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Preliminary Description and Analysis of the First Spectrum of Uranium

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Observations of the spectra emitted by uranium under arc and spark excitation have afforded a separation of the lines of neutral atoms from those emitted by ions. A list of more than 9,000 lines with accurate wavelengths, wave numbers, and estimated intensities, for the region 2900 A to 11000 A, has been compiled as descriptive of the spectrum of the neutral atom. About 2,000 of these lines have been classified as combinations between 18 low and metastable odd energy levels with about 280 high even levels. Well-resolved Zeeman patterns give *g*-values for several low levels that identify them as components of ^5L, ^5K, ^7M, and ^7K terms arising in the electron configurations f^3ds^2 and f^3d^2s. The spectrum of uranium is interpreted as that of a rare-earth element analogous to neodymium, uranium being the third member of a second group of rare earths beginning with thorium. From the fact that uranium is easily ionized in electric arcs and magnetic fields, and also that the short-wave limit of the observed spectrum does not extend below 2900 A, it is concluded that the ionization potential of neutral uranium atoms is approximately 4 volts.

I. Introduction

In the more than 30 years that have elapsed since the appearance, in 1912, of volume 6 of Kayser's "Handbuch der Spectroscopie", only a few additions have been made to our knowledge of the spectra emitted by uranium atoms. At that time Professor Kayser's [1] [1] description of the uranium spectrum was expressed in the words: "Es gehört zu den linienreichsten Spectren der Elemente, gleichzeitig zu den am wenigsten charakteristischen. . . . Der Unterschied zwischen Bogen und Funken ist ausserordentlich gering, wenn überhaupt vorhanden; . . ." In 1916 Meissner [2] published a list of 17 infrared uranium lines, and in 1920 Kiess and Meggers [3] published a list of more than 700 lines in the range

[1] Figures in brackets indicate the literature references at the end of this paper.

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from 5500 A, in the visible spectrum, to beyond 9500 A, in the infrared. But these extensions of the spectrum, and the improvements in wavelengths and intensities reported for uranium lines in the MIT Wavelength Tables [4], did not much alter Kayser's appraisal, as stated above.

In order to set up a system of energy levels for neutral and ionized uranium atoms, it is desirable to have a complete description of the spectrum emitted by each species of atom. Such a description includes not only precise wavelengths and well-estimated intensities for the lines, but also other characteristics, such as reversibility, diffuseness, Zeeman effect, etc. All the published descriptions of uranium spectra agree in reporting a continuous background on which the line spectra are superimposed. The effect of this continuum, in which the fainter and diffuse lines are completely lost, is to attenuate the intensity differences between the measurable lines. Despite this unfavorable circumstance, however, an enormous number of lines, in excess of 5,000, have been cataloged for uranium for both arc and spark excitation. No other significant descriptive data appear to have been published. The pressure shifts measured by W. J. Humphreys [5], and the reversals observed by McLennan, Cohen, and Liggett [6], apparently refer to lines emitted by other than uranium atoms.

Late in 1942 the Spectroscopy Section of the National Bureau of Standards was requested to undertake an investigation of the uranium spectra and to determine, if possible, the system of energy levels responsible for their production. Available for the investigation were several spectrographs, and such auxiliary equipment as interferometers, electromagnet, underwater spark, etc. Highly purified uranium metal was also available for use as electrode material. Accordingly, a program of work was mapped out to observe the spectra as emitted by arcs and condensed spark discharges in air at normal and at reduced pressures, and by discharges in hollow cathodes, in underwater sparks, and in magnetic fields.

II. Experimental Procedure

Five spectrographs in all were employed in making the Bureau of Standards observations. For the region between 2100 A and 2800 A, in the ultraviolet, a large quartz-prism spectrograph by Hilger was used. The dispersion of this instrument, described elsewhere [7], varies from 0.4 to 1.0 A per millimeter in the region for which it was used. A spectrograph in which the dispersive piece was a grating, ruled 30,000 lines per inch by R. W. Wood [8], was used in the first order to record the spectra from 2000 A to 3000 A, in the ultraviolet, and from 4200 A to 8500 A in the visible and infrared, with a dispersion of approximately 2 A per millimeter. In the second order, dispersion of 1 A per millimeter, it was used to record the spectra between 2600 A and 4300 A. A second grating with 15,000 lines per inch, also ruled by Wood, was used in the first order for recording the red and infrared portions of the spectra between 7000 A and 10000 A, the dispersion being 5 A per millimeter. The grating ruled by J. A. Anderson with 7,500 lines per inch was used to photograph the region from 9000 A to beyond 11000 A, in the first order. These three gratings are concave gratings of approximately 21-foot radius of curvature and are mounted in parallel light, according to the method of Wadsworth, as described by Meggers and Burns [9]. A fourth concave grating, ruled by Wood with 15,000 lines per inch, and set up in an Eagle mounting, was used in the fourth order for the region 4100 A to 5000 A, the dispersion being 1.2 A per millimeter.

The electrodes used in the arcs and sparks were rods of uranium metal of highest purity. The arcs were operated on currents of 5 to 7 amperes supplied by a 220-volt circuit. The condensed sparks were obtained from condensers that were charged from the 50,000-volt side of an induction coil whose primary carried a current of 10 amperes from a 110-volt a-c circuit. Each condenser unit was rated at 0.002 microfarad, so that when three or five were connected in parallel the capacitance of the discharge circuit was 0.006 or 0.010 microfarad. No self-inductance was used in this circuit.

The first observations made with arcs and sparks in air revealed the dark background reported by the earlier investigators. This background was found to emanate not only from the white-hot tips of the electrodes but also, and in greater intensity, from the incandescent particles of uranium oxide that are formed in the outer envelopes surrounding the excited atoms. Various devices were tried to minimize, if not eliminate, the background effect. None was entirely successful, but satisfactory results were obtained either with the source shielded so that light from only a narrow zone between the electrodes could pass to the slit of the spectrograph, or with the source in a partially evacuated enclosure. The procedure finally adopted in making the spectrograms was to expose the photographic plates in succession to the shielded, or enclosed, uranium arc, to the uranium spark in air, to a similar spark enclosed in air at reduced pressure, and to the iron arc in air for the reference standards. The different exposures were recorded so that each exposure to a uranium source stood in juxtaposition to an iron exposure.

Inspection of the spectrograms showed that the number of lines recorded on them for any region was at least twice as great as hitherto reported. Yet the fact that arc and spark spectra were adjacent to each other on the plates made it possible to separate them according to the stage of ionization of their emitters on the basis of estimated intensities alone. Nevertheless, it was deemed desirable to carry out experiments on the reversal of the spectrum to single out the lines characteristic of neutral atoms and those most likely to originate in their lowest energy states. For this phase of the investigation the underwater spark was adopted, as described by Meggers and Laporte [10]. Although the continuum from the source, a condensed spark discharge between uranium electrodes submerged in flowing distilled water, was recorded on the spectrograms from the ultraviolet to the near infrared, yet no absorptions attributable to uranium atoms were observed. Instead, a few of the stronger emission lines of singly ionized uranium atoms appeared, superimposed on the continuous background.

The Zeeman-effect observations were made with a large, water-cooled Weiss magnet, equipped with both iron and ferro-cobalt pole pieces. With currents of 160 amperes applied to the coils, fields ranging in strength from 28,000 to 35,000 oersteds were obtained for pole gaps between 8 and 5 millimeters. In the earlier observations the source was a condensed spark discharge between electrodes cut from wire about a millimeter in diameter and accurately centered in the pole gap of the magnet. This source favored the excitation of lines from uranium ions rather than those from neutral atoms and was replaced by an a-c arc in which a current of 1 ampere was carried under an electromotive force of 2,200 volts. Subsequently, this source was replaced by a Back [11] lamp in which an interrupted arc was operated on 1 ampere at 220 volts, the air pressure within the arc enclosure being reduced to one-eighth or one-tenth atmosphere. This source proved to be the best for excitation of lines of the neutral atom and was used in a series of observations covering the range from 3000 A to beyond 9000 A. In order to calibrate the fields, exposures were also made with electrodes of copper, silver, magnesium, and other elements, to secure resolved magnetic patterns of known separations.

Between the pole gap of the magnet and the condensing lens of the spectrograph was placed a large quartz Wollaston prism, which separated the two polarizations in the Zeeman pattern vertically on the spectrograph slit. Owing to the stigmatic properties of a grating mounted in parallel light, it was thus possible to photograph simultaneously the two polarizations. Between them an occulting bar over the slit reserved an unexposed strip on the photographic plates for recording the spectrum without the magnetic field. The no-field exposures served effectively to mark the centers of the magnetic patterns, a desideratum of utmost importance in a complex spectrum where overlapping of the components in the patterns of close lines is of frequent occurrence.

III. Results

The spectrograms from which were derived the results presented below were measured and reduced according to well-known procedures. All the wavelength measurements are referred to iron lines adopted as international secondary standards or for which wavelengths determined by interference measurements are available. The wavelengths adopted for the uranium lines are the means of two or more determinations from measurements on separate spectrograms. The intensities assigned to the lines are estimates on an expanded scale ranging from 0 or 1 for the faintest lines measured to 500 or more for the strongest. Most of the lines are sharp, with no tendency toward diffuseness nor any indication of self-reversal.

In the final tabulation of the results of the measurements a list has been compiled of more than 9,000 wavelengths that are believed to be characteristic of the spectrum emitted by neutral uranium atoms. The list covers the range 2900 A in the ultraviolet to 11000 A in the infrared, the basis of selection for the lines being their relative intensities in the spectra of arc and spark. That this method of selection presented no great difficulty may be seen in figure 1, which shows a portion of the violet region. For some lines, however, the ionic origin is definitely established by the number of *p*-components that they exhibit in well-resolved Zeeman patterns. For U I, which is built up on levels of odd multiplicity, this number is odd, whereas for U II it is even.

The Zeeman effects observed for most of the lines are either triplets or unresolved patterns. However, well-resolved patterns were recorded for a small number of lines. It was these that gave the clue to the analysis of the spectrum by telling uniquely the inner quantum numbers and *g*-values of the levels involved in the production of the lines. But to interpret these *g*-values and inner quantum numbers, it was first necessary to extend existing tables of theoretical Zeeman effects to cover terms of higher *L*-value. In table 1 are given a few lines with their Zeeman patterns, of which some are illustrated in figure 2.

TABLE 1.—*Zeeman effects of some U I lines*

Wave-length	Observed Zeeman effect
8381. 86	(**0.00**, 0.26, 0.53, 0.80, 1.07, 1.30) . . . 1.71, 2.01, **2.29**
8223. 08	(**0.00**, 0.20, 0.40, 0.60, 0.81, 1.04) . . . 0. 00, 0. 20, **0.40**
7101. 61	(**0.00**, .012, 0.23, 0.34) . . . 0.80, 0.93, **1.03**
6820. 76	(**0.00**, 0.23, 0.47, 0.71, 0.97, 1.17) . . . 1.38, 1.63, 1.87, **2. 12**
6395. 42	(**0.00**, 0.15, 0.32, 0.48, 0.63, 0.81, 0.94) . . . 1.55, 1.74, **1.86**
5997. 31	(**0.00**, 0.33, 0.68, 1.04, 1.32, 1.69, 2.06) . . . 2.00, 2.32, 2.66, **3.01**
5971. 50	(**0.00**. 0.15, 0.29, 0.45, 0.58, 0.73) . . . 1.18, 1.34, 1.50, **1.64**

With the key to the structure of the spectrum thus in hand, a search through the tabulated wave numbers of the lines brought to light numerous recurring constant differences, of which some proved to be significant. Although laborious, this method of search proved fruitful in leading to the groups of odd and even energy levels presented in tables 2 and 3. The odd levels have been assigned their designations on the basis of *g*-values derived from the resolved Zeeman-effect observations. Such terms can arise only from electron configurations containing *f*-electrons. There are various possible groupings of the six uranium valence electrons into such configurations, but the ^{7}M term can arise only in the configuration f^3d^2s. Inasmuch as the low ^{5}L and ^{5}K terms are of the same parity as ^{7}M and are unaccompanied by corresponding terms of the septet system, it is necessary to conclude that they owe their origin to the configuration f^3ds^2 rather than to some other configuration.

TABLE 2.—*Low odd levels of U I*

Electron configuration	Term symbol	Term value	*g*-values *LS*	*g*-values Observed
f^3ds^2	$^5L^\circ_6$	0.0	0.714	0.75
f^3ds^2	$^5K^\circ_5$	620.3	.667	.73
	$A^\circ_7={}^5L^\circ_7$?	3800.8		
	A°_3	3868.4		
f^3ds^2	$^5K^\circ_6$	4275.7	.905	.93
	$^5I^\circ_4$	4453.4	.600	.66
f^3d^2s	$^7K^\circ_5$	5762.0	.767	.82
	$^5H^\circ_4$	5991.3	.900	.86
f^3d^2s	$^7M^\circ_6$	6249.0	.571	.62
f^3d^2s	$^7K^\circ_6$	7005.5	.976	.97
	B°_3	7103.9		
	$B^\circ_7={}^5K^\circ_7$?	7326.1		
	$A^\circ_8={}^5L^\circ_8$?	7645.6		
	$C^\circ_7={}^7M^\circ_7$?	8118.6		
	$D^\circ_7={}^7K^\circ_7$?	10347.3		
	$B^\circ_8={}^5K^\circ_8$?	10685.7		
	A°_5	11545.4		
	A°_9	13127.9		

This conclusion is further supported by the interpretation of the spectrum Th II due to singly ionized thorium atoms. This spectrum has been analyzed independently by two groups of investigators [12], who are in agreement in finding that although the lowest energy states belong to the ds^2, d^2s, and d^3 configurations, yet an energetically prominent set of low states is also present due to the configurations fs^2 and fds. In passing from thorium to uranium, we might expect, on the assumption that the binding of *f*-type electrons is preferred, the configuration f^3ds to give the lowest states of the ion, and f^3ds^2 and f^3d^2s the lowest and metastable states of the neutral uranium atom.[2]

[2] In a paper just received here (Physica 11, 419; 1946) Schuurmans in reporting the lowest levels of U II assigns them to the configurations f^3s^2, f^3ds, and f^3d^2. The lowest level of U II belongs to the $^4I^\circ$ term of the f^3s^2 configuration, from which the $^5L^\circ$ term of U I is derived by adding to it a *d* electron to give the configuration f^3ds^2. Schuurman's report also confirms the levels $^5L^\circ_6$, $^5K^\circ_5$, and $^7M^\circ_6$ and their electron configurations as given in table 2 above.

