

# Wavelengths, Intensities, and Zeeman Patterns in Ytterbium Spectra (Yb I, II, III, IV)

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In 1937, Meggers and Scribner published a paper on arc and spark spectra of ytterbium providing wavelengths, relative intensities, and spectrum numbers of 1668 spectral lines, including about 400 for Yb I, 1250 for Yb II, and 12 for Yb III. That work was handicapped by impure materials and conventional light sources. When pure ytterbium metal and new light sources became available in 1950, Meggers and Corliss decided to make a new description of ytterbium spectra. This new description includes data for 7300 spectral lines with wavelengths between 2000 Å and 12000 Å distributed as follows: 1800 belong to Yb I, 5100 to Yb II, 430 to Yb III, and 5 to Yb IV. The Zeeman effect on 1300 lines has been observed in magnetic field intensities ranging from 3.7 to 9.358 tesla (37000 to 93580 gauss). These data were obtained for chemical identifications and for structural analyses of the first two spectra of ytterbium.

**Key Words:** Spectra of ytterbium; ytterbium, spectra of; Zeeman effect in ytterbium; wavelengths of ytterbium.

## 1. Introduction

Although ytterbium was discovered in 1907, Meggers and Scribner [1]<sup>1</sup> provided, in 1937, the first useful description of conventional arc and spark spectra of this element. That publication reviewed all earlier work and presented measured wavelengths of 1668 spectral lines ranging from 2073.70 Å to 10321.64 Å and estimated relative intensities from 1 to 2000. On the basis of relative intensities in arc and spark light sources, that description included the first deliberate assignment of lines to three successive spectra (about 400 to Yb I, 1250 to Yb II, and a dozen to Yb III), and for the first two provided the identification of electron configurations, spectral terms and series.

During the first half of this century, the major obstacle in making useful descriptions of the spectra that characterize the so-called rare earths was the difficulty in obtaining pure samples. For example [1] "our first measurements of Yb spectra were made in 1929 when samples of Lu and Yb oxides, prepared by Auer and obtained from Eder in 1919, were available. Although the chemical separation was far from complete, it was possible to make a fairly satisfactory assignment of lines to Lu and Yb by simultaneous comparison of arc and spark. However, both salts contained some Tm as impurity which could not be completely identified without comparable data for Tm spectra. The first sample of Tm salt available for this purpose was generously supplied in 1933 by B. S. Hopkins, University of Illinois, who also supplied three samples of Yb oxide; one of which contained more Lu than Tm, another more Tm than Lu, and the third was entirely free from both Lu and Tm but contained considerable lanthanum."

Through the courtesy of G. R. Harrison, Meggers

in 1939 photographed the first Zeeman patterns of ytterbium lines by using the Bitter magnet and the concave gratings at the Massachusetts Institute of Technology. These results were an accidental by-product of the first attempt to observe the magnetic splitting of thulium lines, as the purest sample of thulium then available contained about 15 percent of ytterbium. These Zeeman data, and further observations of spark spectra, enabled Meggers [2] to confirm and greatly extend the earlier quantum interpretation of the Yb II spectrum [1], but it also became obvious that the structural analyses of Yb spectra could not be satisfactorily extended without additional experimental data.

Since 1945, several contributions to the data of ytterbium spectra have been presented by others. Gatterer and Junkes [3] presented wavelengths and relative intensities of 1476 ytterbium lines observed in arc and spark spectra between 2262.25 Å and 7448.33 Å, but most wavelengths were taken from earlier tables, estimated intensities were given on a scale of 1 to 10, and in many cases it was impossible to sort the lines into Yb I and Yb II spectra.

A valuable extension to information concerning ytterbium spectra was made in 1959 by Humphreys and Paul [4] who used electrodeless lamps. They reported the wavelengths and relative intensities of 49 infrared lines dispersed by a grating spectrometer and detected with a lead-sulfide cell. The wavelengths ranged from 10267.05 Å to 24,552.51 Å and the intensities from 3 to 30000; no separation of Yb I and Yb II was attempted.

In 1961, Bryant [5] reported on "the spectra of doubly and triply ionized ytterbium." By using three different electrical discharges (hot spark, mild spark, high-voltage arc), Bryant succeeded in photographing 5900 lines (from 677 Å to 11262 Å); he attempted to assign each line to its proper spectrum, either Yb I, Yb II, Yb III, or Yb IV. His list contains 4550 lines with wavelengths greater than 2000 Å. We have

<sup>1</sup> Figures in brackets indicate the literature references on page 106.

changed some of his assignments, failed to find some of his lines, but increased the total number longer than 2000 Å by 60 percent.

In 1962, Allen [6] reported on "the Zeeman effect of the arc and spark spectra of ytterbium and thulium." Those spectra were excited in a d-c arc between impregnated electrodes mounted in bored poles of an electromagnet with a maximum field intensity of 2.55 tesla (25500 gauss). Although Zeeman patterns are tabulated for 350 ytterbium lines, only 20 are resolved; most of the remainder are listed as pseudo triplets or quartets.

Prior to 1947, individual (lanthanon) rare earths were usually extracted from natural mixtures by fractional crystallization. In order to obtain a comparatively pure sample, it was often necessary to repeat this operation thousands of times. A more efficient technique, ion-exchange chromatography involving the use of absorption columns of organic resins, was developed in 1947. By this method since 1950, large quantities of (99.99%) pure lanthanons have been accumulated as by-products of the purification and concentration of thorium and uranium as nuclear fuels. Thus, the former major handicap to spectroscopic investigation of lanthanon spectra has vanished and high-purity metals are now obtainable from various commercial sources at moderate cost [7]. Furthermore, since 1950, new types of light sources such as electrodeless lamps excited by microwaves, and sliding sparks, have been developed. These emit stronger and cleaner spectra than the d-c arcs and a-c sparks previously used at atmospheric pressure. These recent important improvements in materials and methods of observing persuaded us, in 1958, to undertake another description of ytterbium spectra. The present description contains 7300 lines (2000 to 12000 Å) and 1300 Zeeman patterns; it should be adequate for chemical identifications and for further progress in the structural analyses of ytterbium spectra. In fact, new analyses and quantum interpretations of Yb I and Yb II are now approaching completion and will be reported in separate papers.

## 2. Experiments

To obtain spectra of rare-earth elements, it was formerly customary to burn chemical compounds (oxides) of them on carbon, copper, or silver electrodes of electrical arcs or sparks at atmospheric pressure. Those sources favored the excitation of ionic spectra, masked many lines near those of the electrode materials, or of atmospheric gases, and caused undue widening of the lines because of high temperature and pressure. During the past decade, all these defects have been removed by the introduction of electrodeless evacuated lamps containing minute samples of metallic halides excited at moderate temperatures and reduced pressures by microwaves, as described by Corliss, Bozman, and Westfall [8] and demonstrated by Corliss and Meggers [9] for hafnium.

Our first ytterbium lamps were made with bromine compounds but the Yb spectra were found to contain,

in addition to Br lines, many troublesome diatomic molecular bands due to YbBr. Since Yb has relatively low melting (824 °C) and boiling (1193 °C) points, new lamps were made containing only pure metal and a small pressure of noble gas as described by Meggers and Westfall [10] and by Zelikoff, Wyckoff, Aschenbrand, and Loomis [11]. Excited with microwaves, these lamps produced extremely intense Yb I spectra and most of Yb II but only a trace of Yb III. A slightly different form of lamp, also containing pure Yb metal and noble gas, was operated as a ring-discharge with high frequency in a surrounding solenoid; it greatly enhanced the intensity of Yb II relative to Yb I, and in addition excited Yb III and Yb IV peripherally.

In 1937, Meggers and Scribner [1] observed only 400 lines belonging to neutral ytterbium atoms and remarked that "The Yb I spectrum is surprisingly simple but may not be fully developed in the arc." In 1958, when Corliss and Meggers [9] undertook to make an improved description of hafnium spectra, they found that the number of recorded lines belonging to Hf I was greatly increased by using (instead of d-c arcs) electrodeless lamps containing hafnium halides excited by microwaves. This experience prompted us to apply this type of excitation to ytterbium halides to obtain a more complete development of the first spectrum. Our first ytterbium lamps, accordingly, were charged with YbBr<sub>3</sub> prepared by dissolving pure Yb<sub>2</sub>O<sub>3</sub> in a mixture of HBr and Br<sub>2</sub> in water solution at about 300 °C. The spectra emitted by these lamps were satisfactory in the ultraviolet, but the visible region was partly obscured by strong bands of YbBr. We then decided to avoid the use of metal halides since ytterbium has relatively low melting and boiling points. A 100-mg portion of pure Yb metal was placed in a 7-mm o.d. quartz tube with a hemispherical window blown at one end. This tube was evacuated, outgassed, and filled with 7 torr of argon gas. With the argon excited in a microwave field of 2450 MHz, a Bunsen flame was applied to the portion of the tube containing the ytterbium metal. A green glow, characteristic of the arc spectrum of ytterbium, appeared and became dazzlingly brilliant as the temperature rose to make the quartz tube a dull red. At that temperature (ca. 600 °C), ytterbium has a vapor pressure of about 0.01 torr. The lifetime of this type of lamp is limited by the diffusion and ultimate condensation of ytterbium vapor onto the window, which then becomes opaque. In our lamps, this generally took place after about 20 hr of operation. Spectral regions where argon lines interfere with ytterbium were reobserved with lamps containing pure Yb metal and helium gas. In that case, a reservoir with a capacity of about 50 to 100 cm<sup>3</sup> was necessary to maintain the gas pressure because helium gradually escapes through hot quartz.

These ytterbium lamps emit an intense and very clean spectrum consisting primarily of Yb I with numerous lines of Yb II present but none of Yb III. Because Yb I and Yb II contain some prominently outstanding lines, our first spectrograms on nonbacked photographic plates were marred by opaque patches

of halation extending 1 cm on either side of the strong images; all subsequent exposures were made on black-backed plates.

To distinguish and identify successive spectra of ytterbium, a light source of higher excitation was required for comparison. This we found in the ring-discharge discovered, named, and described by J. J. Thompson [12] in 1891. Although Thompson suggested that his light source might serve spectroscopy, it never became popular. However, in 1923, the Bloch brothers [13] demonstrated that the proper use of a Thompson tube permitted them to record simultaneously four successive spectra of mercury and distinguish them by observing different intensity gradients along the diameter or radius of the tube. Nearly 40 years later, in like manner, we succeeded in recording simultaneously four successive spectra of ytterbium, distinguished by radial intensity gradients in spectral-line images obtained from a single source, the ring-discharge or Thompson tube.

In our experiments, a 100 mg lump of pure ytterbium metal was placed in a Vycor tube (18 mm o.d. and 150 mm long) closed at one end with a plane quartz window. This tube was evacuated, outgassed, and sealed after being filled with helium to a pressure of 6 torr. The tube was then surrounded by a solenoid (25 mm diam by 140 mm long) of 20 turns of platinum wire which was connected into the discharge circuit of a high-voltage spark apparatus with capacitance of 0.001  $\mu$ F charged to 20,000 V and discharged through a 6-mm gap. Peak current in the solenoid was about 500 A.

The platinum solenoid and the enclosed ytterbium lamp were mounted with their axes on the optical axis of the spectrograph, and the tube was focused on the slit. When excited, the cold tube emitted a dull reddish glow due to the helium present. A Bunsen burner set beneath the solenoid brought the platinum coils to a bright red heat and the discharge in the tube changed to a bright blue-green as ytterbium was vaporized and excited.

Unlike the ordinary spark in air, the Thompson tube produces clean ytterbium spectra of sharp lines. When it is photographed beside the microwave discharge, the spectra of neutral and ionized atoms are easily distinguished. The first spectrum is strongest in the microwave discharge and considerably weaker in the ring discharge where it appears with maximum intensity on the axis of the tube. The second spectrum is generally much stronger and more fully developed in the ring discharge than in the microwave discharge because the latter lacks energy for the excitation of higher states in ions. The third and fourth spectra appear only in the ring discharge where they are observed only near or at the walls of the tube, fading toward the axis.

It appears that the energy for excitation of spectra in the Thompson tube has its minimum value on the axis and maximum at the walls. Consequently, when the tube is viewed end-on, by focusing the diameter of the tube on the slit of a stigmatic spectrograph, the lines characteristic of neutral atoms are stronger

at the center and lines belonging to singly ionized atoms are nearly uniform in intensity along the diameter, whereas lines due to doubly or trebly ionized atoms are absent at the center but are observed near the wall with noticeably different intensity gradients.

The spectra of microwave and ring discharges of ytterbium were photographed side-by-side together with short images of superposed standards from iron arcs or from thorium-iodide tubes. To disperse and focus the spectra, four concave gratings of 6.5 m radius, in Wadsworth-type mountings, were used. The short ultraviolet region from 2000 Å to 2500 Å was photographed in the first order of two (30,000 lines per inch) gratings with a plate factor of 2.4 Å/mm. In the range 2500 Å to 4500 Å, the spectra were recorded in the second order of either grating with a plate factor of 0.87 Å/mm, and the same setting served to record the range 5000 Å to 9000 Å in the first order with a plate factor of 1.74 Å/mm. In the latter case, a colored glass filter was placed before the slit to absorb the second and third orders, and special dye-sensitized plates recorded the first order. The spectral range 7000 Å to 10000 Å was photographed with a third grating having 15,000 lines per inch and plate factor of 5 Å/mm, and the infrared observations were extended to 12000 Å with a fourth grating, ruled 7,500 lines per inch, whose plate factor was 10 Å/mm.

The above-mentioned spectrograms yielded wavelengths and estimated relative intensities of about 7000 ytterbium lines and, with few exceptions, they all appeared as sharp emission lines. In particular, there was no detectable absorption or self-reversal in any lines emitted by our sources. After our line list was compiled, Sugar [14] developed a new light source specifically for producing self-reversed lines in both the first and second spectra of rare-earth elements. The first observations with this light source were made in 1962 by Sugar with ytterbium electrodes. Those spectrograms (covering 2400 Å to 7000 Å) were evaluated by Meggers who found that 22 lines of Yb I and 50 of Yb II were absorbed or self-reversed; these are indicated by A and by R or r respectively, following the intensity number in our table of ytterbium spectra.

The final contribution to our table of ytterbium lines was made in 1963 by Nissan Spector who was photographing the spectra of erbium emitted by a sliding spark; he kindly substituted ytterbium electrodes for erbium and photographed the spectral range 6600 Å to 11600 Å with this source. A description of this source was given by Sugar [15]. These spectrograms were presented to Meggers who found that below 8000 Å they were practically identical with those from the Thompson tube, but beyond 9000 Å they added several hundred lines to our list, many of which have been explained as transitions between previously established Yb II energy levels. Some ytterbium lines appear slightly hazy (h) in the sliding spark.

A major contribution to this description of ytterbium spectra is found in the data on Zeeman effect. As noted in the introduction, the first Zeeman patterns

of ytterbium lines were obtained accidentally in 1939 when they appeared as impurities in a thulium sample under investigation at MIT. Those Zeeman spectrograms were made with a d-c arc in the Bitter magnet [16] with field intensities at 7.30, 8.50, and 9.358 tesla; both factors favored ionization so that Zeeman patterns were recorded only for strong lines of Yb I or Yb III and none for Yb I. The total number of ytterbium lines with Zeeman patterns on MIT spectrograms was about 400, and in favorable cases the resolution reached 0.05 Lorentz unit, but most of the lines lay between 2200 Å and 4300 Å.

To extend and supplement the Zeeman data for ytterbium obtained at MIT in 1939, we resumed investigations in 1959 at the National Bureau of Standards where a Weiss magnet (with ferro-cobalt pole pieces) was used. When that magnet was animated with 15 kW, it produced a field intensity of 3.70 T in a pole gap of 5 mm. Special electrodeless lamps containing pure ytterbium metal (and argon gas) were made of quartz tubing 4 mm o.d. to be inserted and excited between the pole pieces of the magnet. Care was taken to vaporize the metal only in that portion of the lamp located in the region of uniform magnetic field between the pole pieces. The lamp was viewed end-on and focused on the slit of the spectrograph containing a concave grating with 30,000 grooves per inch, the same one used in the first and second orders to describe ytterbium spectra between 2000 Å and 9000 Å. A Wollaston prism was inserted on the optical axis; it produced a vertical separation of polarized components of Zeeman patterns (parallel or normal to the lines of force) and, since the spectrograph was stigmatic, it recorded all components simultaneously without mixing any. Indeed, the Wollaston was placed where it separated the polarized components sufficiently to insert a narrow strip of "no field" exposure to the ytterbium spectra, useful for recognizing asymmetrical or overlapping Zeeman patterns, and for assigning unresolved patterns to their proper spectrum by noting the reduced intensity of the first spectrum relative to the second in the magnetic field. The magnetic field intensity was calibrated with standard splittings of ubiquitous impurity lines, principally of calcium, magnesium, sodium, and silicon. In this series of Zeeman-effect observations, the highest resolution achieved was about 0.10 Lorentz unit. The first results of Zeeman patterns in Yb I were announced by Meggers and Corliss [17] in 1960.

### 3. Results

These investigations, extending intermittently over a quarter century, resulted in the condensed data displayed in table 1, in which successive columns contain measured wavelengths (in air), estimated relative intensities and other attributes in two or more sources, successive spectra assignments, and types of Zeeman patterns.

In general, the wavelengths are the average of two to four or five measurements, and are regarded re-

liable to 0.01 Å in most cases. In the range 2500 Å to 4500 Å, photographed with our highest dispersion, most strong lines were accompanied by two or more Rowland ghosts. In such cases, the ghosts contributed to the wavelength determination of the parent line, but were scratched from the final list. When the average deviation from the mean of several values was less than 0.005 Å, the third decimal was retained.

Because of the electronic structures of ytterbium atoms and ions (deduced from their spectra), their spectra are characterized by an extraordinary range of line intensities. In table 1, these are roughly estimated from photographic images of illuminated slits and assigned numerical values from 1 to 100,000. In spite of their crudeness, these estimates of relative intensities in the same and in different light sources provide general criteria for assigning lines to their proper spectrum (Yb I or Yb II) and in the same spectrum they often distinguish lines of different excitation. Yb III and Yb IV lines were not excited in microwave discharges but could be seen in spectra of the Thompson tube where they were distinguished by radial intensity gradients. Literal symbols following intensity numbers have the following meanings:

- A = nearly all absorbed in the pulsed arc.
- R = wide reversal in the pulsed arc.
- r = narrow reversal in the pulsed arc.
- d = double but not resolved.
- e = enhanced near wall of Thompson tube.
- h = hazy as distinguished from sharp.
- H = very hazy.
- l = shaded or displaced to longer waves.
- s = shaded or displaced to shorter waves.

The above-mentioned estimates of spectral-line intensities and supplementary information on line attributes constitute the main criteria for sorting the observed lines in four successive spectra: Yb I from neutral Yb atom, Yb II from Yb<sup>+</sup> ions, Yb III from Yb<sup>2+</sup> ions, and Yb IV from Yb<sup>3+</sup> ions. The assignment of observed lines to their proper spectrum is indicated by Roman numerals in column 4 of table 1; there are about 1800 lines for Yb I, 5100 for Yb II, 430 for Yb III, and 5 for Yb IV.

In the last column of table 1, we list the Zeeman-type numbers for about 1300 lines observed in strong magnetic fields. These numbers correspond to the classification of Back and Landé [18] who showed that only 7 types of Zeeman patterns exist, types 1, 2, 3, for energy levels of odd multiplicity, types 4, 5, 6 for even, and type 7 appearing in either multiplicity as a single undisplaced parallel (p) component and two symmetrically displaced normal (n) components. The Zeeman types in table 1 prove that Yb I and Yb III result from energy levels of odd multiplicity, and Yb II from even. Further details of the Zeeman patterns, including quantum numbers (J and L) and magnetic splitting factors (g) derived from them, will be presented in subsequent papers dealing with atomic energy levels and quantum interpretations of Yb I and Yb II spectra.

TABLE 1.—Emission spectra of ytterbium

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
11603.94	20		I		10445.27		4 h	II		9970.44	5		I	
11559.05		5	II		10425.42		2	II		9970.1		200H	II	
11442.70		1	II		10416.16		5	II		9959.25		2	II	
11299.78		5 h	II		10414.15		1	II		9953.32		4	II	
11277.83		1	II		10411.40		10	II		9945.96		4	II	
11262.27	250	10	I		10397.98		3	II		9940.23		3	II	
11060.25		2 h	II		10397.88			I		9932.96		1	II	
11051.05		2	II		10391.64	4	1 h	II		9915.99		6	II	
11035.15		1 h	II		10388.85		2 h	II		9914.02		2	II	
11023.37		1 h	II		10363.89		3	II		9904.5		3	II	
11002.95		4	II		10345.62		1 h	II		9896.50		20	II	
10980.47		3 h	II		10343.99		4 h	II		9894.20	8		I	
10959.94		1 b	II		10343.85			I		9895.9		100H	II	
10943.17		1	II		10341.77	3		I		9892.20		4 h	II	
10882.92		1 b	II		10339.49	7	2 h	II		9888.40	2		I	
10856.25		1	II		10337.35		1 h	II		9885.02		1	II	
10845.53		3 h	II		10328.74		2 h	II		9884.09		3	II	
10830.36		100	II		10327.33		1	II		9882.33	1		I	
10829.11		40	II		10321.68	500	80	I		9881.04		1	II	
10810.82		5 b	II		10293.40		2 h	II		9870.17	200	15	I	
10802.47		4	II		10285.15		2	II		9849.25		2 h	II	
10776.11		1	II		10283.38		2	II		9837.89		2 h	II	
10774.58		1	II		10275.82		1	II		9831.13	7		I	
10770.10	2000	400	I		10267.37	300	100	I		9830.09		2	II	
10754.99		1	II		10259.92		3 b	II		9826.25		2	II	
10745.87		3	II		10257.97		1 h	II		9826.14	1		I	
10731.94		3	II		10251.85		10	II		9823.76	9		I	
10727.72	200	20	I		10242.30		1 h	II		9818.33		6 h	II	
10721.68		3 h	II		10222.98		2 h	II		9817.16	1		I	
10717.07		2	II		10212.34		1 h	II		9816.25		2 h	II	
10717.02	2		I		10212.27	1		I		9800.41		1	II	
10711.60		30 h	II		10198.92		1 h	II		9799.96	400	10	I	
10691.02		1 h	II		10189.53		10 h	II		9797.67		6	II	
10689.20		2 h	II		10186.03		5	II		9775.49	1		I	
10678.64		1	II		10172.39		2	II		9770.61		2 h	II	
10676.73		30	II		10168.71		1 h	II		9760.38	200	1000	II	
10666.30		2 h	II		10167.42		1 b	II		9745.39		7	II	
10651.36		5	II		10157.63		1	II		9735.10		1	II	
10638.35		1	II		10148.91		3	II		9734.62	2		I	
10633.24	5		I		10145.30		4 b	II		9718.81	3		I	
10632.89		400 h	I		10136.34		3 b	II		9717.58		2	II	
10628.11		4	II		10110.87	10		I		9716.88		8	II	
10602.75		2 h	II		10110.60		200	II		9711.44		5	II	
10584.87		1	II		10107.09		1	II		9706.65		10	II	
10580.74		1	II		10103.24		3	II		9705.60		3 h	II	
10574.50		2 h	II		10100.39		1 h	II		9700.26		2 h	II	
10570.51		1	II		10086.67		1	II		9695.71	2		I	
10567.5	1		II		10068.79		2 h	II		9694.33		2	II	
10567.42		3	II		10067.47		1	II		9693.72		50	II	
10565.46		4	II		10066.30		5	II		9688.77	25		I	
10556.48		2 b	II		10053.22		2 h	II		9678.00	1	5	II	
10547.78		4	II		10046.95		2	II		9677.56		1	II	
10546.24		1	II		10039.90		1	II		9671.78		1	II	
10516.65		40	II		10032.55		50	II		9670.80	5		I	
10516.61	60		I		10020.70		1	II		9669.62		1	II	
10502.56		1	II		10016.78		15	II		9669.03		2	II	
10501.08		4	II		10007.96		3	II		9664.23		20	II	
10490.03		1	II		10003.38		4	II		9663.60		1	II	
10485.56		2	II		9994.64		1	II		9663.09		2	II	
10477.15		1 h	II		9992.75		1	II		9661.01		6 b	II	
10456.88		1	II		9990.47		6	II		9659.43	2		I	
10455.88		2	II		9984.66		1	II		9657.25		3	II	
10446.15		1	II		9976.50	2	30	II		9656.05	20		I	

