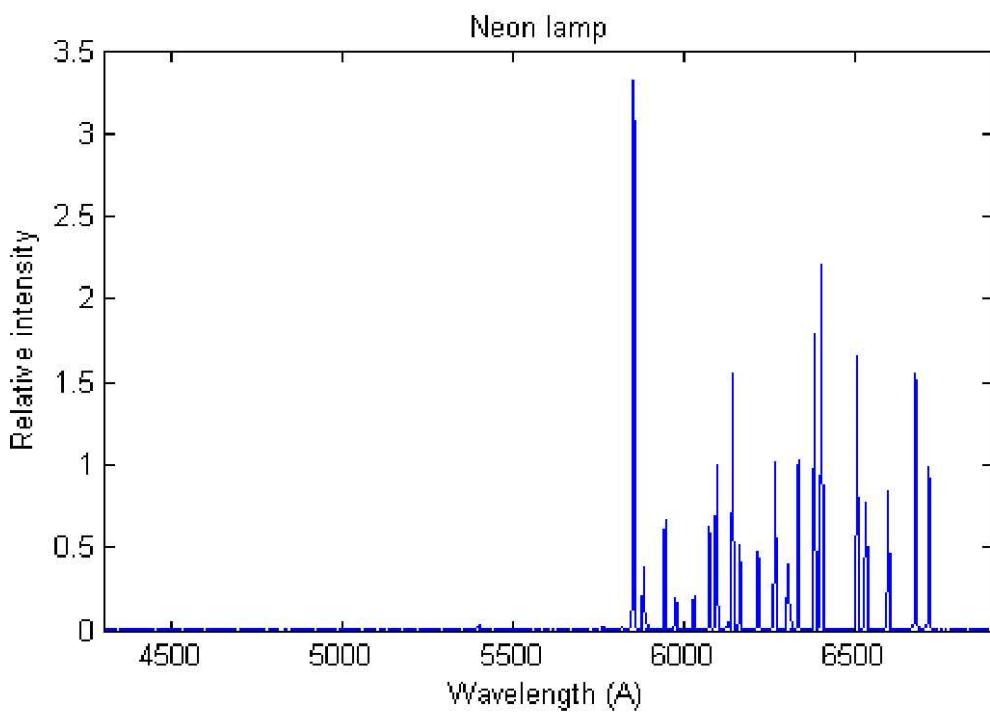
Helium



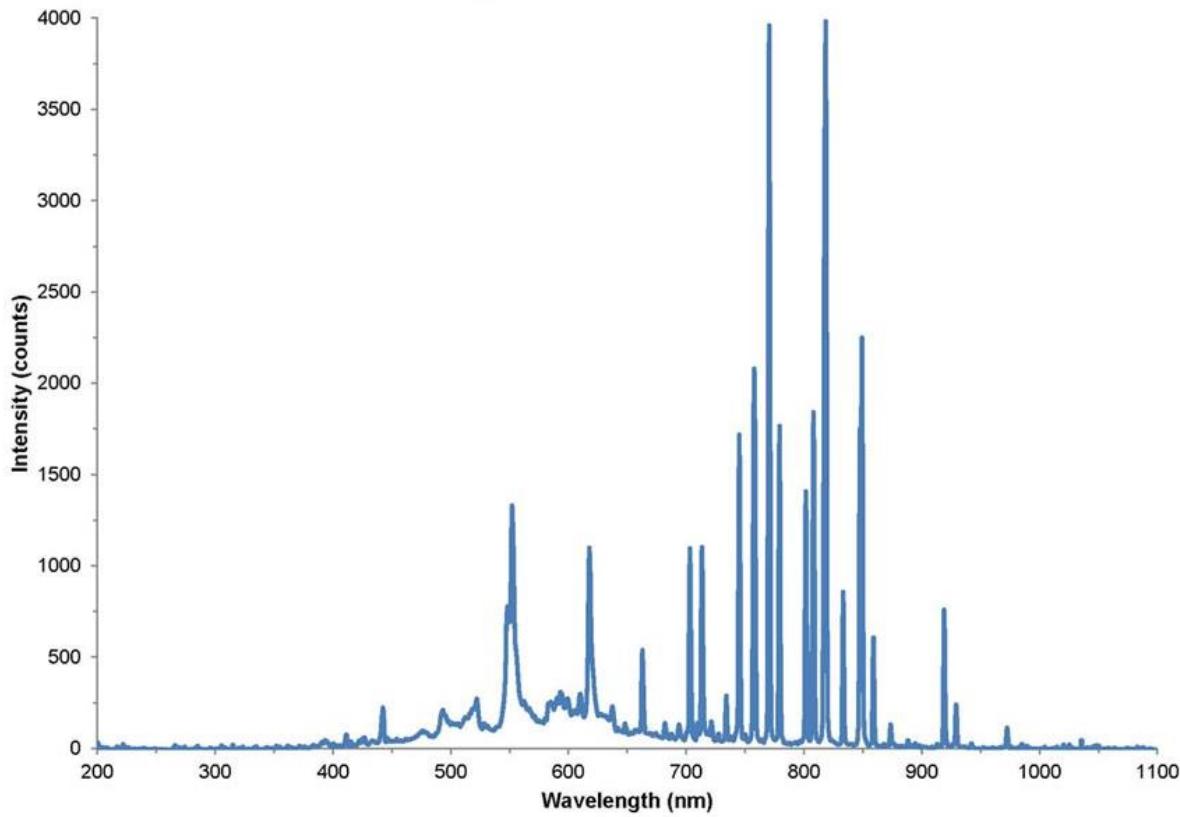
Hydrogen



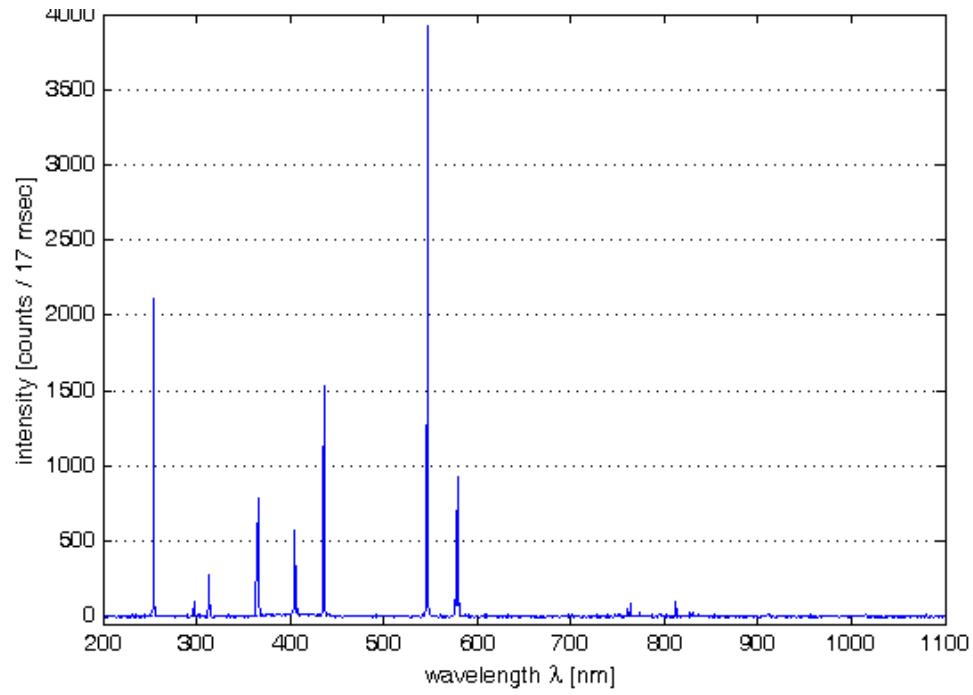
Neon



Argon



Mercury



LINE SPECTRA OF THE ELEMENTS

Edited by Joseph Reader and Charles H. Corliss*
National Bureau of Standards

These tables were prepared under the auspices of the Committee on Line Spectra of the Elements of the National Academy of Sciences—National Research Council. They contain the outstanding spectral lines of neutral (I), singly ionized (II), doubly ionized (III), triply ionized (IV), and quadruply ionized (V) atoms. Listed are lines that appear in emission from the vacuum ultraviolet to the far infrared. For most atoms these lines were selected from much larger lists in such a way as to include the stronger observed lines in each spectral region. In a few cases prominent monoxide band heads are also given.

The data were compiled by the following contributors, whose initials are given in the headings of the tables that they prepared:

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 - C. R. Cowley—University of Michigan
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 - V. Kaufman—National Bureau of Standards
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The literature references are collected at the end of the entire set of tables.

All wavelengths are given in Angstroms. Below 2000 Å the wavelengths are in vacuum; 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 the calibration of most spectrographs. In the air region, the elements used most commonly for calibration purposes are Ne, Ar, Kr, Fe, Th, and Hg; in the vacuum region, the most common are C, N, O, Si, Cu.

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.¹ 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 tables of first and second spectra the intensities of the lines of the singly ionized atom relative to those of the neutral atom should be used with caution, inasmuch as the concentration of ions in a light source depends greatly on the excitation conditions.

Descriptive symbols used in the tables 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
 - b—band head
 - r—easily reversed
 - w—wide

* Charles H. Corliss is now retired.