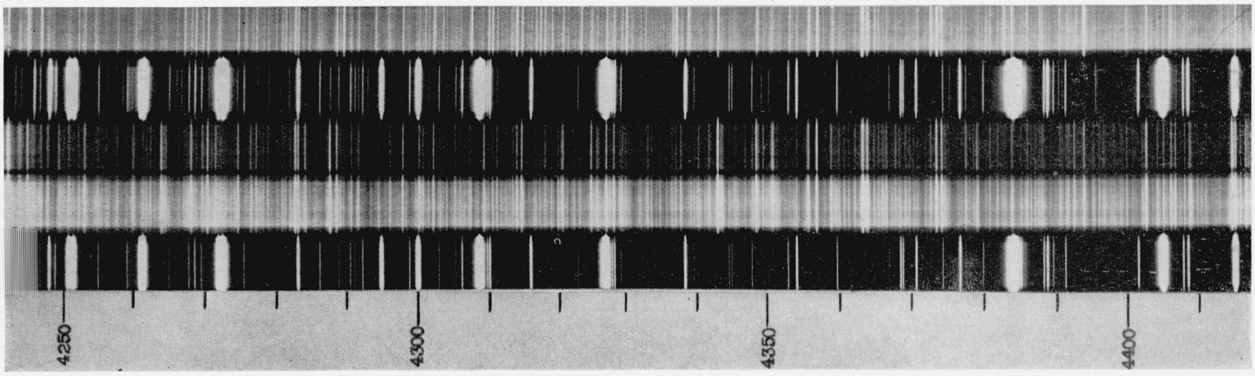

FIGURE 1.—*Top to bottom:* U *arc in vacuum;* Fe *arc in air;* U *spark in vacuum;* U *spark in air;* Fe *arc in air.*

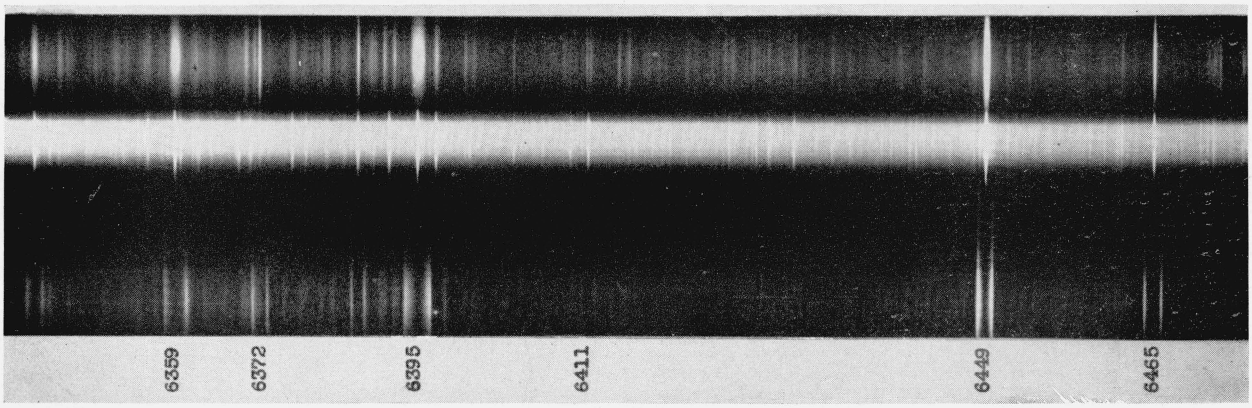

FIGURE 2.—*Zeeman effect of uranium; p-components; no-field; n-components.*

The configuration f^3ds^2 yields 158 terms, comprising 386 energy levels distributed among the quintet, triplet, and singlet systems. The f^3d^2s configuration gives rise to 1,122 terms, with a total of 3,256 levels belonging to the septet, quintet, triplet, and singlet systems. On excitation of the atom, these configurations change into f^3dps, f^3ps^2, and f^3d^2p, depending on which electron is shifted from the low-energy configurations. Each of these excited states yields an enormous number of levels, of even parity, of which more than 275 have now been found. It is obvious why the observed spectrum is so complex.

The even levels of table 3, in combination with the odd levels of table 2, account for most of the stronger lines of the spectrum, as recorded in table 4. For only a small number of the levels have *g*-values been found, but their inner quantum numbers can be uniquely determined from their combinatory properties. The present state of the analysis does not permit assignment of the even levels to their proper electron configurations. In table 3 the symbol for the even levels is made up of the first three figures of the level value, followed by the inner quantum number as a subscript. This follows the scheme adopted by Laporte and Mack [13] for tungsten.

TABLE 3.—*Even levels of* U I

Term symbol	Term value	Term symbol	Term value
179_3	17968.7	210_4	21062.3
185_3	18530.8	215_4	21545.1
196_3	19668.4	220_4	22038.0
203_3	20391.5	223_4	22365.0
219_3	21940.6	224_4	22383.4
227_3	22774.1	225_4	22584.5
234_3	23464.1	231_4	23186.9
251_3	25160.7	234_4	23430.1
268_3	26855.4	235_4	23560.6
294_3	29413.7	238_4	23825.4
295_3	29430.3	247_4	24757.2
296_3	29644.6	249_4	24940.5
302_3	30222.4	252_4	25224.1
340_3	34065.4	256_4	25653.3
161_4	16121.9	265_4	26516.8
174_4	17468.2	271_4	27184.1
178_4	17893.8	283_4	28430.5
181_4	18186.0	284_4	28454.0
185_4	18526.9	285_4	28543.4
191_4	19127.2	292_4	29250.5
192_4	19192.4	297_4	29719.9
195_4	19552.5	303_4	30303.7
197_4	19740.7	304_4	30499.1
201_4	20148.0	309_4	30979.7
205_4	20569.2	312_4	31221.3

TABLE 3.—*Even levels of* U I—Continued

Term symbol	Term value	Term symbol	Term value
313_4	31243.5	173_6	17361.9
316_4	31633.9	182_6	18253.9
321_4	32141.2	187_6	18759.2
116_5	11614.0	197_6	19783.4
122_5	12227.8	202_6	20218.8
134_5	13463.4	204_6	20420.5
157_5	15720.7	206_6	20661.5
169_5	16929.8	209_6	20943.4
179_5	17908.2	212_6	21265.1
184_5	18406.5	215_6	21584.7
189_5	18932.8	217_6	21766.5
194_5	19471.9	218_6	21768.0
196_5	19647.5	220_6	22056.3
201_5	20114.3	224_6	22464.3
203_5	20311.5	225_6	22582.7
206_5	20621.2	227_6	22754.1
208_5	20851.6	228_6	22862.4
210_5	21078.7	235_6	23572.0
213_5	21330.0	237_6	23715.3
216_5	21637.0	240_6	24026.2
223_5	22377.7	244_6	24433.2
233_5	23325.2	246_6	24671.4
234_5	23432.8	252_6	25235.7
235_5	23486.7	253_6	25349.0
239_5	23932.8	254_6	25462.6
244_5	24448.0	257_6	25791.6
245_5	24535.3	258_6	25825.6
249_5	24906.8	259_6	25938.2
250_5	25017.1	261_6	26103.7
251_5	25178.1	262_6	26225.5
252_5	25255.4	265_6	26550.4
253_5	25319.2	266_6	26631.4
258_5	25805.8	267_6	26715.5
263_5	26305.0	268_6	26758.8
265_5	26566.9	269_6	26791.6
269_5	26920.7	270_6	27072.4
273_5	27381.7	274_6	27499.4
276_5	27682.2	275_6	27605.7
277_5	27778.0	276_6	27615.8
278_5	27791.1	277_6	27744.0
281_5	28188.3	278_6	27941.2
284_5	28444.5	279_6	28022.9
285_5	28503.5	280_6	28053.1
286_5	28562.7	281_6	28098.9
287_5	28650.3	284_6	28470.2
292_5	29232.6	288_6	28860.9
301_5	30143.1	289_6	28874.9
309_5	30936.6	290_6	29033.6
310_5	30993.0	291_6	29109.8
311_5	31129.5	292_6	29126.1
313_5	31339.8	294_6	29400.9
314_5	31467.6	295_6	29558.8
315_5	31488.2	298_6	29865.5
317_5	31744.2	299_6	29986.4
319_5	31946.0	300_6	30294.3
323_5	32317.8	301_6	30335.0
146_6	14643.9	302_6	30451.4
156_6	15638.4	303_6	30490.3
165_6	16505.8	304_6	30500.1
170_6	17070.5	305_6	30586.7

TABLE 3.—*Even levels of* U I—Continued

Term symbol	Term value	Term symbol	Term value
306_6	30636.7	318_7	31968.1
307_6	30875.6	319_7	31974.4
308_6	30894.5	320_7	32016.7
311_6	31135.0	321_7	32098.2
315_6	31551.5	326_7	32641.8
324_6	32490.6	327_7	32774.2
325_6	32495.7	335_7	33570.6
334_6	33412.2	340_7	34059.9
336_6	33639.6	194_8	19489.0
156_7	15631.9	205_8	20528.9
169_7	16900.4	223_8	22383.1
197_7	19826.7	227_8	22789.8
198_7	19885.4	231_8	23110.8
204_7	20464.5	239_8	23926.7
207_7	20766.5	244_8	24451.7
223_7	22368.4	245_8	24581.2
226_7	22633.2	253_8	25388.9
229_7	22918.6	257_8	25789.0
230_7	23057.7	259_8	25918.1
231_7	23197.0	261_8	26192.4
235_7	23543.5	263_8	26313.3
237_7	23779.2	264_8	26454.1
238_7	23848.6	265_8	26492.1
240_7	24066.6	266_8	26597.0
241_7	24185.8	269_8	26979.3
243_7	24333.8	270_8	26989.1
245_7	24560.4	271_8	27086.4
256_7	25672.5	272_8	27150.5
261_7	26208.8	274_8	27477.6
262_7	26274.8	278_8	27818.5
263_7	26391.3	289_8	28993.7
266_7	26608.5	290_8	29037.2
273_7	27324.5	294_8	29413.2
278_7	27887.0	296_8	29612.7
279_7	27965.9	300_8	30027.2
280_7	28048.2	307_8	30737.1
281_7	28118.8	309_8	30986.3
282_7	28152.7	312_8	31279.1
283_7	28285.8	314_8	31445.3
284_7	28451.1	319_8	31923.1
285_7	28566.4	324_8	32477.8
287_7	28798.9	341_8	34105.4
288_7	28895.6	238_9	23843.7
291_7	29107.1	245_9	24517.3
297_7	29790.7	256_9	25626.6
298_7	29797.2	279_9	27969.7
299_7	29837.6	293_9	29339.3
300_7	29958.1	295_9	29550.3
302_7	30279.1	312_9	31270.3
306_7	30642.8	321_9	32108.4
310_7	31024.8		
311_7	31166.2		
312_7	31276.0		
313_7	31301.1		
314_7	31358.6		

TABLE 4.—*Classified lines of* U I

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
11384.2	2	8781.71	$C^{\circ}_{7}-169_7$
11167.8	3	8951.83	$C^{\circ}_{7}-170_6$
10647.6	3	9389.23	${}^{7}M^{\circ}_{6}-156_6$
10555.02	20	9471.57	${}^{7}M^{\circ}_{6}-157_5$
10259.42	3	9744.47	$B^{\circ}_{7}-170_6$
10073.54	2	9924.28	${}^{7}K^{\circ}_{6}-169_5$
9932.76	3	10064.94	${}^{7}K^{\circ}_{6}-170_6$
9917.04	2	10080.89	$B^{\circ}_{8}-207_7$
9868.30	3	10130.68	${}^{5}H^{\circ}_{4}-161_4$
9818.86	5	10181.69	$D^{\circ}_{7}-205_8$
9653.20	4	10356.42	${}^{7}K^{\circ}_{6}-173_6$
9645.82	5	10364.35	$B^{\circ}_{3}-174_4$
9642.00	2	10368.45	${}^{5}K^{\circ}_{6}-146_6$
9595.06	4	10419.18	$D^{\circ}_{7}-207_7$
9395.37	5	10640.63	$C^{\circ}_{7}-187_6$
9385.89	5	10651.37	${}^{7}M^{\circ}_{6}-169_7$
9329.43	6	10715.83	$A^{\circ}_{9}-238_9$
9305.18	4	10743.76	${}^{7}K^{\circ}_{5}-165_6$
9257.66	10	10798.91	$A^{\circ}_{9}-239_8$
9148.48	4	10927.78	$B^{\circ}_{7}-182_6$
9139.57	10	10938.44	${}^{5}H^{\circ}_{4}-169_5$
9093.68	25	10993.64	${}^{5}K^{\circ}_{5}-116_5$
8996.08	2	11112.91	${}^{7}M^{\circ}_{6}-173_6$
8951.94	20	11167.70	${}^{7}K^{\circ}_{5}-169_5$
8887.76	3	11248.35	${}^{7}K^{\circ}_{6}-182_6$
8828.49	2	11323.86	$A^{\circ}_{9}-244_8$
8792.34	3	11370.42	$C^{\circ}_{7}-194_8$
8777.69	10	11389.40	$A^{\circ}_{9}-245_9$
8753.68	25	11420.64	$D^{\circ}_{7}-218_6$
8728.75	8	11453.25	$A^{\circ}_{9}\ 245_8$
8710.76	40	11476.91	${}^{5}H^{\circ}_{4}-174_4$
8618.47	8	11599.81	${}^{7}K^{\circ}_{5}-173_6$
8607.96	600	11613.97	${}^{5}L^{\circ}_{6}-116_5$
8574.59	30	11659.17	${}^{7}M^{\circ}_{6}-179_5$
8570.52	120	11664.70	$C^{\circ}_{7}\ 197_6$
8567.71	40	11668.53	${}^{5}I^{\circ}_{4}-161_4$
8557.32	30	11682.70	$B^{\circ}_{8}-223_7$
8540.19	100	11706.13	${}^{7}K^{\circ}_{5}-174_4$
8496.09	100	11766.89	$C^{\circ}_{7}-198_7$
8450.02	400	11831.04	$A^{\circ}_{7}-156_7$
8445.37	400	11837.56	$A^{\circ}_{7}-156_6$
8441.20	80	11843.41	$A^{\circ}_{8}-194_8$
8399.25	15	11902.56	${}^{5}H^{\circ}_{4}-178_4$
8389.16	40	11916.87	${}^{5}H^{\circ}_{4}-179_5$
8381.86	120	11927.25	${}^{7}K^{\circ}_{6}-189_5$
8346.75	80	11977.43	${}^{5}H^{\circ}_{4}-179_3$
8316.39	6	12021.15	$D^{\circ}_{7}-223_7$
8270.05	15	12088.51	$B^{\circ}_{3}-192_4$
8262.05	150	12100.21	$C^{\circ}_{7}-202_6$
8259.44	10	12104.04	$B^{\circ}_{8}-227_8$
8240.51	20	12131.84	${}^{7}K^{\circ}_{5}-178_4$
8230.83	40	12146.11	${}^{7}K^{\circ}_{5}-179_5$
8223.09	200	12157.54	${}^{7}M^{\circ}_{6}-184_5$
8175.84	20	12227.81	${}^{5}L^{\circ}_{6}-122_5$
8174.30	250	12230.11	${}^{5}K^{\circ}_{6}-165_6$
8153.71	20	12260.99	$A^{\circ}_{9}-253_8$
8137.21	30	12285.85	$D^{\circ}_{7}-226_7$
8126.59	15	12301.91	$C^{\circ}_{7}-204_6$
8055.61	30	12410.30	$C^{\circ}_{7}-205_8$
8034.79	40	12442.46	$D^{\circ}_{7}-227_8$

