

# Hot Bands of Water up to $6\nu_2-5\nu_2$ in the $933-2500\text{ cm}^{-1}$ Region

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Emission spectra have been recorded for hot water at temperatures up to  $1550^\circ\text{C}$ . Separate spectra have been recorded in the  $800-1900$  and  $1800-2500\text{ cm}^{-1}$  range. Assignments are made using a linelist generated from high accuracy, variational nuclear motion calculations, and energy differences. The spectra contain many hot bending transitions of the form  $(0n0)-(0n-10)$ , where states up to  $n = 6$  have been assigned. Detailed analysis shows that the spectra contain lines from 34 separate vibrational bands including other hot bending transitions and the difference bands  $(030)-(100)$ ,  $(110)-(020)$ ,  $(011)-(020)$ ,  $(100)-(010)$ ,  $(040)-(110)$ ,  $(040)-(011)$ ,  $(120)-(030)$ ,  $(012)-(030)$ ,  $(011)-(100)$ ,  $(110)-(001)$ , and  $(101)-(110)$ , all of which have not been observed previously. From a total of 8959 lines recorded, 6810 have been assigned; 4556 of these lines are new. These spectra represent the first detection of the  $(060)$  vibrational band, for which a band origin of  $8870.54 \pm 0.05\text{ cm}^{-1}$  is determined. The  $(050)$  band origin is confirmed as  $7542.40 \pm 0.03\text{ cm}^{-1}$ . The assignments extend the range of  $J$  and  $K_a$  values observed for the bending states, particularly for  $(050)$  and  $(060)$ , where 63 and 27 different rotational levels, respectively, have now been observed; 53 frequencies given in HITRAN are corrected. © 1999 Academic Press

## I. INTRODUCTION

The infrared spectrum of water has been the subject of concerted study over many years, both because of its numerous applications and because of the difficulty in analyzing many regions of the spectrum. Generally, states of water with significant bending excitation remain poorly characterized. This is because bending transitions, although at lower energy than the stretches, are also much weaker. In our recent paper (1), henceforth called Paper I, we analyzed emission spectra of water recorded at  $1000^\circ\text{C}$  in the  $900-2000\text{ cm}^{-1}$  frequency region. Using techniques similar to those described below, we were able to assign 1750 new transitions to bending hot bands. Nineteen of these transitions were assigned to the  $(050)-(040)$  band, leading to the first direct detection of the  $(050)$  state and a value for the band origin significantly different from the one which had been inferred previously from “dark state” analysis (2). Paper I extended the now classic work of Flaud, Camy-Peyret, and coworkers (3, 4) on the  $\nu_2 = 0, 1, 2, 3$ , and 4 vibrational states of water recorded in flames and the room temperature work of a number of groups (5–8). Some more recent work has also been performed in flames (9, 10).

In this paper, we report a further significant extension of our work on the hot bending bands of water. This is based on new spectra recorded at higher temperatures than in Paper I (1) and over an extended frequency range. Improved methods of anal-

ysis have enabled us to assign a much higher proportion of the lines (over 75%) than in Paper I where 40% of the lines were assigned. The result is not only substantial new information on the bending states of water but the observation, for the first time, of many bending hot bands and difference bands.

## II. EXPERIMENTAL DETAILS

The line positions were taken from two emission spectra recorded with the Bruker IFS 120 HR Fourier transform spectrometer at the University of Waterloo (11). For each spectrum, 50 scans were co-added at a spectral resolution of  $0.01\text{ cm}^{-1}$ . The spectrometer was operated with a KBr beamsplitter and a KRS-5 window on the emission port. The water vapor was heated in the center of a 1-m long, 5-cm diameter alumina tube. The water-cooled ends of the tube were sealed with KRS-5 windows. A slow flow of water vapor was maintained through the tube at a pressure of about 6 Torr. The thermal emission from the center of the tube was focused into the spectrometer with an off-axis parabolic mirror. In the first experiment, a HgCdTe detector and a  $2900\text{ cm}^{-1}$  cut-off filter was used. The furnace temperature was  $1500^\circ\text{C}$ . Lines were measured from  $800-1900\text{ cm}^{-1}$ , although the data extended up to the filter cutoff. The higher wavenumber part of the  $\nu_2$  band was taken from another spectrum that used an InSb detector. In this case, the furnace had a temperature of  $1500^\circ\text{C}$  and a  $4000\text{ cm}^{-1}$  cutoff filter was used. Lines were measured from  $1800-2500\text{ cm}^{-1}$ . In this way, the entire  $\nu_2$  region ( $930-2500\text{ cm}^{-1}$ ) of hot water could be covered with a good signal-to-noise ratio. The absolute accuracy of line positions is estimated to be  $0.001\text{ cm}^{-1}$  for the strong, unblended lines.