ARGON (Ar)
Z = 18

Ar I and II
 Ref. 196, 203, 204, 219, — E.F.W.

Intensity Wavelength

Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	
Vacuum		50	3582.355	II	300	4735.906	II	
		70	3588.441	II	800	4764.865	II	
		7	3606.522	I	550	4806.020	II	
		25	3622.138	II	150	4847.810	II	
		20	3639.833	II	50	4865.910	II	
		35	3718.206	II	800	4879.864	II	
		150	3729.309	II	70	4889.042	II	
		50	3737.889	II	20	4904.752	II	
		20	3766.119	II	200	4965.080	II	
		20	3770.369	I	50	5009.334	II	
		20	3770.520	II	70	5017.163	II	
30	487.227	II	25	3780.840	II	70	5062.037	II
50	490.650	II	25	3803.172	II	20	5090.495	II
30	490.701	II	50	3809.456	II	100	5141.783	II
30	519.327	II	7	3834.679	I	70	5145.308	II
30	542.912	II	70	3850.581	II	5	5151.391	I
200	543.203	II	35	3868.528	II	15	5162.285	I
70	547.461	II	35	3925.719	II	25	5165.773	II
70	556.817	II	50	3928.623	II	20	5187.746	I
30	573.362	II	25	3932.547	II	20	5216.814	II
30	576.736	II	70	3946.097	II	7	5221.271	I
70	580.263	II	7	3947.505	I	5	5421.352	I
30	583.437	II	35	3948.979	I	10	5451.652	I
70	597.700	II	20	3979.356	II	25	5495.874	I
30	602.858	II	35	3994.792	II	5	5506.113	I
30	612.372	II	50	4013.857	II	25	5558.702	I
500	661.867	II	50	4033.809	II	10	5572.541	I
30	664.562	II	20	4035.460	II	35	5606.733	I
200	666.011	II	150	4042.894	II	20	5650.704	I
1000	670.946	II	50	4044.418	I	10	5739.520	I
3000	671.851	II	100	4052.921	II	5	5834.263	I
70	676.242	II	200	4072.005	II	10	5860.310	I
30	677.952	II	70	4072.385	II	15	5882.624	I
30	679.218	II	25	4076.628	II	25	5888.584	I
200	679.401	II	35	4079.574	II	50	5912.085	I
200	718.090	II	25	4082.387	II	15	5928.813	I
3000	723.361	II	150	4103.912	II	5	5942.669	I
500	725.548	II	300	4131.724	II	7	5987.302	I
70	730.930	II	35	4156.086	II	5	5998.999	I
200	740.269	II	400	4158.590	I	5	6025.150	I
200	744.925	II	50	4164.180	I	70	6032.127	I
70	745.322	II	35	4179.297	II	35	6043.223	I
20	802.859	I	50	4181.884	I	10	6052.723	I
100	806.471	I	100	4190.713	I	20	6059.372	I
60	806.869	I	50	4191.029	I	7	6098.803	I
30	807.218	I	200	4198.317	I	10	6105.635	I
40	807.653	I	400	4200.674	I	100	6114.923	II
50	809.927	I	25	4218.665	II	10	6145.441	I
120	816.232	I	25	4222.637	II	7	6170.174	I
70	816.464	I	25	4226.988	II	150	6172.278	II
80	820.124	I	25	4228.158	II	10	6173.096	I