Table 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
8019.38	20	12466.38	$^7K^o_6-194_5$
8012.96	20	12476.36	$^5I^o_4-169_5$
7998.60	20	12498.76	$A^o_9-256_9$
7991.30	40	12510.17	$^7M^o_6-187_6$
7975.08	40	12535.62	$^5H^o_4-185_4$
7970.46	100	12542.88	$C^o_7-206_6$
7959.97	20	12559.41	$B^o_7-198_7$
7918.79	50	12624.73	$^5K^o_6-169_7$
7907.96	20	12642.02	$^7K^o_6-196_5$
7904.28	30	12647.90	$C^o_7-207_7$
7900.39	40	12654.13	$^5K^o_6-169_5$
7895.99	15	12661.18	$A^o_9-257_8$
7881.91	400	12683.80	$^7M^o_6-189_5$
7868.73	100	12705.05	$A^o_7-165_6$
7823.89	20	12777.86	$^7K^o_6-197_6$
7816.29	40	12790.28	$A^o_9-259_8$
7784.13	500	12843.13	$^5K^o_5-134_5$
7761.84	50	12880.01	$^7K^o_6-198_7$
7759.88	30	12883.26	$A^o_8-205_8$
7754.18	40	12892.73	$B^o_7-202_6$
7748.18	40	12902.71	$A^o_5-244_5$
7724.99	8	12941.45	$^5H^o_4-189_5$
7691.89	20	12997.14	$^7K^o_5-187_6$
7652.21	6	13064.53	$A^o_9-261_8$
7639.52	200	13086.22	$^5K^o_6-173_6$
7634.74	50	13094.43	$B^o_7-204_6$
7631.72	250	13099.61	$A^o_7-169_7$
7619.34	300	13120.89	$A^o_8-207_7$
7609.16	100	13138.44	$B^o_7-204_7$
7597.86	12	13157.99	$B^o_8-238_9$
7595.04	25	13162.87	$B^o_8-238_7$
7590.52	25	13170.71	$^7K^o_5-189_5$
7575.86	20	13196.20	$D^o_7-235_7$
7573.03	30	13201.13	$^5H^o_4-192_4$
7572.06	20	13202.82	$B^o_7-205_8$
7566.03	30	13213.34	$^7K^o_6-202_6$
7550.21	30	13241.02	$B^o_8-239_8$
7533.91	250	13269.68	$A^o_7-170_6$
7501.97	10	13326.17	$A^o_9-264_8$
7480.54	8	13364.35	$A^o_9-265_8$
7443.79	20	13430.33	$^7K^o_5-192_4$
7442.92	10	13431.90	$D^o_7-237_7$
7438.22	20	13440.38	$B^o_7-207_7$
7425.50	150	13463.41	$^5L^o_6-134_5$
7396.98	40	13515.33	$^5I^o_4-179_3$
7371.95	12	13561.21	$^5H^o_4-195_4$
7341.58	10	13617.31	$B^o_7-209_6$
7227.86	8	13831.55	$B^o_8-245_9$
7210.28	20	13865.28	$^7M^o_6-201_5$
7205.42	12	13874.63	$B^o_8-245_7$
7172.09	10	13939.11	$B^o_7-212_6$
7164.87	25	13953.15	$^5I^o_4-184_5$
7147.87	20	13986.34	$D^o_7-243_7$
7130.05	40	14021.28	$^7K^o_5-197_6$
7128.89	200	14023.57	$^5K^o_5-146_6$
7109.13	10	14062.55	$^7M^o_6-203_5$
7101.61	30	14077.44	$^5I^o_4-185_3$
7090.10	10	14100.28	$A^o_3-179_3$
7074.78	80	14130.83	$^5K^o_6-184_5$
7033.84	20	14213.08	$D^o_7-245_7$