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The results of these measurements are given in a table<sup>3</sup> which has been placed in the electronic archive. Included in this table is information about the (relative) intensity of the individual transitions. It should be noted that the relative intensities are different between the two experiments and therefore, intensities given below and above 1800 cm<sup>-1</sup> are not strictly comparable. The archived table lists 8959 transition frequencies, nearly all of which involve “hot” states of water. This is because transitions involving low-lying states of water appear in the spectrum as doublets due to self-absorption by cooler water at the ends of the cell, in the atmosphere, etc. No attempt was made to analyze these artifact doublets which have been removed from the list.

### III. ANALYSIS

We used two basic procedures to analyze the spectrum. The first involved making so-called trivial assignments. These assignments are for transitions which link energy levels of water known from previous experimental studies. For this purpose, we used tabulated energy levels developed by Flaud *et al.* (3, 12, 13), Toth (7, 8), and our own work (1, 14, 15). Furthermore, assignments made using the linelist procedure discussed below led to the determination of new water energy levels which usually allowed further trivial assignments to be made. These assignments yield more than standard combination difference procedures because the spectrum contains a number of bands involving any particular state. For example, besides pure rotational transitions within the (030) state, for which a few lines were found near the low-frequency limit of the spectrum, transitions were also assigned to six other bands involving (030), namely (030)–(020), (030)–(100), (030)–(001), (040)–(030), (120)–(030), and (021)–(030). For transitions which could not be assigned trivially, two linelists computed using high-accuracy, variational nuclear motion calculations were used: PS and ZVPT. The PS linelist was computed by Partridge and Schwenke (17) using a spectroscopically refined effective potential energy surface. The ZVPT linelist was computed using PS’s unadjusted *ab initio* potential plus explicit allowance for the failure of the Born–Oppenheimer approximation. Details of the ZVPT linelist can be found elsewhere (18), as can detailed comparisons between the performance of the two linelists (15, 18, 19). To summarize, the main practical difference is that the PS linelist is significantly more accurate in absolute terms, particularly for low-*J* states, but that ZVPT gives much smoother behavior when transitions are analyzed along a particular branch. We find that using both linelists together gave the most reliable results and that in most cases assignments could be confirmed by the presence of trivial transitions, as described above. In this fashion we were able to assign 6810

transitions. Of course, some of these “newly” assigned transitions have been seen before. HITRAN (20, 21) contains 3468 transitions of H<sub>2</sub><sup>16</sup>O in the frequency range of our spectra. Of these, 1996 were hot enough to appear in our spectrum. Similarly, of the 1607 lines assigned in Paper I, 258 lines not in HITRAN appear in the spectra (1). Table 1 presents the 2287 lines assigned to (0*n*0)–(0*n*–10), and which appear neither in HITRAN or Paper I. A similar number of newly assigned lines, 2279, were assigned to other vibrational bands. For space reasons, these are only given as part of our full data which are obtainable from the electronic archive.