TABLE 1. — Emission spectra of ytterbium — Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
9648.96		3	ii		9377.90	7		i		9155.30	40		i	
9644.92		2 h	ii		9372.12		3	ii		9152.45		8H	ii	
9640.78	2		i		9367.86		1	ii		9150.60		1 h	ii	
9637.59		3 h	ii		9367.21		2	ii		9149.57		2 h	ii	
9630.97		5	ii		9352.58	8	80	ii		9142.22		7	ii	
9629.04		2	ii		9349.25	80	300	ii		9141.37		15	ii	
9623.60		9 h	ii		9341.89		4 h	ii		9140.64	10		i	
9619.82		3 h	ii		9334.67		3	ii		9138.17	3	60	ii	
9613.49		1	ii		9328.56		3 h	ii		9128.47	20		i	
9611.30		2	ii		9325.68		20 h	ii		9127.08		1	ii	
9610.77		2	ii		9324.60		2 h	ii		9125.00		7 h	ii	
9608.81		2	ii		9321.14		2 h	ii		9123.62		2	ii	
9606.08	3		i		9320.30		1	ii		9122.30		15	ii	
9602.64		20	ii		9316.58		1	ii		9121.10	3		i	
9600.55		2 h	ii		9314.88	2	40	ii		9120.52		5 h	ii	
9595.60		2 h	ii		9304.35	1000	80	i		9117.68	100	4	i	
9594.26		2 h	ii		9302.74		2	ii		9113.24		7 h	ii	
9592.23	1		i		9301.33		3	ii		9105.95		15 h	ii	
9589.34	1		i		9299.67		1	ii		9104.10	200	7	i	
9589.14		7 h	ii		9298.90	3		j		9097.69	2		i	
9580.31	30		i		9298.74		6	ii		9096.88		20	ii	
9578.21		1	ii		9291.74	2		i		9094.57		4	ii	
9577.45		3	ii		9289.87	4	100	ii		9089.55	2 d		i	
9572.65	5		i		9287.36		1	ii		9083.98		3 h	ii	
9564.64		3	ii		9272.68	3	30	ii		9082.61		7	ii	
9559.83		5	ii		9271.84		2	ii		9080.35	1	60	ii	
9555.55		5	ii		9263.73		4 h	ii		9077.91		4	ii	
9536.43		3	ii		9261.11		4 h	ii		9076.21		2	ii	
9532.71		8 h	ii		9258.76	1		i		9073.18	1		i	
9532.64	1		i		9257.70		8	ii		9069.22	20		i	
9531.83		20	ii		9253.57	7	70	ii		9066.47		1	ii	
9527.91		3 h	ii		9252.27		3	ii		9062.06		15	ii	
9524.36	300	6	j		9251.95	1	5	ii		9057.08		3 h	ii	
9522.68		4 h	ii		9245.69		2 h	ii		9055.35		2	ii	
9520.19		3	ii		9241.86		2	ii		9045.47	1		i	
9512.32	2		i		9230.17	7		t		9043.95	5		i	
9511.61		3	ii		9226.17		6 h	ii		9040.38		3 h	ii	
9505.71	2		i		9224.21	6		i		9039.08	1		i	
9504.03		1	ii		9220.77		7 h	ii		9035.02	2	20	ii	
9498.90		3	ii		9218.26		1	ii		9029.62		2	ii	
9496.63		10	ii		9217.40		6	ii		9021.00		100 h	ii	
9490.85		2	ii		9215.28		5	ii		9020.90	10		i	
9482.44		20	ii		9211.07		2	ii		9017.02		5 h	ii	
9475.35		1	ii		9207.65		7 h	ii		9016.21	2		i	
9474.20		2 h	ii		9196.5		20H	ii		9014.27		2	ii	
9468.54	2	3	i, ii		9192.40		3 h	ii		9004.83		3	ii	
9468.20		10 h	ii		9191.41		3	ii		9004.21	10	150	ii	
9464.03		4 h	ii		9190.18		5 h	ii		8997.66	400	10	i	
9457.07		6 h	ii		9182.34	10		i		8985.71	8	60	ii	
9445.45		6 h	ii		9187.53		4	ii		8982.45		2	ii	
9442.75		7	ii		9187.01		1	ii		8980.79	3		i	
9428.10		30	ii		9182.32		5 h	ii		8980.74		20	ii	
9423.79		3 d	ii		9178.52		5	ii		8978.58		6	ii	
9417.09		5	ii		9177.47	1		i		8971.65		3 h	ii	
9408.11		4	ii		9176.14	1		i		8967.71		5	ii	
9405.75		3	ii		9175.76		2 h	ii		8959.06	2	70	ii	
9404.73		10	ii		9172.59		2 h	ii		8956.72		9	ii	
9397.79		2 h	ii		9170.70		3 h	ii		8952.23		6	ii	
9390.61		8 h	ii		9168.70		2 h	ii		8948.02	2		i	
9388.92		2	ii		9167.06	3	40	ii		8947.78		6	ii	
9382.31	2		i		9163.69		15	ii		8946.66		5	ii	
9380.18		15	ii		9162.85		2	ii		8945.38	1		i	
9378.29		3	ii		9158.62		15	ii		8942.87		3	ii	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
8930.12		1	II		8710.15	4	II	4		8518.01	20	I		
8927.38		4	II		8699.84	1	II	II		8517.54		2h	II	
8922.56		100h	II		8697.67	1	II	II		8516.60	2	I	I	
8922.50	1000	40	I		8691.24	1	II	II		8515.78	3	I	I	
8912.14	4	60	II		8686.28	2	I	I		8515.24	2	I	I	
8907.81		2h	II		8681.93	3	I	I		8508.02	10	I	I	
8902.99	2		I		8679.50	2	I	I		8505.96	2	I	I	
8902.92		7h	II		8672.34	5	II	7		8503.56		1h	II	
8896.89	1		I		8671.53	1	II	II		8502.18	3	II	4	
8897.61		1	II		8670.82	2	I	I		8500.55		2	II	
8896.50		4	II		8667.69	50	I	I		8494.37	50	I	I	
8890.45	5	50	II		8663.92	10	I	I		8493.74	4	I	I	
8888.66	3		I		8663.39		4h	III		8489.90		30e	III	
8883.16	10		I		8661.59	5	I	I		8487.84	1	I	I	
8874.68	2		I		8659.04	15	II	4		8485.10	30	I	I	
8874.53		9	II		8655.52	15h	I	I		8483.31		2	II	
8873.33		4	II		8654.91	100	I	I		8481.03		2	II	
8867.40		1	II		8654.42	20	I	I		8480.27		2h	II	
8865.65		1	II		8650.23	2	I	I		8477.79		2h	II	
8864.18		1	II		8641.86		15	II		8474.21	3	I	I	
8864.06	2		I		8634.68	9	I	I		8473.35		2	II	
8863.98		4	II		8638.25		1	II		8465.75		15	II	
8862.12		3	II		8621.62		2	II	6	8463.32	1	I	I	
8861.70		1	II		8620.75		1	II	II	8462.25	4	I	I	
8855.12	50	300	II		8612.57	50	I	I		8460.54		2	II	
8851.05		1	II		8607.49	200	400	II	6	8458.72		1	II	
8849.52		1	II		8603.56	80	I	I		8455.87	4	30	II	
8846.83	4	60	II		8601.25	1	I	I		8446.74	5	I	I	
8842.64		2	II		8597.22		2h	III		8446.35	20	I	I	
8839.24		10	II		8594.75	2	I	I		8446.32		6	II	
8831.38	2		I		8594.57		8	II	5	8443.99	5	I	I	
8829.26	30		I		8592.85		10	II	II	8438.92		1	II	
8827.46	1		I		8592.00	200	I	I		8438.42		2	II	
8825.52		2	II		8591.26	20	I	I		8437.07		3	II	
8822.45		7	II		8590.94	20	I	I		8435.61		3	II	
8815.52		9	II		8590.08	1	I	I		8430.76		2	I	
8806.80	6		I		8587.89		1	II		8429.59	3	I	I	
8806.05		2	II		8585.99	20	I	I		8428.83		15	II	
8800.32		2h	II		8585.00		1	II		8428.24	10	I	I	
8797.99	5	100	II		8584.20	2	I	II		8427.26		3	II	
8794.91	5		I		8579.08		7	II	6	8424.89		1	II	
8788.45	5		I		8575.25	10	I	I		8423.84	1	I	I	
8783.76		2	II		8574.91	2	I	I		8418.43	10	I	I	
8783.75	4		I		8566.83		2	II	6	8416.53	20	I	I	
8781.96	1	10	II	6	8561.74		20	II	6	8411.84	1	100	II	
8780.63	10		I		8558.47	2h	I	I		8408.89		3	II	
8762.42		5	II	5	8556.90		4	II	6	8403.58		2	II	
8761.26		2	II		8554.92		2	II	II	8400.65	20	I	I	
8750.88		1h	II		8548.15		1	II	II	8400.61		1	II	
8749.10		40	II	4	8546.26	40	I	I		8400.35	5	I	I	
8744.27		1	II		8543.66		5	II	II	8400.01		20	III	
8742.84		7	II		8535.68	20	I	I		8396.79		8	II	
8742.45		10	II	7	8532.59		1	II	II	8392.00		4h	III	
8740.48		5	II		8528.08	10	I	I		8391.62	3	I	I	
8737.78		10	II	7	8527.65		1	II	II	8383.90	2	I	I	
8736.45	20		I		8525.66	3	I	I		8381.26		20	II	
8736.03	4		I		8525.54		1	II	II	8380.03		3	II	
8735.23		1	II		8524.07	5	I	I		8379.39		8	II	
8731.29	30		I		8523.93	5h	I	I		8378.93	6	I	I	
8725.19		10	II		8522.92	2	I	I		8378.34		3	II	
8724.18	4		I		8520.34	50	I	I		8376.33	2	I	I	
8723.83		1	II		8520.12	7	I	I		8375.94	40	I	I	
8717.80	1		I		8519.66	20	I	I		8374.40		15	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
8371.77		2 h	II		8225.59	1 h	I			8115.46		6	II	
8360.09	2		I		8225.41		5	II	6	8114.26	9		I	
8356.75		5	II		8224.13	10	I			8111.71	90		I	
8352.37		4	II		8221.74	10	I			8111.61		9	II	
8352.03	2		I		8221.35	10	I			8111.19	2	10	II	6
8350.15		9	II		8220.44	2	I			8109.79	100		I	
8349.52	2 h		I		8213.96	9	I			8104.44		5	II	4
8347.14		2 h	II		8213.64		30	II	6	8103.22		1	II	
8346.11	3 h		I		8213.24		10	II	6	8101.64		1	II	
8343.49		2	II		8213.02	30	I			8100.20		3 h	II	
8342.51		8	II		8212.03	5	I			8098.66	2		I	
8341.30		2	II		8210.33	4	I			8097.06		1	II	
8336.34		5	II		8207.98	40	I			8095.74	1		I	
8335.12	1		I		8206.55		3	II		8093.03		8	II	6
8334.43		10	II		8200.20	1	I			8092.95	3		I	
8333.30	10		I		8199.08		1	II		8091.73	1000	10	I	1
8331.71		2 h	II		8197.43	6	I			8089.66	7		I	
8327.88		30 e	III		8194.83		2	II		8086.58	10		I	
8327.71	3		I		8192.40		30	II	4	8085.56	4		I	
8326.86		10 e	III		8190.61		10	II	7	8084.74		9	II	4
8325.18	800	5	I	3	8190.31	5	I			8084.50	1		I	
8320.33	8		I		8189.53		2	II		8079.47		5	II	6
8318.01		1	II		8183.28		1	II		8078.10		2	II	
8317.43	20		I		8180.75	10	I			8076.95		1	II	
8310.61	3		I		8180.64	30	I			8075.92	2	40	II	6
8310.53		2	II	7	8180.34		2 h	II		8074.53		7	II	5
8310.38		2	II		8179.01		4	II		8071.28	10		I	
8309.10	2		I		8178.46		4	II		8070.00	50		I	
8308.40		1	II		8178.14		3	II		8067.21	7		I	
8307.67		2	II		8177.37		2 e	III		8066.72	2	50	II	6
8306.38	2		I		8173.60		3 h	II		8066.43	7		I	
8301.74		15	II	6	8171.82	1	30	II	5	8066.17		9 e	III	
8299.77	2		I		8169.69		1 h	II		8063.02	2	60	II	4
8296.83	4		I		8169.29		2 h	II		8058.91	80		I	
8294.85	150		I		8166.73		4 h	II		8056.20	10		I	
8291.01		20	II		8166.05		1	II		8056.02		20 e	III	
8289.25		3	II		8162.00		2 h	II		8055.12	20		I	
8283.78		15	II	6	8158.49	5	80	II	5	8053.43	50	500	II	6
8282.14		2	II		8157.40		150	II	6	8052.35	20		I	
8280.60		2	II		8155.12		3	II		8051.48	20		I	
8276.29		2 h	II		8149.08		15	II	6	8049.03	5	30	II	6
8267.90		2	II		8148.83		3	II		8042.91	4		I	
8267.87	10		I		8146.64		1	II		8042.63		5	II	
8266.52		7	II		8145.56	20	I			8039.83	200	2	I	1
8266.06	2		I		8145.36	5	I			8038.16		10	II	
8265.64	2		I		8143.81		2 h	II		8035.53		4	II	5
8263.64	4	150	II	4	8142.47		20	II	4	8034.43		1	II	
8262.66		3	III		8140.67		6 e	III		8034.08		2	III	
8261.70		1	II		8140.53	2	I			8023.46	1	20	II	
8260.66		3	III		8139.18		6 e	III		8023.11	3		I	
8259.34	1		I		8137.92		2	II		8022.93		10	II	
8257.79		7 h	III		8136.38	9	I			8021.62	3	150	II	6
8249.18	50		I		8133.01		3	II		8018.74	3		I	
8246.48		1 h	II		8131.92		2	II		8013.17		15	II	6
8242.95	1		I		8124.50		15	II		8009.53	4	50	II	4
8242.03	1		I		8123.85		9	II		8007.83	15	300	II	4
8241.66		5	II		8122.77	1	I			8002.73	1	20	II	4
8240.67	2		I		8122.49		5	II	4	8001.30		2 h	II	
8240.01		1	II		8121.35		3 h	II		7994.90		30	II	4
8237.20		2	II		8121.12		2	II		7990.35	30		I	
8234.61	15		I		8118.80	5	150	II	4	7984.31		4	II	
8230.78		1	II		8117.44		10 e	III		7971.46		100 e	III	
8227.41		1	II		8116.08	10	I			7968.09	1	6	II	



TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
7964.12	2	80	II	4	7772.78		2	II		7623.44		4 a	III	
7958.80		3	II		7771.01			I		7616.50		2	II	
7958.48	2	40	II	6	7767.43	4	2	II		7616.34	3		I	
7950.35	2	60	II	6	7766.02		2	II		7611.69		15	II	5
7950.01		2	II		7761.45			I		7611.28			I	
7947.60	1	40	II	4	7760.49		5	I		7607.09		2	II	
7946.26	50		I		7758.04	500	20	I	7	7603.42	2		I	
7933.25	2		I		7753.91		5	II		7599.13		20	II	6
7930.04		8	II	4	7753.29		6	II		7598.01	2		I	
7928.71		7	II		7749.38		1	II		7596.22	200	1	I	
7924.65	4		I		7746.98	6 b		I		7595.20		2	III	
7922.40	4000	100	I	1	7745.98		5	II	5	7588.43	8		I	
7918.41		3	III		7744.97	5		I		7582.93		40	II	4
7913.30		6	II		7741.94		3	II		7582.90	30		I	
7912.46		10	II		7741.66		2	II	7	7581.32		2 e	III	
7910.08	10		I		7741.15		2	II		7579.97		60	II	5
7906.25		2 h	II		7737.59	1	8	II	4	7576.94		4 e	III	
7904.82	10	200	II	4	7734.53	200	2	I	3	7576.41	2		I	
7899.54		5	II	6	7732.46		4 b	II		7572.81		5	II	
7897.90		2	II		7732.35		6	II	6	7566.65		15	II	4
7896.38	100		I		7719.62		15	II		7561.76		8 e	III	
7895.51		3 h	III		7719.23		40	II	6	7561.42	4		I	
7895.08	1000	50	I	2	7717.58	6		I		7560.18		1	II	
7893.10		20 a	III		7713.74		4 c	III		7556.13	1	40	II	6
7892.39		80 e	III		7707.28		2 h	III		7555.14	1	60	II	4
7891.93		1	II		7706.29	2 h		I		7547.08	5		I	
7889.78		3	III		7702.72		2 h	III		7541.56		2	III	
7885.17		2	III		7699.48	2000	2000	I	1	7541.10	5	80	II	4
7883.96	2		I		7697.62		5	II		7539.25		8 e	III	
7877.06	60		I		7693.21		6 e	III		7537.40		1	II	
7875.15	10		I		7692.75	5 h		I		7533.09		3	II	
7874.10	1	20	II	5	7684.25		4 h	III		7530.78		3	II	
7865.13		7	II	5	7683.77		9	II	5	7529.61		3	III	
7856.20		4	II	4	7679.91	200	1	I	1	7528.07		8	II	
7851.06		3 h	III		7678.20		1	II		7527.46	10000	200	I	1
7849.85		6	II		7676.62		8	II	6	7522.92		7 e	III	
7848.99		15	II	4	7666.57		1	II		7522.73	200	2	I	
7844.11	20	2	I	6	7664.41		70 e	III		7520.94		4	II	
7840.45	1	40	II	4	7664.11		2 h	III		7520.46		15	II	6
7839.17		1 h	II		7662.08	2		I		7517.94		2	II	
7834.65	15		I		7659.90	20		I		7516.24		2	II	
7833.02		9	II	4	7659.40		3 h	III		7513.50		4 e	III	
7825.52	1	50	II	6	7659.14	50		I		7512.86		15	II	
7824.64		3	II		7657.60	100		I		7508.07		8	II	5
7822.78		8 e	III		7655.71		5	II	4	7507.59	5		I	
7821.37	2		I		7650.02	4		I		7503.32		1 h	II	
7820.89	50		I		7648.88		4	II	6	7501.33		1 h	II	
7815.52		5	II	5	7645.84		8	II	6	7500.09		3 h	II	
7811.96	1	8	II	4	7641.45	3		I		7499.87	30		I	
7809.48		8 e	III		7640.63		1 h	II		7496.33	100	2	I	
7808.64		4	II	6	7639.47		4	II	4	7496.24		20	II	
7806.11		3	II		7637.27	15		I		7495.15		2	II	
7804.57		6	II		7636.65		3	II		7494.37		3	II	
7803.65	20	300	II	6	7635.58		4 b	III		7492.34	1	6	II	4
7802.01		9	II		7634.62		6	II		7483.19		2	II	
7801.17		8	II		7633.95	6	100	II	4	7482.80		1	II	
7799.44		3	II		7631.81		4	II		7481.04		6	II	7
7799.33	1		I		7630.67		1	II		7478.77	4		I	
7793.72		2 h	III		7630.48		9	II		7477.86	1	5	II	
7789.80	2		I		7630.00		8	II		7477.61	7	200	II	7
7785.02		3	II	4	7627.45	1	50	II	5	7475.24		2	II	
7777.96	1	7	II	6	7627.24	1	70	II	7	7474.72		4 e	III	
7777.49		6	II	5	7623.90	20		I		7473.32		5	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
7472.44	2		I		7342.30	10	400	II	4	7191.87		I	II	
7469.44	60		I		7341.64		4	II		7190.33		I	I	
7468.09		8	II		7339.99	10		I		7187.07	6	2	I	I
7467.58	40	30	I		7339.80		60	II	7	7182.60		2	II	
7464.10	5	60	II	4	7334.01	50		I		7175.48		300	II	6
7462.71		5 e	III		7331.31	1	80	II	6	7175.10	1000	10	I	3
7459.79	5 b		I		7329.29		2	II		7174.60		8	II	
7456.86		15 e	III		7328.57	8		I		7173.96	10		I	
7456.20		2	II		7327.87	500	2	I	1	7169.25	10		I	
7451.21		1	II		7325.07		2	II		7160.31	2		I	
7449.60		1	II		7323.32			I		7157.72		15 e	III	
7448.28	6000	100	I	7	7318.77	4	1	II		7156.48	3		I	
7447.37	1	60	II	7	7317.74		30	II	7	7154.52		5	II	6
7444.20		2	II		7313.18		15	II		7153.51	3		I	
7439.84	1	80	II	5	7313.05	3000	50	I	2	7152.40	10		I	
7438.92	25	1	I		7311.02		10 e	III		7148.16		2	II	
7433.99	4	30	II	5	7310.70	400	1	I		7147.94		8	II	
7429.51	2	40	II	4	7309.19		40	II	5	7145.13		4	II	7
7429.10		2	II		7306.63	1	100	II	5	7142.39	1	120	II	5
7422.15	40	200	II	5	7305.92		8	II		7141.28	6		I	
7421.04		2	II		7305.22	2500	50	I	8	7137.67		2	II	
7419.60	1	40	II	4	7304.54		5 e	III		7136.82	5		I	
7419.22	10		I		7302.15		15	II	4	7135.61	10		I	
7419.06		8	II		7298.05	8 h		I		7134.85	5		I	
7418.49		4	II		7294.50		1	II		7134.83		2	II	
7418.15		3	II		7290.56		3	II		7128.94		2	II	
7416.64	40		I		7287.96		2	II		7126.81	2	100	II	5
7414.13	5		I		7285.02		1	II		7124.46		5	II	5
7411.63		4	II	5	7284.70		1	II		7117.99		10	II	6
7411.17	200	2	I		7279.67		5	II		7116.96		3	III	
7410.94		8 e	III		7278.37		30	II	4	7108.98	200	2	I	
7410.01		80 e	III		7275.02		1 e	III		7108.37		6	II	6
7406.00	10	150	II	6	7268.03		4	II		7105.34		1	III	
7405.93	6		I		7266.55		1 e	III		7101.66		10	II	4
7404.35	10		I		7266.37		1 e	III		7099.70		2	II	
7402.70		2	II		7265.76		10	II	7	7098.11		6	II	4
7402.45		1	II		7259.76		6	II		7089.40		1	II	
7400.97		5	II		7259.56		3	II		7086.08		20	II	4
7400.67	7		I		7256.62	20		I		7082.61		80	II	4
7399.98		10 e	III		7253.76	40		I		7081.81		4	II	
7398.50		3 e	III		7251.55	30	200	II	6	7080.77		1	II	
7397.10	1	40	II	4	7244.41	2000	40	I	3	7080.53		40	II	6
7396.04		1	II		7238.95	1	80	II		7078.11		5	II	7
7393.34	4	30	II	4	7238.73	4	80	II		7077.07		1	II	
7393.03		1	II		7235.42	1	40	II	6	7074.60		2	II	
7389.22	6	150	II	5	7234.00		3 e	III		7072.12		4	II	4
7387.69	2		I		7229.70		3 e	III		7066.20		10	II	
7384.50	7	150	II	7	7228.98		2	II	5	7060.67		60	II	4
7383.00		2	II		7227.21		5	I		7060.41		2	II	
7382.17	3		I		7222.72	20	150	II	6	7056.72		4	II	5
7377.73	20	400	II		7221.50		10	II		7053.80	1	200	II	7
7377.43	10	300	II		7221.21	1	60	II	7	7052.58		10	II	5
7373.06	3	15	II	4	7220.88	2	50	II	5	7045.75		15	II	
7367.93		8 e	III		7217.57		60	II	5	7045.51		20	II	
7367.76		20	II	4	7209.65		1	II		7043.78	30	700	II	7
7362.92	2	15	II	5	7209.38		2	II		7037.04		10 e	III	
7362.83		60	II		7209.10		8	II		7032.91	2		I	
7361.90	200	1	I		7208.29	4	200	II	7	7031.52		30	II	6
7356.90	3		I		7205.93	4		I		7031.21	3		I	
7354.17		4	II	6	7202.20	100	1	I	3	7029.38		3	II	
7350.42		15	II		7201.09		20	II	7	7029.27		2	II	
7350.04	6000	100	I	3	7198.08	10 h		I		7027.84	10	150	II	
7346.60	3		I		7196.92	3		I		7023.97		6	II	