Table 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
7015.70	12	14249.83	$C^o_7-223_7$
6955.93	6	14372.27	$^7M^o_6-206_5$
6942.43	6	14400.23	$^5H^o_4-203_3$
6922.71	6	14441.24	$B^o_3-215_4$
6917.05	20	14453.06	$A^o_7-182_6$
6915.27	15	14456.77	$^7K^o_5-202_6$
6902.51	20	14483.50	$^5K^o_6-187_6$
6887.64	10	14514.55	$C^o_7-226_7$
6857.21	6	14579.18	$^7K^o_6-215_6$
6846.22	30	14602.58	$^7M^o_6-208_5$
6832.71	20	14631.45	$^7K^o_6-216_5$
6830.84	10	14635.45	$C^o_7-227_6$
6826.91	400	14643.88	$^5L^o_6-146_6$
6820.76	80	14657.09	$^5K^o_6-189_5$
6818.29	50	14662.39	$A^o_3-185_3$
6812.98	15	14673.82	$^5I^o_4-191_4$
6810.02	8	14680.19	$A^o_5-262_6$
6805.21	12	14690.58	$A^o_9-278_8$
6799.42	10	14703.09	$B^o_8-253_8$
6790.30	30	14722.85	$A^o_8-223_7$
6783.50	4	14737.59	$A^o_8-223_8$
6782.85	20	14739.01	$^5I^o_4-192_4$
6780.62	20	14743.85	$C^o_7-228_6$
6772.72	15	14761.05	$^7K^o_6-217_6$
6754.93	25	14799.94	$C^o_7-229_7$
6751.63	15	14807.17	$^7K^o_5-205_4$
6741.36	50	14829.73	$^7M^o_6-210_5$
6738.16	12	14836.75	$B^o_3-219_3$
6727.96	25	14859.26	$^7K^o_5-206_5$
6692.01	15	14939.08	$C^o_7-230_7$
6691.20	20	14940.88	$B^o_8-256_9$
6683.38	40	14958.38	$A^o_7-187_6$
6670.37	8	14987.54	$A^o_8-226_7$
6668.30	10	14992.18	$C^o_7-231_8$
6662.53	12	15005.18	$A^o_5-265_6$
6657.68	15	15016.11	$^7M^o_6-212_6$
6656.81	25	15018.08	$^5K^o_5-156_6$
6656.64	10	15018.46	$^5I^o_4-194_5$
6646.05	8	15042.38	$B^o_7-223_7$
6642.35	8	15050.77	$^7K^o_6-220_6$
6633.41	8	15071.06	$^5H^o_4-210_4$
6630.18	12	15078.40	$C^o_7-231_7$
6629.04	10	15080.98	$^7M^o_6-213_5$
6625.29	20	15089.53	$^7K^o_5-208_5$
6621.07	20	15099.14	$^5I^o_4-195_4$
6620.52	50	15100.39	$^5K^o_5-157_5$
6619.26	6	15103.27	$B^o_8-257_8$
6603.98	30	15138.21	$B^o_7-224_6$
6601.39	12	15144.16	$A^o_8-227_8$
6585.20	15	15181.39	$^7K^o_5-209_6$
6578.78	15	15196.21	$^5K^o_6-194_5$
6570.63	4	15215.05	$^5I^o_4-196_3$
6552.75	25	15256.58	$B^o_7-225_6$
6551.80	10	15258.78	$A^o_3-191_4$
6550.75	8	15261.22	$B^o_3-223_4$
6545.71	15	15272.98	$A^o_8-229_7$
6542.98	30	15279.35	$B^o_3-224_4$
6539.57	6	15287.32	$^5I^o_4-197_4$
6531.15	8	15307.03	$B^o_7-226_7$
6527.03	30	15316.68	$^7K^o_5-210_5$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
6518.94	80	15335.70	$^{7}M_{6}^{o}-215_{6}$
6517.67	6	15338.69	$^{5}H_{4}^{o}-213_{5}$
6503.62	30	15371.81	$^{5}K_{6}^{o}-196_{5}$
6503.45	8	15372.22	$^{7}K_{6}^{o}-223_{5}$
6502.15	4	15375.29	$A_{5}^{o}-269_{5}$
6496.80	12	15387.96	$^{7}M_{6}^{o}-216_{5}$
6486.63	8	15412.08	$A_{8}^{o}-230_{7}$
6481.22	12	15424.94	$C_{7}^{o}-235_{7}$
6479.94	20	15228.00	$B_{7}^{o}-227_{6}$
6469.36	8	15453.23	$C_{7}^{o}-235_{6}$
6467.02	6	15458.82	$^{7}K_{6}^{o}-224_{6}$
6464.97	150	15463.72	$B_{7}^{o}-227_{8}$
6458.94	8	15478.15	$D_{7}^{o}-258_{6}$
6449.16	300	15501.63	$^{5}K_{5}^{o}-161_{4}$
6448.56	12	15503.07	$^{7}K_{5}^{o}-212_{6}$
6442.55	15	15517.53	$^{7}M_{6}^{o}-217_{6}$
6441.95	10	15518.98	$^{7}M_{6}^{o}-218_{6}$
6428.69	15	15550.99	$^{5}K_{6}^{o}-197_{7}$
6427.48	20	15553.91	$^{5}H_{4}^{o}-215_{4}$
6411.58	25	15592.47	$B_{7}^{o}-229_{7}$
6409.84	15	15596.71	$C_{7}^{o}-237_{6}$
6404.44	20	15609.87	$^{5}K_{6}^{o}-198_{7}$
6397.14	60	15627.67	$^{7}K_{6}^{o}-226_{7}$
6395.42	200	15631.88	$^{5}L_{6}^{o}-156_{7}$
6392.74	80	15638.43	$^{5}L_{6}^{o}-156_{6}$
6389.77	80	15645.69	$^{5}H_{4}^{o}-216_{5}$
6383.56	30	15660.93	$^{5}I_{4}^{o}-201_{5}$
6379.76	4	15670.25	$B_{3}^{o}-227_{3}$
6374.12	15	15684.11	$A_{3}^{o}-195_{4}$
6372.43	200	15688.27	$A_{7}^{o}-194_{8}$
6369.84	50	15694.64	$^{5}I_{4}^{o}-201_{4}$
6359.28	100	15720.71	$^{5}L_{6}^{o}-157_{5}$
6354.89	10	15731.57	$B_{7}^{o}-230_{7}$
6348.01	4	15748.62	$^{7}K_{6}^{o}-227_{6}$
6327.38	4	15799.97	$A_{3}^{o}-196_{3}$
6324.44	20	15807.31	$^{7}M_{6}^{o}-220_{6}$
6324.11	3	15808.14	$C_{7}^{o}-239_{8}$
6318.32	5	15822.62	$^{7}K_{5}^{o}-215_{6}$
6309.36	4	15845.10	$D_{7}^{o}-261_{8}$
6301.13	3	15865.79	$A_{9}^{o}-289_{8}$
6298.53	40	15872.34	$A_{3}^{o}-197_{4}$
6293.32	60	15885.47	$^{5}K_{5}^{o}-165_{6}$
6284.57	8	15907.60	$C_{7}^{o}-240_{6}$
6270.55	20	15943.16	$^{5}K_{6}^{o}-202_{6}$
6268.66	50	15947.97	$C_{7}^{o}-240_{7}$
6246.53	20	16004.47	$^{7}K_{5}^{o}-217_{6}$
6238.19	8	16025.87	$A_{7}^{o}-197_{7}$
6234.30	40	16035.87	$^{5}K_{6}^{o}-203_{5}$
6231.22	4	16043.79	$D_{7}^{o}-263_{7}$
6227.96	5	16052.18	$^{7}K_{6}^{o}-230_{7}$
6222.14	25	16067.20	$C_{7}^{o}-241_{7}$
6215.37	100	16084.71	$A_{7}^{o}-198_{7}$
6206.86	5	16106.76	$D_{7}^{o}-264_{8}$
6203.37	20	16115.82	$^{5}I_{4}^{o}-205_{4}$
6201.97	25	16119.46	$^{7}M_{6}^{o}-223_{7}$
6198.39	15	16128.76	$^{7}M_{6}^{o}-223_{5}$
6196.52	20	16133.64	$A_{8}^{o}-237_{7}$
6175.38	200	16188.86	$^{5}K_{6}^{o}-204_{7}$
6174.37	60	16191.52	$^{7}K_{6}^{o}-231_{7}$
6171.85	250	16198.12	$A_{8}^{o}-238_{9}$
6166.80	4	16211.39	$A_{9}^{o}-293_{9}$
6165.35	20	16215.21	$C_{7}^{o}-243_{7}$
6164.50	80	16217.43	$B_{7}^{o}-235_{7}$
6153.66	50	16246.00	$B_{7}^{o}-235_{6}$
6152.25	60	16249.73	$D_{7}^{o}-266_{8}$
6147.93	12	16261.15	$D_{7}^{o}-266_{7}$
6142.32	20	16276.00	$^{7}K_{5}^{o}-220_{4}$
6140.37	8	16281.17	$A_{8}^{o}-239_{8}$
6138.79	4	16285.36	$A_{9}^{o}-294_{8}$
6135.72	8	16293.51	$B_{8}^{o}-269_{8}$
6129.72	100	16309.47	$^{5}K_{5}^{o}-169_{5}$
6127.77	20	16314.64	$C_{7}^{o}-244_{6}$
6120.64	12	16333.65	$^{7}M_{6}^{o}-225_{6}$
6110.67	6	16360.30	$B_{3}^{o}-234_{3}$
6107.74	8	16368.16	$D_{7}^{o}-267_{6}$
6101.77	40	16384.16	$^{7}M_{6}^{o}-226_{7}$
6101.15	20	16385.83	$^{5}K_{6}^{o}-206_{6}$
6099.90	15	16389.20	$B_{7}^{o}-237_{6}$
6098.81	5	16392.12	$^{5}H_{4}^{o}-224_{4}$
6089.19	12	16418.01	$A_{7}^{o}-202_{6}$
6088.12	6	16420.90	$A_{8}^{o}-240_{7}$
6087.54	4	16422.45	$A_{9}^{o}-295_{9}$
6080.37	30	16441.83	$C_{7}^{o}-245_{7}$
6077.29	200	16450.15	$^{5}K_{5}^{o}-170_{6}$
6074.86	10	16456.74	$B_{3}^{o}-235_{4}$
6062.30	80	16490.84	$^{5}K_{6}^{o}-207_{7}$
6057.07	30	16505.07	$^{7}M_{6}^{o}-227_{6}$
6056.80	40	16505.81	$^{5}L_{6}^{o}-165_{6}$
6050.67	20	16522.54	$B_{7}^{o}-238_{7}$
6050.48	15	16523.06	$A_{3}^{o}-203_{3}$
6039.60	40	16552.81	$C_{7}^{o}-246_{6}$
6019.19	40	16608.94	$^{5}I_{4}^{o}-210_{4}$
6017.57	30	16613.41	$^{7}M_{6}^{o}-228_{6}$
6016.73	20	16615.73	$^{7}K_{5}^{o}-223_{5}$
6010.86	20	16631.95	$D_{7}^{o}-269_{8}$
6006.91	10	16642.89	$A_{5}^{o}-281_{5}$
5999.41	40	16663.70	$A_{7}^{o}-204_{7}$
5997.96	30	16667.73	$^{5}K_{6}^{o}-209_{6}$
5997.31	150	16669.54	$^{7}M_{6}^{o}-229_{7}$
5986.10	150	16700.75	$A_{3}^{o}-205_{4}$
5982.87	8	16709.77	$^{7}K_{6}^{o}-237_{6}$
5978.70	10	16721.42	$B_{3}^{o}-238_{4}$
5976.32	200	16728.07	$A_{7}^{o}-205_{8}$
5971.50	250	16741.58	$^{5}K_{5}^{o}-173_{6}$
5955.86	60	16782.74	$^{5}H_{4}^{o}-227_{3}$
5949.66	20	16803.05	$^{5}K_{6}^{o}-210_{5}$
5948.57	40	16806.12	$A_{8}^{o}-244_{8}$
5947.69	15	16808.62	$^{7}M_{6}^{o}-230_{7}$
5942.77	25	16822.52	$^{7}K_{5}^{o}-225_{4}$
5933.82	60	16847.90	$^{5}K_{5}^{o}-174_{4}$
5929.33	25	16860.67	$A_{7}^{o}-206_{6}$
5925.46	20	16871.66	$A_{8}^{o}-245_{9}$
5915.40	600	16900.36	$^{5}L_{6}^{o}-169_{7}$
5905.13	4	16929.75	$^{5}L_{6}^{o}-169_{5}$
5898.78	80	16947.96	$^{7}M_{6}^{o}-231_{7}$
5892.62	40	16965.69	$A_{7}^{o}-207_{7}$
5878.07	3	17007.69	$B_{7}^{o}-243_{7}$
5862.02	12	17054.27	$^{5}K_{6}^{o}-213_{5}$
5856.45	20	17070.47	$^{5}L_{6}^{o}-170_{6}$
5849.17	8	17091.71	$^{5}I_{4}^{o}-215_{4}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air} A	Intensity	ν_{vac} cm^{-1}	Term combination
5836.03	80	17130.19	$D^{\circ}_{7}-274_{8}$
5835.19	8	17132.67	$B^{\circ}_{8}-278_{8}$
5831.82	10	17142.57	$A^{\circ}_{7}-209_{6}$
5819.01	8	17180.30	$^{7}K^{\circ}_{6}-241_{7}$
5817.92	8	17183.50	$^{5}I^{\circ}_{4}-216_{5}$
5814.42	25	17193.87	$A^{\circ}_{3}-210_{4}$
5813.83	20	17195.61	$^{5}H^{\circ}_{4}-231_{4}$
5802.11	60	17230.34	$C^{\circ}_{7}-253_{6}$
5800.78	8	17234.28	$B^{\circ}_{7}-245_{7}$
5787.60	6	17273.55	$^{5}K^{\circ}_{5}-178_{4}$
5784.11	8	17283.96	$B^{\circ}_{8}-279_{9}$
5782.81	10	17287.86	$^{5}K^{\circ}_{5}-179_{5}$
5780.59	100	17294.49	$^{7}M^{\circ}_{6}-235_{7}$
5771.05	30	17323.08	$^{7}M^{\circ}_{6}-235_{6}$
5767.43	15	17333.95	$^{5}H^{\circ}_{4}-233_{5}$
5763.63	15	17345.38	$B^{\circ}_{7}-246_{6}$
5758.35	25	17361.27	$^{5}K^{\circ}_{6}-216_{5}$
5758.14	40	17361.94	$^{5}L^{\circ}_{6}-173_{6}$
5737.27	25	17425.08	$^{7}K^{\circ}_{5}-231_{4}$
5736.38	30	17427.78	$^{7}K^{\circ}_{6}-244_{6}$
5732.74	5	17438.86	$^{5}H^{\circ}_{4}-234_{4}$
5731.87	10	17441.49	$^{5}H^{\circ}_{4}-234_{5}$
5731.49	8	17442.64	$^{7}K^{\circ}_{6}-244_{5}$
5716.87	20	17487.25	$^{5}I^{\circ}_{4}-219_{3}$
5715.69	10	17490.86	$^{5}K^{\circ}_{6}-217_{6}$
5714.20	6	17495.41	$^{5}H^{\circ}_{4}-235_{5}$
5702.85	10	17530.24	$^{7}M^{\circ}_{6}-237_{7}$
5699.87	20	17539.41	$D^{\circ}_{7}-278_{7}$
5695.18	6	17553.85	$C^{\circ}_{7}-256_{7}$
5694.85	4	17554.88	$^{7}K^{\circ}_{6}-245_{7}$
5691.35	15	17565.65	$^{5}K^{\circ}_{5}-181_{4}$
5690.18	3	17569.29	$^{5}H^{\circ}_{4}-235_{4}$
5685.19	12	17584.68	$^{5}I^{\circ}_{4}-220_{4}$
5680.37	8	17599.61	$^{7}M^{\circ}_{6}-238_{7}$
5674.25	8	17618.60	$D^{\circ}_{7}-279_{7}$
5669.42	25	17633.60	$^{5}K^{\circ}_{5}-182_{6}$
5658.26	15	17668.39	$^{7}K^{\circ}_{5}-234_{4}$
5646.49	4	17705.23	$A^{\circ}_{5}-292_{4}$
5645.92	40	17706.99	$C^{\circ}_{7}-258_{6}$
5640.30	40	17724.63	$^{7}K^{\circ}_{5}-235_{5}$
5634.38	80	17743.26	$A^{\circ}_{8}-253_{8}$
5625.43	5	17771.49	$D^{\circ}_{7}-281_{7}$
5622.54	30	17780.63	$^{5}K^{\circ}_{6}-220_{6}$
5621.51	100	17783.89	$A^{\circ}_{7}-215_{6}$
5620.78	200	17786.21	$^{5}K^{\circ}_{5}-184_{5}$
5616.88	10	17798.53	$^{7}K^{\circ}_{5}-235_{4}$
5616.58	80	17799.51	$C^{\circ}_{7}-259_{8}$
5614.74	40	17805.34	$D^{\circ}_{7}-282_{7}$
5613.26	30	17810.04	$^{7}K^{\circ}_{5}-235_{6}$
5610.89	150	17817.56	$^{7}M^{\circ}_{6}-240_{7}$
5591.10	30	17880.61	$B^{\circ}_{8}-285_{7}$
5584.62	40	17901.36	$^{7}K^{\circ}_{6}-249_{5}$
5577.46	8	17924.34	$^{5}I^{\circ}_{4}-223_{5}$
5573.59	60	17936.80	$^{7}M^{\circ}_{6}-241_{7}$
5573.07	60	17938.47	$D^{\circ}_{7}-283_{7}$
5572.09	15	17941.63	$^{5}H^{\circ}_{4}-239_{5}$
5568.48	40	17953.24	$^{7}K^{\circ}_{5}-237_{6}$
5564.17	300	17967.16	$A^{\circ}_{7}-218_{6}$
5559.88	20	17981.03	$A^{\circ}_{8}-256_{9}$
5546.97	6	18022.87	$B^{\circ}_{7}-253_{6}$
5545.75	4	18026.83	$A^{\circ}_{8}-256_{7}$
5534.72	50	18062.76	$B^{\circ}_{7}-253_{8}$
5531.26	100	18074.05	$C^{\circ}_{7}-261_{8}$
5527.98	80	18084.80	$^{7}M^{\circ}_{6}-243_{7}$
5526.33	30	18090.18	$C^{\circ}_{7}-261_{7}$
5522.20	5	18103.70	$D^{\circ}_{7}-284_{7}$
5517.16	10	18120.25	$B^{\circ}_{3}-252_{4}$
5511.49	250	18138.88	$^{5}K^{\circ}_{5}-187_{6}$
5507.77	10	18151.14	$A^{\circ}_{9}-312_{8}$
5502.18	60	18169.57	$A^{\circ}_{3}-220_{4}$
5501.82	25	18170.78	$^{7}K^{\circ}_{5}-239_{5}$
5500.69	120	18174.51	$A^{\circ}_{5}-297_{4}$
5497.75	15	18184.23	$^{7}M^{\circ}_{6}-244_{6}$
5496.43	150	18188.59	$^{5}K^{\circ}_{6}-224_{6}$
5494.59	25	18194.68	$C^{\circ}_{7}-263_{8}$
5487.24	6	18219.04	$D^{\circ}_{7}-285_{7}$
5477.99	6	18249.82	$^{7}K^{\circ}_{6}-252_{5}$
5467.11	8	18286.14	$^{7}M^{\circ}_{6}-245_{5}$
5459.27	15	18312.41	$^{5}K^{\circ}_{5}-189_{5}$
5458.88	8	18313.69	$^{7}K^{\circ}_{6}-253_{5}$
5452.41	40	18335.44	$C^{\circ}_{7}-264_{8}$
5445.87	10	18357.44	$^{5}K^{\circ}_{6}-226_{7}$
5441.09	6	18373.59	$C^{\circ}_{7}-265_{8}$
5431.35	50	18406.54	$^{5}L^{\circ}_{6}-184_{5}$
5426.68	20	18422.38	$^{7}M^{\circ}_{6}-246_{6}$
5418.10	6	18451.53	$D^{\circ}_{7}-287_{7}$
5414.76	30	18462.92	$B^{\circ}_{7}-257_{8}$
5410.24	80	18478.34	$^{5}K^{\circ}_{6}-227_{6}$
5406.87	100	18489.86	$C^{\circ}_{7}-266_{7}$
5404.90	8	18496.60	$A^{\circ}_{3}-223_{4}$
5401.90	30	18506.87	$^{5}K^{\circ}_{5}-191_{4}$
5399.54	10	18514.98	$A^{\circ}_{3}-224_{4}$
5390.28	10	18546.77	$A^{\circ}_{8}-261_{8}$
5389.46	6	18549.60	$B^{\circ}_{3}-256_{4}$
5385.54	100	18563.10	$A^{\circ}_{8}-261_{7}$
5384.22	50	18567.64	$A^{\circ}_{7}-223_{7}$
5382.94	100	18572.07	$^{5}K^{\circ}_{5}-192_{4}$
5379.96	6	18582.34	$A^{\circ}_{7}-223_{8}$
5378.68	6	18586.78	$^{5}K^{\circ}_{6}-228_{6}$
5377.16	12	18592.03	$B^{\circ}_{7}-259_{8}$
5375.76	80	18596.86	$C^{\circ}_{7}-267_{6}$
5375.50	40	18597.76	$A^{\circ}_{5}-301_{5}$
5371.35	15	18612.13	$B^{\circ}_{7}-259_{6}$
5359.43	20	18653.54	$B^{\circ}_{8}-293_{9}$
5356.58	20	18663.46	$A^{\circ}_{7}-224_{6}$
5355.58	30	18666.92	$^{7}K^{\circ}_{6}-256_{7}$
5355.37	15	18667.66	$A^{\circ}_{8}-263_{8}$
5354.36	12	18671.18	$^{7}K^{\circ}_{5}-244_{6}$
5348.99	12	18689.95	$D^{\circ}_{7}-290_{8}$
5341.50	120	18716.14	$A^{\circ}_{3}-225_{4}$
5338.26	10	18727.51	$B^{\circ}_{8}-294_{8}$
5336.54	120	18733.55	$^{5}I^{\circ}_{4}-231_{4}$
5329.26	150	18759.14	$^{5}L^{\circ}_{6}-187_{6}$
5327.32	40	18765.96	$^{5}H^{\circ}_{4}-247_{4}$
5324.03	20	18777.57	$B^{\circ}_{7}-261_{6}$
5322.78	60	18781.98	$^{5}K^{\circ}_{6}-230_{7}$
5319.01	15	18795.28	$A^{\circ}_{9}-312_{8}$
5315.27	150	18808.51	$A^{\circ}_{8}-264_{8}$
5308.54	300	18832.34	$A^{\circ}_{7}-226_{7}$
5304.57	40	18846.44	$A^{\circ}_{8}-265_{8}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
5303.09	20	18851.70	$^{5}K_{5}^{\circ}-194_{5}$
5300.57	120	18860.68	$C_{7}^{\circ}-269_{8}$
5299.44	100	18864.69	$B_{8}^{\circ}-295_{9}$
5297.44	150	18871.81	$^{5}I_{4}^{\circ}-233_{5}$
5286.93	60	18909.30	$^{7}K_{5}^{\circ}-246_{6}$
5283.58	50	18921.32	$^{5}K_{6}^{\circ}-231_{7}$
5281.99	15	18927.00	$B_{8}^{\circ}-296_{8}$
5280.54	50	18932.22	$^{5}K_{5}^{\circ}-195_{4}$
5280.38	300	18932.78	$^{5}L_{6}^{\circ}-189_{5}$
5275.93	80	18948.76	$B_{7}^{\circ}-262_{7}$
5275.19	12	18951.40	$A_{8}^{\circ}-266_{8}$
5274.68	10	18953.24	$A_{7}^{\circ}-227_{6}$
5272.01	100	18962.85	$A_{8}^{\circ}-266_{7}$
5270.62	100	18967.82	$C_{7}^{\circ}-271_{8}$
5267.42	30	18979.37	$^{5}I_{4}^{\circ}-234_{5}$
5267.10	5	18980.50	$A_{9}^{\circ}-321_{9}$
5265.38	50	18986.72	$^{7}M_{6}^{\circ}-252_{6}$
5265.25	60	18987.18	$B_{7}^{\circ}-263_{8}$
5264.76	8	18988.94	$A_{7}^{\circ}-227_{8}$
5259.90	80	19006.48	$^{7}M_{6}^{\circ}-252_{5}$
5258.73	4	19010.73	$^{5}I_{4}^{\circ}-234_{3}$
5254.13	4	19027.37	$^{5}K_{5}^{\circ}-196_{5}$
5244.70	20	19061.56	$A_{7}^{\circ}-228_{6}$
5242.33	12	19070.19	$^{7}M_{6}^{\circ}-253_{5}$
5234.16	120	19099.95	$^{7}M_{6}^{\circ}-253_{6}$
5232.81	30	19104.88	$B_{8}^{\circ}-297_{7}$
5232.18	10	19107.18	$^{5}I_{4}^{\circ}-235_{4}$
5231.02	20	19111.43	$B_{8}^{\circ}-298_{9}$
5229.30	25	19117.69	$A_{7}^{\circ}-229_{7}$
5226.51	15	19127.93	$B_{7}^{\circ}-264_{8}$
5221.90	80	19144.82	$^{7}K_{5}^{\circ}-249_{5}$
5218.56	12	19157.06	$^{5}K_{6}^{\circ}-234_{5}$
5216.92	80	19163.06	$^{5}K_{5}^{\circ}-197_{6}$
5215.18	40	19169.46	$^{5}H_{4}^{\circ}-251_{3}$
5212.74	10	19178.46	$^{7}K_{5}^{\circ}-249_{4}$
5210.48	8	19186.76	$^{5}H_{4}^{\circ}-251_{5}$
5203.20	10	19213.62	$^{7}M_{6}^{\circ}-254_{6}$
5201.47	20	19220.01	$^{7}K_{6}^{\circ}-262_{6}$
5198.00	12	19232.83	$^{5}H_{4}^{\circ}-252_{4}$
5192.01	25	19255.03	$^{7}K_{5}^{\circ}-250_{5}$
5191.51	40	19256.88	$A_{7}^{\circ}-230_{7}$
5189.54	6	19264.20	$^{5}H_{4}^{\circ}-252_{5}$
5189.21	30	19265.40	$D_{7}^{\circ}-296_{8}$
5188.57	25	19267.78	$^{5}K_{6}^{\circ}-235_{7}$
5180.89	50	19296.35	$^{5}K_{6}^{\circ}-235_{6}$
5180.03	12	19299.53	$^{7}K_{6}^{\circ}-263_{5}$
5177.22	8	19310.04	$A_{7}^{\circ}-231_{8}$
5170.90	12	19333.63	$A_{8}^{\circ}-269_{8}$
5168.79	20	19341.50	$B_{8}^{\circ}-300_{8}$
5168.25	10	19343.52	$A_{8}^{\circ}-270_{8}$
5166.74	20	19349.17	$A_{5}^{\circ}-308_{6}$
5164.14	200	19358.93	$C_{7}^{\circ}-274_{8}$
5160.67	15	19371.96	$^{5}I_{4}^{\circ}-238_{4}$
5156.03	25	19389.37	$B_{7}^{\circ}-267_{6}$
5155.50	8	19391.37	$A_{5}^{\circ}-309_{5}$
5154.22	15	19396.20	$A_{7}^{\circ}-231_{7}$
5148.95	15	19416.04	$^{7}K_{5}^{\circ}-251_{5}$
5146.98	40	19423.46	$^{7}M_{6}^{\circ}-256_{7}$
5144.52	60	19432.78	$B_{7}^{\circ}-268_{6}$
5144.11	10	19434.31	$A_{5}^{\circ}-309_{4}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
5142.72	10	19439.56	$^{5}K_{6}^{\circ}-237_{6}$
5142.40	60	19440.78	$A_{8}^{\circ}-271_{8}$
5139.98	35	19449.94	$D_{7}^{\circ}-298_{7}$
5136.74	6	19462.18	$^{7}K_{5}^{\circ}-252_{4}$
5134.19	8	19471.85	$^{5}L_{6}^{\circ}-194_{5}$
5132.20	40	19479.42	$^{5}I_{4}^{\circ}-239_{5}$
5130.16	8	19487.14	$C_{7}^{\circ}-275_{6}$
5129.34	15	19490.28	$D_{7}^{\circ}-299_{7}$
5128.36	15	19493.98	$^{5}K_{5}^{\circ}-201_{5}$
5125.86	12	19503.51	$^{5}K_{6}^{\circ}-237_{7}$
5125.49	25	19504.89	$A_{8}^{\circ}-272_{8}$
5119.51	25	19527.71	$^{5}K_{5}^{\circ}-201_{4}$
5110.69	30	19561.39	$^{7}K_{6}^{\circ}-265_{5}$
5107.68	40	19572.94	$^{5}K_{6}^{\circ}-238_{7}$
5106.74	30	19576.54	$^{7}M_{6}^{\circ}-258_{6}$
5104.03	8	19586.93	$^{7}K_{5}^{\circ}-253_{6}$
5101.74	10	19595.71	$A_{3}^{\circ}-234_{3}$
5101.01	40	19598.51	$^{5}K_{5}^{\circ}-202_{6}$
5097.88	6	19610.54	$D_{7}^{\circ}-300_{7}$
5093.89	20	19625.91	$^{7}K_{6}^{\circ}-266_{6}$
5088.29	120	19647.52	$^{5}L_{6}^{\circ}-196_{5}$
5086.83	15	19653.15	$B_{7}^{\circ}-269_{8}$
5084.52	10	19662.06	$^{5}H_{4}^{\circ}-256_{4}$
5080.99	3	19675.75	$A_{5}^{\circ}-312_{4}$
5076.99	10	19691.23	$^{5}K_{5}^{\circ}-203_{5}$
5076.77	50	19692.10	$A_{3}^{\circ}-235_{4}$
5074.78	50	19699.83	$C_{7}^{\circ}-278_{8}$
5063.77	150	19742.66	$A_{7}^{\circ}-235_{7}$
5061.76	10	19750.49	$^{5}K_{6}^{\circ}-240_{6}$
5061.50	30	19751.48	$B_{3}^{\circ}-268_{3}$
5061.03	25	19753.34	$^{7}K_{6}^{\circ}-268_{6}$
5059.25	10	19760.30	$B_{7}^{\circ}-271_{8}$
5057.18	40	19768.35	$C_{7}^{\circ}-278_{7}$
5056.46	30	19771.18	$A_{7}^{\circ}-235_{6}$
5053.35	60	19783.35	$^{5}L_{6}^{\circ}-197_{6}$
5051.43	25	19790.88	$^{5}K_{6}^{\circ}-240_{7}$
5049.06	30	19800.18	$^{5}K_{5}^{\circ}-204_{6}$
5045.39	5	19814.56	$^{5}H_{4}^{\circ}-258_{5}$
5042.31	15	19826.66	$^{5}L_{6}^{\circ}-197_{7}$
5035.20	4	19854.65	$^{7}M_{6}^{\circ}-261_{6}$
5027.38	400	19885.54	$^{5}L_{6}^{\circ}-198_{7}$
5022.64	10	19904.30	$C_{7}^{\circ}-279_{6}$
5021.18	20	19910.09	$^{5}K_{6}^{\circ}-241_{7}$
5019.89	15	19915.20	$^{7}K_{6}^{\circ}-269_{5}$
5016.25	5	19929.66	$C_{7}^{\circ}-280_{7}$
5012.92	25	19942.90	$A_{5}^{\circ}-315_{5}$
5011.42	120	19948.90	$^{5}K_{5}^{\circ}-205_{4}$
5009.39	15	19956.94	$A_{3}^{\circ}-238_{4}$
5008.68	30	19959.79	$^{7}M_{6}^{\circ}-261_{7}$
5004.01	50	19978.42	$A_{7}^{\circ}-237_{7}$
4999.95	20	19994.66	$^{5}I_{4}^{\circ}-244_{5}$
4998.56	8	20000.20	$C_{7}^{\circ}-281_{7}$
4998.41	8	20000.78	$^{5}K_{5}^{\circ}-206_{5}$
4990.12	30	20034.04	$C_{7}^{\circ}-282_{7}$
4988.32	10	20041.24	$^{5}K_{5}^{\circ}-206_{6}$
4986.69	5	20047.82	$A_{7}^{\circ}-238_{7}$
4985.82	8	20051.32	$B_{8}^{\circ}-307_{8}$
4984.62	15	20056.14	$^{7}M_{6}^{\circ}-263_{5}$
4984.12	15	20058.12	$^{5}K_{6}^{\circ}-243_{7}$
4981.95	25	20066.88	$^{7}K_{6}^{\circ}-270_{6}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air} A	Intensity	ν_{vac} cm^{-1}	Term combination
4978.22	8	20081.91	$^{5}I^{\circ}_{4}-245_{5}$
4972.72	10	20104.12	$D^{\circ}_{7}-302_{6}$
4970.20	20	20114.32	$^{5}L^{\circ}_{6}-201_{5}$
4967.33	120	20125.93	$A^{\circ}_{7}-239_{8}$
4963.31	15	20142.26	$^{7}M^{\circ}_{6}-263_{7}$
4961.10	20	20151.20	$B^{\circ}_{7}-274_{8}$
4959.55	25	20157.53	$^{5}K^{\circ}_{6}-244_{6}$
4955.90	10	20172.34	$^{5}K^{\circ}_{6}-244_{5}$
4955.78	120	20172.83	$A^{\circ}_{8}-278_{8}$
4954.96	50	20176.18	$^{7}K^{\circ}_{5}-259_{6}$
4949.41	5	20198.80	$A^{\circ}_{5}-317_{5}$
4944.52	80	20218.80	$^{5}L^{\circ}_{6}-202_{6}$
4941.47	10	20231.25	$^{5}K^{\circ}_{5}-208_{5}$
4934.56	10	20259.60	$^{5}K^{\circ}_{6}-245_{5}$
4933.06	50	20265.75	$A^{\circ}_{7}-240_{7}$
4928.44	100	20284.74	$^{5}K^{\circ}_{6}-245_{7}$
4921.38	30	20313.84	$^{5}H^{\circ}_{4}-263_{5}$
4919.13	25	20323.13	$^{5}K^{\circ}_{5}-209_{6}$
4918.90	15	20324.07	$A^{\circ}_{8}-279_{9}$
4916.88	40	20332.45	$C^{\circ}_{7}-284_{7}$
4910.35	120	20359.49	$^{7}M^{\circ}_{6}-266_{7}$
4906.29	10	20376.33	$^{7}K^{\circ}_{6}-273_{5}$
4904.21	15	20384.98	$A^{\circ}_{7}-241_{7}$
4901.64	8	20395.68	$^{5}K^{\circ}_{6}-246_{6}$
4896.39	5	20417.55	$B^{\circ}_{7}-277_{6}$
4895.68	15	20420.51	$^{5}L^{\circ}_{6}-204_{6}$
4889.16	8	20447.74	$C^{\circ}_{7}-285_{7}$
4885.15	120	20464.51	$^{5}L^{\circ}_{6}-204_{7}$
4879.76	10	20487.10	$^{5}I^{\circ}_{4}-249_{4}$
4878.50	30	20492.39	$B^{\circ}_{7}-278_{8}$
4878.16	5	20493.84	$^{7}K^{\circ}_{6}-274_{6}$
4874.35	20	20509.83	$^{7}M^{\circ}_{6}-268_{6}$
4868.87	25	20532.95	$A^{\circ}_{7}-243_{7}$
4866.59	6	20542.56	$^{7}M^{\circ}_{6}-269_{6}$
4866.48	4	20543.00	$^{7}K^{\circ}_{5}-263_{5}$
4856.65	50	20584.57	$B^{\circ}_{8}-312_{9}$
4852.96	20	20600.26	$^{7}K^{\circ}_{6}-275_{6}$
4850.59	8	20610.30	$^{7}K^{\circ}_{6}-276_{6}$