There is an overlap between the low frequency region of the spectrum and the sunspot spectrum recorded by Wallace *et al.* (22). Seventy-nine of our lines were found to have been assigned previously in the sunspot (15, 16). However, the frequencies measured here are significantly more accurate than those obtained in sunspots. One of the notable features of our assignments is the large number of different vibrational bands involved. The original objective of this work was to analyze hot bending transitions of the type (0*n*0)–(0*n*–10). This objective has been achieved and bending hot bands up to 6*ν*<sub>2</sub> have been assigned. Indeed, in the cooler spectrum analyzed in Paper I (1), we were able to assign 19 transitions in the (050)–(040) band. Here we assign 130 further transitions in this band and 34 to (060)–(050). This allows us to refine our estimate of the 5*ν*<sub>2</sub> band origin to 7542.40 ± 0.03 cm<sup>-1</sup>, compatible with, but more accurate than, the one obtained in Paper I. We also obtain a new estimate for the 6*ν*<sub>2</sub> band origin of 8870.54 ± 0.05 cm<sup>-1</sup>. As we have yet to assign transitions involving the 0<sub>00</sub> rotational level of either 5*ν*<sub>2</sub> or 6*ν*<sub>2</sub>, these estimates were obtained by correcting predictions made by the linelists for any systematic errors found in the higher states. The PS linelist was used for this purpose because the errors for this linelist are smaller. Our value for the 6*ν*<sub>2</sub> band origin is 20 cm<sup>-1</sup> lower than the (unattributed) HITRAN value of 8890 cm<sup>-1</sup> (20). Table 2 gives a summary of the number of lines newly assigned to each band.

One feature shown in Table 2 is the first observation of a number of hot bands of the general form (*n*<sub>1</sub>*n*<sub>2</sub>*n*<sub>3</sub>)–(*n*<sub>1</sub>*n*<sub>2</sub>–1*n*<sub>3</sub>). While transitions of this type are not unexpected in a spectrum of hot water, more surprising are the many difference bands observed. Table 2 shows that we have assigned transitions to no less than 14 distinct difference bands. The number of transitions assigned to individual difference bands varies from 1 for (031)–(040), to 305 for (011)–(020); however, we are confident of these assignments because they are “trivial” and rely on known energy levels. Indeed, many of the frequencies could have been predicted from previous studies and the only new information that we obtain is some indication of the relative intensity.

There have been limited previous observations of difference bands in water. Toth (23) observed (100)–(010) and (001)–(010) at room temperature. Wallace and Livingston (24) assigned 24 lines in the frequency range 2400–2620 cm<sup>-1</sup> in

<sup>3</sup> Supplementary data for this article may be found on the journal home page (<http://www.apnet.com/www/journal/ms.htm> or <http://www.europe.apnet.com/www/journal/ms.htm>).

TABLE 1  
List of Newly Assigned H<sub>2</sub><sup>16</sup>O Transitions of the Type (0n0)-(0n-10)  
(Intensities (Int) in Arbitrary Relative Units)