TABLE I.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
7022.27		6	II		6852.08	2 b		I		6728.37		1	II	
7022.00		200	II	4	6857.64		2	II		6727.61	400	2000	II	7
7020.16	500	4	I		6854.67		7 e	III		6727.12		20	II	
7019.48		20	II	5	6850.64	4		I		6724.92	1		I	
7012.75		5	II	6	6844.05		1	II		6724.36	1	30	II	6
7008.90		1	II		6843.02		2	II		6724.19		1	II	
7002.14		1	II		6842.87		3	III		6723.90		1	II	
7001.79	3		I		6840.56		3	III		6720.85	2		I	
6999.86	50	800	II	6	6833.56	4		I		6719.87	6 b		I	
6998.96		2	II		6831.17	7		I		6718.00	1	30	II	
6993.31	5	250	II	4	6830.99		2	II		6717.05	30		I	
6990.51	100		I		6829.80	1	70	II		6715.79	1000	20	I	7
6985.15		20 e	III		6828.90	2	200	II	4	6710.95		1	II	
6981.99	20	300	II	4	6828.35		2	II		6710.73		3	II	
6978.36		5	II		6826.18		5	II		6707.91	3		I	
6977.67	20	150	II	6	6826.02		10	II		6707.76	5		I	
6977.30		1	II		6819.41		2	II		6707.61		15	II	
6976.89	3 h		I		6817.16	100		I		6702.48	2		I	
6973.58	10		I		6816.18		40	II		6701.26	15		I	
6970.54		7	II		6815.88	1	100	II	6	6699.36	100	1000	II	4
6968.73	1	30	II	6	6813.65	5		I		6698.93		5	II	
6965.46	1		I		6812.42		2	II		6698.13		3	II	
6964.47		3	II		6809.30		5	II	4	6697.64	10 h		I	
6963.47		10	II		6806.67	10		I		6692.42	700	5	I	1
6963.10	5	300	II	6	6803.91		20	II		6689.84		15	II	
6959.11	1	10	II	5	6802.47	2	400	II	5	6689.28	10	150	II	5
6958.11	300	3	I		6799.60	60000R	6000	I	3	6687.82	60		I	
6953.29	1		I		6798.29		2 h	II		6687.64		1	II	
6952.14		4	II		6796.80		2 h	II		6685.34		1	II	
6951.38	50		I		6792.58		30	II		6683.41		10	II	
6949.50		10	II	4	6790.82		20	II	6	6682.06		15	II	
6944.95		30	II	6	6786.32		1	II		6680.74		4	II	
6943.98	4		I		6785.14	1	150	II	4	6679.30	1	100	II	
6934.05	100	600	II	6	6784.80		4 e	III		6678.17	20000	1000	I	3
6929.57		9	III		6782.17	1000	20	I	3	6673.08		10	II	4
6926.08	1	30	II	5	6779.74	2		I		6670.57		1	II	
6923.78		2	II		6777.22	600	10	J		6670.18		50	II	
6921.30		5	II	5	6776.87		2 e	III		6667.62	50000	2000	I	7
6916.78		1	II		6775.79		2	II		6666.78		20	II	
6916.10		3	II		6773.47	2		II		6666.55		40	II	4
6915.84		4	II	7	6772.42	1	50	II	6	6665.08		1	II	
6914.84	2		I		6772.26	20		I		6661.90	2	200	II	6
6913.73	50	1	I		6768.70	6000	1000	I	2	6658.43		60	II	6
6911.34		1	II		6765.67	40	1	I		6657.26		25	II	
6911.11	1	20	II	5	6765.24	200	1	I	7	6656.70	2		I	
6908.92		2	II		6761.64	3 h		I		6651.52		4	II	
6902.28	2		I		6761.31		4	II	4	6647.25		1	II	
6901.06		2	II		6759.10		15	II	4	6644.94		6	II	
6897.78		1	II		6757.29	1		I		6644.06	2	200	II	4
6897.31	1	40	II	5	6755.44	1	150	II	6	6643.55	10000	300	I	7
6892.61	5		I		6754.69		3	II		6642.12	10 h		I	
6891.94	20		I		6753.01	2		I		6640.88		15	II	
6890.19		3	III		6751.45		10	II		6640.79	7		I	
6889.59	10	100	II	5	6751.17		2 e	III		6639.62		3	II	
6888.76		2	II		6749.40	1000	20	I	2	6639.34	150	1	I	
6886.95		8	II	4	6746.64		6	II		6639.19		5	II	
6886.77		5	II		6745.23	30	600	II	7	6636.54		2	II	
6881.40	1	100	II	5	6740.59		8	II		6636.42	6 h		I	
6877.93	2	250	II	7	6738.24		2	II		6634.28	5		I	
6871.51		3	II		6734.56		1	II		6632.40		2	II	
6869.56	200	1	I		6732.53		15	II	7	6630.85	2 h		I	
6867.95		2	III		6732.17	2		I		6626.73	800	2	I	2
6864.27	2	300	II	6	6731.02	5 h		I		6626.39		2 e	III	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Muggers lamp	Thompson lamp				Muggers lamp	Thompson lamp				Muggers lamp	Thompson lamp		
6625.27	4h		i		6512.23		1 e	III		6417.91	20000	1000	i	2
6619.66		40	II		6509.09		1	i		6416.98		?	II	
6617.72		4	II		6506.81		1	i		6412.85		30	II	
6617.06	100	1000	II	6	6507.98		2	i		6411.38		7 e	III	
6616.40	2	40	II		6507.15		1	II		6408.77		4	i	
6615.80	1	80	II		6505.29		1	i		6408.44		4	i	
6611.87		4	II		6503.96		3	i		6404.62	900	20	i	
6611.32		5	II		6503.01	50	500	II	4	6402.64		50	II	
6610.79		1 e	III		6502.28		20	II		6400.35	40000	2000	i	7
6610.31		1	II		6500.70	2	30	II		6397.15		2	II	
6608.68		1	II		6498.79	1	20	II		6396.68		1	II	
6607.07	2000	40	i	1	6493.58		5	II		6396.09		7	II	
6605.82	4	250	II	7	6492.73	10	700	II	4	6393.91		3	II	
6604.45		50	II		6491.18		5	II		6393.74	700	5	i	2
6600.68		7	II		6490.32		20	II		6393.59		8	II	
6600.03		2	i		6489.06	80000R	10000	i	2	6393.23	4	150	II	4
6594.65	3h		i		6488.47		200	II		6389.69		10	II	
6593.25		50	II		6487.08		10	II		6387.68	100	2	i	
6592.69	2	150	II	7	6486.74		50	II		6386.84		25	II	
6592.47	40		i		6485.55	10	200 h	II		6382.92	20	200	II	7
6592.12		30	II		6477.98		5	i		6381.68	10		i	
6590.72	1	15	II		6477.63		6	II		6380.47		3	II	
6587.26		1	II		6476.36		1	II		6378.33		150 e	III	
6585.41	100	1000	II	6	6475.98	8		i		6377.01	6	400	II	7
6582.79	2	250	II	7	6474.74	30	1500	II	6	6376.74	1	20	II	
6578.10		20	II		6470.17		1	II		6374.81	4	80	II	5
6574.10	2	200	II	6	6468.88	70		i		6372.72	1500	20	i	1
6573.31		10	II		6468.18	1500	5	i		6371.34		2 e	III	
6572.90	300	2	i		6466.79		7	II		6367.91		4	II	
6571.44	10	400	II	4	6466.33		25 e	III		6365.88		10 e	III	
6570.94		9	II		6465.78		3 h	II		6365.05	30		i	
6568.35	60	1	i		6464.66	3		i		6364.92		3	II	
6567.60		9	II		6464.46	1		i		6360.33		4	II	
6565.72	1		i		6463.15	50	2000	II	7	6359.22	2 h		i	
6563.38		2	II		6461.37	3 h		i		6358.49	20		i	
6562.35		5 h	II		6460.89	2		i		6356.67	2	200	II	5
6561.65	3		i		6460.66	1		i		6355.38	20	1000	II	4
6560.94		1 h	II		6456.95	2	150	II		6354.39		20	II	
6559.65		2	II		6456.90	2		i		6348.85	2 h		i	
6557.46		4	II		6456.64	1		i		6348.05		10	II	
6555.15	1500	15	i	7	6456.33	5		i		6347.32		20	II	
6553.35	900	9	i	3	6455.41	1000		i		6347.08		4 e	III	
6552.61		2	II		6455.23		4	II		6345.74	40	400	II	
6550.90	1		i		6453.30	1	150	II		6344.97	3000	100	i	3
6550.14	400	10	i	3	6453.21	10	150	II		6343.54		7	II	
6549.16		6 e	III		6452.73	1		i		6343.01	8		i	
6548.53	2	200	II	6	6452.46	1		i		6342.65		1	II	
6547.82	4 h		i		6452.10		15	II		6341.41		6	II	
6547.77		9	II		6450.88	40		i		6340.93		15	II	7
6547.43	2		i		6450.10		4 e	III		6338.10		7	II	
6546.35		2	II		6449.59	1500	15	i		6336.23	100	1	i	
6541.38	3	400	II	6	6448.41	4 h		i		6335.72	3000	70	i	1
6540.36		1	II		6446.22	20		i		6334.20		5	II	
6539.33		3 e	III		6442.10		9	II		6333.45	1	70	II	
6538.31	20		i		6440.79	5	400	II	6	6328.52		200 e	III	
6531.71		5	II		6437.98	1	150	II		6328.19	4		i	
6531.26		4	II		6435.61	3 h		i		6324.77	40	400	II	5
6531.00	25	1	i		6433.44	15	1	i		6324.43	1	90	II	4
6527.01		25	II		6432.73	1000	3000	II	5	6322.56	400	3	i	2
6526.36		3	II		6427.60	20	900	II	5	6318.91	20	1	i	
6523.19	2	250	II		6423.67		5	II		6317.78		2 e	III	
6521.51		25	II		6421.53	1500	10	i	2	6313.61		1	II	
6513.78	5		i		6421.04	400	20	i		6312.95		20	II	6

TABLE I.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
6311.10	2		I		6209.05	2		I		6121.91	9	II		
6309.82	20	1	I		6206.89	3	70	II		6120.30	5	250	II	
6306.15	400	2000	II	5	6206.10	10	500	II	6	6118.26	3000	100	I	7
6305.37	90	1	I		6205.49		3	II		6117.54	2	10	II	
6304.79	8		I		6204.88		4	II		6116.67	10	70	II	
6303.91		5	II		6204.20		4	II		6113.42	10		I	
6303.27	50	400	II	5	6198.67	20		I		6111.27	4000	60	I	2
6300.94		8	II		6196.90	3		I		6110.14	6	200	II	7
6299.71	2		I		6196.01		6	II		6108.32		2	II	
6297.95	90	1	I		6194.85	900	4	I	2	6106.16	5	200	II	6
6297.35	5	400	II		6192.32	60	1	I		6105.58	1	10	II	
6292.56		2	II		6191.14		7 h	II		6104.79		2 c	III	
6292.17	2	20	II		6190.78	15	1000	II	7	6101.83	40		I	
6291.06		5	II		6189.03	1	90	II		6099.35		3 e	III	
6286.25	2000	20	I	2	6187.08		20	II		6098.89		7	II	
6285.72		3	II		6185.43		2	II		6098.54	3	250	II	
6283.00		1 e	III		6184.05		1	II		6096.98	1	30	II	
6281.96		4	II		6183.01	2		I		6096.15	15	2	I	
6280.60		2	II		6182.14	1		I		6095.96		3	II	
6280.39		5 e	III		6181.78	100	2	I	7	6094.49	4		I	
6279.21		1 e	III		6178.81	1	20	II		6089.18	20	100	II	
6277.08		150	II	7	6178.63		3	II		6088.70	3	200	II	7
6274.78	2000	10000	II	6	6176.91	1		I		6087.44	20		I	
6271.15	6	250	II	4	6175.62	150	50	II		6086.48	2		I	
6270.31	3	100	II	5	6175.58		90	II	4	6083.86	1	30	II	
6269.95	1	40	II		6175.36		9	II		6083.29	5	200	II	5
6265.45	1	80	II	7	6174.70	1	60	II		6082.37	6	500	II	6
6262.89		15	II		6173.76		7	II		6082.21		10	II	
6262.43	1		I		6172.53	5		I		6076.55		2 e	III	
6261.50	2		I		6171.87	20		I		6075.21	3	200	II	7
6260.79	30	1500	II	7	6171.63	30	300	II	6	6074.10		1	II	
6257.03	20		I		6169.55	100	200	II		6073.17	7		I	
6255.43	200		I		6164.53		2	II		6070.19		20	II	
6251.31		2 e	III		6161.97	50		I		6068.64	1	60	II	
6250.39		1	II		6160.74	6		I		6066.51	15		I	
6249.54		1	II		6156.03	2		I		6065.72	300	3	I	2
6248.29		20	II		6152.57	800	4000	II	6	6063.01		4	II	
6247.99	1500	15	I	3	6150.63		70 h	II		6059.93		3	II	
6246.97	500	4000	II	4	6149.44		1	II		6059.22	6000	80	I	
6245.93		6	II		6148.50	15		I		6056.46	10	500	II	4
6244.69	3		I		6148.24	1		I		6055.85		40 e	III	
6244.39		1	II		6146.91	10	400	II	7	6054.57	4000	50	I	7
6242.25	1	80	II		6146.29		3	II		6053.61		3	II	
6239.67		3	II		6144.20	3 h		I		6052.88	100	900	II	5
6236.82		5 e	III		6142.83	1	60	II	7	6052.66		250	II	
6236.55	600	5	I		6141.70		1	II		6052.63	150		I	
6236.13	3	150	II	4	6141.05		3	II		6050.48	2		I	
6235.25	200	3	I		6140.72		5 e	III		6048.87		2	II	
6234.85	3	250	II	6	6140.56		2	II		6048.44	4000	50	I	1
6234.12	25		I		6135.42		2	II		6048.18	5	50	II	
6233.37	5	250	II	4	6134.28	7	200	II	4	6046.91	9		I	
6232.02		2	II		6133.56		3	II		6045.95	6 h		I	
6229.36		10	II		6132.95		25	II		6045.52		6	II	
6228.53	1		I		6131.53	1	80	II	5	6044.96	3 h		I	
6223.63	15	500	II	7	6130.67	1		I		6043.45		1	II	
6219.16	15		I		6128.51		5	II		6042.22	2	100	II	
6216.14		9	II		6128.18	10	300	II		6041.79	100	1	I	
6215.56	6	200	II	6	6127.92		10	II		6040.77	15	500	II	6
6214.22		100 e	III		6126.89		1	II		6038.82		9	II	
6213.74		3	II		6126.39	3	100	II		6035.72	400	4	I	7
6212.28		2	II		6124.63		3	II		6035.37	3		I	
6211.10		1	II		6123.68	1	30	II		6034.26	1		I	
6210.59	900	1	I		6122.99	40	250	II	6	6031.80	3000	40	I	3

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
6029.76		1	II		5965.48	1	I	I		5928.63	2	I		
6029.06	7 h		I		5964.12		II	II		5928.24		II		
6027.50	1 b		I		5963.60	2	I	I		5927.69	60	I		
6024.08	40	400	II	7	5962.51		2 c	III		5926.968	10	I		
6023.82	2 h l		I		5961.83	1	60	II	4	5926.688	5	I		
6021.92	10	400	II	6	5960.20	1	I	I		5925.46	600	5	I	
6021.24		5 c	III		5960.04	10	I	I		5925.00	60	I		
6020.55	40	400	II		5959.33	1000	10	I	2	5924.498	15	I		
6018.16	5 h		I		5959.03		7	II		5924.165	2	I		
6017.70		2	II		5958.70	4000	100	I	1	5922.991	5	I		
6016.62	5	50	II		5956.86		7	II		5922.153	15	I		
6014.95	1500	10	I	1	5955.34	1500	8	I	2	5920.98		2	II	
6014.16	10		I		5954.19	2 h		I		5920.48	2	I		
6012.51		.9	II		5950.93	5	250	II	6	5920.38	5	300	II	
6012.16	1	15	II		5950.66	1500	10	II	3	5919.710	8	I		
6011.56		8	II		5949.83		20	II		5919.585	2	I		
6011.18	1		I		5949.02		10 d	III		5919.10		7	II	
6009.56	1	10	II		5948.98		5	II		5917.826	3	I		
6008.80	5	50	II		5947.71	2		I		5917.130	6	I		
6008.44	200	1	I		5947.54	1		I		5916.95		2	II	
6007.41	20	1000	II	4	5947.26	15	500	II	5	5916.00	5 h l	I		
6004.52	2000	20	I	3	5946.79	4 h l		I		5915.052	3	I		
6004.015		10	II		5946.23	1		I		5914.912	2	20	II	
6003.62	400	10	I	1	5945.00	40	2000	II	4	5914.415	5	I		
6003.33	2 h l		I		5945.44	8		I		5912.35	5 h l	I		
6002.52	3	90	II		5945.33	3		I		5912.15	2	I		
6001.05	1	30	II	6	5945.27	3		I		5911.55	5	I		
6000.91		8	II		5945.10	4		I		5911.35	20	I		
6000.28	20		I		5944.93	2		I		5910.10	4	I		
5999.95	1	30	II		5944.73	4		I		5909.33	2	10	II	
5998.71		25	II		5944.63	1	10	II		5909.10	2	I		
5996.84		1	II		5944.41	3		I		5908.56	400	1500	II	
5993.95		1	II		5944.24	2		I		5906.45	2	I		
5993.704		15	II		5943.63	9		I		5906.33		2	II	
5991.51	2000	6000	II	6	5943.55	5	200	II		5905.85	2	I		
5990.01		10	II		5943.05	20	250	II		5905.22	3	I		
5989.33	5000	100	I	3	5942.89	3		I		5903.38	3	90	II	
5987.91	15	500	II		5942.73	3		I		5902.80		3	II	
5987.58	20		I		5942.02	4		I		5902.71	2	I		
5986.78	1	40	II		5941.72	2		I		5900.85		20	II	
5985.98		6 e	III		5941.29		2	II		5899.30	2	I		
5985.35	20	300	II	5	5941.04	1		I		5898.77	15	800	II	
5984.98	3 h l		I		5940.68	20		II		5897.21	50	2500	II	
5983.12	2		I		5940.63		1	II		5896.63		6 d	II	
5980.83	2		I		5939.35	2	8	II		5895.16	2	I		
5978.35	2		I		5938.15	1	10	II		5894.98	5	I		
5978.11		10	II		5936.68		20	II		5892.30		2	II	
5976.93		2	II		5936.49	900	10	I	1	5888.02		4	II	
5976.21	20		I		5935.88	2		I		5886.05	5	I		
5975.70	2		I		5935.56	2		I		5883.61		6	III	
5975.29	2		I		5935.05	20	1000	II	5	5882.80	100	600	II	
5974.63	2		I		5934.27	3		II		5877.68	10	I		
5973.49	2	20	II		5934.01		1	II		5874.67	2	200	II	
5973.05		20 e	III		5933.775	2		I		5873.12		10	II	
5972.73	150	1	I		5932.98	2		I		5872.90		3	III	
5972.29		1	II		5932.562	4		I		5872.15		1	II	
5972.02		2	II		5931.853	3		I		5868.94		7	II	
5970.26		5	II		5931.73	3 h		I		5868.34	2	100	II	
5969.95	3		I		5931.33		3 e	III		5866.59		6	II	
5969.84	2		I		5930.723	6		I		5866.48		1	II	
5968.23	2 h l		I		5929.82	4		I		5865.63	1	70	II	
5966.86	2		I		5929.77		10	II		5863.86		3	II	
5966.43	20		I		5928.761	5		I		5863.37		1	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
5862.90	1	15	II		5786.09	400	3	I		5712.844		15	II	
5861.53		3	III		5784.43	3 h		I		5711.38	1		I	
5861.11	10		I		5784.026	10		I		5710.733		25	II	
5854.89		3	II		5779.92		3 e	III		5710.403	1	15	II	
5854.510	4000	200	I	3	5777.95	3	100	II	5	5709.715		2	II	
5854.30	5	70	II		5777.29	1	10	II		5706.773	10	100	II	
5853.84		3	II		5775.61	1	50	II		5704.98	2	70	II	5
5852.92		5	II		5774.34	500	5	I		5704.14		3	II	
5847.18	1	40	II	6	5773.82	1000	10	I		5701.922	250	3	I	3
5845.50	6 h		I		5772.76		3	II		5699.95	3000	50	I	1
5844.97		9 e	III		5772.39	3 h I		I		5699.02		15	II	
5842.44	80	1	I		5771.66	500	2000	II	4	5698.21	2		I	
5841.96	20		I		5769.44		6	II		5697.65		2	II	
5839.56		1	I		5767.95	3	30	II		5696.93	2		I	
5839.25	2 h		I		5767.20	20	800	II	6	5696.717		5	II	
5838.91	6 h		I		5765.21	5 h		I		5695.22		2	II	
5838.62	2	70	II	5	5764.65	1	40	II		5694.906		15	II	
5838.27	70	1	I		5760.18	30	6	II		5694.13		1	II	
5837.14	600	4000	II	6	5759.84	4 h		I		5693.694	10	400	II	7
5836.18	1	50	II		5758.25	9		I		5689.917	1000	30	I	7
5835.53	1	30	II		5757.84	2	15	II		5689.67		3	II	
5834.58	200	3	I		5755.89	3000	40	I	3	5688.48	200	3	I	
5833.99	5 h	200 h	I		5754.80	2	70	II		5687.14	1 d	20 d	II	
5833.62	20		I		5753.57	1	25	II		5686.53	80	800	II	6
5832.12		2 e	III		5753.20	2		I		5685.832	1	9	II	
5831.82	300	3	I	3	5750.62		8	II		5684.13	2		I	
5831.58		5	II		5749.91	1000	400	II	3	5683.56	10	300	II	
5831.04		15	II		5746.703		3	II		5683.09	500	5	I	7
5830.82	2		I		5746.36	1	15	II		5679.270	1	15	II	
5829.63	200	2	I		5745.80	2000	30	I	1	5679.180	2	8	II	
5829.11	5 h		I		5741.99	15		I		5675.180	2	50	II	
5828.49		1	II		5741.75		2	II		5674.31	10	150	II	7
5824.33	2	50	II	7	5740.83		15 e	III		5672.37		2	II	
5823.36		2	II		5738.82		5	II		5672.16		8	II	
5820.17	2		I		5738.53	2		I		5671.45		2 e	III	
5819.99		3	II		5737.09		20	II		5670.02	500	2	I	
5819.41	50	1500	II	4	5735.773	10	600	II	7	5665.34		1	II	
5814.76		2	II		5735.50		5	II		5663.21	200	2	I	
5813.58	3	40	II	5	5734.26		3	II		5660.152		4	II	
5812.64	3 h		I		5733.00	2 h I		I		5658.86		1 e	III	
5811.90	1	40	II		5732.60	4 h I		I		5654.27	2	150	II	7
5811.13	1	20	II		5731.94	6 h I		I		5653.24	3	200	II	7
5810.67	3000	7	I	1	5731.69		3	II		5651.965	1000	4000	II	4
5808.66	3	120	II		5731.25	6 h I		I		5642.446	40		I	
5807.86		30	II		5730.41	7 h I		I		5637.812	80	600	II	6
5807.51	1	7	II		5730.001	20	1500	II	5	5637.33	1	6	II	
5806.58	7		I		5729.26	5 h I		I		5634.45		1	II	
5804.06	80	1	I		5728.853	150	5	I		5633.81		1 e	III	
5803.44	5000	80	I	2	5728.58	5 h I		I		5631.496	2	90	II	
5802.36	200	1	I		5727.47	90		I		5628.958	10		I	
5801.50		8	II		5727.21		5	II		5627.89	4	200	II	7
5801.13	1	15	II		5726.68	10 h		I		5625.92	20		I	
5801.04	1	10	II		5726.49		2	II		5624.494		10	II	
5799.57	1	40	II		5724.58	500	2	I	7	5620.88	1	70	II	
5798.82	2 h		I		5724.21		3	II		5620.19	50	700	II	4
5796.09	80		I		5723.70	600	7	I		5618.55		1	II	
5792.28	1	10	II		5722.743		8	II		5616.66	2 h		I	
5789.98	1500	15	I		5719.99	20000	1000	I	3	5614.68	1		I	
5789.63	100		I		5718.86		1	III		5614.116	3		I	
5789.17	2	50	II		5717.25	10	300	II	7	5613.39	5 h		I	
5788.74	1	15	II		5716.70		2	II		5611.50	1		I	
5787.86	500	5	II		5713.73	20	500	II	4	5610.60	2		I	
5786.59	20	150	II	5	5713.270	4	15	II		5610.281	3		I	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
5609.89		I	II		5529.92	4	150	II	7	5458.088	2	60	II	
5609.44	1	I	I		5529.08	5	250	II	5	5457.427	4	150	II	
5608.914	1	50	II		5528.403	3		I		5455.046	5	250	II	4
5608.64		2	II		5527.81	50		I		5454.007	2500	25	I	I
5608.041	6	I	I		5526.37	5		I		5453.47	60	1	I	
5607.91		1	II		5524.544	3000	30	I	7	5449.64	1	1	II	
5607.345	10	150	II		5521.76	10		I		5449.270	500	2500	II	5
5607.124		4	II		5521.61			II		5448.565		4	II	
5606.64		1	II		5520.22	1	50	II	6	5445.492	1	40	II	
5605.847	3	I	I		5519.83		2	II		5441.615	2	5	II	
5604.145		9	II		5518.352	70	1	I		5441.259	200	1	I	
5602.35	2	20	II		5516.334		10	II		5440.548	10	200	II	
5602.264	3	40	II		5515.38		3	II		5438.01	2		I	
5600.45	10	I	I		5514.79	1		I		5435.27		6	II	
5598.14	2	I	I		5512.47	20		I		5432.89	400	6	I	
5597.189	800	10	I	7	5512.19	20		I		5432.71	60	1500	II	4
5595.84	5	I	I		5511.764	1	30	II	7	5431.167	2	80	II	
5591.19	10	I	I		5511.401	2	70	II	7	5429.838		8	II	
5590.10	10	I	I		5509.198		20	II		5428.162		2 c	III	
5588.452	500	4000	II	4	5509.046		3	II		5426.867	30	900	II	7
5587.249	200	2	I		5508.266		20	II	5	5425.445	100	1	I	
5586.362	2000	100	I	3	5507.70		1	II		5424.627	30	300	II	5
5585.426	400	5	I		5506.11	1500	5	I		5422.715		1	II	
5585.248		20	II		5505.49	20000	300	I	2	5421.361	7		I	
5583.57	1	II	II		5504.17	60		I		5420.608		7	II	
5582.236	2	II	II		5504.026	300	3	I		5417.421		9	II	
5581.778		8	II		5502.802	1	10	II		5414.258	6	200	II	7
5581.05	2	40	II		5501.37	2	20	II		5413.195	15		I	
5580.79	20	700	II	4	5499.65		2	II		5411.038	1	40	II	
5578.463		4	II		5498.75	5000	500	I	7	5410.635		15	II	
5578.232	2000	20	I	7	5498.390		3	II		5409.473	2	60	II	4
5576.250	5	I	I		5494.58		1	II		5408.348	100	2	I	
5575.705	10	100	II		5494.364	1	10	II		5408.092		4	II	
5573.64		1	II		5493.088	700	5	I	2	5405.541	60	1	I	
5572.528	30	300	II		5491.285	6		I		5404.399	300	5	I	
5568.11	10000	100	I	2	5490.847		3	II		5403.079	3000	100	I	1
5566.04		3	II		5489.633	80		I		5402.706		3	II	
5564.352		3	II		5488.883		8	II		5402.00	150	2	I	
5562.098	2000	200	I	3	5487.512	1	9	II		5399.71	50	500	II	7
5559.58		1	II		5486.535	7	150	II	6	5398.084		2 e	III	
5558.98	800	8	I		5483.212		3	II		5397.23		1	II	
5556.466	50000 A	10000	I	2	5481.925	20000	400	I	2	5395.73	20	300	II	7
5554.62	500	5	I		5479.806	1	50	II		5394.084		3	II	
5554.30		4	II		5479.122		2 d	II		5393.757	2500	90	I	1
5552.30		1 e	III		5478.50	100	1500	II	4	5393.37	5	150	II	6
5551.69		2	II		5477.206		9	II		5390.845	2500	40	I	3
5550.37		7	II		5476.90	2		I		5390.622	4000	150	I	1
5549.79		20	II		5475.706		10	II		5390.18		6	II	
5549.32		1	II		5475.132		4	II		5389.84	200	800	II	5
5548.918		50	II		5474.565	400	5	I		5387.99	90	8	I	
5548.79	100	I	I		5474.037	1500	15	I		5386.72	1	50	II	
5547.16	50	500	II	7	5471.17	30	400	II	5	5386.07		10	II	
5545.814	500	10	I		5469.353	400	5	I		5385.29	200	2	I	
5544.17		1 h	II		5468.387	150	2	I		5384.48	5	50	II	5
5543.96		8	II		5468.260		3	II		5383.95	3	60	II	
5540.03		10	II		5468.099	1		I		5382.55	2		I	
5539.053	20000	1000	I	1	5467.495	1	9	II		5380.94	1		I	
5538.016	50	I	I		5466.714	1	25	II		5380.54	500	7	I	2
5535.47	7	I	I		5464.894	6	200	II		5380.24	70	2	I	7
5533.21		7	II		5463.850		3	II		5379.15	6		I	
5533.14		10	II		5463.24	4		I		5376.97	5	250	II	7
5532.111		3	II		5463.12		10	II		5371.53		4	II	
5530.73	1	1	II		5460.74		4 e	III		5370.47		9	II	



TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
5368.28	50	400	II	4	5290.578	150	3	I		5218.792	1		I	
5367.79	10	100	II		5290.06	2	20	II		5217.936	3	70	II	7
5367.35	4	60	II	7	5289.45		2	II		5215.44	4	100	I	
5365.41	1	50	II		5289.178	1	5	I		5214.95	500	5	I	3
5364.78		15	II		5288.51	2000	15	I	7	5212.232		25	II	
5364.12		15	II		5287.45	3000	70	I	1	5211.604	6000	400	I	3
5363.66	10000	200	I	2	5287.285	5	100	II		5209.54		1	I	
5362.43	1	20	II		5286.12	2	100	II		5205.574	4	80	II	
5360.85		1	II		5283.825		3	II		5204.57		1	II	
5360.10	1	30	II		5283.00		1	II		5202.87		1	II	
5359.91	6	200	II		5281.210		20	II		5201.32		1	II	
5358.64	400	2000	II	6	5280.522	1	50	II		5201.21		2	II	
5357.71		3	II		5279.53	1000	5000	II	4	5200.74		4	II	
5357.08	20	200	II		5277.04	30000	3000	I	2	5200.54	50	500	II	4
5356.54	1	2	II		5275.592	1000	10	I	3	5200.10	4		I	
5356.41		10	II		5271.473	400	20	I		5199.14		1	II	
5352.95	1000	6000	II	4	5266.964	15		I		5195.81	40		I	
5351.29	5000	300	I	3	5265.63		8	II		5195.085	5000	200	I	3
5350.474	2	40	II		5265.558	40		I		5195.20	100	1	I	
5349.626		5	II		5264.238	10		I		5194.752	2000	80	I	
5349.10	1	6	II		5263.570	6	200	II	6	5193.850	2000	20	I	1
5348.208	300	3	I	7	5262.012	1	30	II		5189.89		7	II	
5347.22	1000	3000	II	4	5261.52		1	II		5189.50		8	II	
5345.83	200	900	II		5259.65		1	II		5189.14	200	2	II	
5345.66	400	1500	II		5258.165	900	10	I		5188.89		9	II	
5342.99		7	II		5257.490	800	3000	II	6	5187.33		3	II	
5341.10	2		I		5257.29	90		I		5185.15		1	II	
5339.69		1	II		5256.85		20	II		5184.66		1	II	
5339.312		15	II		5255.680	4	150	II		5184.15	150	1000	II	4
5338.75	10	100	II	7	5255.61	2		I		5182.755	2000	50	I	7
5338.31	60		I		5254.79		2 e	III		5180.641		5 e	III	
5337.11		7	II		5254.60		3	II		5180.355	15	150	II	6
5335.82	10		I		5254.20	1	20	II		5178.73	60		I	
5335.49	50		I		5253.448	1		I		5178.70	90	20	I	
5335.15	2000	7000	II	4	5250.804	100	2	I		5175.45	250	2	I	
5334.02	100	200	II		5250.51	1	8	II		5173.11	2	200	II	
5331.596		20	II		5249.80	5	150	II		5173.064	10	100	II	
5330.92		1	II		5248.99		6	II		5172.40		1	II	
5330.79	1		I		5248.17		1	II		5172.214	50	1	I	
5330.348	6		I		5247.94	15		I		5168.29	90		I	
5328.526	3	50	II		5246.857	400	4	I		5167.660		3	II	
5327.593	4		I		5246.39	4	40	I		5163.862	1		I	
5324.778		7	II		5244.61	100	300	II	5	5160.99		1	II	
5324.486		9	II		5244.31	10000	250	I	2	5160.74		1 e	III	
5323.10	300	3	I	1	5243.56		1	II		5160.47	7		II	
5322.541		8	II		5243.41		4	II		5159.655		3	II	
5321.14	10	250	II		5243.15		2	II		5157.962	3	100	II	
5320.962	5		I		5240.51	300	1000	II	6	5156.285	100	2	I	
5320.774		15	II		5239.25		2	II		5152.34	7	200	II	
5320.324	6		I		5236.66	3	150	II		5151.25		4	II	
5318.79		1	II		5234.28		2	II		5149.04		1	II	
5315.462		6	II		5232.537	6	40	II		5148.75	1		I	
5309.31	30	200	II	4	5230.292	60		I		5147.02	50	700	II	6
5307.74		6	II		5229.963	1	60	II		5146.37		3 e	III	
5306.506		40	II		5228.172	1000	30	I	7	5142.28	3	100	II	
5300.995	100	2000	II	4	5227.271	4000	80	I	1	5141.64		3	II	
5299.852	2000	10	I	3	5227.01	1	70	II		5140.38	120	2	I	
5297.153	150	4	I		5226.18	20	150	II		5140.11	20		I	
5297.02	50	1	I		5224.53	1		I		5139.53	900	10	I	1
5295.755		5	II		5222.68		3	II		5139.35	40		I	
5293.726		3	II		5221.606	50	1	I		5138.01		1	II	
5291.99		10	II		5220.82		5	II		5137.43	2	4	II	
5291.077		5	II		5220.41		10	II		5137.389	6		I	

TABLE 1. — Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
5137.23		1	II		5067.800	1500	40	I	2	4992.786	2		I	
5136.76	2		I		5067.600		10	II		4992.654		6	II	
5136.49		1	II		5067.297	200	300	II	4	4992.520		7	II	
5135.98	200	1500	II	7	5065.74		1	II		4992.102	2		I	
5133.42		1	II		5065.488		4	II		4989.924	6		I	
5132.71	90	1	I		5063.605	8		I		4989.794		4	II	
5132.40	1	60	II		5062.938	30	300	II	6	4989.57	100	1	I	
5131.01	1	10	II		5062.634		15	II		4988.383	1	15	II	
5130.711		2	II		5061.87		2 c	III		4988.022		1	II	
5130.56		1	II		5061.24		1	II		4987.292	1	15	II	
5130.523	100	2	I		5060.722	2		I		4986.88	6	3	II	
5130.30		8 e	III		5058.71		3	II		4985.36	2		I	
5130.095	7		I		5058.613	900	5	II	2	4982.82	2		I	
5129.688	200	2	I		5057.275		2	II		4981.34	1		I	
5129.56		60	II		5055.933	15		I		4978.62	1	9	II	
5128.55	3	100	II		5055.485	2		I		4976.65		2	II	
5127.64	2		I		5054.94		15 e	III		4975.86		4 e	III	
5126.80	2000	20	I	3	5052.90		2 e	III		4974.16	2000	100	I	2
5121.58	30	300	II	6	5051.096		2	II		4973.90		15	II	
5119.29	100	1	I		5050.77	15		I		4972.42	10	2	I	
5117.72	1	25	II		5049.832	5	250	II	5	4972.26	1	20	II	
5116.200		10	II		5047.08		15 d	II		4971.20		8	II	
5114.606	40	1	I		5043.708	150	4	I	7	4970.41	40	7	I	
5113.34	700	10	I	3	5043.28		1	II		4970.203	3	4	II	
5111.89	2		I		5042.962	3	20	II	7	4967.35		2	II	
5111.47	1	60	II		5041.756		4	II		4966.902	1000R	700	I	3
5107.58		1	II		5039.86		2	II		4965.43	3	15	II	
5106.95	1		I		5038.240		15	II		4964.61		3 e	III	
5106.12		1	II		5034.262	5	1	I		4963.18		2	II	
5105.75	600	30 h 1	I	7	5033.289	1	20	II		4962.28	1		I	
5105.028	10	150	II		5032.899	2		I		4961.124		3	II	
5104.85	2000	30	I	1	5032.566	1	25	II		4960.478		4 e	III	
5104.42	20	400	II		5032.14	2		II		4960.28	1		I	
5103.724	5	1	I		5029.342		3	II		4958.895		2	II	
5103.644	5		I		5029.09	6		I		4957.83	8		I	
5101.810		3	II		5027.67	2000	80	I	2	4957.262		7	II	
5101.57	3	80	II		5025.256	1	6	II		4956.512	500	9	I	3
5100.08	100	1	I		5023.925	1	9	II		4955.98		1	II	
5099.11		3	II		5022.32		3 e	III		4954.68	3	50	II	7
5097.75		2	II		5021.860	400	4	I		4953.72	1		I	
5095.99		3	II		5021.13	50	400	II	7	4953.622		3	II	
5093.92	2		I		5019.691	1500	15	I	1	4952.740		2	II	
5090.77	80		I		5017.80		3	II		4951.88	2		I	
5090.628		15	II		5014.98		2	II		4949.24		2	II	
5088.92	1	30	II		5014.472	20	250	II	6	4946.524		1	II	
5088.275	15		I		5013.76		1	II		4946.19		1	II	
5087.89	4		I		5013.27		2	III		4945.944		3	II	
5087.61	10	150	II	4	5010.04		1	II		4944.956	5	150	II	
5086.45	15		I		5009.525	500	2000	II	7	4944.080	200	600	II	6
5085.70	2	80	II		5009.025		2	II		4942.742	20	200	II	
5085.22		1	II		5008.876	1	15	II		4942.254	250	3	I	
5083.938	90	1	I		5007.76		1	II		4940.53		2	II	
5083.52		2	II		5005.25		1	II		4938.828		4	II	
5082.934		7	II		5004.79	15		I		4937.222	100	2000	II	7
5082.590	250	9	I		5004.63		1	II		4935.50	20000R	2000	I	1
5080.981	500	9	I	2	5003.306	2		I		4932.81	5		I	
5076.967		6	II		5002.98	5	70	II	5	4931.963	1000	40	I	2
5076.744	5000	150	I	1	5000.452		2	II		4931.16	5		I	
5075.813		8	II		4998.87		3	II		4930.78		1	II	
5074.609		80	II		4998.266	3	15	II		4929.31	1	20	II	7
5074.34	20000	2000	I	1	4996.604		4	II		4928.184		4	II	
5073.35		1	II		4994.74		1	II		4927.154		1	II	
5069.144	4000	150	I	7	4993.32		1	II		4924.187		2	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Å	Å				Å	Å				Å	Å		
4923.747		1	II		4845.612	3	I			4778.982	200	7	I	3
4919.595	100	2	I		4841.918	50	2	I		4778.414		1	II	
4918.45		10	II		4841.47		2	II		4778.35		1	II	
4918.118	150	2	I	7	4841.153	50	150	II	6	4777.946		4	II	
4917.044	20	60	II	4	4839.462	2		I		4777.56		1	II	
4915.42		1	II		4839.279	1	15	II		4774.145	4	6	II	
4912.365	3000	100	I	3	4839.014	1	7	II		4773.839		8	II	
4909.81		3	II		4838.657	7		I		4773.13		3	II	
4906.335	50		I		4838.220	10	20	II		4772.43		2	II	
4906.27		9	II		4837.46	4000	100	I	2	4772.23		6	II	
4905.48		2	II		4837.045	500	1000	II		4772.000		2	II	
4904.93	1		I		4836.96	500	1000	II	6	4770.834	150	2	I	
4903.89	1	25	II		4834.926	1	10	II		4768.32		6	II	
4903.71	3	50	II	7	4834.72	10	100	II	4	4768.036		3	II	
4900.16		4	II		4834.23	2	3	II		4765.51	1		I	
4899.980		2	II		4833.55		1	II		4765.080	3		I	
4899.78	500	5	I	3	4833.24		1	II		4762.587	300	5	I	2
4898.42		15	II		4832.989	200	5	I		4761.55	2		I	
4897.90	2	40	II		4831.912	400	20	I		4761.139	2	40	II	
4897.08	5		I		4831.533	2	20	II		4758.320	80	4	I	7
4895.606	150	5	I		4831.30	600	10	I	3	4757.559	40	1	I	
4894.963	50	400	II	5	4830.704	500	10	I	2	4757.14		1	II	
4894.596	3000	400	I	1	4828.29		3	I		4756.36		1	II	
4894.296	50		I		4827.81		2	II		4755.15	4		I	
4893.465	500	5	I	7	4826.78		2	II		4754.370	5		I	
4891.992	200	4	I	7	4825.655	1		I		4752.91	100	400	II	6
4891.654		3	II		4824.28	1		I		4751.789	400	10	I	1
4891.056	1	6	II		4823.615		2	II		4751.22	3		I	
4890.07		1	II		4822.47		1	II		4749.948	2	30	II	
4889.99		3	II		4822.010		3	II		4749.55		1	II	
4889.18	25	1	I		4821.58		2 e	II		4749.06	1	5	II	
4887.662		2	II		4820.74		1	II		4748.71		2	II	
4885.45	90	3	I		4820.242	400	1000	II	4	4748.08		2 d	II	
4884.205		4	II		4819.59	20	1	I		4746.68	10	150	II	6
4882.15	2		I		4818.371	100	600	II	4	4745.483	1	20	II	
4880.674		6	II		4816.43	5000	600	I	1	4745.27	2		I	
4880.190		10	II		4815.612		6	II		4743.57		3	II	
4875.852		2	II		4815.28		1	II		4743.356	250	7	I	3
4873.180		2	II		4813.92	2	7	II		4741.574	8		I	
4871.670	2	40	II	7	4812.918	400	40	I	3	4739.70	1	10	II	
4871.150	10	90	II	7	4811.89	1		I		4739.330	1		I	
4870.288	30		I		4810.51	40	4	I		4738.656	5	7	II	
4868.511	8		I		4809.451	2	30	II		4736.89	1		I	
4863.87		3	II		4808.502	2	50	II		4736.69		2	II	
4863.56		1	II		4806.571	3		I		4736.525	15		I	
4863.295	40		I		4803.653		10	II		4732.935	1	25	II	
4862.802		4 e	III		4801.473		2	II		4732.505	18		I	
4862.524	2		I		4800.535	2		I		4732.14	2		I	
4860.84		2	II		4799.96		1	II		4732.025	30	200	II	6
4859.49		2	II		4798.72		3	II		4731.70		2	II	
4857.542	50	1	I		4795.829	80	1	I		4731.04	2		I	
4856.50	1		I		4794.96	1		I		4729.25		3	II	
4855.922	15		I		4794.85	1		I		4728.109		8	II	
4854.92	1		I		4794.57	1		I		4727.901		7	II	
4853.825	500	7	I	1	4792.63		3	II		4726.54		1	II	
4853.347		7	II		4792.336		2	II		4726.08	1000	3000	II	4
4851.150	300	600	II	7	4790.61	1	15	II		4725.14		2	II	
4850.848	1	10	II		4788.924		5	II		4723.85	1		I	
4849.265		2	II		4786.61	2000	8000	II	4	4723.404		4	II	
4849.034	100	1	I		4784.54	70	9	I		4722.53	2		I	
4848.455	50	800	II		4781.867	10000	2000	I	1	4722.148	10		I	
4846.873	1	15	II		4781.17		2 d	II		4720.955		2 e	III	
4846.612	4	20	II		4780.32	400	15	I	1	4720.79	2000	50	I	2

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Å	Å				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
4720.390		2	II		4666.735	200	10	I	7	4620.51		2	II	
4718.56	3000	500	I	3	4666.145	2	1	II		4618.467	15		I	
4718.34	200	2	I		4664.565	30		I		4617.900	5		I	
4717.375	30		I		4663.873	5		I		4617.46	1		I	
4715.672		3	II		4663.44	1		I		4615.947	300	15	I	1
4715.16	6		I		4661.878	5		I		4615.740		2	II	
4714.70	700	40	I		4660.906		4	II		4615.427	3		I	
4712.78	40	200	II	5	4660.68		2 e	III		4614.020	1		II	
4712.73	2		I		4660.057	4		I		4611.90		1	II	
4709.96	15	1	I		4659.910		5	II		4610.70		1	II	
4709.330	40	1	I		4659.780	20		I		4610.172	600	30	I	3
4706.81	2		I		4659.60		1	II		4609.600		1	II	
4706.700	2		I		4658.87	4 d		I		4608.131		15	II	
4705.40		4	II		4658.746		3	II		4608.051	3		I	
4705.04		7	II		4658.443	2	2	I, II		4607.004		3 e	III	
4704.886	300	20	I		4657.43		1	II		4606.854	1		I	
4704.23		1	II		4656.971	3000	500	I	2	4602.354	2		I	
4703.012		4	II		4654.46	4		I		4600.300		2	II	
4702.982	10		I		4654.070	1	5	II		4598.85		2	II	
4702.355	200	10	I		4653.310	5		I		4598.361	300	300	II	5
4700.77		1 e	III		4652.667		5	II		4597.980	5	30	II	
4699.045		6	II		4652.279		2	II		4597.279	2	30	II	
4698.52	10	40	II		4651.67	500	20	I	3	4597.087		1	II	
4697.689		2	II		4650.99	3		I		4596.342		7	II	
4697.34		3	II		4650.05	1500	100	I	7	4595.556		1	II	
4696.842	1	15	II		4649.756		2	II		4594.033	10		I	
4696.286	40	2	I		4647.076		2	II		4593.375	30	5	I	
4695.832	7		I		4646.91	7		I		4593.214		4	II	
4695.70	2		I		4646.532		2 e	III		4592.445		10	II	
4693.06	1		I		4645.05		10	II		4591.780	5		I	
4692.41		2	II		4644.54	3000	100	I	1	4591.333		4	III	
4691.982		4	II		4643.14		5	II		4590.834	2000	200	I	3
4690.810	20	90	II		4642.945	6	2	I		4590.578	10		I	
4689.807	1	7	II		4640.11		15	II		4589.211	1000	150	I	2
4689.069	15		I		4639.14		40 e	III		4588.677		1	II	
4688.515	90	100	II	4	4638.04		1	II		4587.547		2	III	
4688.38	5	20	II		4638.81	3		I		4587.075		15	II	
4687.593	1000	50	I	1	4637.28		1 e	III		4585.916	40	4	I	7
4685.876		6	II		4637.341	3		I		4585.767		10	II	
4685.28	4		I		4637.226		3	II		4585.634	15		II	
4685.071		3	II		4635.01		1	II		4585.528		2	III	
4684.268	1500	80	II	7	4634.38	4		I		4582.924	60	6	I	
4683.810	200	1000	II	7	4634.014	20	200	II	7	4582.695	50	6	I	
4681.666	10	1	I		4633.406		3 e	III		4582.355	6000R	600	I	3
4681.514	3		I		4633.196	30	4	I		4581.222	7		I	
4681.088		3	II		4631.09	2		I		4580.724	9	1	I	
4680.136	6	1	I		4630.514		3	II		4580.649	40	6	I	
4679.625	15		I		4630.522	20		I		4579.536		6	II	
4678.171	2	6	II		4629.833	200	3	I		4578.620		3	II	
4677.432	90	1	I		4629.75		2	II		4578.142		7	II	
4676.67	6		I		4628.861	2		I		4577.722	10		I	
4675.66	2	4	II		4628.43	2		I		4576.209	10000R	1000	I	1
4675.20	1		I		4627.556	4		I		4574.800		2	II	
4674.644		1	II		4627.23	5		I		4572.740		1	II	
4674.493	1	3	II		4626.054	2		I		4572.027		1	II	
4673.62	1		I		4625.47	2		I		4571.660		3	II	
4672.125	1		I		4624.98		2	II		4571.064		1	II	
4671.701	30	1	I		4624.585		4	II		4570.081		1	II	
4671.386		3	II		4624.41	1200	50	I	2	4569.172		2	III	
4670.586	50	200	II	4	4623.91		1	II		4568.853	200	50	I	3
4669.510	2		I		4623.060		3	II		4567.368	700	80	I	2
4669.280		4	II		4621.83		2	II		4563.95	2000	200	I	1
4667.05	1	1	II		4621.80	3		I		4563.680		3	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Magers lamp	Thompson lamp				Magers lamp	Thompson lamp				Magers lamp	Thompson lamp		
Å					Å					Å				
4562.440		5	II		4517.218		2	II		4463.965		2	II	
4561.533		2	III		4517.051		1	IV		4463.855	1	8	II	
4560.022		3	II		4516.094	1	2	II		4463.493	1	9	II	
4558.906		3	III		4515.636		2	II		4461.72	7		I	
4558.095	2		I		4515.161	200	600	II	4	4460.923	1	5	II	
4557.936	20	150	II		4514.896		10	II		4450.405		1	IV	
4555.50		2	II		4513.990	6	20	II		4459.181		1	II	
4555.47	3		I		4513.409	1000	80	I	3	4457.428		2	II	
4554.217		5 e	III		4512.909		1	II		4457.311		1	IV	
4554.032	1	3	II		4511.725		3	II		4456.994		4	II	
4553.576	500	1500	II	6	4510.744		3	II		4455.651	4	1	I	
4552.619		B	II		4509.700		3	IV		4452.663		3	II	
4552.351	6		I		4508.788	1	9	II		4452.153		1	II	
4552.175		2	IV		4506.95		2 d	II		4451.930		20	II	
4551.792		2 d	II		4506.045	1	4	II		4451.11		2 d	II	
4550.601		6	II		4505.900		5	II		4450.60		1	IV	
4548.359	40	80	II		4505.345		3	II		4444.860		3	II	
4547.960		3	II		4504.850		2	II		4444.108		2	III	
4547.788	10		I		4504.331	1	9	II		4442.075		3	II	
4547.032	1	20	II		4504.076		3	III		4441.484		2	II	
4546.866	30	1	I		4503.636	600	50	I	3	4441.031	9	2	I	
4545.770	8	1	I		4503.463		5	II		4440.415		3	III	
4545.383		1	II		4503.21	150	5	I		4440.011	4		I	
4545.216		2	II		4500.542		3	II		4439.19	7000R	500	I	2
4544.420	30	1	I		4500.304		1	II		4438.142		7	II	
4543.879	2	40	II		4499.621		3	II		4436.356	4		I	
4543.680	2		I		4499.462		1	II		4435.150		5	II	
4543.452		4	II		4498.098	1		I		4434.795	20	1	I	
4543.302		3	II		4495.840	1		I		4434.178	40	100	II	
4542.588	1 h	5	IV		4495.520		1	II		4432.041	1		I	
4542.371		1	II		4493.965	50	150	II	6	4431.595		1	II	
4541.598		2	IV		4493.244		1	IV		4430.208	900	150	I	3
4541.452	1		I		4492.120	4		I		4429.689		2	III	
4541.325	20	100	II	5	4491.422		1	II		4428.980	30	1	I	
4540.045	8	2	I		4490.240		1	II		4428.782	700	100	I	
4539.323	5	20	II		4490.161	2		I		4428.153		3 b	II	
4538.678	4		I		4488.282	1000	60	I	1	4428.02	3		I	
4538.027		3	II		4487.266	50	200	II	7	4427.367	600	200	I	
4537.494		2	II		4487.03		2 h	II		4423.129		1	II	
4536.805		3	II		4486.794		1	II		4422.150		3	II	
4536.313	2		I		4486.225		1	II		4422.070	1		I	
4535.718		2	II		4485.986		1	II		4419.616	3		I	
4534.250		1	II		4485.325		6	II		4419.495		1	II	
4533.506	1000	50	I	3	4485.040		2	II		4418.132		3	II	
4533.006	150	8	I		4484.466	20	60	II		4417.814		1	II	
4532.702	50	2	I		4484.280	1	5	II		4417.060		3	II	
4531.333	1500	200	I	1	4483.152	8	1	I		4415.202	1		I	
4530.657		3	II		4482.422	1500	150	I	3	4414.548		1	I	
4530.23		4	III		4478.271	30	1	I		4412.075		2	III	
4529.87	3000	400	I	1	4475.666		2	II		4411.095	500	30	I	3
4528.982		5	II		4474.115		3	II		4410.740		2 h	II	
4527.526		2	II		4473.884		1	II		4410.230	200	8	I	
4525.535		1	II		4473.005	20	2	I		4409.685		2 h	II	
4525.108		3	II		4472.470	1500	300	I	7	4409.346	200	300	II	5
4524.810		2	II		4472.146		8	II		4408.220		1	II	
4524.549	1	4	II		4470.958		1	II		4407.650	1	4	II	
4523.161		2	II		4469.566		3	II		4407.081	5	1	I	
4521.338		4	III		4468.520	4		I		4405.496		1	II	
4520.918	2		I		4468.18	10	1	I		4404.208		1	II	
4520.746		8	II		4467.642		1	II		4403.037		1	II	
4520.510	5	2	I		4467.128	1	10	II		4402.824		5	II	
4520.161	200	2	I		4466.002		7	II		4402.605	40	2	I	7
4517.584		100	III		4465.663		2	II		4402.300	40	200	II	4