4848.00	30	20621.33	$^{5}L^{\circ}_{6}-206_{5}$
4845.67	15	20631.23	$^{5}K^{\circ}_{6}-249_{5}$
4842.48	80	20644.82	$^{5}K^{\circ}_{5}-212_{6}$
4841.04	12	20650.97	$A^{\circ}_{7}-244_{8}$
4835.91	8	20672.88	$B^{\circ}_{8}-314_{7}$
4834.18	12	20680.27	$C^{\circ}_{7}-287_{7}$
4827.86	4	20707.34	$^{5}I^{\circ}_{4}-251_{3}$
4816.84	4	20754.72	$^{7}K^{\circ}_{5}-265_{4}$
4816.47	5	20756.30	$C^{\circ}_{7}-289_{6}$
4815.71	80	20759.57	$B^{\circ}_{8}-314_{8}$
4814.11	12	20766.50	$^{5}L^{\circ}_{6}-207_{7}$
4812.72	10	20772.47	$^{7}K^{\circ}_{6}-277_{5}$
4810.90	100	20780.36	$A^{\circ}_{7}-245_{8}$
4808.03	5	20792.73	$B^{\circ}_{7}-281_{7}$
4805.22	3	20804.88	$^{7}K^{\circ}_{5}-265_{5}$
4800.23	10	20826.54	$B^{\circ}_{7}-282_{7}$
4794.50	10	20851.44	$^{5}L^{\circ}_{6}-208_{5}$
4791.57	6	20864.18	$^{5}H^{\circ}_{4}-268_{3}$
4790.38	5	20869.36	$^{7}K^{\circ}_{5}-266_{6}$
4790.06	80	20870.73	$A^{\circ}_{7}-246_{6}$
4789.03	6	20875.22	$C^{\circ}_{7}-289_{8}$
4787.60	8	20881.49	$^{7}K^{\circ}_{6}-278_{7}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air} A	Intensity	ν_{vac} cm^{-1}	Term combination
4782.81	8	20902.38	$^{5}K^{\circ}_{6}-251_{5}$
4779.09	8	20918.66	$C^{\circ}_{7}-290_{8}$
4777.67	80	20924.86	$^{5}K^{\circ}_{5}-215_{4}$
4773.43	60	20943.45	$^{5}L^{\circ}_{6}-209_{6}$
4768.66	60	20964.39	$^{5}K^{\circ}_{5}-215_{6}$
4761.34	15	20996.65	$^{7}K^{\circ}_{5}-268_{6}$
4756.81	120	21016.64	$^{5}K^{\circ}_{5}-216_{5}$
4750.72	8	21043.56	$^{5}K^{\circ}_{6}-253_{5}$
4744.30	12	21072.04	$A^{\circ}_{3}-249_{4}$
4744.04	12	21073.22	$^{5}K^{\circ}_{6}-253_{6}$
4743.53	50	21075.48	$^{7}M^{\circ}_{6}-273_{7}$
4739.50	4	21093.40	$^{7}K^{\circ}_{6}-281_{6}$
4738.44	30	21098.10	$D^{\circ}_{7}-314_{8}$
4732.43	5	21124.92	$B^{\circ}_{7}-284_{7}$
4730.68	25	21132.70	$^{7}M^{\circ}_{6}-273_{5}$
4727.66	20	21146.21	$^{5}K^{\circ}_{5}-217_{6}$
4727.34	25	21147.63	$^{5}K^{\circ}_{5}-218_{6}$
4715.68	120	21199.93	$^{5}I^{\circ}_{4}-256_{4}$
4706.74	8	21240.18	$B^{\circ}_{7}-285_{7}$
4701.23	50	21265.10	$^{5}L^{\circ}_{6}-212_{6}$
4697.87	8	21280.32	$^{7}K^{\circ}_{6}-283_{7}$
4696.06	12	21288.53	$B^{\circ}_{8}-319_{7}$
4695.23	25	21292.27	$A^{\circ}_{3}-251_{3}$
4694.71	15	21294.64	$C^{\circ}_{7}-294_{8}$
4691.26	10	21310.30	$^{7}K^{\circ}_{5}-270_{6}$
4686.92	30	21330.00	$^{5}L^{\circ}_{6}-213_{5}$
4682.00	40	21352.43	$^{5}I^{\circ}_{4}-258_{5}$
4681.06	6	21356.74	$^{7}M^{\circ}_{6}-275_{6}$
4666.66	8	21422.65	$B^{\circ}_{8}-321_{9}$
4663.75	120	21435.98	$^{5}K^{\circ}_{5}-220_{6}$
4662.83	10	21440.22	$C^{\circ}_{7}-295_{6}$
4661.65	30	21445.64	$^{7}K^{\circ}_{6}-284_{7}$
4651.13	12	21494.14	$C^{\circ}_{7}-296_{8}$
4643.61	50	21528.98	$^{7}M^{\circ}_{6}-277_{5}$
4639.36	6	21548.69	$B^{\circ}_{7}-289_{6}$
4633.51	8	21575.90	$D^{\circ}_{7}-319_{8}$
4631.62	100	21584.67	$^{5}L^{\circ}_{6}-215_{6}$
4630.90	8	21588.03	$A^{\circ}_{7}-253_{8}$
4623.91	5	21620.69	$D^{\circ}_{7}-318_{7}$
4620.44	60	21636.94	$^{5}L^{\circ}_{6}-216_{5}$
4620.23	300	21637.88	$^{7}M^{\circ}_{6}-278_{7}$
4618.75	8	21644.85	$^{7}K^{\circ}_{6}-287_{5}$
4612.93	8	21672.16	$C^{\circ}_{7}-297_{7}$
4608.35	6	21693.66	$A^{\circ}_{8}-293_{9}$
4605.42	4	21707.50	$B^{\circ}_{7}-290_{6}$
4603.43	12	21716.87	$^{7}M^{\circ}_{6}-279_{7}$
4599.07	4	21737.46	$^{7}K^{\circ}_{5}-274_{6}$
4594.85	8	21757.44	$^{5}K^{\circ}_{5}-223_{5}$
4593.65	5	21763.12	$^{5}K^{\circ}_{5}-224_{4}$
4592.93	15	21766.53	$^{5}L^{\circ}_{6}-217_{6}$
4592.63	5	21767.95	$^{5}L^{\circ}_{6}-218_{6}$
4588.65	15	21786.83	$^{5}H^{\circ}_{4}-277_{5}$
4577.59	4	21839.47	$C^{\circ}_{7}-300_{7}$
4576.64	80	21843.97	$^{5}K^{\circ}_{5}-224_{6}$
4575.03	8	21851.68	$^{5}I^{\circ}_{4}-263_{5}$
4574.27	6	21855.32	$^{7}K^{\circ}_{6}-288_{6}$
4571.68	8	21867.69	$C^{\circ}_{7}-299_{6}$
4571.24	10	21869.81	$^{7}M^{\circ}_{6}-281_{7}$
4563.95	40	21904.72	$A^{\circ}_{8}-295_{9}$
4558.05	25	21933.09	$^{5}K^{\circ}_{6}-261_{7}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
4554.59	4	21949.73	${}^{5}K^{\circ}_{6}-262_{6}$
4551.98	80	21962.31	${}^{5}K^{\circ}_{5}-225_{6}$
4551.58	15	21964.27	${}^{5}K^{\circ}_{5}-225_{4}$
4550.98	12	21967.15	$A^{\circ}_{8}-296_{8}$
4546.62	8	21988.24	$A^{\circ}_{7}-257_{8}$
4546.10	6	21990.76	$A^{\circ}_{7}-257_{6}$
4544.36	15	21999.17	${}^{5}K^{\circ}_{6}-262_{7}$
4539.08	12	22024.75	$A^{\circ}_{7}-258_{6}$
4536.60	20	22036.76	${}^{7}M^{\circ}_{6}-283_{7}$
4532.58	12	22056.31	${}^{5}L^{\circ}_{6}-220_{6}$
4531.14	10	22063.33	${}^{5}I^{\circ}_{4}-265_{4}$
4526.25	6	22087.18	$B^{\circ}_{7}-294_{8}$
4525.98	8	22088.51	$B^{\circ}_{8}-327_{7}$
4517.40	3	22130.42	$D^{\circ}_{7}-324_{8}$
4516.73	80	22133.72	${}^{5}K^{\circ}_{5}-227_{6}$
4514.11	10	22146.56	$B^{\circ}_{3}-292_{4}$
4504.87	6	22192.01	$A^{\circ}_{8}-299_{7}$
4504.16	5	22195.50	${}^{7}M^{\circ}_{6}-284_{5}$
4499.92	5	22216.39	$C^{\circ}_{7}-301_{6}$
4494.71	60	22242.18	${}^{5}K^{\circ}_{5}-228_{6}$
4484.81	5	22291.27	${}^{5}K^{\circ}_{6}-265_{5}$
4481.07	10	22309.87	$B^{\circ}_{3}-294_{3}$
4476.46	40	22332.82	${}^{5}K^{\circ}_{6}-266_{7}$
4469.32	100	22368.51	${}^{5}L^{\circ}_{6}-223_{7}$
4468.70	4	22371.60	$C^{\circ}_{7}-303_{6}$
4466.71	4	22381.59	$C^{\circ}_{7}-304_{6}$
4461.44	8	22408.00	$A^{\circ}_{7}-261_{7}$
4458.10	5	22424.79	$A^{\circ}_{7}-262_{6}$
4455.23	5	22439.23	${}^{5}H^{\circ}_{4}-283_{4}$
4449.66	5	22467.34	${}^{5}I^{\circ}_{4}-269_{5}$
4449.52	8	22468.07	$C^{\circ}_{7}-305_{6}$
4448.90	8	22471.18	$B^{\circ}_{7}-298_{7}$
4448.33	40	22474.05	$A^{\circ}_{7}-262_{7}$
4446.53	12	22483.18	${}^{5}K^{\circ}_{6}-268_{6}$
4440.74	60	22512.49	$A^{\circ}_{7}-263_{8}$
4438.43	6	22524.17	$C^{\circ}_{7}-306_{7}$
4435.16	6	22540.77	$B^{\circ}_{3}-296_{3}$
4430.08	30	22566.64	${}^{5}K^{\circ}_{5}-231_{4}$
4426.94	80	22582.67	${}^{5}L^{\circ}_{6}-225_{6}$
4425.41	12	22590.47	$A^{\circ}_{7}-263_{7}$
4421.22	3	22611.84	${}^{7}M^{\circ}_{6}-288_{6}$
4420.40	20	22616.05	$B^{\circ}_{3}-297_{4}$
4418.47	25	22625.93	${}^{7}M^{\circ}_{6}-289_{6}$
4414.75	8	22645.01	${}^{5}K^{\circ}_{6}-269_{5}$
4414.08	8	22648.46	$A^{\circ}_{3}-265_{4}$
4413.14	15	22653.29	$A^{\circ}_{7}-264_{8}$
4412.03	2	22658.98	${}^{5}H^{\circ}_{4}-287_{5}$
4405.74	20	22691.34	$A^{\circ}_{7}-265_{8}$
4403.07	4	22705.09	${}^{5}K^{\circ}_{5}-233_{5}$
4398.10	4	22730.72	${}^{5}I^{\circ}_{4}-271_{4}$
4394.45	3	22749.59	$A^{\circ}_{7}-265_{6}$
4393.60	200	22754.01	${}^{5}L^{\circ}_{6}-227_{6}$
4387.70	6	22784.61	${}^{7}M^{\circ}_{6}-290_{6}$
4385.48	6	22796.16	$A^{\circ}_{7}-266_{8}$
4385.38	10	22796.66	${}^{5}K^{\circ}_{6}-270_{6}$
4383.27	50	22807.62	$A^{\circ}_{7}-266_{7}$
4382.84	8	22809.86	${}^{5}K^{\circ}_{5}-234_{4}$
4382.34	40	22812.47	${}^{5}K^{\circ}_{5}-234_{5}$
4378.90	3	22830.40	$A^{\circ}_{7}-266_{6}$
4373.60	5	22858.08	${}^{7}M^{\circ}_{6}-291_{7}$
4373.08	4	22860.80	${}^{7}M^{\circ}_{6}-291_{6}$
4372.76	80	22862.44	${}^{5}L^{\circ}_{6}-228_{6}$
4372.01	10	22866.36	${}^{5}K^{\circ}_{5}-235_{5}$
4371.76	100	22867.66	$C^{\circ}_{7}-309_{8}$
4369.96	20	22877.11	${}^{7}M^{\circ}_{6}-292_{6}$
4368.47	6	22884.88	$B^{\circ}_{8}-335_{7}$
4362.80	20	22914.64	$A^{\circ}_{7}-267_{6}$
4362.05	300	22918.58	${}^{5}L^{\circ}_{6}-229_{7}$
4357.92	25	22940.30	${}^{5}K^{\circ}_{5}-235_{4}$
4355.75	80	22951.74	${}^{5}A^{\circ}_{5}-235_{6}$
4352.59	4	22968.37	$B^{\circ}_{7}-300_{6}$
4349.71	4	22983.62	${}^{7}M^{\circ}_{6}-292_{5}$
4349.07	5	22986.97	$A^{\circ}_{8}-268_{8}$
4343.53	3	23016.30	$C^{\circ}_{7}-311_{6}$
4337.63	15	23047.61	$C^{\circ}_{7}-311_{7}$
4337.40	25	23048.83	${}^{5}K^{\circ}_{6}-273_{7}$
4335.73	60	23057.71	${}^{5}L^{\circ}_{6}-230_{7}$
4329.42	6	23091.31	$A^{\circ}_{8}-307_{8}$
4328.73	60	23095.00	${}^{5}K^{\circ}_{5}-237_{6}$
4328.01	5	23098.82	${}^{7}K^{\circ}_{5}-288_{6}$
4325.38	4	23112.88	${}^{7}K^{\circ}_{5}-289_{6}$
4323.05	3	23125.35	$B^{\circ}_{7}-302_{6}$
4318.09	15	23151.89	${}^{7}M^{\circ}_{6}-294_{6}$
4317.07	30	23157.37	$C^{\circ}_{7}-312_{7}$
4316.48	50	23160.53	$C^{\circ}_{7}-312_{8}$
4315.82	5	23164.09	$B^{\circ}_{7}-303_{6}$
4313.13	100	23178.50	$A^{\circ}_{7}-269_{8}$
4312.39	8	23182.50	$C^{\circ}_{7}-313_{7}$
4311.31	4	23188.29	$A^{\circ}_{7}-270_{8}$
4309.68	25	23197.06	${}^{5}L^{\circ}_{6}-231_{7}$
4309.17	30	23199.82	$B^{\circ}_{3}-303_{4}$
4308.20	8	23205.06	${}^{5}K^{\circ}_{5}-238_{4}$
4304.81	4	23223.32	$D^{\circ}_{7}-335_{7}$
4303.80	6	23228.79	${}^{5}I^{\circ}_{4}-276_{5}$
4301.72	15	23240.02	$C^{\circ}_{7}-314_{7}$
4297.92	10	23260.56	$B^{\circ}_{7}-305_{6}$
4295.88	5	23271.59	$A^{\circ}_{7}-270_{6}$
4293.30	30	23285.59	${}^{\circ}_{7}-271_{8}$
4288.84	200	23309.80	${}^{7}M^{\circ}_{6}-295_{6}$
4288.70	10	23310.54	$B^{\circ}_{7}-306_{6}$
4287.75	6	23315.70	$A^{\circ}_{3}-271_{4}$
4287.56	10	23316.76	$B^{\circ}_{7}-306_{7}$
4286.00	6	23325.22	${}^{5}L^{\circ}_{6}-233_{5}$
4285.74	8	23326.67	$C^{\circ}_{7}-314_{8}$
4285.23	20	23329.44	${}^{7}K^{\circ}_{6}-301_{6}$
4283.17	3	23340.63	$A^{\circ}_{8}-309_{8}$
4276.10	5	23379.25	$A^{\circ}_{8}-310_{7}$
4273.19	6	23395.17	$B^{\circ}_{3}-304_{4}$
4271.24	15	23405.85	${}^{5}K^{\circ}_{5}-240_{6}$
4271.12	3	23406.50	${}^{5}K^{\circ}_{6}-276_{5}$
4270.25	4	23411.27	$B^{\circ}_{7}-307_{8}$
4266.32	40	23432.82	${}^{5}L^{\circ}_{6}-234_{5}$
4265.18	6	23439.08	${}^{5}H^{\circ}_{4}-295_{3}$
4259.88	6	23468.23	${}^{5}K^{\circ}_{6}-277_{6}$
4259.46	12	23470.56	${}^{7}K^{\circ}_{5}-292_{5}$
4256.91	10	23484.64	${}^{7}K^{\circ}_{6}-303_{6}$
4256.54	3	23486.69	${}^{5}L^{\circ}_{6}-235_{5}$
4255.10	5	23494.62	${}^{7}K^{\circ}_{6}-304_{6}$
4253.71	8	23502.29	${}^{5}K^{\circ}_{6}-277_{5}$
4249.83	4	23523.74	${}^{\circ}_{7}-273_{7}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
4246.58	2	23541.73	$^{7}M^{\circ}_{6}-297_{7}$
4246.26	100	23543.52	$^{5}L^{\circ}_{6}-235_{7}$
4241.11	15	23572.12	$^{5}L^{\circ}_{6}-235_{6}$
4233.13	25	23616.55	$^{7}M^{\circ}_{6}-298_{6}$
4231.67	60	23624.71	$A^{\circ}_{8}-312_{9}$
4230.51	6	23631.18	$^{7}K^{\circ}_{6}-306_{6}$
4226.54	3	23653.37	$^{5}H^{\circ}_{4}-296_{3}$
4226.17	3	23655.46	$A^{\circ}_{8}-313_{7}$
4225.32	3	23660.21	$B^{\circ}_{7}-309_{8}$
4224.36	10	23665.57	$^{5}K^{\circ}_{6}-278_{6}$
4222.36	150	23676.76	$A^{\circ}_{7}-274_{8}$
4219.96	25	23690.25	$^{5}K^{\circ}_{6}-279_{7}$
4218.46	8	23698.70	$B^{\circ}_{7}-310_{7}$
4216.61	6	23709.07	$^{7}M^{\circ}_{6}-300_{7}$
4215.99	8	23712.57	$D^{\circ}_{7}-340_{7}$
4215.88	4	23713.16	$A^{\circ}_{8}-314_{7}$
4215.50	5	23715.32	$^{5}L^{\circ}_{6}-237_{6}$
4211.60	30	23737.31	$^{7}M^{\circ}_{6}-299_{6}$
4209.83	3	23747.28	$^{5}K^{\circ}_{6}-279_{6}$
4207.92	5	23758.02	$D^{\circ}_{7}-341_{8}$
4204.16	12	23779.26	$^{5}L^{\circ}_{6}-237_{7}$
4199.63	10	23804.95	$A^{\circ}_{7}-275_{6}$
4198.22	40	23812.93	$^{5}K^{\circ}_{5}-244_{6}$
4196.40	8	23823.24	$^{5}K^{\circ}_{6}-281_{6}$
4195.62	4	23827.71	$^{5}K^{\circ}_{5}-244_{5}$
4193.42	5	23840.17	$B^{\circ}_{7}-311_{7}$
4192.91	10	23843.09	$^{5}K^{\circ}_{6}-281_{7}$
4191.94	30	23848.63	$^{5}L^{\circ}_{6}-238_{7}$
4191.77	3	23849.60	$C^{\circ}_{7}-318_{7}$
4186.96	30	23876.97	$^{5}K^{\circ}_{6}-282_{7}$
4183.26	20	23898.08	$C^{\circ}_{7}-320_{7}$
4180.31	30	23914.97	$^{5}K^{\circ}_{5}-245_{5}$
4177.49	4	23931.12	$^{7}K^{\circ}_{6}-309_{5}$
4177.19	3	23932.82	$^{5}L^{\circ}_{6}-239_{5}$
4175.40	5	23943.09	$A^{\circ}_{7}-277_{6}$
4173.68	12	23952.97	$B^{\circ}_{7}-312_{8}$
4169.85	5	23974.92	$B^{\circ}_{7}-313_{7}$
4169.06	50	23979.52	$C^{\circ}_{7}-321_{7}$
4167.04	20	23991.14	$^{5}I^{\circ}_{4}-284_{5}$
4163.75	25	24010.08	$^{5}K^{\circ}_{6}-283_{7}$
4162.43	60	24017.68	$A^{\circ}_{7}-278_{8}$
4160.95	40	24026.20	$^{5}L^{\circ}_{6}-240_{6}$
4160.28	4	24030.10	$^{7}M^{\circ}_{6}-302_{7}$
4157.64	8	24045.34	$^{7}M^{\circ}_{6}-300_{6}$
4156.82	6	24050.06	$^{5}I^{\circ}_{4}-285_{5}$
4156.66	100	24051.04	$^{5}K^{\circ}_{5}-246_{6}$
4153.97	150	24066.58	$^{5}L^{\circ}_{6}-240_{7}$
4147.62	3	24103.46	$^{7}K^{\circ}_{5}-298_{6}$
4145.23	4	24117.34	$B^{\circ}_{3}-312_{4}$
4144.93	3	24119.09	$B^{\circ}_{7}-314_{8}$
4141.86	25	24136.94	$^{5}K^{\circ}_{5}-247_{4}$
4139.30	15	24151.88	$^{5}H^{\circ}_{4}-301_{5}$
4137.03	5	24165.13	$A^{\circ}_{7}-279_{7}$
4136.44	10	24168.59	$^{5}K^{\circ}_{6}-284_{5}$
4133.50	30	24185.78	$^{5}L^{\circ}_{6}-241_{7}$
4132.02	5	24194.47	$^{5}K^{\circ}_{6}-284_{6}$
4130.66	8	24202.40	$^{7}M^{\circ}_{6}-302_{6}$
4127.34	8	24221.90	$A^{\circ}_{7}-279_{6}$
4125.78	3	24231.05	$^{5}H^{\circ}_{4}-302_{3}$
4124.03	3	24241.32	$^{7}M^{\circ}_{6}-303_{6}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
4123.00	5	24247.38	$A^{\circ}_{7}-280_{7}$
4119.09	4	24270.41	$^{7}K^{\circ}_{6}-312_{7}$
4117.91	4	24277.34	$A^{\circ}_{8}-319_{8}$
4116.35	6	24286.54	$^{5}K^{\circ}_{5}-249_{5}$
4115.65	8	24290.67	$^{5}K^{\circ}_{6}-285_{7}$
4111.02	15	24318.01	$A^{\circ}_{7}-281_{7}$
4110.66	4	24320.18	$^{5}K^{\circ}_{5}-249_{4}$
4109.22	3	24328.68	$A^{\circ}_{8}-319_{7}$
4108.36	30	24333.77	$^{5}L^{\circ}_{6}-243_{7}$
4105.32	10	24351.80	$A^{\circ}_{7}-282_{7}$
4101.91	50	24372.03	$C^{\circ}_{7}-324_{6}$
4099.27	6	24387.75	$^{7}M^{\circ}_{6}-306_{6}$
4097.75	15	24396.79	$^{5}K^{\circ}_{5}-250_{5}$
4091.64	50	24433.24	$^{5}L^{\circ}_{6}-244_{6}$
4089.16	8	24448.02	$^{5}L^{\circ}_{6}-244_{5}$
4086.68	6	24462.86	$A^{\circ}_{8}-321_{8}$
4083.04	6	24484.64	$A^{\circ}_{7}-283_{9}$
4076.63	12	24523.18	$^{5}K^{\circ}_{6}-287_{7}$
4075.48	4	24530.07	$B^{\circ}_{3}-316_{7}$
4074.62	15	24535.26	$^{5}L^{\circ}_{6}-245_{5}$
4073.55	15	24541.73	$^{7}K^{\circ}_{5}-303_{4}$
4072.84	10	24546.02	$^{7}K^{\circ}_{6}-315_{6}$
4070.89	20	24557.72	$^{5}K^{\circ}_{5}-251_{5}$
4068.38	4	24572.91	$^{7}K^{\circ}_{5}-301_{6}$
4066.29	20	24585.51	$A^{\circ}_{3}-284_{4}$
4064.38	6	24597.06	$B^{\circ}_{7}-319_{8}$
4064.03	6	24599.20	$^{5}K^{\circ}_{6}-289_{6}$
4061.35	25	24615.41	$^{5}K^{\circ}_{5}-252_{6}$
4060.61	4	24619.90	$^{5}K^{\circ}_{6}-288_{7}$
4059.51	3	24626.59	$^{7}M^{\circ}_{6}-307_{6}$
4058.11	30	24635.10	$^{5}K^{\circ}_{5}-252_{5}$
4055.94	12	24648.28	$B^{\circ}_{7}-319_{7}$
4055.58	10	24650.42	$A^{\circ}_{7}-284_{7}$
4051.56	3	24674.92	$A^{\circ}_{3}-285_{4}$
4049.20	15	24689.29	$^{7}K^{\circ}_{5}-302_{6}$
4049.00	3	24690.53	$B^{\circ}_{7}-320_{7}$
4047.62	80	24698.92	$^{5}K^{\circ}_{5}-253_{5}$
4042.76	150	24728.64	$^{5}K^{\circ}_{5}-253_{6}$
4037.97	8	24757.94	$^{5}K^{\circ}_{6}-290_{6}$
4036.73	3	24765.54	$A^{\circ}_{7}-285_{7}$
4035.67	4	24772.06	$B^{\circ}_{7}-321_{7}$
4035.06	2	24775.80	$^{7}M^{\circ}_{6}-310_{7}$
4034.50	30	24779.26	$^{5}I^{\circ}_{4}-292_{5}$
4031.60	5	24797.08	$^{5}I^{\circ}_{4}-292_{4}$
4025.58	3	24834.14	$^{5}K^{\circ}_{6}-291_{6}$
4022.93	3	24850.49	$^{5}K^{\circ}_{6}-292_{6}$
4013.84	15	24906.80	$^{5}L^{\circ}_{6}-249_{5}$
4008.43	8	24940.40	$^{7}K^{\circ}_{6}-319_{5}$
4005.21	80	24960.44	$^{5}I^{\circ}_{4}-294_{3}$
4004.90	4	24962.38	$^{7}K^{\circ}_{6}-318_{7}$
4002.58	15	24976.82	$^{5}I^{\circ}_{4}-295_{3}$
4000.73	8	24988.39	$^{5}H^{\circ}_{4}-309_{4}$
3999.18	40	24998.08	$A^{\circ}_{7}-287_{7}$
3997.09	30	25011.18	$^{7}K^{\circ}_{6}-320_{7}$
3996.13	8	25017.18	$^{5}L^{\circ}_{6}-250_{5}$
3994.57	4	25026.96	$^{7}M^{\circ}_{6}-312_{7}$
3989.29	8	25060.05	$A^{\circ}_{7}-288_{6}$
3983.77	10	25094.77	$A^{\circ}_{7}-288_{7}$
3980.80	30	25113.51	$^{7}K^{\circ}_{5}-307_{6}$
3978.40	20	25128.64	$A^{\circ}_{8}-327_{7}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
3977.80	4	25132.42	$^{7}K^{o}_{5}-308_{6}$
3974.75	4	25151.75	$B^{o}_{7}-324_{8}$
3972.73	3	25164.54	$B^{o}_{7}-324_{6}$
3971.67	5	25171.26	$^{5}K^{o}_{5}-257_{6}$
3970.59	15	25178.08	$^{5}L^{o}_{6}-251_{5}$
3969.42	25	25185.52	$^{5}K^{o}_{5}-258_{5}$
3968.52	3	25191.24	$^{5}I^{o}_{4}-296_{3}$
3968.26	8	25192.87	$A^{o}_{7}-289_{8}$
3966.31	5	25205.23	$^{5}K^{o}_{5}-258_{6}$
3964.22	12	25218.51	$^{7}M^{o}_{6}-314_{5}$
3961.98	12	25232.78	$A^{o}_{7}-290_{6}$
3961.52	40	25235.75	$^{5}L^{o}_{6}-252_{6}$
3961.42	25	25236.38	$A^{o}_{7}-290_{8}$
3958.93	3	25252.26	$^{5}H^{o}_{4}-313_{4}$
3954.10	6	25283.05	$^{5}K^{o}_{6}-295_{6}$
3952.45	12	25293.64	$C^{o}_{7}-334_{6}$
3951.05	4	25302.57	$^{7}M^{o}_{6}-315_{6}$
3950.48	12	25306.27	$A^{o}_{7}-291_{7}$
3950.05	3	25308.97	$A^{o}_{7}-291_{6}$
3948.99	12	25315.79	$B^{o}_{7}-326_{7}$
3948.65	5	25317.95	$^{5}K^{o}_{5}-259_{6}$
3948.45	35	25319.27	$^{5}L^{o}_{6}-253_{5}$
3947.50	3	25325.32	$A^{o}_{7}-292_{6}$
3943.82	200	25348.98	$^{5}L^{o}_{6}-253_{6}$
3940.09	4	25373.00	$^{7}K^{o}_{5}-311_{6}$
3938.68	3	25382.08	$A^{o}_{3}-292_{4}$
3928.45	8	25448.16	$B^{o}_{7}-327_{7}$
3926.73	30	25459.33	$^{7}K^{o}_{5}-312_{4}$
3926.22	50	25462.62	$^{5}L^{o}_{6}-254_{6}$
3924.10	4	25476.34	$^{5}H^{o}_{4}-314_{5}$
3923.02	12	25483.36	$^{5}K^{o}_{5}-261_{6}$
3921.19	6	25495.24	$^{7}M^{o}_{6}-317_{5}$
3918.15	5	25515.03	$^{5}K^{o}_{6}-297_{7}$
3917.25	6	25520.94	$C^{o}_{7}-336_{6}$
3913.51	6	25545.32	$A^{o}_{3}-294_{3}$
3910.96	10	25561.94	$^{5}K^{o}_{6}-299_{7}$
3905.12	5	25600.16	$A^{o}_{7}-294_{6}$
3904.35	6	25605.23	$^{5}K^{o}_{5}-262_{6}$
3903.26	8	25612.37	$A^{o}_{7}-294_{8}$
3898.66	4	25642.58	$^{5}H^{o}_{4}-316_{4}$
3894.12	120	25672.49	$^{5}L^{o}_{6}-256_{7}$
3892.26	3	25684.80	$^{5}K^{o}_{5}-263_{5}$
3891.50	6	25689.75	$^{5}I^{o}_{4}-301_{5}$
3889.11	10	25705.59	$^{7}K^{o}_{5}-314_{5}$
3887.10	4	25718.88	$^{7}M^{o}_{6}-318_{7}$
3886.14	4	25725.18	$^{7}M^{o}_{6}-319_{7}$
3885.99	8	25726.18	$^{7}K^{o}_{5}-315_{5}$
3881.15	4	25758.31	$A^{o}_{7}-295_{6}$
3879.53	30	25769.02	$^{5}I^{o}_{4}-302_{3}$
3876.45	5	25789.50	$^{7}K^{o}_{5}-315_{6}$
3876.13	60	25791.63	$^{5}L^{o}_{6}-257_{6}$
3873.08	15	25811.98	$A^{o}_{7}-296_{8}$
3871.04	120	25825.59	$^{5}L^{o}_{6}-258_{6}$
3867.50	15	25849.18	$^{7}M^{o}_{6}-321_{7}$
3867.17	30	25851.41	$A^{o}_{3}-297_{4}$
3864.10	30	25871.93	$^{7}K^{o}_{5}-316_{4}$
3855.43	20	25930.12	$^{5}K^{o}_{5}-265_{6}$
3854.22	100	25938.25	$^{5}L^{o}_{6}-259_{6}$
3852.97	5	25946.65	$^{5}K^{o}_{5}-265_{5}$
3851.72	20	25955.07	$^{5}H^{o}_{4}-319_{5}$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
3847.05	8	25986.59	$C^{o}_{7}-341_{8}$
3846.55	25	25989.96	$A^{o}_{7}-297_{7}$
3845.59	3	25996.49	$A^{o}_{7}-298_{7}$
3843.42	8	26011.12	$^{5}K^{o}_{5}-266_{6}$
3842.32	3	26018.59	$^{5}K^{o}_{6}-300_{6}$
3839.62	120	26036.86	$A^{o}_{7}-299_{7}$
3838.31	4	26045.80	$^{5}I^{o}_{4}-304_{4}$
3835.51	5	26064.77	$A^{o}_{7}-298_{6}$
3834.92	8	26068.82	$^{7}M^{o}_{6}-323_{5}$
3832.37	6	26086.13	$B^{o}_{7}-334_{6}$
3831.06	5	26095.03	$^{5}K^{o}_{5}-267_{6}$
3829.79	25	26103.69	$^{5}L^{o}_{6}-261_{6}$
3821.95	30	26157.26	$A^{o}_{7}-300_{7}$
3819.89	8	26171.38	$^{5}K^{o}_{5}-269_{6}$
3819.25	6	26175.74	$^{5}K^{o}_{6}-302_{6}$
3818.02	6	26184.21	$^{7}K^{o}_{5}-319_{5}$
3812.00	150	26225.57	$^{5}L^{o}_{6}-262_{6}$
3811.88	4	26226.33	$A^{o}_{7}-300_{8}$
3809.66	4	26241.61	$^{7}M^{o}_{6}-324_{6}$
3808.93	40	26246.66	$^{7}M^{o}_{6}-325_{6}$
3801.15	25	26300.38	$^{5}K^{o}_{5}-269_{5}$
3800.47	6	26305.09	$^{5}L^{o}_{6}-263_{5}$
3797.38	8	26326.53	$^{5}H^{o}_{4}-323_{5}$
3791.53	4	26367.10	$^{5}K^{o}_{6}-306_{7}$
3789.81	3	26379.07	$^{7}K^{o}_{5}-321_{4}$
3788.06	4	26391.26	$^{5}L^{o}_{6}-263_{7}$
3781.75	15	26435.31	$A^{o}_{3}-303_{4}$
3779.35	5	26452.10	$^{5}K^{o}_{5}-270_{6}$
3778.26	8	26459.75	$A^{o}_{8}-341_{8}$
3775.61	12	26478.27	$A^{o}_{7}-302_{7}$
3774.91	15	26483.22	$^{5}I^{o}_{4}-309_{5}$
3773.44	40	26493.53	$A^{o}_{7}-300_{6}$
3768.76	8	26526.42	$^{5}I^{o}_{4}-309_{4}$
3766.89	40	26539.60	$^{5}I^{o}_{4}-310_{5}$
3765.35	40	26550.43	$^{5}L^{o}_{6}-265_{6}$
3763.45	30	26563.83	$^{5}K^{o}_{5}-271_{4}$
3763.27	40	26565.11	$^{7}K^{o}_{6}-335_{7}$
3763.01	12	26566.94	$^{5}L^{o}_{6}-265_{5}$
3758.36	20	26599.85	$^{5}K^{o}_{6}-307_{6}$
3753.93	20	26631.21	$^{5}L^{o}_{6}-266_{6}$
3751.18	35	26650.74	$A^{o}_{7}-302_{6}$
3749.74	4	26660.94	$^{5}K^{o}_{6}-309_{5}$
3747.61	8	26676.10	$^{5}I^{o}_{4}-311_{5}$
3742.10	3	26715.37	$^{5}L^{o}_{6}-267_{6}$
3737.38	5	26749.10	$^{5}K^{o}_{6}-310_{7}$
3736.02	12	26758.88	$^{5}L^{o}_{6}-268_{6}$
3733.17	3	26779.28	$B^{o}_{7}-341_{8}$
3732.26	60	26785.86	$A^{o}_{7}-305_{6}$
3731.45	100	26791.64	$^{5}L^{o}_{6}-269_{6}$
3725.31	6	26835.81	$A^{o}_{7}-306_{6}$
3724.45	15	26842.02	$A^{o}_{7}-306_{7}$
3719.29	40	26879.22	$^{5}K^{o}_{5}-274_{6}$
3718.31	6	26886.30	$^{5}I^{o}_{4}-313_{5}$
3717.72	20	26890.55	$^{5}K^{o}_{6}-311_{7}$
3713.56	20	26920.71	$^{5}L^{o}_{6}-269_{5}$
3707.95	25	26961.41	$B^{o}_{3}-340_{3}$
3704.65	3	26985.45	$^{5}K^{o}_{5}-275_{6}$
3703.27	30	26995.50	$^{5}K^{o}_{5}-276_{6}$
3702.62	25	27000.26	$^{5}K^{o}_{6}-312_{7}$
3699.18	10	27025.36	$^{5}K^{o}_{6}-313_{7}$