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
943.94022	.0529	11 1 10	12 4 9	020-010	1066.31305	.0344	19 1 19	19 2 18	030-020
949.96367	.0000	10 2 9	11 3 8	040-030	1066.77948	.1986	19 0 19	19 1 18	030-020
964.37877	.0328	27 0 27	27 1 26	020-010	1068.05176	.0732	15 5 11	16 6 10	010-000
965.13485	.0377	11 2 9	12 5 8	020-010	1068.06722	.0581	15 8 7	16 9 8	030-020
968.34800	.0453	23 0 23	23 1 22	030-020	1068.16437	.0434	25 0 25	26 1 26	010-000
970.67487	.0258	23 10 13	24 11 14	020-010	1069.92135	.0367	8 3 6	9 4 5	050-040
973.48293	.0575	16 1 16	16 2 15	050-040	1070.29204	.0521	9 3 6	10 4 7	050-040
976.38088	.0389	18 6 13	19 7 12	020-010	1070.63641	.0570	12 6 7	13 7 6	040-030
977.84397	.0360	15 4 12	16 5 11	010-000	1071.29693	.0769	26 1 26	26 2 25	010-000
985.34530	.0458	12 3 10	13 4 9	030-020	1071.43985	.0633	8 2 7	9 3 6	040-030
985.59945	.0720	26 1 26	26 2 25	020-010	1071.83091	.0469	21 13 8	22 14 9	010-000
986.03654	.0610	19 0 19	19 1 18	040-030	1072.58483	.0593	13 5 9	14 6 8	030-020
987.29971	.0642	20 7 14	21 8 13	010-000	1073.00459	.1172	18 8 11	19 9 10	010-000
991.40262	.0381	16 5 12	17 6 11	020-010	1073.98561	.0832	19 10 9	20 11 10	010-000
991.86950	.0453	22 1 22	22 2 21	030-020	1074.07206	.0261	14 5 9	15 6 10	030-020
994.85150	.0334	10 2 9	11 3 8	030-020	1074.77991	.0408	16 8 8	17 9 9	020-010
1000.31630	.0385	15 0 15	15 1 14	050-040	1075.01497	.1234	16 8 9	17 9 8	020-010
1001.65833	.0277	10 3 8	11 4 7	050-040	1075.96458	.1020	14 7 8	15 8 7	030-020
1003.46788	.0898	18 6 13	19 7 12	010-000	1076.00568	.0581	17 6 11	18 7 12	020-010
1003.77147	.0459	9 3 6	10 4 7	060-050	1076.55296	.0361	22 0 22	22 1 21	020-010
1004.12793	.1167	14 4 11	15 5 10	020-010	1076.60756	.1452	22 1 22	22 2 21	020-010
1007.52981	.0896	25 0 25	25 1 24	020-010	1076.67366	.0854	19 7 12	20 8 13	010-000
1008.13718	.0695	18 1 18	18 2 17	040-030	1076.69294	.0623	15 6 10	16 7 9	020-010
1008.89018	.0475	16 6 11	17 7 10	030-020	1077.63855	.0363	18 8 10	19 9 11	010-000
1011.83775	.0136	15 6 9	16 7 10	040-030	1078.01944	.0385	11 5 7	12 6 6	040-030
1011.91379	.0570	19 8 11	20 9 12	020-010	1078.42686	.0757	11 5 6	12 6 7	040-030
1014.58442	.0413	8 1 8	9 2 7	030-020	1078.53834	.0717	13 6 7	14 7 8	030-020
1015.84378	.0885	21 0 21	21 1 20	030-020	1078.64446	.0805	16 9 8	17 10 7	020-010
1015.89532	.0751	18 7 12	19 8 11	020-010	1078.67635	.1004	11 4 7	12 5 8	040-030
1018.33243	.1173	16 5 12	17 6 11	010-000	1081.14711	.0328	18 10 9	19 11 8	020-010
1021.20904	.0522	19 7 12	20 8 13	020-010	1081.32722	.0245	19 12 7	20 13 8	020-010
1022.81009	.0538	11 0 11	11 1 10	060-050	1083.90034	.2301	16 6 11	17 7 10	010-000
1024.75479	.0527	20 8 13	21 9 12	010-000	1084.08111	.0291	22 1 22	23 0 23	040-030
1026.66920	.0352	16 7 10	17 8 9	030-020	1084.11453	.1235	18 9 10	19 10 9	010-000
1028.16779	.0813	14 1 14	14 2 13	050-040	1084.60503	.0365	18 9 9	19 10 10	010-000
1028.98887	.0840	18 8 11	19 9 10	020-010	1085.49125	.0667	13 8 5	14 9 6	040-030
1029.99772	.1417	24 1 24	24 2 23	020-010	1085.64066	.0338	7 1 7	8 2 6	030-020
1030.36361	.0573	28 1 28	28 2 27	010-000	1085.91049	.0794	12 1 12	12 2 11	050-040
1031.04112	.0377	21 10 11	22 11 12	010-000	1086.17699	.0288	18 7 11	19 8 12	010-000
1034.35299	.0665	17 0 17	17 1 16	040-030	1086.86970	.0692	19 11 8	20 12 9	010-000