TABLE I.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Å	Å				Meggers lamp	Thompson lamp				Å	Å		
4401.824		1	II		4363.71	3	I	I		4331.082		5	II	
4401.445	1	6	II		4363.54		1	II		4330.488	20	1	I	
4400.583		1	II		4363.280	6	90	II		4329.818		15	II	
4400.332	50	2	I		4362.333		4	II		4329.718	70	4	I	7
4399.391		1	II		4362.156	1	6	II		4329.654		1	II	
4398.96	2000	100	I	3	4361.868		2	II		4327.853		9	II	
4396.499	10	40	II		4361.639	100	7 h	I		4327.238		2	II	
4396.254	100	5	I	7	4361.468	1	10	II	7	4326.637	1	15	II	
4395.52	1		I		4360.663		4	II		4326.556		9	II	
4394.973	70	3	I		4360.140	1	2	II		4326.404	2000	200	I	1
4394.177	25	2	I		4359.958		20	II		4325.240	6	90	II	
4393.688	2000	400 h	I	7	4359.528	1000	150 h	I	3	4325.033		2	II	
4392.825	50	100	II	6	4359.165	3	2	I, II		4324.962		1	II	
4390.49		1	II		4356.676	500	40	I	2	4324.500		7	II	
4390.43		1	II		4356.469		5	III		4324.160		1	II	
4389.764	50	200	II		4356.160		3	II		4323.630		8	II	
4389.15		1	III		4355.58		1	II		4323.554	1	5	II	
4388.528		8	II		4354.191	3	10	II		4322.851		1	II	
4387.46		1	II		4354.037	2	1	I		4322.56	2	30	II	
4387.32	30	2	I		4353.570	500	90 h l	I		4322.53	1	20	II	
4387.144	1	10	II		4352.948	2000	400	I	3	4322.230	200	2000	II	6
4386.50	200	5	I		4351.67	1		I		4320.995		2	III	
4385.97	2	20	II		4351.07		4	III		4320.723		2	II	
4385.82		1	III		4350.901		15 e	III		4319.556	1	9	II	
4385.66	3	10	II		4350.44		2	III		4318.978		1	II	
4385.14	100	2	I		4350.006	40	1	I		4318.820		1	II	
4384.72		2	II		4349.952		2	II		4318.750		2	II	
4384.39		4	III		4349.470	2	1	I		4318.459	2	10	II	
4384.29	3		I		4348.807		8	III		4318.010		3	II	
4383.93		10	II		4348.087	3	15	II		4317.751	1	15	II	
4383.11		1	I		4347.66	3		I		4316.954	2000	3000	II	4
4383.02		2	II		4347.358		3	II		4315.302		3	II	
4382.16		1	II		4347.223	10	20	II		4315.15		1	II	
4382.08		2	II		4347.13		1	II		4314.65		1	III	
4381.87	2	1	I		4347.013		4	III		4314.306		2	III	
4381.80		20	II		4346.00		1	II		4313.567	30	1	I	
4380.30		4	III		4345.054		3	III		4313.156	70	4	I	
4380.07		10	III		4344.894	1	20	II		4312.991	60	3	I	
4379.91		8	III		4344.762	300	20	I		4312.356	500	40	I	
4379.50	20	300	II		4344.204	60	300	II	4	4311.86	2		I	
4379.452	200	20	I		4343.845		5	II		4311.714			III	
4379.268	60	3	I		4343.632	3		I		4310.230	1	10	II	
4377.80		1	II		4343.110	2		I		4310.124		20	II	
4377.527	3000	300 h l	I		4342.753		3	II		4309.886		15	II	
4376.851	1	40	II		4342.151	6	80	II	5	4309.823	3000	300	I	7
4376.649		2	II		4341.646		10	II		4309.308		4	II	
4376.456	2000	200	I	8	4340.673	2	7	II		4309.085		3	III	
4375.814		6	II		4340.269		1	II		4308.73		2	III	
4374.861		3	II		4340.147	1	15	II		4308.586		7	II	
4373.116	20	1	I		4339.71	4		I		4307.820	300	10	I	
4372.854		1	II		4339.38	30		I		4307.583		4	II	
4372.65		2	II		4339.082	150	1000	II	4	4307.29		3	II	
4372.560	2	30	II		4337.599	80	20	I		4306.494	2	80	II	
4371.083		3	II		4337.235		2	II		4305.966	5000	2000	I	3
4371.05		1	II		4336.430	1000	150 h l	I		4305.484	150	20	I	
4370.810	200	2000	II	6	4336.30		1	II		4305.369		9	III	
4368.89		1	II		4335.360	20	1	I		4304.879		5	III	
4368.678	100	5 h	I		4334.914	3	4	II		4304.512		2	II	
4368.520		1	II		4333.909	400	90	I		4304.458		3	III	
4368.23	10		I		4332.809		4	II		4304.422		2	II	
4366.284	1000	200 h l	I		4331.942		2	II		4304.01		20	III	
4365.948		2	II		4331.762		3	II		4303.675		2	II	
4364.056		5	II		4331.318		1	II		4301.74		3	III	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
4301.496	5	15	II		4267.590	50	100	II		4242.425	4	60	II	
4301.135		40	III		4267.132	500	30 h l	I		4242.299		4	II	
4300.984	1000	80	I	7	4266.983	300	30	I		4241.67	2	6	II	
4300.736		4	II		4266.952	10	100	II		4241.24		2	II	
4298.498		2	III		4266.70	20	1	I		4241.159	1	15	II	
4298.075		1	II		4266.156	3		I		4241.116		5	II	
4296.696		3	II		4266.115	2		I		4240.95	6		I	
4294.338		3	II		4265.976		2	II		4239.455		1	II	
4295.88	3		I		4265.498		1	II		4238.84		1	II	
4295.04	300		I		4265.144		1	III		4238.63	2	1	I	
4295.023	500	50 h a	I		4264.802	1	30	II		4238.345		1	II	
4294.598		3	III		4264.520		1	II		4238.157	2	30	II	
4294.473	30	2	I		4264.282		5	II		4237.284		3	II	
4293.421		8	II		4264.029		6	II		4237.00	5		I	
4293.319		3	III		4262.826	2	5	II		4235.69	7		I	
4292.99	3		I		4262.691		6	II		4235.565	1	20	II	
4292.946		5	III		4262.273		1	II		4235.49	2		I	
4292.615	10	1	I		4261.56		8	III		4235.012	1	20	II	
4292.083	70	2	I		4261.346	20	1	I		4234.545	50	800	II	6
4291.954	3	2	I		4260.761		2	III		4233.777		1	I	
4290.357		7	II		4260.678		7	II		4233.445	150	8	I	
4289.91		1	II		4260.068		3	III		4232.427		1	II	
4289.64		20	III		4259.17		1	II		4231.972	10000	1000	I	3
4289.606	1		I		4258.98		4	III		4231.648		6	II	
4288.840	80	7	I		4258.743	200	20 b l	I		4231.073		15	III	
4288.800		9	II		4258.194	2	20	II		4230.184	100	400	II	4
4286.839		7	II		4257.640	200	2000	II	4	4229.767		4	III	
4286.625		4	III		4257.550	40	10	I		4229.681		3	II	
4285.878		9	II		4257.36	60	3	I		4229.657	4		I	
4285.816		1	II		4257.198		6	II		4229.271	3	30	II	
4285.258	1	9	II		4256.756	1000	100	I		4227.952	50	700	II	6
4285.127	2	15	II		4255.765	500	2000	II	4	4226.85		2	II	
4284.942	7	80	II		4254.775	200	800	II	6	4226.596		4	II	
4284.170	2000	500 b	I	7	4254.000		9	II		4226.523		4	III	
4283.782		7	III		4253.790		1	II		4226.273	1	20	II	
4283.453		1	II		4253.468		7	III		4226.152	300	10 h	I	
4282.808		10	II		4253.363	3		I		4225.998		8	II	
4282.098	40	2	I		4253.292	1		I		4225.548	10	30	II	
4281.972	20	50	II		4252.941	20	1	I		4225.303		1	III	
4281.850	20	1	I		4252.806		3	II		4224.196	20	150	II	4
4281.584		5	II		4252.515	300	3000	II	4	4224.064		1	II	
4281.384		2	III		4252.040		15	II		4223.621	50	2	I	
4280.636		2	II		4251.521	3000	200	I	3	4223.466		2	II	
4280.594		1	II		4250.21		5	II		4222.466		10	II	
4277.738	4000	1000	I	3	4249.861		2	II		4222.32	5		I	
4277.326		8	III		4249.81		2	II		4222.057		4	II	
4277.092		2	II		4249.748		4	II		4220.831		10	III	
4276.78		1	II		4248.12		2	II		4220.69		4	II	
4276.21		2	III		4247.885	40	300	II	6	4220.507	7	1	I	
4275.694		4	III		4247.04		2	II		4220.260		1	II	
4275.66	5		I		4246.88	4		I		4219.706	500	20 h	I	
4275.63	5		I		4246.835		10	II		4219.646		10	II	
4275.48	2		I		4246.586	4	20	II		4219.247	1000	200	I	
4273.74	10	1	I		4245.740	3	15	II		4218.693	3000	600	I	7
4273.340	20	150	II	5	4245.597		2	II		4218.565	1000	5000	II	4
4272.647	400	40 h l	I		4245.245	10	1	I		4217.79		2	II	
4272.103	1000	40	I		4244.73		1	II		4217.69		2	II	
4271.963		2	II		4244.51		8	II		4217.310		4	II	
4271.798	600	70 h l	I		4244.21	6	80	II	5	4216.885	6	60	II	
4270.515	4	60	II		4244.054	6	15	II		4216.766	20		I	
4268.996		4	III		4243.92	3		I		4216.704	60	300	II	4
4268.882		1	II		4243.494		9	II		4216.569		2	II	
4268.39	1		I		4242.86	4		I		4216.417		8	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
4216.14		1	III		4190.297	200	2000	II	4	4157.755	100	200	II	
4215.519	6	20	II		4189.15	3		I		4157.292		8	III	
4215.485	2		I		4188.993	70	5 h	I		4156.575	1	4	II	
4215.416		2	III		4188.723		7	II		4156.444		1	II	
4215.178		2	III		4188.371		2	II		4155.385	8	1	I	
4214.942	2	15	II		4188.130	1	20	II		4155.123	50	2 h	I	
4214.29	3		I		4187.73	1		I		4154.83	4		I	
4213.962	50 d	20 h	I		4186.83	15	300	II	7	4154.484		7	III	
4213.856		2	II		4186.75	1		I		4153.88		6	II	
4213.641		300	III		4186.027		2	II		4153.758		4	II	
4213.407		3	II		4185.565	2	30	II	5	4153.197		7	II	
4213.106	10	1	I		4184.635	1	20	II	7	4153.11		15	III	
4212.361		6	II		4184.289	2	1	I		4152.79		3	II	
4211.957		1	II		4184.164		3	II		4152.38		5	III	
4211.82	2000	300	I	2	4183.905		1	II		4152.290	2		I	
4211.502		2	II		4183.402		4	III		4152.058	3		I	
4211.298		4	II		4183.129	5		I		4151.64		7	III	
4210.664	4	40	II	7	4183.06		3	III		4151.19	9	1	I	
4210.48	5		I		4182.553		2	II		4150.04		10	III	
4210.299	200	20	I	7	4182.353		2	III		4149.066	2000R	2000	II	7
4210.225	15		I		4182.07	9	1	I		4148.440		8	II	
4209.870		5	II		4180.809	10000	20000	II	4	4147.774	1	30	II	
4209.342	8	1	I		4179.95	20		I		4146.984		2	II	
4208.625		4	II		4179.084	10	80	II		4146.870	80	5	I	
4208.519		1	II		4178.585	4	6	II		4146.764	1	30	II	
4208.186		6	III		4178.225		8	II		4146.160		3	II	
4207.65		1	II		4177.81	4	80	II	4	4144.700	1	20	II	
4207.32	6	1	I		4177.40	2	50	II		4144.278	1	15	II	
4206.042		1	III		4176.204		3	II		4143.498	500	30 h	I	
4205.907	2		I		4175.928	10	90	II		4143.070		4	II	
4205.785	80	6 h	I		4175.868	100	10	I		4142.364	1	30	II	
4205.608		4	II		4175.835		30	II		4141.457	2	60	II	5
4204.195	300	5	I		4175.602	2	30	II	4	4140.307	8	1	I	
4204.058		5	II		4175.545	1	20	II		4139.397	2		II	
4203.254		2	II		4174.56	3000	300	I	2	4139.332	10	30	II	
4202.907	6	2	I		4174.399		6	II		4139.051	500	20	I	
4202.666		2	II		4174.259	80	4 h	I		4138.445		4	II	
4202.44	15	30 h t	II		4173.134	9	1	I		4138.166		3	II	
4201.991		1	II		4172.95		60	III		4138.13		1	II	
4201.864	3	1	I		4172.422	200	20	I		4138.11		1	II	
4201.460	2	20	II		4172.15		20	II	7	4137.985		2	II	
4201.291	200	8 h	I		4171.222	20	1	I		4137.378		4	II	
4200.841		5	II		4170.106	200	2000	II	5	4136.930		7	II	
4200.72	60	1	I		4169.499	2	8	II		4136.872		1	II	
4199.939		4	II		4169.260	50	5 h	I		4136.35		2	III	
4199.713		10	II		4169.141	50	5	I		4135.88		3	III	
4198.863		1	II		4167.37		1	III		4135.088	500	5000	II	6
4198.738		10	III		4166.743	40	3	I		4134.790	20	1	I	
4198.18	2		I		4165.692		2	II		4134.476	20	80	II	6
4197.876	400	100 h	I		4165.143		6	II		4132.722		6	III	
4196.632	1	9	II		4165.08		1	III		4132.465		4	II	
4196.54	1		II		4164.660	5	50	II		4132.165	15	2	I	
4195.056	2		I		4164.587		15	II		4132.063		2	II	
4194.98		100	III		4163.770	3		I		4131.600	2	20	II	
4194.39	2		I		4163.502	10	2	I		4131.325		3	II	
4194.34		30	III		4162.717		100	III		4131.255	2		I	
4194.23	2		I		4162.023		5	II		4131.15		4	II	
4194.19	2		I		4161.572		1	II		4131.024	6	40	II	
4193.807	2	10	II	6	4161.178		7	III		4130.878	1	4	II	
4193.533		4	II		4160.299		2	II		4130.645	2		I	
4192.725		3	II		4160.243	4		I		4129.413		1	II	
4191.473		2	II		4160.090	3	40	II		4129.329		2	II	
4191.36	1		I		4159.006	6	1	I		4129.157	2	30	II	4



TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
4128.934	100	4 b	I		4103.416	1	10	II		4074.705	8	60	II	5
4128.815	30	2	I		4103.113		2	II		4074.528		20	III	
4128.115	4		I		4102.478	20	10	II		4074.359	3		I	
4128.046		3	II		4102.264		5	II		4074.074		1	II	
4127.202		4	II		4101.335	30	3	I		4073.846	8		I	
4127.170	1		I		4100.877		1	II		4073.288	1		I	
4126.992	20	30	II		4100.160		8	II		4072.923	2		I	
4126.726	1	15	II		4099.820		2	II		4071.442		1	II	
4126.030		2	II		4099.402		3	II		4071.334		3	II	
4125.965	3		I		4099.338	20	1	I		4071.115	2		I	
4125.538	150	5 h	I		4098.920	4		I		4070.527	8	50	II	
4125.185	20	1	I		4098.848		2	II		4069.013		4	II	
4124.736	2	30	II		4098.232		20	III		4068.50		2	II	
4124.564		1	II		4098.096		2	II		4068.229		2	II	
4123.75	6	1	I		4097.885	100	600	II	5	4067.461	4		I	
4123.180	1	20	II		4097.080	6	2	I		4067.115	30	2	I	
4122.853	50	500	II	4	4096.968		1	II		4067.031		2	II	
4122.274	4	1	I		4096.785		3	II		4067.00	1		I	
4122.143	8	1	I		4096.644	2	20	II		4066.809		15	II	
4121.902	200	20	I		4096.156	1	15	II		4066.520		2	II	
4121.345		3	II		4094.351		2	II		4065.963	20 b	1	I	
4121.062		15	III		4093.694	2	20	II		4064.757		15	II	
4120.071	1	40	II		4092.959		10	II		4063.927	1	30	II	
4119.812		2	II		4092.052	1	4	II		4063.726	1000	150	I	2
4119.464	200	1500	II	5	4091.53	6	100	II		4063.455	3000	500	I	3
4119.25	20	30	II		4091.466	2	40	II		4062.35		1	II	
4119.067	30	3	I		4090.666		20	III		4062.100		2	II	
4119.046	3	50	II		4090.594		3	II		4061.614		7	II	
4118.396		3	II		4089.908	20	4	I		4061.302	10	1	I	
4118.180	8	2	I		4089.68	10000R	3000	I	3	4060.180		1	II	
4118.07	10	1	I		4088.633		2	II		4060.04		1	II	
4117.177	1	30	II		4088.528		1	II		4059.893		2	II	
4116.89	1		I		4087.67	5	1	I		4059.470	40	7	I	7
4116.654		4	II		4087.480	30 d	5 d	I		4058.625	60	6	I	
4116.090	4		I		4087.343	20	3	I		4058.404	150	15	I	
4115.70	1		I		4086.61	7	100	II	7	4058.238		1	II	
4115.454		9	II		4087.492		8	III		4058.065	1	6	II	
4114.694	1		I		4085.66	1	8	II		4056.142	500	2000	II	4
4114.591	2	30	II		4085.05		3	II		4055.468		3	II	
4114.31		1	III		4084.845		3	II		4055.29	2		I	
4113.879	1	20	II		4084.515		1	II		4054.588		1	II	
4113.805	2		I		4084.47	4		I		4053.547		2	II	
4113.707		5	II		4083.870		1	II		4053.235		1 h	II	
4113.389	40	2 h	I		4083.648	15	4 b	I		4053.11		10	II	
4113.046	40	400	II	6	4083.346	4		I		4052.860		20	II	
4112.768		3	III		4082.992	500	20	I		4052.283	5000	1000	I	1
4111.966		3	III		4082.814		4	II		4052.072	1000	60	I	1
4111.381		6	II		4082.64		1	II		4051.935	30	3	I	
4111.07	8		I		4082.586	2		I		4051.339	20	60	II	4
4110.448		2	II		4082.529		1	II		4050.083	20	150	II	4
4110.169		10	II		4081.05		1	II		4049.982		5	II	
4109.79	40	2	II		4079.991	2	40	II	6	4049.335		7	II	
4109.654		400	II	4	4079.88		6	II		4048.683		5	II	
4109.574	3000	400	I	2	4079.542		3	II		4048.554		2	II	
4109.306	2	40	II		4079.164	2	20	II		4048.21		1	II	
4108.845	5	15	II		4078.56	7	70	II	4	4048.090		2	II	
4108.542	8	1	I		4078.000	10 h		I		4047.38	20	200	II	5
4108.399		4	III		4077.713	10	20	II		4046.998		2	II	
4107.222	20	3 h	I		4077.276	200	2000	II	5	4046.56		1	II	
4106.284		3	II		4076.82		1	II		4046.52		1	II	
4106.070		5	II		4076.198		3 h	II		4046.37	1		I	
4104.60	2		I		4076.09		3 h	II		4046.297		4	II	
4104.05	4		I		4075.873		3	II		4045.605		1	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
4045.302	6	80	II		4007.518		20	II		3976.148		7	II	
4044.657		2	II		4007.356	2000	500	I	3	3975.283	2000	100	I	2
4044.464	3	1	I		4006.962		2	II		3974.91		1	II	
4043.426		4	II		4006.828	15	2	I		3974.30		2	II	
4043.05	20	300	II	5	4006.672		1	II		3973.87	10	3	I	
4042.532	3	40	II		4006.53		2	II		3972.91		1	II	
4042.328		4	II		4005.65	2 h		I		3972.848		3	II	
4040.563	1	30	II	4	4005.619		1	II		3972.517		4	II	
4040.498		8	II		4005.218		1	II		3972.267		3	II	
4040.29		1	II		4003.574		1	II		3972.18	3		I	
4040.08	60	1000	II	5	4003.224		2	II		3972.08		1	II	
4039.938	15	1	I		4002.798		2	II		3972.01	7		I	
4039.613		4	II		4002.68		1	II		3971.739		2	II	
4039.140		3	II		4002.326		10	II		3971.014	2 h		II	
4038.97	2	1	I		4002.04	3 h		I		3969.89	4	1	I	
4038.94	2		I		4002.002		1	II		3969.519		1	II	
4038.187		6	II		4000.808	5	150	II	7	3969.461		1	II	
4037.916		9	II		4000.46	10		I		3969.082		3	II	
4037.822	20	50	II	7	4000.212	4	1	I		3968.79		20	II	
4036.772	20	15	II		3999.777	2	40	II		3968.68		1	II	
4036.550	1	15	II		3998.879	2	1	I		3968.024	10	100	II	5
4035.855	5	3	I		3998.430		7	II		3966.062		2	II	
4035.51	5	1	I		3998.38		1	II		3965.416		1	III	
4035.315	9	90	II	6	3998.133	3		I		3964.584		1	II	
4034.438		6	II		3997.667		10	III		3964.459	1	20	II	4
4033.695		4	II		3997.244		4	II		3964.364		1	III	
4033.029		10	III		3995.859		1	II		3963.301		2	II	
4032.869	10	100	II	5	3995.432	1	20	II	7	3963.07	5		I	
4032.756		2 h	II		3994.563		2	II		3962.457		4	II	
4032.441		2	II		3994.300		1	II		3961.98	70	6	I	1
4030.712		1	II		3993.753	100	10	I	3	3961.832		4	II	
4029.844	2	60 d	II		3992.826		1	II		3961.731	5	1	I	
4028.158		2000	III	2	3992.09		8	II		3961.503	5	1	I	
4027.580		10	II		3991.945		4	III		3961.288		1	II	
4027.19		1	II		3991.74		10	III		3961.104		2	II	
4026.922		2	II		3991.09		1	II		3960.866		2	II	
4025.740		2	II		3990.885	10000R	1000	I	3	3960.34		1	II	
4024.375		4	II		3990.603		2	II		3960.27		1	II	
4023.987	6	30	II	5	3990.473		2	II		3959.730		1	II	
4022.712	3	40	II		3990.280		1	II		3959.060	1	9	II	
4021.956		1	II		3989.717		6	II		3958.818		2	II	
4021.56	2	1	I		3988.666		70	II		3958.376		3	II	
4020.310		2	II		3987.99	50000A	30000	I	7	3957.270	6	2	I	
4019.852	1	10	II		3986.962		5	II		3957.05	5		I	
4019.35	6	150	II	4	3986.830		5	II		3954.266		4	II	
4018.966	30	3	I		3986.179		10	II		3953.546		1	II	
4018.264		2	II		3985.564		100	III		3951.08		10	II	
4018.134		2	II		3985.125		1	II		3949.91	10	100	II	6
4017.94		1	II		3984.765		3	II		3949.58	100	200	II	5
4017.060		3	II		3983.748		1	II		3949.307		2	III	
4016.976		9	II		3983.314	2	60	II	4	3948.64		4	II	
4015.296		4	II		3983.179		1	II		3948.18	20	100	II	5
4015.004		1	II		3982.009	2	20	II	4	3946.94	20	150	II	4
4013.579	1	15	II		3981.574		1	II		3945.577		2	II	
4013.464		3	II		3981.160		5	II		3944.55		1	II	
4012.704		1	II		3980.78		1	II		3944.509		1	II	
4012.204		1	II		3980.318		10	II		3943.692		2	II	
4010.84		2	II		3979.710	10	2	I		3943.29	4	1	I	
4010.825	3		I		3979.095	60	4	I		3942.72		6	II	
4009.237		20	II		3978.543	2	10	II		3939.780	10	1	I	
4008.94	4	1	II		3977.342	2	20	II		3939.517	1	20	II	
4008.775		3	II		3977.113		1	II		3938.53	40	400	II	
4007.962	10	5	I		3976.527		1	II		3938.25	40	500	II	6

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3937.984		1	II		3904.447		1	II		3872.338		8	II	
3936.596		2	II		3903.74		1 h	II		3871.946		1	II	
3935.385		5	II		3903.397		4	II		3870.447		2	II	
3935.066		3	II		3903.288		3	II		3870.197		2 h	II	
3934.30		100	II		3902.814		5	II		3868.907	4	1	I	
3934.182	3000R	200	I		3902.43		3 h	II		3868.838		4	II	
3933.87		2	II		3902.396	10 h	4	I		3868.602		1	9	II
3933.25		2 h	II		3902.109		5	II		3868.570		1	20	II
3931.90	10	100	II	6	3902.042		1	20	II	3867.75		1	II	
3931.634		2	II		3901.44		1	II		3867.675		3	II	
3931.44		1	II		3901.06	10	1	I		3867.48		5 h	II	
3931.273	4		I		3900.85	4000R	500	I	3	3867.378		1	II	
3931.227		500	III		3899.245		3	II		3866.862		1	II	
3930.900		1	II		3899.07	4	80	II	7	3865.95	8 h	1	I	
3930.004		2	II		3896.450		1	II		3865.43	1	1	I	
3929.885		1	II		3897.946		8	II		3865.351		1	II	
3929.80	1		I		3897.555	10	2	I		3865.255		3	II	
3929.053		6	II		3897.34		2 d	II		3865.14	1	1	I	
3928.068		10	II		3897.060		1	II		3864.33	20 h	1	I	
3927.60		1	II		3896.966		4	II		3863.784		2	II	
3926.962		1	II		3896.742	20	3	I		3863.455	200	800	II	5
3926.724	30	3	I		3896.55		150	III		3863.046	10	100	II	
3926.651		2	II		3895.884		2	II		3862.59	2	1	I	
3924.656		2	II		3895.758	1	30	II		3862.511	1	20	II	5
3924.527	10	2	I		3893.740		2	II		3862.46	1	1	I	
3923.230		4	II		3892.285		1	II		3862.18	10	1	I	
3922.443	1	15	II		3891.696		1	II		3861.792		3	II	
3921.201		2	II		3890.850	2	50	II	4	3861.730		2	II	
3920.745		4	II		3890.767	20	3	I		3861.566		1	II	
3920.602		2 h	II		3889.664		2	II		3861.467		1	II	
3919.980	1	15	II		3887.825		10	II		3860.975	2	1	I	
3918.804		9	II		3887.50		1	II		3860.917		1	II	
3917.685		3	II		3887.290	20	300	II	4	3860.815	10	1	I	
3917.473		5	II		3887.166		20	III		3860.64	3	1	I	
3916.892		2	II		3886.63		1	II		3859.887		2	II	
3916.783	2	15	II		3886.378		4	II		3859.35		2 b	II	
3916.702		1	II		3885.647		1	II		3858.555	10	100	II	4
3916.425		10	II		3885.470		1	II		3858.434		1	II	
3916.316		1	II		3885.195		4	II		3858.07		9	II	
3916.268		1	II		3884.833		1	II		3857.860		2	II	
3915.427		10	II		3883.638		1	II		3857.586	10	20	II	
3914.690		3	II		3883.105		1	II		3856.514		3	II	
3913.923		7	II		3882.583		10	III		3856.009		2	III	
3913.729		7	II		3882.068	40	4	I		3856.00	3	1	I	
3913.347	30	200	II	4	3881.738		3	II		3855.883	50	8	I	
3913.234		20	III		3880.684		1	II		3854.91	4	30	II	
3912.746		15	III		3880.332		2	II		3854.806	20	100	II	5
3911.272	600	60	I	3	3880.197	5	70	II	4	3854.116	2	1	I	
3910.911		6	II		3880.044		1	II		3854.09	2	1	I	
3910.653	20	4	I		3879.985		20	III		3853.731		3	II	
3910.429		2	II		3879.140		7	II		3853.238	1	2	II	
3910.364		4	II		3878.023		4	II		3852.562		10	II	
3909.96		1	II		3877.06	4	60	II		3852.160	4	40	II	
3909.186		1	II		3876.902		1	II		3851.80		2	II	
3908.020		5	II		3876.776	1	20	II	5	3851.65	1	1	I	
3907.355	2	40	II	4	3876.33		2 h	II		3851.56	5	1	I	
3906.960	4	30	II	6	3875.76	1	1	I		3851.242		1	II	
3906.64		3	II		3874.610		3 h	II		3851.090		2	II	
3906.196	4	30	II		3874.066		10	II		3850.98	7	1	I	
3905.832	20	200	II	6	3873.497		4	II		3850.866		4	II	
3905.51	5	1	I		3873.246	5	1	I		3850.32		2	II	
3904.812	100	1500	II	5	3872.852	5000R	1000	I	7	3849.54	1	1	I	
3904.537		2	II		3872.555		5	II		3848.792	5	1	I	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3847.473	30	200	II	4	3819.916	1	15	II		3789.37	1	II		
3846.237		4	II		3818.365		1	II		3788.267	4	II		
3846.186	1	15	II		3817.777	3	20	II	5	3787.418	1	5	II	
3845.79	1		I		3817.624		7	II		3787.080	1	10	II	
3845.64	3		I		3817.09	1		I		3786.465	1	II		
3845.402		4	I		3816.345	15	150	II	6	3785.960	1	II		
3845.35	2		I		3816.189	30	300	II	4	3785.656	1	20	II	
3844.988	2	6	II		3815.640		1	II		3785.330	6	80	II	
3844.349	1	15	II		3815.203	200	10	I		3784.512	1	II	4	
3843.811		6	II		3814.310		10	II		3784.384	7	100	II	
3843.420	5	80	II	6	3814.215	15	200	II	4	3784.144	1	10	II	
3843.30	2		I		3814.084		4	II		3783.914	1	II		
3843.082	1	20	II		3813.665		3	II		3782.80	1	I		
3842.653		1	II		3811.584		2	II		3782.736	4	II		
3841.950	1	9	II		3809.04	5	30	II		3782.540	70	700	II	
3841.296	1	10	II		3808.809	10	1	I		3781.684	8	II		
3840.70		1	II		3808.544		1	II		3781.415	1	I		
3840.341	3	70	II	7	3808.460	1	2	II		3781.268	1	II		
3840.297	2	40	II		3808.35		2	II		3781.046	3	II		
3840.013		2	II		3808.315		2	II		3780.605	1	II		
3839.907	1500	80	I	1	3807.574	50	500	II		3780.217	2	20	II	
3839.469	30	300	II	5	3807.545	100	1000	II	4	3779.838	1	II		
3839.382	1	20	II		3806.996		3	II		3779.472	2	II		
3838.900	10	100	II	4	3806.869		1	II		3779.206	20	150	II	
3838.67		2	II		3806.818		2	II		3779.184	1	15	II	
3838.287	80	4	I	2	3806.73	2		I		3778.800	2	II		
3838.128		3	II		3806.188	2	20	II		3778.452	3	II		
3838.02	7	1	I		3806.011		1	II		3777.906	1	20	II	
3837.57	5	1	I		3804.99		1	II		3777.534	2	30	II	
3837.411		4	II		3804.431	4	40	II	5	3776.520	3	40	II	
3836.677		2	II		3804.35		2	II		3776.362	1	II		
3836.541		1	II		3803.680		1	II		3775.906	2	II		
3836.46	5	1	I		3802.47		1	II		3774.956	2	II		
3835.952		2	II		3802.28		1	II		3774.323	700	40	I	
3835.872		1	II		3801.752	1	20	II		3773.625	1	II		
3835.495		3	II		3801.386	2		I		3773.428	200	600	II	
3834.35	1		I		3801.263	10	1	I		3772.517	20	100	II	
3833.884		9	II		3801.026		3 h	II		3772.294	3	40	II	
3832.701		4	II		3800.622	20	80	II	5	3771.768	3	II		
3832.664		1	II		3799.054		1	II		3771.596	2	II		
3832.180		3	II		3798.960	4	20	II		3771.350	3	II		
3832.108		3	II		3798.854		1	II		3771.155	1	10	II	
3831.610	3	20	II	7	3798.402	4000	900	I	2	3770.814	1	II		
3831.288		1	II		3798.162	3000	300	I	1	3770.28	1	II		
3831.13		1	II		3797.915		2	II		3770.195	2	40	II	
3830.905	2		I		3797.219		2	II		3770.095	2000 R	500	I	
3830.178		2	II		3797.181		3	II		3769.35	1	II		
3829.767		2	II		3796.950		10	II	4	3769.189	1	II		
3829.736		1	II		3796.496	2		I		3768.966	2	II		
3828.673	20	5	I		3796.157	7	80	II	6	3767.891	10	II		
3827.494		4	II		3795.916		4	II		3767.714	8	2	I	
3827.030		2	II		3795.878		3	II		3767.175	1	II		
3826.768		8	II		3795.785	3	1	I		3766.925	2	20	II	
3826.620	5	1	I		3795.061		4	II		3766.736	8 h	II		
3826.51		1	II		3794.906		3	II		3766.527	4	II		
3824.956	1		I		3793.934		4	II		3766.101	20	200	II	
3823.241	5	1	I		3793.104		3	II		3765.080	1	8	II	
3822.216		1	II		3792.86		4	II		3764.59	1	I		
3822.17		1	II		3792.557		1	II		3764.56		3 h	II	
3821.526		1	II		3792.39		2	II		3764.03	1	II		
3821.224		1	II		3791.741	7000	600	I	1	3763.35	1	II		
3820.825		8	II		3791.336		2	II		3763.27	1	II		
3820.288		5	II		3789.457		6	II		3763.045	1	6	II	