Table 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
3695.21	20	27054.42	$^7K^\circ_6-340_7$
3694.17	5	27062.01	$^5K^\circ_5-276_5$
3692.75	30	27072.40	$^5L^\circ_6-270_6$
3692.43	10	27074.79	$A^\circ_7-307_6$
3689.86	5	27093.65	$A^\circ_7-308_6$
3687.46	30	27111.26	$A^\circ_3-309_4$
3685.78	40	27123.64	$^5K^\circ_5-277_6$
3679.38	60	27170.82	$^5K^\circ_5-278_5$
3677.39	60	27185.47	$A^\circ_7-309_8$
3676.52	10	27191.91	$^5K^\circ_6-314_5$
3673.73	6	27212.54	$^5K^\circ_6-315_5$
3672.19	5	27223.97	$A^\circ_7-310_7$
3665.21	12	27275.84	$^5K^\circ_6-315_6$
3663.19	8	27290.84	$^5I^\circ_4-317_5$
3659.16	100	27320.93	$^5K^\circ_5-278_6$
3658.68	12	27324.51	$^5L^\circ_6-273_7$
3654.89	40	27352.83	$A^\circ_3-312_4$
3653.21	25	27365.41	$A^\circ_7-311_7$
3651.93	15	27375.04	$A^\circ_3-313_4$
3651.04	4	27381.68	$^5L^\circ_6-273_5$
3649.86	3	27390.55	$^7M^\circ_6-336_6$
3648.25	15	27402.64	$^5K^\circ_5-279_6$
3644.24	60	27432.77	$^5K^\circ_5-280_6$
3639.49	30	27468.58	$^5K^\circ_6-317_5$
3638.60	3	27475.25	$A^\circ_7-312_7$
3638.20	150	27478.35	$A^\circ_7-312_8$
3636.31	15	27492.60	$^5I^\circ_4-319_5$
3635.30	30	27500.27	$A^\circ_7-313_7$
3627.70	6	27557.85	$A^\circ_7-314_7$
3626.36	15	27568.05	$^5K^\circ_5-281_5$
3620.08	60	27615.81	$^5L^\circ_6-276_6$
3616.33	40	27644.47	$A^\circ_7-314_8$
3612.96	5	27670.29	$^5K^\circ_6-319_5$
3611.40	20	27682.26	$^5L^\circ_6-276_5$
3603.74	25	27741.03	$^5K^\circ_6-320_7$
3603.36	30	27743.96	$^5L^\circ_6-277_6$
3602.48	30	27750.75	$A^\circ_7-315_6$
3600.56	3	27765.55	$A^\circ_3-316_4$
3598.94	30	27778.02	$^5L^\circ_6-277_5$
3594.81	8	27810.01	$^5K^\circ_5-283_4$
3593.20	40	27822.47	$^5K^\circ_6-321_7$
3592.97	15	27824.23	$^5K^\circ_5-284_5$
3591.74	50	27833.72	$^5K^\circ_5-284_4$
3589.66	20	27849.84	$^5K^\circ_5-284_6$
3587.78	4	27864.45	$^5I^\circ_4-323_5$
3585.38	25	27883.15	$^5K^\circ_5-285_5$
3584.88	250	27887.01	$^5L^\circ_6-278_7$
3580.25	25	27923.08	$^5K^\circ_5-285_4$
3577.92	30	27941.25	$^5L^\circ_6-278_6$
3577.78	8	27942.31	$^5K^\circ_5-286_5$
3574.76	50	27965.94	$^5L^\circ_6-279_7$
3567.49	4	28022.92	$^5L^\circ_6-279_6$
3566.60	200	28029.97	$^5K^\circ_5-287_5$
3565.05	10	28042.15	$^5K^\circ_6-323_5$
3564.27	3	28048.26	$^5L^\circ_6-280_7$
3563.66	50	28053.05	$^5L^\circ_6-280_6$
3557.84	50	28098.91	$^5L^\circ_6-281_6$
3555.32	60	28118.85	$^5L^\circ_6-281_7$
3554.88	8	28122.37	$A^\circ_7-319_8$
3549.20	25	28167.36	$A^\circ_7-318_7$