1035.31507	.0343	10 4 7	11 5 6	050-040	1087.07321	.0382	8 3 5	9 4 6	050-040
1035.99526	.0428	26 1 26	27 0 27	020-010	1087.52982	.1103	10 4 7	11 5 6	040-030
1036.26034	.0541	15 6 9	16 7 10	030-020	1087.78860	.0654	12 7 6	13 8 5	040-030
1037.67660	.0350	15 5 11	16 6 10	020-010	1088.92511	.0486	15 1 15	15 2 14	040-030
1040.05649	.0365	20 9 12	21 10 11	010-000	1089.29016	.1672	15 0 15	15 1 14	040-030
1040.90391	.0257	11 3 9	12 4 8	030-020	1089.34881	.1346	13 5 8	14 6 9	030-020
1041.62777	.0877	14 5 10	15 6 9	030-020	1089.67495	.0632	23 0 23	24 1 24	020-010
1042.02879	.1018	20 1 20	20 2 19	030-020	1089.88263	.0288	15 7 9	16 8 8	020-010
1045.47449	.0354	16 8 9	17 9 8	030-020	1090.02041	.0388	12 0 12	12 1 11	050-040
1046.40077	.0667	17 6 12	18 7 11	010-000	1090.05930	.0324	18 11 7	19 12 8	020-010
1047.35132	.1195	16 6 11	17 7 10	020-010	1090.08785	.0486	18 11 8	19 12 7	020-010
1048.08724	.0916	26 1 26	27 0 27	010-000	1090.20683	.0366	6 4 3	7 5 2	060-050
1048.14379	.0332	14 4 10	15 5 11	040-030	1090.25974	.0664	8 4 5	9 5 4	050-040
1050.06302	.0480	10 3 8	11 4 7	040-030	1090.34320	.0370	20 14 7	21 15 6	020-010
1050.27124	.0363	13 6 7	14 7 8	040-030	1090.69809	.0400	14 8 6	15 9 7	030-020
1050.67508	.0359	27 0 27	27 1 26	010-000	1090.92471	.0289	22 1 22	23 0 23	030-020
1052.05363	.0460	17 8 10	18 9 9	020-010	1090.95776	.0373	9 0 9	9 1 8	060-050
1052.09669	.0262	20 10 11	21 11 10	010-000	1091.04267	.0751	9 3 7	10 4 6	040-030
1052.75790	.1562	23 0 23	23 1 22	020-010	1091.87258	.0904	25 1 25	25 2 24	010-000
1053.03321	.0362	15 7 9	16 8 8	030-020	1092.22110	.1986	18 1 18	18 2 17	030-020
1053.48440	.0333	25 0 25	26 1 26	020-010	1092.51215	.2184	15 7 8	16 8 9	020-010
1054.04169	.0893	15 7 8	16 8 9	030-020	1092.68931	.1622	15 6 9	16 7 10	020-010
1054.63878	.1023	18 7 12	19 8 11	010-000	1093.05213	.0286	5 3 2	6 4 3	060-050
1054.65402	.0561	17 9 8	18 10 9	020-010	1093.26951	.1451	10 3 8	11 4 7	030-020
1056.47034	.0443	13 4 9	14 5 10	040-030	1093.62768	.0440	20 13 8	21 14 7	010-000
1056.58661	.0182	11 4 8	12 5 7	040-030	1095.09634	.0825	11 6 5	12 7 6	040-030
1057.53207	.0460	13 4 10	14 5 9	020-010	1095.22392	.0431	7 5 2	8 6 3	060-050
1058.07650	.0440	11 6 5	12 7 6	050-040	1095.80057	.0532	17 8 10	18 9 9	010-000
1058.78457	.0846	19 8 11	20 9 12	010-000	1095.83961	.1051	18 10 9	19 11 8	010-000
1059.14820	.0701	13 0 13	13 1 12	050-040	1095.86303	.0452	18 10 8	19 11 9	010-000
1061.47512	.1062	16 1 16	16 2 15	040-030	1097.95451	.2017	17 8 9	18 9 10	010-000
1061.61344	.0426	16 0 16	16 1 15	040-030	1098.03286	.1348	15 8 7	16 9 8	020-010
1062.12153	.0636	14 6 9	15 7 8	030-020	1098.14925	.0578	15 8 8	16 9 7	020-010
1063.04375	.0846	15 5 10	16 6 11	030-020	1099.23183	.0779	13 7 7	14 8 6	030-020
1063.11449	.0979	12 4 9	13 5 8	030-020	1099.31828	.1171	13 7 6	14 8 7	030-020
1063.22748	.0924	19 9 10	20 10 11	010-000	1099.71487	.1652	21 0 21	21 1 20	020-010
1064.23042	.0483	13 7 6	14 8 7	040-030	1099.77322	.2002	17 7 10	18 8 11	010-000
1065.02295	.0503	20 11 10	21 12 9	010-000	1100.01160	.0748	8 1 8	8 2 7	060-050
1065.63976	.0344	12 5 8	13 6 7	040-030	1100.89023	.0892	19 12 7	20 13 8	010-000
1066.20074	.1529	16 7 10	17 8 9	020-010	1101.21860	.0324	26 2 25	27 1 26	010-000