TABLE I.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3762.98		1	II		3735.606		9	II		3708.218		3	II	
3762.93	1		I		3735.352		10	II		3707.707		2	II	
3762.550	40	400	II	4	3734.96		1	II		3707.486	1	7	II	5
3762.12		1	II		3734.694	3000R	300	I	1	3707.234		1	II	
3761.92		1	II		3734.435	1000	100	I	1	3707.020		4	II	
3760.999	10	200	II	6	3734.150		8	II		3706.833		4	II	
3760.481	200	6	I		3734.12		2	II		3706.32		1	II	
3760.23		2 d	II		3733.989		10	II		3706.023	10	5	I	
3757.355		1	II		3733.762		5	II		3705.745	1		I	
3756.888		2	II		3733.19		1	II		3705.64	2	30	II	7
3756.445		6	II		3732.458		5	II		3704.750		20	II	
3755.762		2	II		3732.33	I	10	II		3704.300		1	II	
3755.32		1	II		3731.166		7	II		3703.92		7	II	
3754.83		2	II		3731.044		8	II		3703.423	10	200	II	7
3754.74		1	II		3730.409	20	200	II	4	3702.94		6	II	
3754.606	2	6	II		3729.81	10	100	II	4	3702.42	1	5	II	
3753.897	8	100	II	5	3728.24		2	II		3702.07		8	II	
3753.65		1	II		3727.073		1	II		3700.580	1000	40	I	2
3753.49		2	II		3726.169	1	5	II		3699.800	5	100	II	7
3753.053	4	60	II		3725.84	5	70	II		3699.514	3000	100	I	
3752.730		4	II		3724.91		3	II		3698.81	2		I	
3752.56		1	II		3724.36	200		I		3698.596	40	400	II	6
3751.947	10	40	II	6	3724.213	150	800	II	5	3698.446	2	40	II	
3751.62	1		I		3723.06		2	II		3698.070		2	II	
3751.206	1	2	II		3722.626		7	II		3698.012		6	II	
3751.13	1		I		3722.296	40	600	II	7	3697.688		2	II	
3751.030		1	II		3720.98	6	100	II	5	3694.190	100000A	80000	II	6
3750.045		8	II		3720.846		3	II		3692.072		4	II	
3749.688	40	400	II	5	3720.584		2	II		3691.67	2	6	II	
3749.386	1	6	II		3720.192		3	II		3691.472	10	200	II	6
3748.55	1		I		3719.924		3	II		3691.34		1	II	
3748.345	3	10	II		3719.148		2	II		3691.230	1	10	II	
3748.204		2	II		3718.887		1	II		3690.560	30	300	II	7
3748.102		1	II		3718.749		2	II		3689.99		8	II	
3747.817	2	20	II		3718.482	1	10	II		3688.937		4	II	
3747.229		10	II		3718.139		4	II		3688.81	10		I	
3746.67		1	II		3718.052	3	15	II		3688.490		1	II	
3746.33	3		I		3717.885		2	II		3688.438	10	1	I	
3744.943	40	5	I		3717.412		3	II		3687.598	20	150	II	6
3744.752		1	II		3717.28	3		I		3687.142	7	80	II	6
3744.166		4	II		3717.23	1		I		3685.973		15	II	
3744.09	2		I		3717.15		1	II		3684.997	500	40	I	3
3743.97		1	II		3716.596		2	II		3684.068		1	II	
3743.390		3	II		3716.139	10	40	II		3683.352	2	30	II	7
3743.26		6	II		3715.725		4	II		3683.277	1	15	II	
3743.138		15 h	II		3715.440		10	II		3682.777		2	II	
3742.627		1	II		3715.409	50	4	I		3682.20		1	II	
3742.358		1	II		3714.186	50	150	II	6	3681.29		1	II	
3742.036	4	20	II		3713.93		1	II		3681.196		15	II	
3741.642	3	15	II		3713.70		2	II		3680.770		7	II	
3741.59	8	80	II	4	3713.298		2	II		3680.667		4	II	
3741.296	50	6	I		3712.666	10		I		3679.932	200	20	I	
3740.772		10	II		3712.438	1	10	II		3679.521		2	II	
3740.59		2	II		3712.416		4	II		3678.26		1	II	
3739.59		1	II		3712.06		1	II		3678.15		1	II	
3739.56		1	II		3711.95	1		I		3677.906		6	II	
3739.411	30	3	I		3711.907	1	400	II	7	3677.853	1	15	II	
3738.009		10	II		3711.245		6	II		3677.81	2		I	
3737.80	2		I		3710.825		3	II		3677.25	2		I	
3737.537	1	40	II		3710.340	100	1000	II	6	3676.89		1	II	
3737.123		6	II		3710.090		2	II		3676.14		2	II	
3736.901	7	10	II	4	3708.97		10	II		3675.782		20	II	
3736.237	400	100	I	3	3708.663	150	600	II	4	3675.720	20		I	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3675.085	300	2000	II	7	3647.25	1		I		3614.593	5		II	
3674.065	2	20	II		3646.277	1	10	II		3614.048	5	100	II	4
3673.900		8	II		3646.24		7	II		3613.894		200	III	
3673.423		8	II		3645.72		7	II		3613.38		3	II	
3673.286		1	II		3644.236	40	400	II	5	3613.340		3	II	
3670.69	50	600	II	5	3643.28	1	10	II		3613.295		2	II	
3669.69	2000 r	6000	II	6	3642.63		3	II		3612.950		4	II	
3668.992	3	50	II		3642.37		7 h	II		3611.994	20	1	I	
3668.16		1	II		3642.24		4	II		3611.300	60	800	II	4
3667.951		8	II		3640.79		1	II		3610.233	100	700	II	6
3666.67	1	30	II		3639.97		1	II		3609.24		1	II	
3666.62	200	4	I	7	3639.746	1	15	II		3608.936		3	II	
3666.522		5	II		3639.445	20	8	I		3608.488	10	150	II	5
3666.09		10	II		3639.030		2	II		3608.356	3		I	
3664.895	3	40	II		3637.757	2000R	3000	II	6	3607.703	700	70	I	
3664.744	40	200	II	5	3636.899		2	II		3607.186		2	II	
3664.560	8	90	II	7	3636.23		2	II		3606.478	300	2000	II	5
3663.74		30	III		3635.330		1	II		3605.347	2	20	II	5
3663.11		6	II		3634.86		2	II		3605.208		1	II	
3662.545	1	20	II		3634.74		1	II		3603.848	20	300	II	5
3662.297		2	II		3634.525	30	20	I, II		3602.237		1	II	
3662.061		7	II		3634.40		10	II		3601.917	2	20	II	6
3662.033		5	II		3634.27		2	II		3601.209	2	15	II	
3661.656		2	II		3633.858		10	II		3600.966	10	100	II	
3661.185		2	II		3633.70	1	20	II	7	3600.763	20	300	II	
3661.08		6	II		3632.595	20	150	II	5	3600.663	2	30	II	
3660.99		1	II		3632.415	20	100	II	5	3600.363	10	150	II	6
3660.73	1	8	II		3631.86		8	II		3598.87		2 h	II	
3660.64		1	II		3631.073	7	80	II	4	3598.662	9	1	I	
3660.58	1	15	II		3630.975	4		I		3598.043	2	20	II	
3660.42		1	II		3630.621		4	II		3597.60		1	II	
3660.137	1	10	II		3630.337		2	II		3597.078		10	II	
3659.835		30	III		3630.301		4	II		3596.488	1	30	II	
3659.427	4		I		3629.919	30	300	II	6	3596.416	3		I	
3658.78	1		I		3629.58	3		I		3596.300		4	II	
3658.605	5	70	II		3629.238	800	15	I	7	3595.844		5	II	
3657.665		3	II		3628.340		6	II		3595.649		2	II	
3657.233	3 h		I		3627.89	2	30	II		3595.162		9	II	
3657.131		1	II		3627.206	2	30	II	5	3594.93	1		I	
3657.007		2	II		3627.078		1	II		3594.864	1	10	II	
3656.81		1	II		3626.80	1	6	II		3593.882		1	II	
3656.672		2	II		3625.230	2	60	II		3593.728		2	II	
3656.312	10	2	I		3624.684	15	200	II	6	3593.060		1	II	
3655.729	2000R	100	I	1	3624.109	10	1	I		3592.734	1	20	II	
3655.48	1	20	II		3623.627	1	10	II		3592.217	1	10	II	
3654.417	1	5	II		3622.320	20	80	II	6	3591.844	150	15	I	
3654.28	1	20	II		3621.873		7	II		3591.24		1	II	
3653.041	2	20	II		3621.80		2	II		3591.18		2	II	
3652.953	3	40	II		3621.743	400	10	I		3591.141		4	II	
3652.538	1	15	II		3621.513	1	15	II		3590.657	5	50	II	7
3651.24	1	10	II		3621.18		1	II		3589.997		1	II	
3651.15		1	II		3620.988	30	400	II	7	3589.186		7	II	
3650.80	4	50	II	4	3620.65	2		I		3588.832	1	20	II	
3649.739	10	150	II	5	3620.362		4	II		3588.456		2	II	
3649.084		8	II		3619.803	700 r	3000	II	4	3587.736		7	II	
3648.827		2	II		3618.887		1	II		3587.569		1	II	
3648.676		1	II		3618.040	50	200	II	6	3586.824	30	90	II	6
3648.440	10	100	II	6	3617.045	1	10	II		3586.536		6	II	
3648.38	4	50	II		3616.395		10	II		3585.878		8	II	
3648.29		1	II		3616.031		3	II		3585.794	1	20	II	
3648.242		2	II		3615.957		2	II		3585.466	2000R	4000	II	5
3648.150	150	15	I		3614.994	50	7	I	7	3583.96		4 h	II	
3647.730	2	40	II	7	3614.63		1	II		3583.827	7	70	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air A	Intensity		Spectrum	Zeeman type	Wave-length in air A	Intensity		Spectrum	Zeeman type	Wave-length in air A	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3583.532		5	II		3556.435		3	II		3525.171		2	II	
3583.26		7	II		3556.263	200	15	I		3525.05		1	II	
3583.180		1	II		3556.124		1	II		3524.82		1	II	
3582.841	3	40	II		3556.092		1	II		3524.044		1	II	
3582.20		3	II		3556.013	10		I		3523.734		3 h	II	
3580.755		10	II		3555.204	5	30	II	4	3523.148	3	2	I, II	
3580.640	1	15	II		3555.055		3	II		3522.826		3	II	
3580.474		1	II		3554.347		5	II		3522.747	1	10	II	
3580.404	100	10	T		3553.82		1	II		3522.021		1	II	
3580.125	100	20	I		3553.340		7	II		3521.773	5		I	
3579.511	3	40	II	7	3553.192		3	II		3521.727		3	II	
3578.95		1	II		3553.153		3	II		3521.664		2	II	
3578.710	10	2	I		3552.324	100	1000	II	5	3521.585	1	7	II	
3578.561	600	50	I	1	3551.405	1		I		3521.224		7	II	
3577.985		1	II		3550.87		300	III		3521.007	5	20	II	
3577.690	1	10	II		3549.822	200	2000	II	6	3520.917		10	II	
3577.504		3	II		3548.470		2	II		3520.293	600 r	3000	II	6
3577.008	30	300	II	7	3548.18	50	7	I		3519.82	2		I	
3576.288		8	II		3548.096		7	II		3519.690		2	II	
3576.188		1	II		3547.756	5	1	I		3519.417	5	50	II	7
3575.905	1	20	II		3546.065		1	II		3519.10		1	II	
3575.704		5	II		3545.725	1	90 h	II		3518.89		1	II	
3575.573	3	60	II	5	3544.162	10	1	I		3518.795		3	II	
3575.125	20	2	I		3543.890		1	II		3518.674		1	II	
3574.58		30 h	II		3543.324	1	10	II		3518.457	300	20	I	1
3573.750	1	10	II	7	3543.159	30	200	II	4	3518.353	1	10	II	
3573.67		1	II		3542.385	7	100	II	6	3518.156	20	300	II	7
3573.458	3	3	I, II		3542.272	1	6	II		3517.001	500	60	I	3
3573.41		4	II		3541.924	8	1	I		3516.60		1	II	
3573.247	20	2	I		3541.375	7	80	II	5	3516.180		2	II	
3572.498	200	800	II	4	3540.926		3	II		3515.865	30	300	II	4
3572.448	50		I		3540.61		1	II		3515.610	10	50	II	5
3572.212	2	15	II		3540.21		2	II		3515.258	20	2	I	
3570.987	1	8	II		3540.09		1	II		3515.138	1	15	II	
3570.566	200	1000	II	5	3540.02		1	II		3513.640		4	II	
3569.925	2	20	II		3539.932		3	II		3513.573	400	30	I	3
3569.500	2		I		3539.362	20	200	II	4	3513.412		2	II	
3569.308		2	II		3539.33	200		I		3512.708	2	20	II	
3569.094	1	10	II		3538.569		2	II		3512.441		6	II	
3568.430	5	50	II	4	3537.964		1	II		3511.283		8	II	
3567.130	50	500	II	6	3537.127		6	II		3510.942		3	II	
3566.905	2	1	I		3536.815	3 h		I		3510.764	600	50	I	1
3566.519		2	II		3536.068	1	8	II		3510.500	1	15	II	
3565.891		4	II		3534.752	4	20	II		3509.86	1	10	II	
3565.823		1	II		3534.13		2	II		3509.776		3	II	
3565.477		6	II		3534.05	50	100	II	5	3508.95		1	II	
3565.404		3	II		3533.80		3	II		3507.830	200	2000	II	4
3564.955		1	II		3533.107	20	60	II	6	3506.125	8	200	II	5
3563.941	200	800	II	5	3531.725	20	1	I		3505.282	50	150	II	4
3563.712	2	20	II		3531.24	5	100	II	4	3504.936	3	15	II	
3562.706	7	80	II	6	3530.58		1	II		3504.737	3		I	
3561.738	1	10	II		3530.16		3	II		3504.542	1	15	II	
3561.444	2	6	II		3530.05		1	II		3503.988	20	7	I	
3561.309		2	II		3529.715	2	20	II		3503.690	4	40	II	4
3560.704	500 r	2000	II	6	3529.458		2	II		3503.277		2	II	
3560.327	2000 R	3000	II	7	3529.085	8	100	II	6	3503.190		3	II	
3559.570	10		I		3528.771		2	II		3503.011		1	II	
3559.139		4	II		3528.075	2		I		3502.572		4 h	II	
3559.032	1000	50	T	7	3527.501	1	15	II	7	3502.180	10	100	II	4
3557.825		2	II		3527.332	2	20	II	7	3500.863		5	II	
3557.466		1	II		3526.477		1	II		3500.813	10	5	I	
3557.100	2	20	II	7	3525.722	5	50	II	6	3500.131	10	30	II	
3556.940		4	II		3525.456		3	II		3499.885		3	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
3499.85		1	II		3468.00		3 h	II		3442.868	3	40	II	6
3499.791		2	II		3467.26	10		I		3442.058	1	10	II	
3499.636	1	9	II		3467.066	10	200	II	7	3441.354		7	II	
3499.419	5	10	II		3466.346		10	II		3441.30		1	II	
3498.392	2	40	II		3465.898	3	40	II	6	3441.07	3		I	
3497.86		2	II		3465.792		3	II		3440.894		8 h		
3496.858	5	20	II		3464.905		1	II		3440.016		5	II	
3495.90		50 h	II		3464.87	30000A	2000	I	7	3439.648	i	20	II	
3495.780		3	II		3464.190	100	20	I		3438.848	400 r	2000	II	6
3495.623	10	1	r		3463.511		150	III		3438.709	200	1500	II	6
3498.154	1	15	II		3463.325	2	30	II		3438.516		10	II	
3492.807	5	80	II		3463.179	2	20	II		3437.754		3	II	
3491.624	6	100	II		3462.79		1 h	II		3437.222		2	II	
3491.133	2		I		3462.338	20	15	I		3437.17	5	1	I	
3491.063		3	II		3461.719	30	300	II	4	3437.114		2	II	
3490.890		2 h	II		3461.327		5	II		3436.482	100	700	II	5
3490.58		1	II		3461.004	100	9	I		3435.74		4 b	II	
3490.213	1	20	II		3460.269	3000R	60	I	7	3435.516		2	II	
3489.746	60	15	I		3460.137		4	II		3435.429		3	II	
3489.399	8	1	I		3460.092		10	II		3434.610	200	600	II	5
3488.855	200	1	I		3459.902		2	II		3434.244	1	10	II	
3488.786	200	700	II	5	3459.828		4	II		3433.650		1	II	
3488.43		10 h	II		3459.663	100	10	I	7	3433.167	100	10	I	
3488.34	6	50	II		3459.183	10	40	II	4	3433.160		10	II	
3487.971	20	5	I		3459.095	60	3	I		3432.942		80	III	
3487.603	2		I		3458.792		2	II		3432.782	1	3	II	
3487.402		3	II		3458.391	1000	20	I	7	3432.261	1	30	II	
3487.233	6	100	II		3458.286	200	1500	II	5	3432.143	150	15	I	
3487.041		2	II		3457.333		2	II		3431.780		4 h	II	
3486.137	1	8	II		3457.10		2	II		3431.63		1	II	
3485.757	200	1500	II	7	3457.04		1	II		3431.512		2	II	
3484.656		1	II		3456.953		1	II		3431.377	5	9	II	
3484.38		2	II		3456.774		6	II		3431.140	700	20	I	7
3484.176	7		I		3456.525	10		I		3431.107	3000R	80	I	7
3484.143	1	15	II		3456.231	5	20	II		3430.872		3	II	
3484.09		2	II		3456.181		40	III		3430.65		1	II	
3484.06		2	II		3455.863		5	II		3430.632		2	II	
3483.782	1	10	II		3454.92		3	II		3429.96		1	II	
3482.942	1	10	II		3454.75	10		I		3429.80		1	II	
3482.564	5	30 h	II		3454.215	50	300	II		3428.782	700	30	I	7
3482.390		1	II		3454.080	2000 r	10000	II	4	3428.463	200	2000	II	6
3481.706		2	II		3453.524		5	II		3427.808	1	20	II	
3481.68	30		I		3453.207		2	II		3427.508		3	II	
3481.302	1	20	II		3452.398	300	30	I	3	3426.878	150	30	I	
3479.912		2	II		3452.264		7	II		3426.558		2	II	
3478.885	3000 r	10000	II	5	3451.82	2		I		3426.43		1	II	
3477.022	20	30	II		3451.33	1	20	II		3426.044	3000R	100	I	7
3476.303	10000A	8000	II	4	3451.305		3	II		3425.71		1	II	
3474.62	60	400	II	4	3450.929		2	II		3424.750		5	II	
3474.512		3	II		3450.269		5	II		3424.610	1		I	
3473.996		5	II		3449.362		1	II		3424.554	3	15	II	
3473.75		3	II		3449.15		7 h	II		3424.295	1		I	
3473.01		2	II		3448.906		1	II		3424.182		1	II	
3472.58		1	II		3447.993	4	40	II	7	3422.454		6	II	
3472.324	5	20	II		3447.668	1	20	II	7	3421.909		1	II	
3471.691		2	II		3446.887	100	600	II	6	3420.345	150	20	I	
3471.46		1	II		3445.950	7	100	II	5	3419.807		3	I	
3470.79	8	80	II	5	3445.107		3	II		3419.742	2	20	II	7
3470.106	10	3	I		3444.544		2	II		3419.606	20	100	II	4
3469.975		20	III		3443.895		2 h	II		3418.571		1	II	
3469.925	5	70	II	4	3443.587	30	20	I, II	7	3418.390	400	50	I	7
3469.253	3	5	II		3443.391		6 h	II		3417.565	3	30	II	5
3468.395	1	20	II		3442.586	10	5	II		3417.345	1	10	II	



TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3417.044	250	20	I		3389.439		4	II		3363.645	10	20	II	
3416.894	40	200	II	4	3388.523		7	II		3362.770	1		I	
3416.314		1	II		3387.760		3	II		3362.705	4	6	II	
3415.974	10	100	II	5	3387.505	200 r	50	I	I	3362.438	10	70	II	
3415.853		2	II		3387.370	20	2	I		3362.145	1		I	
3415.610		6	II		3387.293	2	20	II		3361.927	4		I	
3415.062	10	80	II	7	3387.120		2	II		3361.573	15	100	II	4
3414.836	20	200	II	6	3387.073		3	II		3361.467	1	8	II	
3413.357	5	15	II	5	3386.560		1	II		3361.329	3	30	II	
3412.507		5			3385.883	20	40	II		3359.49		1	II	
3412.453	80	40	I	7	3385.559	10	100	II	6	3359.193		3 h	II	
3411.750		6	II		3385.329	2		I		3358.612		2	II	
3411.240	10	8	I		3384.682	200	15	I		3358.254		50	III	
3410.880		4	II		3384.560		1	II		3357.802	5	40	II	
3410.699	1	6	II		3384.352		4	II		3356.966	20	200	II	5
3410.566	50	60	II	7	3384.007		2000	III	7	3356.683		1	II	
3410.487	1	10	II		3383.862	3	20	II	6	3356.305	6	40	II	
3409.875	6	70	II		3382.537	20	20	I,II		3355.870	20	200	II	6
3409.568	1	10	II		3381.255		1	II		3355.618	1		I	
3409.022		3	II		3381.060	2	15	II		3354.020		3	II	
3408.95	2		I		3380.820	1	20	II	4	3353.966	2	30	II	
3408.516	10	100	II	4	3380.644		1	II		3353.733	20	150	II	4
3408.20		3	II		3380.340		1	II		3353.607	1		I	
3408.058		7	II		3379.986	40	100	II	5	3353.563	1	6	II	
3407.922	2		II		3379.788	100	700	II	4	3353.200	3	40	II	4
3406.536	1	6	II		3379.517	6	70	II	5	3352.880	60	4	I	
3406.200	200	5	I		3379.386	2	2	I,II		3352.491	10	30	II	
3405.79		1	II		3378.698	50	3	I		3351.382	6		I	
3405.249	5	30	II		3378.404	10	100	II	6	3351.265	20	20	I,II	
3405.093		2	II		3378.286	60	4	I		3351.067	6	60	II	5
3405.03		1	II		3377.792	3	40	II		3350.967	5	40	II	5
3404.103	150	800	II	5	3377.456		3	II		3350.357	1		I	
3402.640		5	II		3376.780		2	II		3350.209	3		I	
3402.273	200	300	II	6	3376.623	3	80	II		3349.942	20	150	II	7
3401.010	200	1000	II	5	3375.483	2000 r	5000	II	6	3349.713	1		I	
3400.603		4 d	II		3375.079	30	70	II		3349.074	10	60	II	4
3400.445		3	II		3374.184		1	II		3347.537	150	1000	II	7
3399.548		3	II		3374.07		1	II		3347.016	2		I	
3398.649	2	10	II		3373.873	2	20	II		3346.504	30	30	I,II	
3397.661		100	III		3373.756		1	II		3346.192		7	II	
3397.446	2	20	II		3373.033	1	10	II		3345.958	2		I	
3397.125	2	20	II		3372.576	500	40	I		3345.921		7	II	
3397.037	50	2	I		3372.00		1	II		3345.575	5		I	
3396.328	40	400	II	5	3371.325	100	10	I		3345.187		9	II	
3395.14		5 h	II		3371.090	2		I		3345.012	20		I	
3394.519	3		II		3369.886	10	80	II	6	3344.715		3	II	
3394.437	60	300	II	5	3369.544	70	200	II	5	3344.507	1		I	
3394.152		1	II		3369.344	20	60	II	5	3344.212	30	3	I	
3393.972	30	3	I		3367.738		6	II		3343.78		1	II	
3393.815		1	II		3367.324	1		I		3343.705		2	II	
3393.636		2	II		3367.077		4	II		3343.566		2	II	
3393.252		1	II		3366.964		3	II		3343.071	80	400	II	6
3392.555		150	III		3366.937	3		I		3342.98	20 h	100 h	II	
3392.390	7	100	II	5	3366.923	10		I		3342.910		1	II	
3392.356	2	20	II		3365.969	80	600	II	6	3341.097	5	40	II	5
3392.276		4	II		3365.658		2	II		3340.791		1	II	
3391.104	100	900	II	4	3365.444		1	II		3339.644	2		I	
3390.817	3	40	II		3365.181	5		I		3339.476		3	II	
3390.63		1	II		3365.059		4	II		3339.305		3	II	
3390.421	1 h	30 h	II		3364.471		4	II		3339.274		1	II	
3390.246	1 h	40 h	II		3364.302		20	III		3339.075	10 h		I	
3389.985		2	II		3364.125		2	II		3339.022		1	II	
3389.904	8 h		I		3363.886		1	II		3338.749	1	8	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3337.581		1	II		3313.763	5	40	II	7	3285.35	1	II		
3337.420		20	II		3313.039		3	II		3285.168	2	II		
3337.171	30 r	100	II	7	3312.450	1	20	II		3283.494	4	40	II	4
3337.005		5 h	II		3311.742	2	10	II		3282.33	3		I	
3336.88		1	II		3311.690	3	8	II		3282.03		5	II	
3336.718		4	II		3311.180		2	II		3281.715	1	7	II	
3336.68	20	1	I		3311.050	4	30	II		3280.850		4	II	
3335.826	1	10	II		3310.937	10	80	II	7	3280.335	1	10	II	
3335.435		2	II		3310.815		1	II		3279.69		4	II	
3335.327		3	II		3310.20		1	II		3279.32		4	II	
3334.321	1	3	II		3309.512	10	70	II		3278.99		1	II	
3333.800		4	II		3309.470	2	20	II		3278.614	50	1	I	
3333.057	200	1000	II	4	3309.372	70	300	II	5	3278.56	5		I	
3332.774		7	II		3309.185	5	50	II		3278.400	2	20	II	4
3332.150	9		I		3308.461		2	II		3278.057	7	70	II	6
3331.95	1		I		3308.210		1	II		3277.73		4	II	
3331.220	5	50	I	4	3306.783	100	400	II	7	3277.607	4	15	II	4
3330.238		1	II		3305.733	500 r	2000	II	6	3277.575		1	II	
3329.93	4		I		3305.252	20	20	I,II		3277.07		1	II	
3329.50	3	5	II		3304.770	70	400	II	6	3276.218	15		I	
3329.382	50	100	II	6	3304.558	80	400	II	5	3275.801	50	200	II	6
3329.087		4	II		3304.346		6	II		3275.19		7	II	
3329.017	3	10	II		3303.926		1	II		3275.14		1	II	
3328.584		8	II		3303.864		2	II		3275.01	1	8	II	
3328.51	2		I		3303.449		1	II		3274.96		2	II	
3328.39		1	II		3303.203		2	II		3274.770	6		I	
3327.756	8	80	II	6	3302.978	3		I		3273.940	7	70	II	
3327.485	1	15	II		3302.368	7		I		3273.65		1	II	
3327.195	3	3	I,II		3302.202		1	II		3272.98		2	II	
3326.949	2	20	II	5	3301.780	1	10	II		3272.644	30		I	
3326.745		4	II		3301.711	10	20	II	6	3271.528	20	150	II	
3326.366	40	200	II	5	3301.491	1		I		3271.247	2	20	II	
3325.512	1	2000	II	3	3301.328		1	II		3271.190	10	40	II	
3325.104	9	50	II	4	3299.828	200	10	I	7	3271.125	3	30	II	
3324.80		2	II		3299.647	2		I		3270.57		2	II	
3324.470	10	70	II	4	3299.447		1	II		3269.265	50	200	II	
3324.172	40	300	II	5	3299.400	1	6	II		3268.94		2	II	
3324.043	2	12	II		3298.896		8	II		3268.84		1	II	
3323.46		3 h	II		3298.826	1	10	II		3268.811	2		I	
3322.963	20	250	II	5	3298.102		2	II		3267.890	150	2	I	
3322.87	1	2	II		3297.851	10	100	II	6	3267.313	10		I	
3322.58		1	II		3297.486	8		I		3266.915		6	II	
3320.802		1	II		3296.501		4	II		3266.39		4 d	II	
3320.642		2	II		3295.825		4	II		3266.163		4	II	
3320.314	10	200	II	5	3294.58		2	II		3265.930	3	30	II	
3320.032	5	30	II		3294.341	7	100	II	6	3265.247	2		I	
3319.737		2	II		3293.836		2	II		3265.068	7	60	II	
3319.674	5		I		3293.685	7		I		3264.889	8	80	II	
3319.412	700 r	50	I	7	3293.66		3	II		3264.114		4	II	
3319.180	80	500	II	5	3293.25		1	I		3263.938	1	10	II	
3318.973	50	100	II	5	3293.19	10		I		3263.79		1	II	
3318.590		1	II		3292.92		1	II		3262.296	6	60	II	
3318.283	3	40	II	5	3292.26	20		I		3261.759	5	50	II	
3317.939	2	30	II		3292.069	5	20	II		3261.686	20	200	II	6
3317.094		3	II		3291.967		10	II		3261.506	500	1500	II	5
3316.834	10	200	II	4	3291.946	20		I		3261.02		1	II	
3316.496	300	30	I	1	3291.028		4	II		3260.82		5	II	
3315.390	20	200	II	5	3290.554		8	II		3259.99	1	8	II	
3315.101	1 h	15 h	II		3290.14		4	II		3259.100	100	500	II	6
3314.720	10	20	II		3289.370	60000 A	50000	II	4	3258.663	1	10	II	
3314.533	20	5	I		3287.61		1	II		3258.453		8	II	
3314.52		10	II		3286.960	10	70	II	5	3258.86		1	II	
3314.27	1		I		3285.78		1	II		3256.030	5	50	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3255.24		1	II		3223.854	4	20	II		3188.26	1	II		
3254.62		2	II		3223.105	4	40	II		3187.51	2	II		
3254.197	100	300	II		3222.696	150	3	I		3187.01	3	II		
3253.911	10	100	II		3222.55		1	II		3186.580	10	100	II	
3253.545	20	1	I		3222.11		5	II		3185.64	1	II	4	
3253.340	20	120	II		3221.486	10	70	II	5	3185.09	1	II		
3253.023	3		I		3221.246	15	150	II	4	3184.71	1	II		
3252.106	1	10	II		3220.96		2	II		3183.90	3	I		
3250.505	1	5	II		3220.814		8	II		3183.498	1	5	II	
3249.80		1	II		3219.638		8	II		3183.46	1	5	II	
3249.57		1	II		3219.408	2	9	II		3183.07	2	I		
3249.17		4	II		3219.325	1	10	II		3182.86		4	II	
3248.446	2	10	II		3218.913	2	15	II		3182.52	1	8	II	
3247.932	1	5	II		3218.323	100	600	II	7	3182.165	2	10	II	
3246.85		1	II		3217.96		1	II		3182.09	1	I		
3246.657	1	7	II		3217.66		3	II		3181.64	1	II		
3246.28		1	II		3217.45		1	II		3181.27	1	4	II	
3246.060		10	II		3217.40	5		I		3181.03	1	9	II	
3245.70		5	II		3217.29	1	7	II		3180.919	200	800	II	
3245.05		6	II		3217.176	200	1000	II	5	3180.48		1	II	
3244.46	2		I		3216.66	2		I		3179.94	1	10	II	
3243.46		5	II		3216.273		50	III		3179.344	30	70	II	
3243.00	4	30	II		3215.927	10	100	II		3178.85	1	II		
3242.12	1	10	II		3215.68		2	II		3177.815	1	II		
3242.048	4	50	II		3215.456	10	60	II		3177.78	2	II		
3241.86	30	1	I		3215.38		2	II		3176.26	3	II		
3240.946	20	1	I		3214.330	2	20	II		3176.06		1	II	
3240.57		3	III		3214.14		1	II		3175.759	25	150	II	
3239.580	200	5	I		3213.172		6	II		3174.22		2	II	
3239.39	1	8	II		3212.485		5	II		3173.797	20	150	II	
3239.195	50	200	II	6	3210.84		7	II		3171.176	100	300	II	
3237.888	10		I		3210.112	20	200	II	5	3169.558	10	I		
3237.215		5	II		3208.01		3	II		3169.056	200	1200	II	
3236.488	20	60	II		3207.870	2		I		3168.985	8	10	II	
3236.24	10		I		3207.702	4	30	II	5	3168.405	8	60	II	
3236.160	40	300	II	4	3207.538	2	10	II		3167.72		1	II	
3235.975	3	30	II		3207.40		1	II		3167.044	1	8	II	
3235.858		6	II		3207.380	6		I		3166.727	2	20	II	
3235.635	2		I		3206.148	20	200	II	7	3166.644	10	I		
3235.61		8	II		3205.863	20	50	II		3166.407	10	I		
3235.520	4		I		3205.58		1	II		3165.981	1	5	II	
3234.740	2	10	II		3204.681	20	200	II	4	3165.875		7	II	
3233.487	3	40	II		3203.989	1	10	II		3165.206	60	500	II	
3233.38		1	II		3202.76		2	II		3164.973	6	15	II	
3232.29		4	II		3201.35	5	30	II		3163.985	4	I		
3231.986	50	300	II	6	3201.160	800 r	2000	II	5	3163.796	100	600	II	
3231.90	1	10	II		3200.69		1	II		3162.737	4	I		
3231.81		10	II		3199.785	5	50	II		3162.293	50	5	I	
3231.376	10	50	II		3199.24		1	II		3161.80		2	II	
3231.228		2	II		3198.647	400	1000	II	5	3161.55	2	I		
3229.93	2		I		3196.354	10	50	II	7	3160.894	1	8	II	
3229.614	50	150	II	6	3196.052	2	20	II		3160.12	1	II		
3229.475	2	20	II		3195.585	20	200	II	5	3160.01		3	II	
3228.575		2000	III		3195.349	15		I		3159.79		2	II	
3228.503	5	40	II		3194.765	10	100	II	7	3159.59		1	II	
3227.478	100	2	I		3194.242	8	70	II	6	3159.49		2	II	
3226.725	20	80	II	4	3192.885	1000 r	3000	II	7	3159.34		1	II	
3225.685	100	400	II	6	3192.62	4	30	II		3159.04		2	II	
3225.78	20	200	II	7	3192.45	1	8	II		3158.869	5	10	II	
3224.890		4	II		3192.15		5	II		3158.43	1	7	II	
3224.752		3	II		3191.352		800	III	1	3158.300	40	300	II	
3224.43		4	II		3190.780	8	30	II		3158.145	1	I		
3224.25		1	II		3190.58		5	II		3157.043		7	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3156.365		4	II		3126.012	5	4000	III	7	3092.496	5	3000	III	3
3155.798	30	40	II		3125.885	1	10	II		3092.10	1	8	II	
3155.52		2	II		3125.700	5	20	II		3091.10	1	6	II	
3155.284	5	50	II		3125.448	50	100	II		3090.924	6	15	II	
3155.183	40	200	II	6	3124.25		2	II		3090.747	1	10	II	
3154.194	5	40	II		3123.870		6	II		3089.61	3	20	II	
3153.880	100	700	II	7	3123.510	8	60	II		3089.102	150 r	500	II	4
3153.616	20	100	II		3122.74		1	II		3089.04	10		II	
3153.180	40	300	II	5	3122.48		3	II		3088.823	3	80	II	
3152.880	2		I		3122.185	2	20	II		3088.78	1	9	II	
3152.44	4	40	II		3121.38		2	II		3088.66		3	II	
3151.90		1	II		3119.73		1	II		3087.998	1	15	II	
3151.486	15	100	II		3119.37		2	II		3087.720		6	II	
3151.255	3	8	II		3119.10		1	II		3087.46		2	II	
3150.46	3	30	II		3117.806	1000 r	3000	II	6	3086.971	10	100	II	4
3150.19		6	II		3117.318	2		I		3086.508	8	40	II	
3150.12		2	II		3116.702	60	300	II	5	3085.817	10	70	II	6
3148.998	30	200	II		3116.487	10	70	II		3085.434	9	60	II	
3148.43		2	II		3116.842	10	40	II		3085.21	8		I	
3148.08		1	II		3116.070	15	70	II	6	3084.347	7	70	II	6
3147.450	1		I		3115.340	100	400	II	7	3083.909		3	II	
3146.134	8	60	II		3115.25	1	8	II		3083.44		1	II	
3145.540	150	500	II		3114.906	3	20	II		3082.34		1	II	
3145.063	80	600	II	6	3114.69		1	II		3082.264		6	II	
3142.813	1	7	II		3114.505		4	II		3082.05		1	II	
3142.74		2	II		3112.980	1	10	II		3081.625		8	II	
3141.733	60	400	II	4	3112.91		4	II		3081.18		1	II	
3141.17		3	II		3112.742	5		I		3081.142	2		I	
3140.936	1000 r	2000	II	6	3111.047	1	6	II		3080.552	3	30	II	6
3140.28		2	II		3109.786	5	40	II		3080.49		3	II	
3139.75	1	6	II		3109.52		2	II		3080.17	3	20	II	
3139.27		2	II		3109.10	1	5	II		3079.593		7	II	
3138.577	1	1000	II		3107.902	1000 r	3000	II	4	3079.264	7	1	II	
3138.276		5	II		3107.760	100	500	II	5	3078.450	1	10	II	
3138.07		2	II		3106.97		2	II		3078.31	1	10	II	
3137.622		10	II		3106.94	1	6	II		3077.82		2	II	
3137.51		1	II		3106.740	2	10	II		3077.34		7	II	
3136.760	80	400	II	6	3106.133		3	II		3077.18		8	II	
3136.67	1	10	II		3106.007		4	II		3077.14		6	II	
3136.18		2	II		3105.37		1	II		3076.50		1	II	
3135.989		4	II		3103.81		4	II		3076.013	30	150	II	6
3135.93		1	II		3103.36		1	II		3075.10		2	II	
3135.43		1	II		3102.71		2	II		3074.92		2	II	
3135.316	1	10	II		3102.18		20	III		3074.84		3	II	
3135.12	4	30	II		3102.074	30	150	II	5	3074.63	3		I	
3133.96		1	II		3101.688		5	II		3074.60	2		I	
3133.845		3	II		3101.361	50	250	II	4	3074.50	1	10	II	
3133.778		3	II		3101.004	15	100	II		3073.89		3	II	
3132.628	15	150	II	6	3100.745	5		I		3073.680	20	100	II	
3132.478	2	15	II		3100.25		4	II		3073.19		3	II	
3132.294	1	8	II		3100.03		2	II		3072.486	6	60	II	
3131.397		1	II		3099.114	1	10	II		3072.41		4	II	
3131.38		3	II		3098.850	4	10	II		3071.583	5	50	II	
3130.862	2		I		3098.384		3	II		3071.26		1	II	
3129.145	8	80	II	5	3097.331	1	8	II		3070.98	1		I	
3128.60		1	II		3096.278		4	II		3070.28	2	7	II	
3127.866	20	120	II	6	3096.10		1	II		3069.34		2	II	
3127.64		2	II		3095.415	20	60	II		3068.69	1	10	II	
3127.49		2	II		3095.221	10	60	II	6	3068.284	7	60	II	
3127.31		2 h	II		3094.894	100	200	II		3067.966	2	10	II	
3127.138	4	40	II		3093.870	200 r	1000	II	5	3067.365	10	70	II	6
3126.25	1	5	II		3093.423	3	30	II	6	3066.54		2	II	
3126.192	4	20	II		3093.40	1	10	II		3066.487	2	6	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
3065.74		7	II		3039.276		6	II		3004.097	1	5	II	
3065.52		2	II		3038.81		2	II		3003.60		2	II	
3065.48		1	II		3038.75	2	10	II		3002.608	30	200	II	
3065.040	300 r	1000	II	4	3038.531	5	30	II		3002.47		2	II	
3064.866	30	150	II		3037.992	15	90	II	6	3002.035	5	30	II	5
3064.75		2	II		3036.820	10	60	II		3001.864	2	10	II	
3063.80		4	II		3036.13		1	II		3001.288	4	40	II	4
3063.671	20	100	II		3035.945	1	7	II		3000.987	2	15	II	
3063.350	2	10	II		3034.99	1	5	II		3000.865	2		I	
3063.125	40	200	II	5	3034.642	40	200	II	4	3000.465	100	300	II	4
3062.524		4	II		3034.52		2	II		3000.13		2	II	
3062.06		1	II		3034.32		1	II		2999.642	5	10	II	
3061.646		6	II		3033.860	30	100	II		2999.43		8	III	
3060.440	5		I		3033.664	2	10	II		2998.377	4	30	II	
3060.394		7	II		3033.40		2	II		2998.000	1	800	III	
3059.568		7	II		3033.28		1	II		2996.75		2	II	
3059.362		4	II		3033.14		1	II		2996.373		5	II	
3058.71		2	II		3031.625		100	III		2995.862	20	100	II	5
3058.66		5	II		3031.110	5000 A	3000	II	4	2995.08	6	30	II	
3058.288		4	II		3029.486	2	2000	III	3	2994.94	2	20	II	
3058.20		1	II		3028.38	2	20	II		2994.805	150 r	600	II	6
3057.29		1	II		3027.476	7		I		2994.53		20	II	
3056.01		2	II		3026.669	100	700	II	4	2994.48	1	10	II	
3055.60		1	II		3025.76		2	II		2993.939	10	70	II	6
3055.46		2	II		3025.38		6	II		2992.28		5	II	
3055.350	5	15	II		3024.935	2	15	II		2991.872	40	200	II	5
3055.157	10	60	II	4	3023.614	5	30	II	6	2991.70	5	9	II	
3054.649	1	10	II		3022.58		1	II		2991.33		1	II	
3053.928	2	20	II		3022.454	10	60	II	7	2991.240	1	6	II	
3053.452		8	II		3021.27		1	II		2990.366	30	200	II	5
3053.064	1	10	II		3020.99		4	II		2989.768	2	15	II	
3052.20		2	II		3020.708	20	100	II	5	2989.376	6	10	II	
3052.021	1	7	II		3020.345	2	10	II		2989.20	2	20	II	6
3051.98		2	II		3020.211		5	II		2988.95		5	II	
3051.11		2	II		3019.440	2	15	II		2988.56		1	II	
3050.64		1	II		3019.17		2	II		2988.30		2	II	
3050.50		6	II		3019.058	8	40	II		2987.862	1	10	II	
3049.84		2	II		3017.560	100	800	II	5	2987.25	1	6	II	
3049.14		7	II		3016.95		6	II		2986.64		2	II	
3048.82		2	II		3016.40		1	II		2986.47		1	II	
3048.41		6	II		3014.97		2	II		2985.876	10	70	II	4
3048.15		2	II		3014.526	10	60	II	7	2985.078	50	300	II	5
3047.052	20	100	II	6	3014.427	40	200	II	5	2984.84	7	60	II	
3046.482	30	200	II	4	3014.02		8	II		2984.44		1	II	
3046.27		3	II		3013.08		2	II		2983.990	200 r	1000	II	6
3045.91		2	II		3012.80		3	II		2983.702	15	100	II	
3045.84		1	II		3012.28		1	II		2983.369	4	8	II	
3045.46		4	II		3011.842		4	II		2982.659	10	70	II	4
3045.044	1	7	II		3011.218	7		I		2982.494	20	150	II	4
3044.88	10	60	II	6	3011.00		1	II		2982.055	2	8	II	
3044.004	20	100	II	4	3010.735	2		I		2982.01		5	II	
3043.93		4	II		3010.625	50	300	II	4	2981.519	3	20	II	
3043.07		1	II		3009.392	100	500	II	4	2980.482		5	II	
3042.78		3	II		3009.21	2		I		2979.859	10	60	II	4
3042.650	50	300	II	4	3007.923	5	30	II		2979.658	3	20	II	4
3042.34		2	II		3007.56		3	II		2979.44		1	II	
3041.180	7		I		3006.863	10	70	II	5	2978.906	6	40	II	4
3040.83		2	II		3006.30		3	II		2977.835		50	III	
3040.652		30	III		3006.14	5	40	II		2977.76		1	II	
3040.504	5	30	II		3005.766	800 r	3000	II	4	2977.695		4	II	
3040.444	2	15	II		3005.118	5		I		2977.525	10	60	II	6
3040.235	5	15	II		3004.642	1	15	II		2977.270	1	9	II	
3039.665	40	300	II	4	3004.46	3	10 h	II		2976.58		1	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
2975.567	3	20	II		2938.84	1	4	II		2905.61		3	II	
2975.238		6	II		2938.51	3	20	II		2904.97		3	II	
2973.86	1		II		2938.188	7	50	II	6	2904.79	1	7	II	
2972.94		6	II		2937.186	15	100	II	5	2904.20		1	II	
2972.47	3	30	II	7	2935.52		4	II		2902.924	8	80	II	5
2970.84	20	200	II	6	2935.245	1	7	II		2902.41	6	40	II	6
2970.564	4000A	3000	II	6	2935.108	30	200	II	5	2901.86		1	II	
2969.70	1	7	II		2934.360	60	3	I		2901.60		1	II	
2967.72		4	II		2933.82		6	III		2901.39		2	II	
2966.763	20	100	II	7	2932.90		1	II		2899.705	40	200	II	4
2965.166	8	60	II		2932.21		1	II		2899.236	5	40	II	5
2964.82		4	II		2932.06		2	II		2898.30		600	II	7
2964.755	100 r	500	II	5	2931.27		1	II		2897.98		2	II	
2964.39	15	100	II	6	2929.70		5	II		2897.31		4	II	
2963.96		4	II		2929.48		3	II		2896.902	10	100	II	4
2963.46	40	300	II	6	2929.44		1	II		2895.06		2	II	
2963.255	10	70	II		2928.973		300	III		2894.95	3	30	II	5
2963.17	8	50	II		2928.62	3		I		2893.620	10	100	II	4
2962.522	40	250	II	6	2927.850	10	70	II	5	2891.384	3000A	2000	II	4
2961.801	4	30	II		2927.48	3		I		2891.16	4	40	II	
2961.150	1	6	II		2927.42		1	II		2890.28		B	II	
2960.850	10	60	II	4	2927.116	1	10	II		2888.24	15		I	
2958.425		3	II		2926.65	2	15	II		2888.04	100 r	300	II	6
2957.632	40	150	II		2926.28		1	II		2887.74	2	7	II	
2957.05		3	II		2924.65	2	9	II		2886.263	30	200	II	5
2955.61		2	II		2924.560		4	II		2885.97	10	70	II	4
2955.318	40	200	II	5	2924.235	20	100	II	4	2885.594		7	II	
2955.09	1	4	II		2922.35	2	7	II		2885.02	1	8	II	
2954.45		1	II		2922.235	4		I		2884.51		2	II	
2953.016	5	40	II	4	2921.85		1	II		2883.87	1	10	II	6
2952.55	4		I		2921.64		2	II		2883.686	10	1	I	
2952.475		4	II		2921.119	40	200	II	6	2883.01		6	II	
2952.253	1	10	II		2920.16	1	10	II		2882.155	7	50	II	7
2951.716	1	8	II		2919.346	400 r	1000	II	6	2882.01		1	II	
2951.406	5	40	II		2919.08		4	III		2881.93	7	60	II	5
2951.022	8	50	II		2918.89		2	II		2881.10		6	II	
2950.80	2	8	II		2918.53		1	II		2879.83		1	II	
2950.64		1	II		2916.83	2	10	II		2879.159	10	70	II	5
2950.52	2	20	II		2916.61	7	30	II		2876.45		1	II	
2950.326	20	150	II	4	2916.431	10	70	II	4	2875.86		400	II	7
2949.840		5	II		2915.99		4	II		2874.83		1	II	
2948.65	2		II		2915.275	150 r	300	II	4	2874.11		6	II	
2947.76		3	II		2915.14		4	II		2873.490	15	1	I	
2947.131	4	30	II		2914.84	1	8	II		2873.14		3	II	
2946.95		5	II		2914.48	7	40	II	6	2872.82		1	II	
2946.852	2	20	II		2914.210	100 r	600	II	4	2872.11	2	10	II	
2946.765	10	70	II	5	2913.75		3	II		2871.712	2	10	II	
2946.305	30	200	II	6	2913.12	1	10	II		2870.57		3	II	
2945.907	100 r	600	II	5	2912.865	10	50	II	4	2870.51		3	II	
2945.22		3	II		2912.51		5	II		2870.061	20	100	II	5
2944.865	5	30	II		2912.25		2	II		2869.61		1	II	
2944.336	5		I		2911.61		3	II		2869.546	1	15	II	
2944.19		2	II		2911.523	40	200	II	6	2868.536		5	II	
2943.20		2	II		2910.43		2	II		2867.90		7	II	
2943.15		1	II		2909.88		4	II		2867.58	5	15	II	
2942.823	10	50	II	4	2909.48	30	150	II	5	2867.20	1	7	II	
2942.60		2	II		2909.19	20	100	II	7	2867.065	100 r	500	II	4
2942.038	15	80	II	6	2908.55	1	9	II		2866.179	4	30	II	6
2941.77	1	4	II		2908.33	10	50	II	4	2865.96	1	6	II	
2941.11		1	II		2908.15		4	II		2865.74		1	II	
2940.517	25	150	II	5	2908.09	5	40	II		2865.60	1	7	II	
2940.25		2	II		2906.88	7	60	II	6	2865.328	5	30	II	6
2939.534	20	100	II	5	2906.313	1	1000	III	3	2864.725	4	40	II	4