120	825.346	I	100	4237.220	II	10	6212.503	I
120	826.365	I	100	4251.185	I	5	6215.938	I
150	834.392	I	25	4259.362	I	25	6243.120	II
100	835.002	I	200	4266.286	I	7	6296.872	I
100	842.805	I	70	4266.527	II	15	6307.657	I
150	869.754	I	150	4272.169	I	7	6369.575	I
180	r 876.058	I	550	4277.528	II	20	6384.717	I
180	r 879.947	I	20	4282.898	II	70	6416.307	I
150	894.310	I	100	4300.101	I	25	6483.082	II
1000	919.781	II	25	4300.650	II	15	6538.112	I
1000	932.054	II	70	4309.239	II	15	6604.853	I
1000	r 1048.220	I	200	4331.200	II	25	6638.221	II
500	r 1066.660	I	50	4332.030	II	20	6639.740	II
		100	4333.561	I	50	6643.698	II	
		50	4335.338	I	5	6660.676	I	
		25	4345.168	I	5	6664.051	I	
	Air	800	4348.064	II	25	6666.359	II	
		50	4352.205	II	100	6677.282	I	
5	2420.456	II	25	4362.066	II	35	6684.293	II
10	2516.789	II	50	4367.832	II	150	6752.834	I
10	2534.709	II	200	4370.753	II	5	6756.163	I
15	2562.087	II	70	4371.329	II	15	6766.612	I
25	2891.612	II	50	4375.954	II	20	6861.269	II
200	2942.893	II	150	4379.667	II	150	6871.289	I
100	2979.050	II	50	4385.057	II	5	6879.582	I
50	3033.508	II	70	4400.097	II	10	6886.174	I
50	3093.402	II	200	4400.986	II	50	6937.664	I
8	3200.37	I	400	4426.001	II	7	6951.478	I
20	3243.689	II	150	4430.189	II	7	6960.250	I
25	3293.640	II	50	4430.996	II	10000	6965.431	I
20	3307.228	II	50	4433.838	II	150	7030.251	I
7	3319.34	I	20	4439.461	II	10000	7067.218	I
25	3350.924	II	35	4448.879	II	100	7068.736	I
7	3373.47	I	100	4474.759	II	25	7107.478	I
25	3376.436	II	200	4481.811	II	25	7125.820	I
25	3388.531	II	100	4510.733	I	1000	7147.042	I
7	3393.73	I	20	4522.323	I	15	7158.839	I
7	3461.07	I	20	4530.552	II	70	7206.980	I
70	3476.747	II	400	4545.052	II	15	7265.172	I
20	3478.232	II	20	4564.405	II	7	7270.664	I
50	3491.244	II	400	4579.350	II	2000	7272.936	I
100	3491.536	II	400	4589.898	II	35	7311.716	I
70	3509.778	II	15	4596.097	I	25	7316.005	I
70	3514.388	II	550	4609.567	II	5	7350.814	I
70	3545.596	II	7	4628.441	I	70	7353.293	I
70	3545.845	II	35	4637.233	II	200	7372.118	I
7	3554.306	I	400	4657.901	II	20	7380.426	II
100	3559.508	II	15	4702.316	I	10000	7383.980	I
100	3561.030	II	20	4721.591	II	20	7392.980	I
70	3576.616	II	550	4726.868	II	15	7412.337	I
25	3581.608	II	50	4732.053	II	10	7425.294	I
						12	769.15	III