Table 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
3548.42	6	28173.57	$A^\circ_7-319_7$
3546.55	25	28188.41	$^5L^\circ_6-281_5$
3543.21	4	28214.98	$^5K^\circ_6-324_6$
3542.57	25	28220.04	$^5K^\circ_6-325_6$
3540.00	5	28240.59	$^5K^\circ_5-288_6$
3538.23	4	28254.66	$^5K^\circ_5-289_6$
3535.96	10	28272.78	$A^\circ_3-321_4$
3534.33	30	28285.84	$^5L^\circ_6-283_7$
3532.89	8	28297.41	$A^\circ_7-321_7$
3518.47	5	28413.33	$^5K^\circ_5-290_6$
3514.61	200	28444.54	$^5L^\circ_6-284_5$
3511.44	30	28470.23	$^5L^\circ_6-284_6$
3509.06	8	28489.58	$^5K^\circ_5-291_6$
3507.34	80	28503.50	$^5L^\circ_6-285_5$
3507.05	30	28505.87	$^5K^\circ_5-292_6$
3500.07	80	28562.71	$^5L^\circ_6-286_5$
3499.61	4	28566.46	$^5L^\circ_6-285_7$
3493.99	40	28612.42	$^5K^\circ_5-292_5$
3489.37	80	28650.33	$^5L^\circ_6-287_5$
3486.12	3	28677.02	$A^\circ_7-324_8$
3473.56	8	28780.70	$^5K^\circ_5-294_6$
3466.30	40	28840.99	$A^\circ_7-326_7$
3463.90	8	28860.94	$^5L^\circ_6-288_6$
3462.21	30	28875.01	$^5L^\circ_6-289_6$
3454.61	30	28938.53	$^5K^\circ_5-295_6$
3435.49	20	29099.60	$^5K^\circ_5-297_4$
3434.28	10	29109.85	$^5L^\circ_6-291_6$
3432.36	4	29126.15	$^5L^\circ_6-292_6$
3431.14	8	29136.53	$^5K^\circ_6-334_6$
3418.39	5	29245.18	$^5K^\circ_5-298_6$
3412.58	5	29295.00	$^5K^\circ_6-335_7$
3404.33	12	29366.00	$^5K^\circ_5-299_6$
3400.28	2	29400.95	$^5L^\circ_6-294_6$
3386.24	5	29522.83	$^5K^\circ_5-301_5$
3376.04	4	29612.00	$^5I^\circ_4-340_3$
3368.98	5	29674.05	$^5K^\circ_5-300_6$
3358.14	8	29769.87	$A^\circ_7-335_7$
3250.51	8	29837.69	$^5L^\circ_6-299_7$
3347.37	5	29865.62	$^5L^\circ_6-298_6$
3345.89	15	29878.88	$^5K^\circ_5-304_4$
3337.03	12	29958.16	$^5L^\circ_6-300_7$
3333.89	8	29986.42	$^5L^\circ_6-299_6$
3316.55	8	30143.21	$^5L^\circ_6-301_5$
3310.63	6	30197.08	$A^\circ_3-340_3$
3303.84	8	30259.13	$A^\circ_7-340_7$
3301.65	4	30279.21	$^5L^\circ_6-302_7$
3298.88	8	30304.58	$A^\circ_7-341_8$
3292.94	15	30359.30	$^5K^\circ_5-309_4$
3282.98	2	30451.43	$^5L^\circ_6-302_6$
3278.79	3	30490.29	$^5L^\circ_6-303_6$
3277.73	6	30500.20	$^5L^\circ_6-304_6$
3276.76	10	30509.19	$^5K^\circ_5-311_5$
3276.15	5	30514.84	$^5K^\circ_5-311_6$
3268.45	4	30586.72	$^5L^\circ_6-305_6$
3266.93	20	30600.98	$^5K^\circ_5-312_4$
3264.55	6	30623.30	$^5K^\circ_5-313_4$
3263.12	20	30636.75	$^5L^\circ_6-306_6$
3254.33	8	30719.49	$^5K^\circ_5-313_5$
3238.67	2	30868.01	$^5K^\circ_5-315_5$
3237.87	15	30875.62	$^5L^\circ_6-307_6$