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1101.88518	.1505	12 5 8	13 6 7	030-020	1128.61811	.1632	16 10 7	17 11 6	020-010
1102.31162	.0325	21 15 6	22 16 7	010-000	1129.46972	.0331	6 3 3	7 4 4	050-040
1102.41072	.0440	12 9 4	13 10 3	030-020	1129.57797	.1153	13 4 9	14 5 10	030-020
1102.54322	.0450	10 5 5	11 6 6	040-030	1130.58625	.0294	9 7 2	10 8 3	050-040
1103.00899	.0522	15 9 7	16 10 6	020-010	1130.86036	.0539	19 14 5	20 15 6	010-000
1103.54008	.0335	10 4 6	11 5 7	040-030	1130.99144	.0945	8 6 3	9 7 2	050-040
1103.67642	.0179	11 4 8	12 5 7	030-020	1131.22730	.2513	17 11 6	18 12 7	010-000
1103.71995	.0395	18 12 7	19 13 6	020-010	1131.92666	.1605	15 7 9	16 8 8	010-000
1104.99229	.0696	17 10 7	18 11 8	020-010	1132.47219	.0768	11 8 3	12 9 4	040-030
1105.61881	.0508	6 2 5	7 3 4	050-040	1132.50697	.1428	17 6 11	18 7 12	010-000
1106.22817	.0491	17 9 9	18 10 8	010-000	1132.64390	.0651	11 3 8	12 4 9	040-030
1106.26702	.0368	21 0 21	22 1 22	030-020	1132.94626	.0807	17 5 12	18 6 13	020-010
1106.42662	.2052	17 9 8	18 10 9	010-000	1133.46308	.0478	10 3 7	11 4 8	040-030
1106.44805	.0364	9 6 3	10 7 4	050-040	1133.67451	.0467	24 2 23	25 1 24	010-000
1106.65999	.0520	10 7 4	11 8 3	050-040	1133.76841	.0580	19 6 13	20 7 14	010-000
1107.07787	.0578	12 5 7	13 6 8	030-020	1133.83123	.0484	18 1 18	19 0 19	040-030
1107.15024	.0802	7 3 4	8 4 5	050-040	1134.10929	.0637	12 4 8	13 5 9	030-020
1107.92847	.2701	16 7 10	17 8 9	010-000	1134.53713	.0825	7 2 5	8 3 6	050-040
1108.71686	.0970	10 5 6	11 6 5	040-030	1134.63351	.1062	11 6 6	12 7 5	030-020
1108.80844	.0384	20 14 7	21 15 6	010-000	1134.71296	.2431	23 0 23	23 1 22	010-000
1108.84614	.0496	12 8 5	13 9 4	040-030	1134.95787	.0385	7 5 3	8 6 2	050-040
1108.92791	.1471	18 11 8	19 12 7	010-000	1135.13250	.0818	18 14 5	19 15 4	020-010
1109.32628	.0260	22 0 22	23 1 23	020-010	1135.36003	.1823	14 5 9	15 6 10	020-010
1109.35099	.0886	22 1 22	23 0 23	020-010	1135.80749	.1760	10 7 4	11 8 3	040-030
1110.66156	.0680	8 5 4	9 6 3	050-040	1135.87629	.0480	11 0 11	12 1 12	060-050
1110.88260	.1874	12 6 7	13 7 6	030-020	1136.01531	.6664	15 7 8	16 8 9	010-000
1110.92735	.0925	14 6 8	15 7 9	020-010	1136.42261	.0221	15 3 12	16 4 13	040-030
1111.67401	.1325	11 7 4	12 8 5	040-030	1136.59499	.1216	13 7 7	14 8 6	020-010
1111.77331	.0980	13 5 9	14 6 8	020-010	1136.62610	.0365	18 5 13	19 6 14	020-010
1112.65286	.0377	19 14 5	20 15 6	020-010	1137.02930	.3881	13 7 6	14 8 7	020-010
1112.77866	.0619	17 11 6	18 12 7	020-010	1137.08845	.1570	12 8 5	13 9 4	030-020