Ar III
 Ref. 367, 372, 373, 375 —
 E.F.W.

Intensity Wavelength

Vacuum

Hafnium (Cont.)

Holmium (Cont.)

Manganese (Cont.)

75	1787.04	IV	300	3654.839	I	10	2400.49	I	40	7346.37	II
75	1787.38	IV	80	3662.883	I	60	2407.35	II	100	7485.87	II
75	1788.64	IV	240	3663.281	I	50	2414.13	II	20	7728.82	I
75	1790.44	IV	30	3701.432	I	5	2441.06	I	100	7944.66	II
80	1795.65	IV	35	3704.170	I	20	2446.90	I	2000	10139.75	I
80	1795.79	IV	30	3801.660	I	15	2464.06	I	240	11287.40	I
60	1907.03	IV	20	3901.867	I	40	2482.00	I	120	13209.95	I
75	1910.25	IV	60	3906.372	I	30	2482.72	I	140	13426.57	I
65	1997.54	IV	200	3983.839	II	40	2483.82	I	60	13468.38	I
			1800	4046.572	I	90	2534.77	I	80	13505.58	I
		Mn V	150	4077.838	I	15000	2536.52	I	500	13570.21	I
Ref. 405 — C.H.C.			40	4108.057	I	25	2563.86	I	450	13673.51	I
			250	4339.224	I	25	2576.29	I	200	13950.55	I
Intensity		Wavelength	4000	4347.496	I	5	2578.91	I	500	15295.82	I
			4000	4358.337	I	15	2625.19	I	100	16881.48	I
Intensity		Vacuum	80	4916.068	I	5	2639.78	I	400	16920.16	I
			1100	5460.753	I	250	2652.04	I	300	16942.00	I
300	404.36	V	160	5675.922	I	400	2653.69	I	500	17072.79	I
380	406.02	V	240	5769.598	I	100	2655.13	I	400	17109.93	I
300	406.40	V	280	5790.663	I	5	2674.91	I	20	17116.75	I
600	410.30	V	20	6072.713	I	50	2698.83	I	20	17198.67	I
600	410.60	V	30	6234.402	I	50	2699.38	I	20	17213.20	I
480	410.98	V	160	6716.429	I	80	2705.36	II	70	17329.41	I
400	411.32	V	250	6907.461	I	80	2752.78	I	30	17436.18	I
460	412.74	V	240	11287.407	I	20	2759.71	I	50	18130.38	I
460	413.75	V				40	2803.46	I	40	19700.17	I
600	415.62	V				30	2804.43	I		22493.28	I
650	415.98	V				2	2805.34	I	250	23253.07	I
350	419.80	V			Z = 80	2	2806.77	I		32148.06	I
600	428.59	V				150	2814.93	II		36303.03	I
500	429.05	V			Hg I and II (nat.)	750	2847.68	II			
400	433.54	V			Ref. 34, 45, 90, 117, 133, 189, 235,	50	2856.94	I		Hg III	
600	435.67	V			304, 327, 328 — R.W.S.	150	2893.60	I		Ref. 343 — C.H.C.	
350	436.16	V				150	2916.27	II			
500	436.18	V			Intensity	60	2925.41	I		Intensity	
450	438.74	V			Wavelength	150	2935.94	II		Vacuum	
350	439.35	V			Vacuum	400	2947.08	II		Air	
1000	441.72	V				1200	2967.28	I			
850	442.49	V	400	893.08	II	300	3021.50	I	3	621.44	III
400	467.32	V	300	915.83	II	120	3023.47	I	2	679.68	III
300	474.82	V	150	923.39	II	30	3025.61	I	2	878.59	III
MERCURY (198) (Hg)			200	940.80	II	50	3027.49	I	1	886.48	III
Z = 80			100	962.74	II	400	3125.67	I	1	988.89	III
			50	969.13	II	320	3131.55	I	2	1009.29	III
			800	1099.26	II	320	3131.84	I	5	1068.03	III
			80	1250.58	I	400	3208.20	II	2	1161.95	III
Hg I and II (198)			8	1259.24	I	400	3264.06	II	9	1681.40	III
Ref. 43, 50, 69, 145, 229, 242 —		R.W.S.	100	1268.82	I	80	3341.48	I	15	1759.75	III
			5	1307.75	I	100	3385.25	II	1	1894.77	III
Intensity		Wavelength	300	1307.93	II	200	3451.69	II			
			400	1321.71	II	2800	3650.15	I			
Intensity		Vacuum	80	1350.07	II	300	3654.84	I	7	2314.15	III
			200	1361.27	II	240	3662.88	I	4	2380.55	III
80	1250.564	I	20	1402.62	I	30	3701.44	I	8	2431.65	III
8	1259.242	I	200	1414.43	II	35	3704.17	I	5	2480.56	III
100	1268.825	I	10	1435.51	I	30	3801.66	I	2	2612.92	III
5	1307.751	I	15	1619.46	II	100	3806.38	II	4	2617.97	III
20	1402.619	I	120	1623.95	II	20	3901.87	I	3	2670.49	III
10	1435.503	I	20	1628.25	II	60	3906.37	I	70	2724.43	III
1000	1849.492	I	150	1649.94	II	100	3918.92	II	6	2769.22	III
Air			50	1653.64	II	200	3983.96	II	3	2844.76	III
			200	1672.41	II	1800	4046.56	I	15	3090.05	III
			100	1702.73	II	150	4077.83	I	5	3283.02	III
60	2262.210	II	100	1707.40	II	40	4108.05	I	12	3312.28	III
20	2302.065	I	120	1727.18	II	250	4339.22	I	8	3389.01	III
20	2345.440	I	250	1732.14	II	400	4347.49	I	5	3450.77	III
100	2378.325	I	20	1775.68	I	4000	4358.33	I	3	3500.35	III
20	2380.004	I	40	1783.70	II	100	4398.62	II	4	3538.88	III
40	2399.349	I	30	1796.22	II	90	4660.28	II	5	3557.24	III
20	2399.729	I	200	1796.90	II	80	4855.72	II	15	3803.51	III
20	2446.900	I	60	1798.74	II	5	4883.00	I	70	4122.07	III
15	2464.064	I	30	1803.89	II	5	4889.91	I	10	4140.34	III
40	2481.999	I	40	1808.29	II	80	4916.07	I	100	4216.74	III
30	2482.713	I	400	1820.34	II	5	4970.37	I	15	4470.58	III
40	2483.821	I	5	1832.74	I	5	4980.64	I	12	4552.84	III
90	2534.769	I	1000	1849.50	I	20	5102.70	I	50	4797.01	III
15000	2536.506	I	300	1869.23	II	40	5120.64	I	10	4869.85	III
25	2563.861	I	300	1870.55	II	100	5128.45	II	80	4973.57	III
25	2576.290	I	200	1875.54	II	20	5137.94	I	30	5210.82	III
250	2652.043	I	20	1900.28	II	20	5290.74	I	6	5695.71	III
400	2653.683	I	30	1927.60	II	5	5316.78	I	25	6220.35	III
100	2655.130	I	300	1942.27	II	60	5354.05	I	35	6418.98	III
50	2698.831	I	100	1972.94	II	30	5384.63	I	40	6501.38	III
80	2752.783	I	200	1973.89	II	1100	5460.74	I	10	6584.26	III
20	2759.710	I	150	1987.98	II	30	5549.63	I	6	6610.12	III
40	2803.471	I			Air	160	5675.86	I	30	6709.29	III
30	2804.438	I				240	5769.60	I	12	7517.46	III
.750	2847.675	II	90	2026.97	II	100	5789.66	I	7	7808.10	III
50	2856.939	I	90	2052.93	II	280	5790.66	I	25	7946.75	III
150	2893.598	I	90	2148.00	II	140	5803.78	I	50	7984.51	III
150	2916.227	II	70	2148.00	II	60	5859.25	I	5	8151.64	III
60	2925.413	I	5	2247.55	I	60	5871.73	II			
1200	2967.283	I	60	2262.23	II	20	5871.98	I			
300	3021.500	I	20	2302.06	I	20	6072.72	I			
120	3023.476	I	15	2323.20	I	1000	6149.50	II			
30	3025.608	I	5	2340.57	I	30	6234.40	I			
50	3027.490	I	20	2345.43	I	80	6521.13	II			
400	3125.670	I	20	2352.48	I	160	6716.43	I			
320	3131.551	I	100	2378.32	I	250	6907.52	I			
320	3131.842	I	20	2380.00	I	250	7081.90	I			
80	3341.481	I	40	2399.38	I	200	7091.86	I			
2800	3650.157	I	20	2399.73	I						

Neodymium (Cont.)