TABLE 4.—*Classified lines of* U I—Continued

λ_{air}A	Intensity	ν_{vac}cm^{-1}	Term combination
3235.90	6	30894.46	$^5L_6^\circ-308_6$
3225.60	2	30993.09	$^5L_6^\circ-310_5$
3223.45	8	31013.72	$^5K_5^\circ-316_4$
3212.03	8	31124.03	$^5K_5^\circ-317_5$
3211.46	2	31129.52	$^5L_6^\circ-311_5$
3210.90	5	31134.96	$^5L_6^\circ-311_6$
3207.67	6	31166.29	$^5L_6^\circ-311_7$
3196.41	3	31276.12	$^5L_6^\circ-312_7$
3189.91	5	31339.84	$^5L_6^\circ-313_5$
3187.99	8	31358.73	$^5L_6^\circ-314_7$
3174.87	3	31488.25	$^5L_6^\circ-315_5$
3171.58	5	31520.94	$^5K_5^\circ-321_4$
3136.30	4	31875.54	$^5K_5^\circ-325_6$
3129.38	3	31946.01	$^5L_6^\circ-319_5$
3122.46	4	32016.76	$^5L_6^\circ-320_7$
3114.54	4	32098.19	$^5L_6^\circ-321_7$
3076.91	2	32490.73	$^5L_6^\circ-324_6$
3076.43	8	32495.83	$^5L_6^\circ-325_6$
3062.66	2	32641.92	$^5L_6^\circ-326_7$
3048.64	3	32791.96	$^5K_5^\circ-334_6$
3027.66	5	33019.20	$^5K_5^\circ-336_6$
2992.04	3	33412.29	$^5L_6^\circ-334_6$
2977.92	8	33570.67	$^5L_6^\circ-335_7$
2671.82	8	33639.60	$^5L_6^\circ-336_6$
2935.15	6	34059.87	$^5L_6^\circ-340_7$

From the spectroscopic evidence presented in this paper, it is clear that uranium is an element of the rare-earth type; that, in fact, it is the homologue of neodymium, being the third member of a series beginning with thorium. That the seventh period of elements in the periodic system should encompass a second group of rare earths similar to the group in the sixth period was foreseen more than 20 years ago by Bohr [14]. Since that time opinion has differed concerning the atomic number at which the binding of the 5*f* electron first sets in. Some investigators, notably Villar [15], have suggested Th(90), others U(92), and still others, including Starke [16], the transuranium element 93 as the first in which a 5*f* electron appears. In each instance the basis of opinion was evidence derived from chemical behavior, nuclear activity, behavior of ions in crystals and solutions, etc. The testimony of the spectroscope, however, in selecting thorium for this role is unique and decisive, and it is supported by the recent spatial classifications of the elements by Djounkovsky and Kavos [17] and by Talpain [18], which array thorium, protoactinium, and uranium as the chemical homologues of cerium, praseodymium, and neodymium.

At the present time the state of the analysis of U I does not permit a calculation to be made of the ionization potential of neutral uranium atoms from series-forming terms. Nevertheless, an approximate value of 4 volts for this important atomic constant may be estimated from the fact that no lines of neutral atoms have been found below wavelength 2900 A. This accounts for the ease with which uranium is ionized in electric arcs, and magnetic fields, and explains the appearance of lines due to ionized atoms in the red and near infrared regions and their overwhelmimg preponderance in the regions of shorter wavelength.

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