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
2864.62	1	10	II		2835.95	1	II			2800.006	8	50	II	
2864.19		1	II		2835.48	2	II			2799.376	30	40	II	5
2863.13	5	30	II		2835.13	1	II			2798.211	20	100	II	6
2862.97	2	5	II		2834.972	10	70	II	6	2797.796	10	80	II	5
2862.85	1	8	II		2834.63	4	II			2797.28	2	II		
2861.84	20	200	II	6	2833.68	1	II			2796.764	2	II		
2861.212	40	300	II	5	2832.201	4	20	II	4	2795.60	5	600	III	1
2861.11	5	30	II		2830.989	30 r	200	II	5	2795.292	6	20	II	6
2860.70	3	15	II		2830.88	4	30	II	7	2795.074	8	40	II	4
2860.393	20	100	II	7	2830.539	1	8	II		2794.774	7	40	II	7
2859.94	4	20	II		2828.48	1	10	II		2794.441	10	70	II	5
2859.805	1000R	1000	II	4	2827.921	3	20	II	7	2794.08	2	10	II	
2859.392	30	200	II	6	2827.81	1	5	II		2793.280	10	60	II	4
2858.460	8	40	II	4	2826.735	3	II			2792.54	3	II		
2858.332	15	60	II	6	2826.522	2	II			2790.47	3	III		
2857.75		2	II		2826.013	15	III			2789.665	3	II		
2857.29	4	20	II	5	2824.974	20	100	II	5	2789.431	3	15	II	
2857.13		3	II		2824.86	1	4	II		2788.245		300	III	
2855.85	1	7	II		2824.54	2	9	II		2787.965	7	30	II	5
2854.490	10	50	II	4	2824.20	2	10	II		2787.010	1	7	II	
2854.144	10	60	II	4	2823.95	1	III			2786.025	1	5	II	
2854.04	4	40	II		2823.585	7	50	II	7	2785.903	2	II		
2853.68	3	30	II	4	2823.320	4	II			2785.750	8	30	II	5
2853.409	5	60	II	6	2821.52	3	II			2785.066	2	II		
2852.63	1	II			2821.152	30 r	200	II	4	2784.966	4	II		
2851.92		4	II		2820.12	3	II			2784.656	30	150	II	6
2851.86	10	70	II	5	2819.75	2	II			2783.16	2	II		
2851.126	500R	1000	II	4	2819.49	2	10	II	6	2782.58	3	II		
2850.64	3	II			2819.24	2	II			2782.54	1	5	II	
2850.13	1	II			2818.722	6	1000	III	1	2782.203	1	5	II	
2849.90	3	II			2817.66	2	II			2782.102	1	2	II	
2849.84	1	II			2816.915	600	III	7		2781.493	2	II		
2849.71	1	III			2816.368	2	8	II		2780.820	1	3	II	
2849.336	6	40	II	6	2816.317	4	20	II		2780.125	3	II		
2848.88	1	7	II		2815.20	1	II			2780.032	2	15	II	
2848.445	20	100	II	4	2814.87	2	10	II		2779.412	3	III		
2847.97	3	II			2814.528	20	100	II	6	2776.688	1	5	II	
2847.75	2	II			2814.241	2	10	II		2776.280	60 r	200	II	6
2847.64	2	II			2814.14	2	II			2775.440	2	10	II	6
2847.28	4	II			2813.00	1	II			2774.304	5	20	II	7
2847.175	400 r	1000	II	5	2812.612	2	6	II		2773.91	2	II		
2847.03	1	II			2811.133	3	8	II		2771.86	2	II		
2846.324		5	II		2810.723	5	20	II	4	2771.324	20	100	II	4
2846.183	1	5	II		2810.109	4	15	II		2770.405	2	II		
2845.355		4	II		2809.326	2	9	II		2769.412	2	II		
2844.685	4	20	II		2808.75	2	II			2768.281	2	20	II	
2844.067	4	10	II		2808.514	2	50	III		2766.624	2	7	II	
2843.83	3	15	II		2808.305	4	20	II	5	2766.167	1	3	II	
2843.702	1	7	II		2807.83	2	10	II		2765.495		100	III	
2842.955		300	III	7	2807.744	2	6	II		2765.046	2	8	II	
2842.586	6	30	II	6	2807.32	1	4	II		2764.514	10	50	II	6
2842.51	2	8	II		2807.22		10	III		2762.716	1	3	II	
2842.291	1	7	II		2807.180	2	8	II		2761.70	4	II		
2842.140	3	15	II	7	2806.43	1	II			2761.373	10	70	II	7
2841.308	2	20	II	6	2806.057	1	4	II		2760.780	10	70	II	5
2841.26	1	II			2804.807	1	3	II		2759.532	3	20	II	
2841.02	2	II			2804.260	5	30	II	4	2759.257	3	II		
2839.91	2	II			2803.427	2	1000	III	7	2759.003	7	40	II	4
2839.85	1	II			2803.319	400	III	7		2758.263	1	II		
2839.17	1	II			2801.598	1	5	II		2758.065	1	II		
2838.64	3	15	II		2801.272	1	II			2757.542	3	II		
2837.92	2	II			2800.109	2	10	II		2756.76		200	III	
2837.09	1	II			2800.060	6	30	II		2755.94		200	III	

TABLE I.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Å	Meggers lamp				Thompson lamp	Å				Meggers lamp	Thompson lamp		
2754.943	3	20	II	6	2719.005	3	15	II	7	2681.180		2	II	
2754.105		2	II		2718.349	40 r	200	II	7	2680.993		2	III	
2753.584	5	20	II		2717.76		2	II		2680.404	6	40	II	6
2751.452	20	80	II	4	2717.661	3	10	II		2678.847	1	3	II	
2750.477	600R	500	II	4	2717.617	1	4	II		2677.394	1	500	III	3
2749.907	3	500	III	7	2717.106	4	20	II	7	2676.131	3	6	II	
2749.624	3	20	II		2716.463		2	III		2674.866	3	10	II	4
2748.664	50 r	150	II	5	2716.354	3	5	II		2673.331		30	III	
2748.56	3	10	II		2716.177		3	II		2672.656	200R	200	II	4
2748.036	5	30	II	4	2715.94	3	15	II	7	2672.028		2	II	
2747.641	3	10	II		2715.640	1	4	II		2671.958	1000A	10	I	7
2747.580	20	80	II	5	2715.383	4	7	II		2671.554		2	II	
2746.83		1	II		2715.17		1	II		2670.605		1	II	
2745.712	5	30	II	5	2714.408	4	30	II	6	2669.305		1	II	
2745.115	2	8	II		2714.18		2	II		2669.131	1	3	II	
2744.782	1	3	II		2714.052		1	III		2668.94		2	II	
2744.372	1	1	II		2713.718		2	II		2668.752	8	40	II	
2742.741		2	II		2712.658	15	80	II	4	2668.707	4	20	II	7
2742.651	1	5	II		2712.321	2	400	III	3	2668.587	1	3	II	
2741.779	4	15	II		2711.785	20	30	II	5	2668.092		2	III	
2741.714	8	40	II	5	2711.09		1	II		2667.965		2	II	
2741.150	2	6	II		2710.674	6	30	II	6	2666.994	20	2000	III	7
2740.79	3	9	II		2710.544	20	80	II	5	2666.132	20	2000	III	7
2740.551	3	6	II		2710.046	2	5	II		2665.038	60	100	II	6
2740.397	1	4	II		2709.715	4	20	II	4	2664.894		70	III	
2740.215	2	6	II		2708.842	5	30	II	6	2664.39		2	II	
2739.475	1	2	II		2708.46		2	II		2663.900	2	5	II	
2738.818	2	8	II	7	2708.035		30	III		2661.888		3	II	
2738.81		1	II		2705.106		3	II		2660.861	1	4	II	
2737.61	3	15	II	5	2704.75		2	II		2660.73		2	II	
2736.553	4	20	II		2704.53	3	15	II		2659.983		100	III	
2736.050		2	II		2702.133	1	4	II		2659.635		2	II	
2735.673	2	6	II		2701.733	1	4	II		2659.267	9	20	II	4
2734.928		2	II		2701.130	3	5	II		2657.46		1	II	
2734.413		1	II		2700.797	6	40	II	5	2657.20		2	II	
2734.067	5	30	II	7	2698.617	2	8	II		2656.838	2	15	II	5
2733.724		4	II		2698.447		1	II		2656.125	10	40	II	4
2733.65		2	II		2696.625	4	20	II	7	2653.75	1000R	1000	II	7
2733.112	5	10	II	5	2696.150		2	II		2652.28		2	I	
2732.942	1	4	II		2695.556		2	II		2652.25	2	700	III	2
2732.742	30 r	150	II	4	2695.427	8	60	II	6	2651.74	3	1000	III	2
2732.50		1	II		2694.99		1	III		2651.68	2	2	I	
2732.033		1	II		2694.622	1	4	II		2650.795	2	10	II	
2731.83		1	II		2692.703	2	10	II		2650.728	9	30	II	4
2731.573		3	II		2692.408	3	15	II	6	2649.787	10	40	II	6
2731.517		3	II		2691.996	5	30	II	6	2649.165		3	II	
2730.62		1	II		2691.49		3	II		2648.803	6	30	II	4
2729.50	2	8	II	5	2691.44		2	II		2647.455	8	40	II	5
2729.093	1	5	II		2691.012	2	500	III	3	2647.233	2	10	II	
2728.47		1	II		2690.669	2	2	II		2646.442	6	30	II	5
2728.420	6	20	II	4	2690.298	1	3	II		2645.691		2	II	
2727.66		1	II		2689.85		1	III		2644.306	20	80	II	6
2727.22		1	II		2689.338		2	III		2643.62		100	III	
2724.65	1	3	II		2688.22		1	II		2643.237		3	II	
2724.41		2	II		2687.980	4	30	II	6	2642.815		5	II	
2723.336		3	II		2687.900	1	5	II		2642.558	10	1000	II	6
2722.759		2	II		2687.08		1	II		2641.97	2	10	II	
2722.475	1	5	II		2685.990	2	10	II		2641.886	50	50	II	5
2722.205	8	40	II	7	2685.30		2	III		2641.495		2	II	
2721.895		3	II		2685.022		2	III		2640.482		300	III	
2721.183		3	II		2684.747	10	70	II	6	2639.448	10	40	II	4
2720.522	1	5	II		2683.895		2	II		2638.596	4	5	II	
2719.996		2	II		2683.416	4	30	II	5	2638.055	1	500	III	3



TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type	Wave-length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å	Å	Å	Å	Å	Å	Å	Å	Å	Å	Å	Å	Å	Å	Å
2637.637		2	II		2592.694		20	III		2542.318	4	10	II	
2637.378	2	2	II		2591.026	3	10	II	6	2541.82		1	II	
2636.519	1	6	II	6	2590.711	2	5	II		2541.16	2	6	II	
2636.399		3	II		2590.328		2	III		2540.60		1	II	
2636.275	2	3	II		2588.617		100	III		2539.64		4	II	
2635.37		30	III		2586.30	3	10	II	7	2538.79	2	20	II	
2635.197	1	4	II		2585.67		2	III		2538.67	300A	200	II	6
2634.50		2	III		2584.76		2	III		2538.203	4	30	II	
2634.306	30	40	II	6	2583.748	1	4	II		2537.65	10	70	II	7
2634.183		3	II		2582.489		2	II		2537.240	1	5	II	
2632.69	2	8	II		2582.38		7	III		2537.08		1	II	
2631.73	3	15	II	4	2582.068		3	II		2536.962	2	10	II	6
2630.36		1	III		2581.41	1	4	II		2536.027	4	20	II	5
2628.80	2	7	II		2581.092		3	II		2534.05		2	II	
2628.605	1	4	II		2580.36	3		I		2532.55	2	6	II	
2628.424		2	II		2579.57	4	1000	III	1	2532.19	2	3	II	
2628.07	3	20	II	6	2577.74	3	10	II		2531.00		1	II	
2627.07		300	III		2577.605	5	20	II		2529.98	1	3	II	
2624.949	3	5	II		2576.09		2	II		2529.50	3	9	II	
2624.52		2	II		2574.78	2	10	II		2529.14		20	III	
2623.22	2	9	II	4	2573.147	6	30	II	7	2528.836	1	1	II	
2621.67	4	20	II		2572.15	1	4	II		2528.339	3	25	II	7
2621.11	1	600	III	3	2571.69	1	2	II		2527.954		3	II	
2619.93	3	15	II		2571.36	7	50	II	4	2527.864	4	30	II	5
2619.074	4	20	II	5	2569.61	1	2	II		2527.49		2	II	
2618.948		2	II		2568.60		2	II		2527.165		2	III	
2618.800	40	1	I		2568.17	3	10	II		2526.31	2	5	II	
2617.01	100 r	100	II	6	2567.607	7	2000	III	7	2526.189		3	II	
2615.35	1	5	II		2566.78		100	III		2524.990	2	10	II	
2615.262	6	30	II	4	2565.573	10	40	II		2524.573	4	8	II	
2614.55	1	3	II		2564.439		5	III		2524.30		3	III	
2614.45	2	3	II		2564.32		3	III		2522.498	15	50	II	6
2612.63	2	10	II		2563.92	2	2	II		2522.07		15	III	
2612.041	4	20	II		2561.66		10	III		2521.04	3	15	II	
2611.645	2	2	II		2560.56		100	III		2520.329		8	III	
2610.060	5	30	II	7	2559.972	2	5	II		2519.39		2	II	
2610.531	1	4	II		2559.094		3	III		2518.59		2	II	
2609.14		30	III		2558.40	3	2	II		2518.47		1	II	
2608.498	1	4	II		2557.804	4	5	II		2518.01	3	10	II	6
2607.864	5	30	II	4	2557.708	1	5	II		2516.82	50	300	II	7
2607.22		2	III		2557.259	4	20	II	7	2516.35	6	30	II	6
2605.43	2	3	II		2556.30		3	II		2516.118	1		I	
2604.69		2	II		2555.29	1	300	III	3	2516.031	3	15	II	
2604.58		4	III		2554.641		2	II		2515.600		7	II	7
2604.053	5	30	II	5	2552.88	2	2	II		2515.460	2	3	II	
2602.40		2	II		2552.70	10	60	II	7	2515.165		2	II	
2601.87	20	1	I		2552.147	15	80	II	7	2514.69		1	II	
2600.850	2	9	II		2550.786		1	II		2514.248	7	20	II	7
2600.508	1	2	II		2550.68	3	10	II		2513.64		1	II	
2600.21	3	15	II		2550.39		40	III		2512.87		2	II	
2599.75	1	2	II		2550.060	10	20	II		2512.524	5	20	II	5
2599.144	1	600	III	1	2550.023		3	II		2512.061	50 r	100	II	4
2598.43	2	6	II		2548.756	3	15	II	7	2511.868	4	20	II	
2598.11		2	II		2548.00		3	II		2510.50	2	7	II	
2597.69	1	3	II		2547.498	2	8	II		2510.29	1	2	II	
2597.619	2	2	II		2547.23	2	5	II		2510.18		1	III	
2597.495	1	5	II		2547.20		2	II		2510.03	1	1	II	
2597.23	1	500	III	2	2546.886	1	2	II		2509.86	2	5	II	
2596.735	3	30	II		2546.28	2	5	II		2508.073	10	20	II	
2596.320	6	80	II	6	2545.871	2	4	II		2506.69		1	III	
2596.16	6	80	II	6	2545.545		3	II		2506.52		4	III	
2594.493	3	20	II		2544.72		2	II		2506.25		40	III	
2594.20	3	15	II	6	2542.76	3	10	II		2505.477	6	30	II	6

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type	Wave- length in air	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
Å					Å					Å				
2503.46		1	II		2449.45		2	II		2398.02	40	20	II	
2502.02	30	70	II	4	2447.26	3	10	II		2397.87		3	II	
2501.21	1	3	II		2446.41		1	II		2397.73		3	II	
2500.568	2	6	II		2445.92	1	2	II		2397.34		1	II	
2498.73		2	II		2444.64		2	II		2390.74	20R	70	II	4
2498.36	2	5	II		2443.74		2	II		2390.57	2	8	II	
2496.85		2	II		2442.64	1	3	II		2389.18		3	II	
2495.63	5	20	II		2440.43		20	III		2388.40	2	7	II	
2495.05	4	3	II		2440.01		1	II		2386.75		2	II	
2493.64	3	10	II		2439.72		2	II		2385.94		1	II	
2493.50		2	III		2439.59	3	5	II		2385.01	1	5	II	
2491.69		20	III		2439.31		20	III		2383.44		1	II	
2491.15	3	5	II		2438.27		100	III		2382.98		2	II	
2490.42		200	III	7	2437.24	4	7	II		2382.57	1	10	II	
2489.92		3	II		2436.87	1	2	II		2380.39	2	15	II	
2487.08	1	3	II		2436.06		5	II		2377.22		20	III	
2484.89	5	20	II	6	2434.71	1	9	III		2375.18		3	II	
2484.29		5	III		2434.02		2	II		2374.74		1	II	
2481.42	1	3	II		2433.74		1	II		2374.52	1	5	II	
2481.35		2	II		2433.62	1	3	II		2374.32		3	II	
2481.03	1	2	II		2433.43		20	III		2373.89	2	20	II	7
2479.29		2	II		2433.16	1	2	II		2373.06		7	II	
2479.15	1	5	II		2433.05		1	II		2371.64		1	II	
2477.76		1	II		2432.62	2	3	II		2369.99		30	III	
2476.62		2	II		2432.01		2	II		2369.59		2	II	
2475.92		2	II		2431.69		1	II		2369.42		50	II	
2474.52	2	1	II		2429.18		10	III		2367.46		50	III	
2474.27	1	3	II		2429.01	1	10	II		2366.97		2	II	
2473.95		1	II		2428.74		1	II		2365.68		2	III	
2473.16		2	II		2428.30		1	II		2365.48		200	III	
2471.06	2	3	II		2428.12		6	II		2364.10		2	II	
2470.85		2	II		2427.66		1	II		2363.49		9	II	
2469.89	1	2	II		2427.20		1	II		2362.89	10	60	II	
2469.52		1	II		2426.19		1	II		2362.30		1	II	
2467.24		2	II		2425.68		1	II		2361.08		40	III	
2466.63	5	20	II	6	2424.61	4	6	II		2358.67		2	II	
2465.13		2	II		2423.96		1	II		2358.53		6	III	
2464.59	1	10	II		2422.84	10	20	II		2357.84	1	7	II	
2464.50	1000A	10	I	7	2421.35	10	50	II	4	2355.03		1	II	
2463.79		1	II		2420.03	1	4	II		2350.06		2	II	
2463.35	2	4	II		2419.41		1	II		2349.39		7	II	
2463.04		1	II		2419.20		2	II		2347.41		1	II	
2462.71		1	II		2418.38		2	II		2345.63		3	III	
2461.98		2	II		2417.01		3	II		2344.66	4	20	II	
2461.83		1	II		2415.89		2	II		2344.09	4	7	II	
2461.40	3	10	II		2414.33	2	6	II		2340.78		1	II	
2460.25	10	40	II	7	2413.77		2	II		2340.40	1	6	II	
2460.00	1	1	II		2413.66	1	5	II		2339.61		1	III	
2459.93	1	4	II		2412.33		60	III		2337.97		200	III	
2458.687		10	III		2411.53		9	III		2336.83		1	II	
2458.22		2	II		2410.77		8	III		2335.44	2	10	II	
2457.73		2	II		2410.04		20	III		2335.11		1	II	
2456.74		1	II		2409.44		1	II		2333.28		7	III	
2456.35		1	II		2409.06		5	II		2332.28		1	II	
2456.08		6	II		2407.98		1	II		2331.56		1	II	
2455.97		3	II		2407.76		1	II		2330.39		1	II	
2454.75	1	10	II		2406.79		1	II		2328.06		1	II	
2454.52	3	20	II		2406.09	1	10	II		2327.74		3	II	
2453.51		2	II		2404.62		2	III		2327.38		1	II	
2451.94	2	3	II		2403.95		50	III		2326.92	1	10	II	
2451.15		1	II		2403.41		4	II		2324.44	30	9	I	
2450.26	3	5	II		2402.71		2	II		2323.18		4	II	
2449.71	1	3	II		2399.93		1	II		2323.02		1	II	

TABLE 1.—Emission spectra of ytterbium—Continued

Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type	Wave-length in air Å	Intensity		Spectrum	Zeeman type
	Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp				Meggers lamp	Thompson lamp		
2322.63		1	II		2263.12		3	II		2148.60		5	III	
2321.58		1	II		2262.26		100	III		2144.77		15 e	IV	
2320.81	200A	150	II	4	2257.63		200	III		2142.21		2	II	
2318.65		2	II		2255.48		8	II		2139.98		10 e	IV	
2315.20	3	10	II		2253.97		1	II		2138.35		4 e	IV	
2314.81		8	III		2253.27		2	II		2137.71		4	II	
2314.99	1	200	III	7	2251.93		1	II		2135.27		3	II	
2312.59	1	3	II		2244.28		100	III		2131.40	6	5	II	
2311.18		1	II		2243.18		1	II		2126.74	100	80	II	
2309.54	2	5	II		2240.11		300	III		2125.57		4	II	
2309.27		100	III		2237.51		2	II		2120.36		3	II	
2307.39	1	6	II		2231.56		5	III		2119.18		20	III	
2306.30		2	II		2227.71		5	III		2117.62		6	II	
2305.32	2	300	III	1	2224.89		1	II		2116.67	100	80	II	
2303.28		2	II		2224.46	100	80	II	4	2114.56		3	III	
2303.16		1	II		2222.25		1	II		2113.39		1	III	
2298.67		2	II		2216.20		1	II		2110.20		4	III	
2297.91		4	II		2214.68		3	II		2109.54		50	III	
2296.63		2	II		2213.06		1	II		2106.71		10	III	
2292.83		4	II		2212.60	3		I		2102.73	5	20	II	
2292.19		3	II		2211.91		1	II		2102.10		4	III	
2291.61		1	II		2203.11		2	II		2098.36		30	III	
2289.76	4		I		2202.27		60	III		2096.79		15	III	
2286.96	2	10	II		2201.20		3	II		2095.31		80	III	
2286.14		1	II		2198.14		20	III		2094.77		10	III	
2286.04	1		I		2199.45		6	II		2093.13		6	III	
2285.79		4	II		2185.71	100	80	II	5	2092.26		20	III	
2284.99		30	II		2178.70		4	II		2091.23		20	III	
2283.40	3	9	II		2174.28	1	3	II		2087.98		50	III	
2282.99	1	150	III		2169.79		2	II		2087.37		10	III	
2279.44		1	II		2165.21		3	II		2086.53		4	III	
2276.11		1	II		2163.89		4 e	IV		2078.05		30	III	
2275.07		3	II		2161.60	10	40	II		2073.64		10	III	
2271.31		1	II		2160.20		6	II		2067.52		4	III	
2271.11	40	2	I		2159.89		1	II		2066.49		10	III	
2269.57		1	II		2155.68	3		I		2054.80		20	III	
2268.57		4	II		2155.50		30	II		2029.54		6	III	
2268.31		3	II		2155.20		3	II		2022.03		2	II	
2267.16		3	II		2154.19		20 e	IV		2021.36		2	II	
2265.67		200	III		2152.32		3	II		2018.08		2	II	
2263.89		1	II		2148.94		2	II		1996.17		40	III	

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#### 4. References

- [1] W. F. Meggers and B. F. Scribner, Arc and spark spectra of ytterbium, *J. Res. NBS* **19**, 651-664 (1937), RP1053.
- [2] W. F. Meggers, The second spectrum of ytterbium, *J. Opt. Soc. Am.* **37**, 988 A (1947).
- [3] A. Gatterer and J. Junkes, *Spektren der Seltenen Erden*, pp. 307-314 (Vatican City Press, 1945).
- [4] C. J. Humphreys and E. Paul, Jr., *Infrared Atomic Spectra*, Quarterly Report Foundational Research Projects NOVORD Report 5970, NOLC Report 473, 57-67 (1959).
- [5] B. W. Bryant, The spectra of doubly and triply ionized ytterbium, *Johns Hopkins Spectroscopic Report Number 21*, 82 pp. (1961).
- [6] L. Allen, The Zeeman effect of the arc and spark spectra of ytterbium and thulium, *United Kingdom Atomic Energy Authority Research Group Report, AERE-R4029*, 34 pp (1962).
- [7] W. F. Meggers, Present experimental status of rare-earth spectra, *J. Opt. Soc. Am.* **50**, 405-406 (1960).
- [8] C. H. Corliss, W. R. Bozman, and F. O. Westfall, Electrodeless metal-halide lamps, *J. Opt. Soc. Am.* **43**, 398-400 (1953).
- [9] C. H. Corliss and W. F. Meggers, Improved description of hafnium spectra, *J. Res. NBS* **61**, 269-324 (1958), RP2904.
- [10] W. F. Meggers and F. O. Westfall, Lamps and wavelengths of mercury 198, *J. Res. NBS* **44**, 447-455 (1950), RP2091.
- [11] M. Zelikoff, P. H. Wyckoff, L. M. Aschenbrand, and R. S. Loomis, Electrodeless discharge lamps containing metal vapors, *J. Opt. Soc. Am.* **42**, 818-819 (1952).
- [12] J. J. Thompson, On the discharge of electricity through exhausted tubes without electrodes, *Phil. Mag.* **32**, 321-336, 445-464 (1891).
- [13] V. L. Bloch and E. Bloch, Spectres d'Etincelle d'Ordre Supérieur du Mercure, *J. Phys. Rad.* **4**, 333-348 (1923).
- [14] J. Sugar, Light source for producing self-reversed spectral lines, *J. Res. NBS* **66A** (Phys. and Chem.), No. 4, 321-324 (1962).
- [15] J. Sugar, Analysis of the third spectrum of praseodymium, *J. Opt. Soc. Am.* **53**, 831-839 (1963).
- [16] G. R. Harrison and F. Bitter, Zeeman effects in complex spectra at fields up to 100,000 gauss, *Phys. Rev.* **57**, 15-20 (1940).
- [17] W. F. Meggers and C. H. Corliss, First spectrum of ytterbium, Yb I, *J. Opt. Soc. Am.* **50**, 1136A (1960).
- [18] E. Back and A. Landé, *Zeemaneffekt und Multiplett-Struktur der Spektrallinien*, p. 168 (Julius Springer, Berlin, 1925).

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