120	4527.25	I	170	5485.70	II	24	6941.39	II	10	8120.93
340	4541.27	II	35	5501.47	I	17	7010.80	II	12	8122.07
340	4542.61	I	45	5525.72	I	8	7018.85	II	12	8141.75
100	4556.14	II	90	5533.82	I	17	7020.92	II	12	8143.27
170	4559.67	I	55	5535.27	II	17	7024.58	II	7	8164.97
340	4563.22	II	55	5543.24	I	10	7033.21	II	8	8172.56
200	4578.89	II	55	5548.47	II	35	7037.30	II	9	8179.83
200	4579.32	II	55	5561.17	I	7	7052.14	II	9	8182.41
100	4586.62	I	27	5575.50	I	7	7054.74	II	4	8185.58
200	4597.02	II	27	5576.70	I	7	7061.47	II	7	8205.38
100	4603.82	I	27	5577.70	I	40	7066.89	II	10	8231.52
100	4609.87	I	27	5587.61	I	8	7082.93	II	4	8248.76
300	4621.94	I	240	5594.43	II	12	7089.71	II	5	8249.68
100	4627.98	I	55	5601.43	I	12	7092.09	II	4	8262.80
510	4634.24	I	45	5601.92	I	12	7092.74	II	7	8266.72
340	4641.10	I	220	5620.54	I	12	7092.94	II	4	8272.79
250	4645.77	II	65	5635.76	I	17	7093.98	I	4	8302.74
200	4646.40	I	45	5639.54	I	20	7095.42	I	10	8307.72
300	4649.67	I	35	5653.57	I	29	7129.35	II	6	8324.50
200	4654.73	I	70	5668.87	II	12	7142.04	II	4	8332.01
130	4670.56	II	65	5669.77	I	10	7143.72	II	12	8346.36
170	4680.74	II	140	5675.97	I	8	7151.03	II	4	8375.16
310	4683.45	I	55	5676.33	I	6	7153.09	I	4	8375.33
110	4684.04	I	220	5688.53	II	6	7185.01	I	4	8394.71
110	4690.35	I	23	5689.51	I	10	7189.09	II	7	8400.85
190	4696.44	I	30	5701.57	I	24	7189.42	II	5	8456.87
130	4703.57	II	130	5702.24	II	20	7192.01	II	4	8530.53
470	4706.54	II	80	5706.21	II	10	7199.00	II	5	8582.03
140	4706.96	I	160	5708.28	II	8	7227.01	I	5	8591.53
190	4709.71	II	80	5718.12	II	15	7236.54	II	7	8594.87
190	4715.59	II	65	5726.83	II	7	7261.64	II	8	8643.43
240	4719.02	I	100	5729.29	I	9	7285.29	II	5	8667.07
190	4724.35	II	23	5734.55	I	9	7288.56	II	5	8677.48
140	4731.77	I	70	5740.86	II	6	7291.38	II	6	8691.29
120	4779.46	I	55	5749.19	I	7	7298.72	II	6	8695.07
170	4789.41	II	27	5749.66	I	12	7316.81	II	6	8712.82
120	4797.15	II	23	5767.33	I	7	7321.43	I	6	8715.03
240	4811.34	II	45	5776.12	I	7	7323.12	II	17	8839.10
140	4820.34	II	45	5784.96	I	6	7334.54	I		
350	4825.48	II	45	5788.22	I	6	7357.10	I		
130	4832.28	II	45	5800.09	I	6	7374.04	II		
110	4849.06	II	160	5804.02	II	7	7381.79	II		
280	4859.02	II	80	5811.57	II	9	7401.31	I		
190	4866.74	I	45	5813.89	I	10	7406.62	II		
350	4883.81	I	27	5820.37	I	6	7411.20	II		
140	4889.10	II	70	5825.87	II	10	7418.18	II		
240	4891.07	I	80	5842.39	II	9	7427.41	II		
280	4896.93	I	30	5844.66	I	5	7448.71	II		
120	4901.53	I	23	5845.95	I	12	7511.16	II		
210	4901.84	I	55	5858.91	I	17	7513.73	II		
110	4902.03	II	35	5867.08	I	7	7514.44	II		
190	4913.41	I	30	5868.90	I	7	7516.02	II		
170	4914.37	II	27	5871.04	I	9	7526.45	II		
330	4920.68	II	30	5883.29	I	12	7528.99	II		
470	4924.53	I	23	5886.24	I	10	7538.26	II		
260	4944.83	I	30	5887.91	I	5	7540.97	II		
290	4954.78	I	27	5921.22	I	7	7547.00	II		
290	4959.13	II	27	5955.87	I	5	7577.54	II		
150	4961.39	II	30	5994.76	I	7	7587.65	II		
250	4989.94	II	27	5996.47	I	6	7590.75	II		
150	5033.52	II	45	6007.67	I	6	7603.73	II		
110	5063.73	I	35	6031.27	II	5	7605.92	II		
360	5076.59	II	27	6033.29	I	5	7614.72	I		
150	5089.84	II	45	6034.24	II	9	7639.79	II		
360	5092.80	II	55	6066.03	I	8	7646.00	II		
180	5102.39	II	27	6071.70	I	6	7663.52	II		
150	5105.21	II	30	6073.97	I	12	7696.56	II		
360	5105.35	I	23	6133.47	II	6	7718.20	II		
340	5107.59	II	27	6149.28	I	4	7743.90	II		
680	5130.60	II	35	6157.83	II	10	7750.95	II		
170	5132.33	II	23	6166.67	II	6	7773.06	II		
170	5165.14	II	35	6170.49	II	7	7792.22	II		
130	5181.17	II	45	6178.59	I	6	7796.40	II		
120	5182.60	II	27	6183.91	II	8	7797.32	II		
500	5191.45	II	27	6208.24	I	5	7798.32	II		
630	5192.62	II	45	6223.39	I	10	7808.47	II		
330	5200.12	II	27	6226.50	I	7	7818.83	II		
310	5212.37	II	23	6238.50	II	5	7825.20	II		
150	5213.23	I	35	6244.08	I	12	7863.04	II		
130	5225.05	II	23	6257.49	I	5	7872.03	I		
130	5228.43	II	27	6258.73	II	7	7886.60	II		
450	5234.20	II	23	6277.29	II	4	7896.50	II		
250	5239.79	II	27	6285.79	I	9	7900.40	II		
720	5249.59	II	23	6292.84	II	5	7906.03	I		
200	5250.82	II	23	6297.07	I	12	7917.01	II		
360	5255.51	II	55	6310.49	I	10	7925.03	II		
120	5269.48	II	27	6341.51	II	5	7947.93	II		
590	5273.43	II	23	6382.07	II	10	7949.68	II		
150	5276.88	II	65	6385.20	II	5	7955.38	II		
110	5291.67	I	35	6485.69	I	12	7958.95	I		
680	5293.17	II	45	6630.14	I	12	7965.73	II		
160	5302.28	II	35	6637.96	II	15	7982.09	II		
110	5306.47	I	45	6650.57	II	12	7982.68	II		
220	5311.46	II	30	6655.67	I	12	8000.76	II		
500	5319.82	II	25	6737.79	II	9	8007.70	I		
180	5356.98	II	40	6740.11	II	4	8020.07	II		
290	5361.47	II	25	6742.54	I	8	8026.35	II		
150	5371.94	II	30	6790.37	II	10	8043.24	I		
110	5385.90	II	30	6804.00	II	8	8051.33	II		
160	5341.53	II	25	6846.72	II	5	8064.00	II		
110	5451.12	II	40	6900.43	II	10	8099.17	I		

neon continued next page →

Neon (Cont.)

	2007.01	II	100	3371.80	II	100	5974.627	I	120	9577.01	II
80	2025.56	II	500	3378.22	II	120	5975.534	I	1000	9665.42	II
150	2085.47	II	150	3388.42	II	80	5987.907	I	100	9808.86	II
180	2096.11	II	120	3388.94	II	100	6029.997	I	800	10295.42	II
120	2096.25	II	300	3392.80	II	100	6074.338	I	2000	10562.41	II
80	p 2562.12	II	100	3404.82	II	80	6096.163	I	1500	10798.07	II
90	w 2567.12	II	120	3406.95	II	60	6128.450	I	2000	10844.48	II
80	2623.11	II	100	3413.15	II	100	6143.063	I	3000	11143.020	II
80	2629.89	II	120	3416.91	II	120	6163.594	I	3500	11177.528	II
90	w 2636.07	II	120	3417.69	II	250	6182.146	I	1600	11390.434	II
80	2638.29	II	50	3417.904	I	150	6217.281	I	1100	11409.134	II
80	2644.10	II	15	3418.006	I	150	6266.495	I	3000	11522.746	II
80	2762.92	II	120	3428.69	II	60	6304.789	I	1500	11525.020	II
90	2792.02	II	60	3447.703	I	7	6328.165	I	950	11536.344	II
80	2794.22	II	50	3454.195	I	100	6334.428	I	500	11601.537	II
100	2809.48	II	100	3456.61	II	120	6382.992	I	1200	11614.081	II
80	2906.59	II	100	3459.32	II	200	6402.246	I	300	11688.002	II
80	2906.82	II	25	3460.524	I	150	6506.528	I	2000	11766.792	II
90	2910.06	II	30	3464.339	I	60	6532.882	I	1500	11789.044	II
90	2910.41	II	30	3466.579	I	150	6598.953	I	500	11789.889	II
80	2911.14	II	60	3472.571	I	70	6652.093	I	1000	11984.912	II
80	2915.12	II	150	3479.52	II	90	6678.276	I	3000	12066.334	II
80	2925.62	II	200	3480.72	II	20	6717.043	I	800	12459.389	II
80	w 2932.10	II	200	3481.93	II	100	6829.467	I	1000	12689.201	II
80	2940.65	II	25	3498.064	I	90	7024.050	I	1100	12912.014	II
90	2946.04	II	30	3501.216	I	100	7032.413	I	700	13219.241	II
150	2955.72	II	25	3515.191	I	50	7051.292	I	800	15230.714	II
150	2963.24	II	150	3520.472	I	80	7059.107	I	400	17161.930	II
150	2967.18	II	120	3542.85	II	100	7173.938	I	400	18035.80	II
100	2973.10	II	120	3557.80	I	150	7213.20	II	1000	18083.21	II
15	2974.72	I	100	3561.20	II	150	7235.19	II	350	18221.11	II
100	2979.46	II	250	3568.50	II	100	7245.167	I	250	18227.02	II
12	2982.67	I	100	3574.18	II	150	7343.94	II	2500	18276.68	II
150	3001.67	II	200	3574.61	II	40	7472.439	I	2000	18282.62	II
120	p 3017.31	II	50	3593.526	I	90	7488.871	I	1200	18303.97	II
300	3027.02	II	30	3593.640	I	100	7492.10	II	250	18359.12	II
300	3028.86	II	15	3600.169	I	150	7522.82	II	1200	18384.85	II
100	3030.79	II	20	3633.665	I	80	7535.774	I	2000	18389.95	II
120	3034.46	II	150	3643.93	II	60	7544.044	I	1000	18402.84	II
100	3035.92	II	200	3664.07	II	100	7724.628	I	1200	18422.39	II
100	3037.72	II	20	3682.243	I	120	7740.74	II	400	18458.65	II
100	3039.59	II	12	3685.736	I	300	7839.055	I	400	18475.79	II
100	3044.09	II	200	3694.21	II	120	7926.20	II	900	18591.55	II
100	3045.56	II	10	3701.225	I	400	7927.118	I	1600	18597.70	II
120	3047.56	II	150	3709.62	II	700	7936.996	I	350	18618.96	II
100	3054.34	II	250	3713.08	II	2000	7943.181	I	550	18625.16	II
100	3054.68	II	250	3727.11	II	2000	8082.458	I	1200	21041.295	II
100	3059.11	II	800	3766.26	II	100	8084.34	II	750	21708.145	II
100	3062.49	II	1000	3777.13	II	1000	8118.549	I	300	22247.35	II
100	3063.30	II	100	3818.43	II	600	8128.911	I	350	22428.13	II
100	3070.89	II	120	3829.75	II	100	8136.406	I	2250	22530.40	II
100	3071.53	II	150	4219.74	II	2500	8259.379	I	400	22661.81	II
120	3088.17	II	120	4250.65	II	2500	8266.077	I	1000	23260.30	II
100	3092.09	II	120	4369.86	II	800	8267.117	I	1050	23373.00	II
120	3092.90	II	70	4379.40	II	6000	8300.326	I	850	23565.36	II
100	3094.01	II	150	4379.55	II	100	8315.00	II	3500	23636.52	II
100	3095.10	II	100	4385.06	II	1500	8365.749	I	300	23701.64	II
100	3097.13	II	200	4391.99	II	100	8372.111	I	1100	23709.2	II
100	3117.98	II	150	4397.99	II	8000	8377.606	I	1800	23951.42	II
120	3118.16	II	150	4409.30	II	1000	8417.159	I	600	23956.46	II
10	3126.199	I	100	4413.22	II	4000	8418.427	I	1000	23978.12	II
300	3141.33	II	100	4421.39	II	1500	8463.358	I	200	24098.54	II
100	3143.72	II	100	p 4428.52	II	800	8484.444	I	500	24161.42	II
100	p 3148.68	II	100	4428.63	II	5000	8495.360	I	600	24249.64	II
100	3164.43	II	150	p 4430.90	II	600	8544.696	I	1500	24365.05	II
100	3165.65	II	150	p 4430.94	II	1000	8571.352	I	800	24371.60	II
100	3188.74	II	120	4457.05	II	4000	8591.259	I	400	24447.85	II
120	3194.58	II	100	4522.72	II	6000	8634.647	I	700	24459.4	II
500	3198.59	II	10	4537.754	I	3000	8647.041	I	300	24776.46	II
60	3208.96	II	10	4540.380	I	15000	8654.383	I	550	24928.88	II
120	3209.36	II	100	4569.06	II	4000	8655.522	I	250	25161.69	II
120	3213.74	II	15	4704.395	I	100	8668.26	II	650	25524.37	II
150	3214.33	II	12	4708.862	I	5000	8679.492	I	125	28386.21	II
150	3218.19	II	10	4710.067	I	5000	8681.921	I	150	30200.	II
120	3224.82	II	10	4712.066	I	2000	8704.112	I	250	33173.09	II
120	3229.57	II	15	4715.347	I	4000	8771.656	I	450	33352.35	II
200	3230.07	II	10	4752.732	I	12000	8780.621	I	1300	33901.	II
120	3230.42	II	12	4788.927	I	10000	8783.753	I	2200	33912.10	II
120	3232.02	II	10	4790.22	I	500	8830.907	I	600	34131.31	II
150	3232.37	II	10	4827.344	I	7000	8853.867	I	100	34471.44	II
100	3243.40	II	10	4884.917	I	1000	8865.306	I	120	35834.78	II
100	3244.10	II	4	5005.159	I	1000	8865.755	I	Ne III	Ref. 365, 371, 402 – R.L.K.	
100	3248.34	II	10	5037.751	I	3000	8919.501	I	Ref. 365, 371, 402 – R.L.K.	Ne III	
100	3250.36	II	10	5144.938	I	2000	8988.57	I	Ref. 365, 371, 402 – R.L.K.	Ne III	
150	3297.73	II	25	5330.778	I	100	9079.46	II	Intensity	Wavelength	
150	3309.74	II	20	5341.094	I	6000	9148.67	I	Vacuum		
300	3319.72	II	8	5343.283	I	6000	9201.76	I			
1000	3323.74	II	60	5400.562	I	4000	9220.06	I			
150	3327.15	II	5	5562.766	I	2000	9221.58	I			
100	3329.16	II	10	5656.659	I	2000	9226.69	I			
200	3334.84	II	5	5719.225	I	1000	9275.52	I			
150	3344.40	II	12	5748.298	I	200	9287.56	II			
300	3345.45	II	80	5764.419	I	6000	9300.85	I			
150	3345.83	II	12	5804.450	I	1500	9310.58	I			
200	3355.02	II	40	5820.156	I	3000	9313.97	I			
120	3357.82	II	500	5852.488	I	6000	9326.51	I			
200	3360.60	II	100	5872.828	I	2000	9373.31	I			
120	3362.16	II	100	5881.895	I	5000	9425.38	I			
100	3362.71	II	60	5902.462	I	3000	9459.21	I			
120	3367.22	II	60	5906.429	I	5000	9486.68	I			
12	3369.808	I	100	5944.834	I	5000	9534.16	I			
40	3369.908	I	100	5965.471	I	3000	9547.40	I			

Ne III

Ref. 365, 371, 402 — R.L.K.

Intensity Wavelength

Vacuum

20 251.14 II
22 251.56 --

20 251.56 11
20 251.73 11

20 251.75 II
40 267.06 II

40 267.52 II

20 267.71 II
62 223.12 II

40 283.18 II
160 283.21 II

110 **283.69**

40 283.89 II
222 221.12 --

220 301.12 II
220 313.05 II

220 313.68 II

40 313.95 II

Silver (Cont.)

sodium continued next page →

Sodium (Cont.)

850	2661.00	II	1	4249.41	I	50	11197.21	I	10	1995.68	III
350	2666.46	II	2	4252.52	I	400	11381.45	I	11	2005.22	III
1000	2671.83	II	15	4273.64	I	1000	11403.78	I	11	2008.47	III
850	2678.09	II	20	4276.79	I	400	12679.17	I	10	2011.87	III
200	2680.34	I	2	4287.84	I	60	14767.48	I	10	2014.17	III
100	2680.43	I	3	4291.01	I	100	14779.73	I	11	2017.03	III
650	2808.71	II	250	4292.48	II	60	16373.85	I	10	2017.56	III
850	2809.52	II	250	4292.86	II	100	16388.85	I	12	2028.56	III
600	2829.87	II	250	4308.81	II	400	18465.25	I	11	2031.13	III
800	2839.56	II	250	4309.04	II	50	22056.44	I	10	2034.54	III
1000	2841.72	II	250	4320.91	II	25	22083.67	I	12	2035.90	III
400	2852.81	I	30	4321.40	I	60	23348.41	I	12	2041.66	III
200	2853.01	I	40	4324.62	I	100	23379.13	I	11	2043.29	III
650	2856.51	II	250	4337.29	II	10	2341.49	I	10	2044.82	III
800	2859.49	II	3	4341.49	I	5	2344.11	II	10	2045.44	III
750	2871.28	II	250	4344.74	I	5	2344.74	II	10	2051.48	III
650	2872.95	II	5	4344.74	I	5	2348.60	II	10	2060.36	III
900	2881.15	II	200	4348.60	II	10	2375.22	II	15	2066.60	III
850	2886.26	II	200	4375.22	II	10	2387.49	II	15	2082.91	III
2	2893.62	I	200	4390.03	I	5	2409.14	II	13	2140.72	III
700	2893.95	I	40	4392.81	I	5	2409.14	II	15	2144.54	III
900	2901.14	II	250	4393.34	I	5	2409.14	II	14	2202.83	III
800	2904.72	II	60	4405.12	II	5	2417.52	II	15	2225.93	III
1100	2904.92	II	200	4405.12	II	5	2417.52	II	15	2230.33	III
1100	2917.52	II	5	4419.88	I	5	2417.52	II	16	2232.19	III
1100	2919.05	II	8	4423.25	I	5	2419.88	I	14	2246.70	III
1200	2919.85	II	200	4446.70	II	6	2419.88	I	14	2251.47	III
1300	2920.95	II	200	4447.41	II	6	2445.23	II	14	2278.42	III
1000	2923.49	II	200	4454.74	II	6	2449.62	II	13	2285.66	III
750	2930.88	II	200	4455.23	II	8	2457.21	II	13	2309.99	III
850	2934.08	II	200	4457.21	II	5	2474.24	II	15	2338.99	III
950	2937.74	II	200	4474.63	II	7	2474.24	II	15	2394.03	III
800	2945.70	II	200	4478.80	II	8	2481.67	II	15	2406.59	III
950	2947.50	II	200	4490.15	II	8	2490.87	II	15	2459.31	III
1200	2951.24	II	200	4490.87	II	8	2491.44	II	18	2468.85	III
1100	2952.40	II	200	4491.44	II	10	2503.06	III	20	2474.73	III
850	2960.12	II	60	4494.18	I	8	2503.33	III	20	2497.03	III
500	2970.73	II	100	4497.66	I	10	2507.30	III	15	2510.26	III
600	2974.24	II	200	4499.62	II	10	2515.34	III	15	2530.25	III
750	2974.99	II	200	4506.97	II	12	2518.65	III	14	2542.80	III
1000	2977.13	II	200	4519.21	II	12	2519.59	III	15	2550.25	III
1100	2979.66	II	200	4524.98	II	15	2529.87	III	14	2564.59	III
1100	2980.63	II	200	4533.32	II	12	2530.59	III	15	2570.31	III
1300	2984.19	II	10	4541.63	I	5	2541.37	III	15	2586.59	III
550	3004.15	II	15	4545.19	I	30	2550.52	III	15	2599.31	III
750	3007.44	II	200	4551.53	II	7	2566.90	III	18	2646.85	III
750	3009.14	II	160	4590.92	II	7	2567.65	III	15	2649.31	III
600	3015.40	II	120	4664.811	I	50	2567.87	III	15	2650.25	III
550	3053.67	II	200	4668.560	I	50	2568.63	III	15	2654.54	III
550	3055.35	II	160	4722.23	II	20	2702.08	III	15	2668.85	III
550	3056.16	II	160	4731.10	II	100	2712.45	III	15	2670.31	III
550	3057.38	II	20	4741.67	II	70	2718.14	III	15	2674.39	IV
550	3058.72	II	30	4751.822	I	7	2718.76	III	15	2676.63	IV
700	3060.25	II	160	4768.79	II	8	2719.36	III	15	2683.63	IV
800	3061.35	II	100	4788.79	II	9	2720.08	III	15	2688.85	IV
500	3064.38	II	200	4978.541	I	10	2724.45	III	15	2694.31	IV
500	3066.22	II	400	4982.813	I	11	2724.99	III	15	2700.31	IV
500	3066.54	II	40	5148.838	I	12	2731.90	III	15	2704.44	IV
550	3074.33	II	80	5153.402	I	11	2732.34	III	15	2708.59	IV
550	3078.32	II	100	5191.65	II	10	2736.76	III	15	2712.23	IV
550	3080.25	II	80	5208.55	II	10	2737.36	III	15	2716.44	IV
550	3087.06	II	70	5400.46	II	12	2740.67	III	15	2720.85	IV
550	3092.04	II	90	5414.55	II	11	2743.39	III	15	2724.20	IV
650	3094.45	II	280	5682.633	I	10	2752.87	III	15	2728.29	IV
650	3095.55	II	70	5688.193	I	10	2758.18	III	15	2732.54	IV
500	3103.58	II	560	5688.205	I	11	2768.94	III	15	2736.57	IV
500	3104.40	II	80000	5889.950	I	10	2769.29	III	12	2742.48	IV
500	3113.69	II	40000	5895.924	I	10	2771.12	III	10	2746.11	IV
1700	3124.42	II	120	6154.225	I	11	2778.27	III	12	2750.83	IV
600	3125.21	II	240	6160.747	I	10	2781.11	III	10	2755.24	IV
600	3129.38	II	60	6175.25	II	10	2785.48	III	10	2759.48	IV
2500	3135.48	II	70	6199.26	II	15	2807.07	III	10	2763.51	IV
1700	3137.86	II	70	6234.68	II	10	2810.77	III	10	2767.65	IV
950	3145.71	II	80	6260.01	II	11	2811.67	III	10	2771.29	IV
2000	3149.28	II	80	6274.74	II	10	2816.81	III	10	2775.08	IV
2000	3163.74	II	70	6361.15	II	10	2818.94	III	10	2779.48	IV
700	3175.09	II	70	6366.41	II	11	2844.36	III	15	2783.34	IV
1000	3179.06	II	90	6514.21	II	12	2847.53	III	10	2787.44	IV
1700	3189.79	II	80	6524.68	II	10	2850.59	III	13	2791.64	IV
1600	3212.19	II	130	6530.70	II	15	2849.56	III	10	2796.76	IV
700	3234.93	II	130	6544.04	II	12	2850.38	III	11	2802.18	IV
1500	3257.96	II	130	6545.75	II	10	2855.92	III	10	2802.33	IV
650	3260.21	II	80	6552.43	II	10	2856.71	III	11	2808.98	IV
950	3274.22	II	20	7373.23	I	10	2861.21	III	12	2814.14	IV
1700	3285.60	II	10	7373.49	I	10	2880.66	III	10	2818.99	IV
1700	3301.35	II	50	7809.78	I	10	2887.39	III	12	2827.05	IV
1200	3302.37	I	25	7810.24	I	10	2887.47	III	10	2833.95	IV
600	3302.98	I	4400	8183.256	I	20	2889.75	III	11	2841.92	IV
1500	3304.96	II	800	8194.790	I	15	2890.75	III	12	2848.57	IV
1000	3318.04	II	8800	8194.824	I	15	2900.16	III	11	2855.47	IV
950	3327.69	II	100	8649.92	I	10	2918.45	III	15	2865.47	IV
50	3426.86	I	60	8650.89	I	11	2919.36	III	15	2871.97	IV
1500	3533.05	II	25	8942.96	I	14	2926.26	III	10	2872.41	IV
1200	3631.27	II	40	9153.88	I	12	2927.24	III	12	2890.76	IV
850	3711.07	II	60	9465.94	I	12	2932.74	III	11	2905.08	IV
300	4113.70	II	80	9961.28	I	13	2933.89	III	10	2967.60	IV
250	4123.08	II	20	10566.00	I	10	2943.52	III	12	2916.33	IV
250	4233.26	II	60	10572.28	I	12	2946.43	III	10	2914.53	IV
6	4238.99	I	200	10746.44	I	14	2951.24	III	10	2918.39	IV
250	4240.90	II	80	10749.29	I	10	2951.24	III	12	2916.33	IV
10	4242.08	I	120	10834.87	I	13	2958.57	III	10	2914.53	IV