1113.23816	.2808	14 7 8	15 8 7	020-010	1137.20341	.0374	23 1 22	24 2 23	020-010
1113.50441	.1891	24 1 24	24 2 23	010-000	1137.39438	.0695	16 6 10	17 7 11	010-000
1113.70736	.1167	13 8 5	14 9 6	030-020	1137.60195	.0689	15 11 4	16 12 5	030-020
1114.35817	.0563	16 11 6	17 12 5	030-020	1137.87766	.1060	18 13 6	19 14 5	010-000
1114.36718	.1117	14 7 7	15 8 8	020-010	1139.69242	.0363	19 5 14	20 6 15	020-010
1115.11161	.0300	9 4 6	10 5 5	040-030	1140.79776	.0877	6 4 3	7 5 2	050-040
1115.44820	.0653	12 6 6	13 7 7	030-020	1140.86441	.1434	15 8 8	16 9 7	010-000
1115.64115	.0613	19 13 7	20 14 6	010-000	1141.20669	.0452	21 6 15	22 7 16	010-000
1116.38746	.1648	15 6 10	16 7 9	010-000	1141.23344	.3812	15 8 7	16 9 8	010-000
1116.46949	.1286	14 1 14	14 2 13	040-030	1141.31482	.0221	6 4 2	7 5 3	050-040
1116.68688	.0758	16 7 9	17 8 10	010-000	1141.75477	.0804	19 0 19	20 1 20	030-020
1117.00977	.0473	5 4 1	6 5 2	060-050	1141.78862	.0274	19 1 19	20 0 20	030-020
1117.07924	.0374	14 0 14	14 1 13	040-030	1142.35630	.0463	4 4 1	5 5 0	060-050
1117.25119	.0475	25 1 24	26 2 25	010-000	1142.59821	.0197	3 3 0	4 4 1	060-050
1117.46542	.0944	7 4 3	8 5 4	050-040	1142.97330	.0678	9 6 4	10 7 3	040-030
1117.49380	.0401	4 3 2	5 4 1	060-050	1143.02030	.1408	9 6 3	10 7 4	040-030
1117.81217	.1958	17 0 17	17 1 16	030-020	1143.42860	.2314	16 1 16	16 2 15	030-020
1118.02530	.0620	17 10 8	18 11 7	010-000	1143.50128	.0713	16 0 16	16 1 15	030-020
1118.04074	.1874	17 10 7	18 11 8	010-000	1143.92346	.0808	8 4 4	9 5 5	040-030
1118.32257	.2748	16 8 9	17 9 8	010-000	1143.98758	.0737	13 1 13	13 2 12	040-030
1118.69432	.0952	10 6 5	11 7 4	040-030	1144.96483	.3768	13 5 8	14 6 9	020-010
1118.85883	.0492	10 6 4	11 7 5	040-030	1145.04201	.1691	13 0 13	13 1 12	040-030
1119.08517	.0535	18 13 6	19 14 5	020-010	1146.32545	.0737	11 7 5	12 8 4	030-020
1119.25518	.1080	16 8 8	17 9 9	010-000	1146.35043	.2478	11 7 4	12 8 5	030-020
1119.70033	.0310	6 5 2	7 6 1	060-050	1146.39950	.0591	19 15 4	20 16 5	010-000
1120.46550	.1666	8 2 7	9 3 6	030-020	1146.75035	.3876	19 0 19	19 1 18	020-010
1120.85473	.0477	11 5 7	12 6 6	030-020	1146.89140	.3944	15 6 9	16 7 10	010-000
1121.20127	.0895	11 0 11	11 1 10	050-040	1147.82007	.2366	20 1 20	21 0 21	020-010
1121.27597	.0525	13 0 13	14 1 14	060-050	1147.99878	.0325	6 1 6	6 2 5	060-050
1121.50486	.0776	14 8 6	15 9 7	020-010	1148.52676	.0714	17 0 17	18 1 18	040-030
1121.54117	.2473	14 8 7	15 9 6	020-010	1148.84531	.0611	2 2 1	3 3 0	060-050
1122.25594	.1281	9 4 5	10 5 6	040-030	1149.23060	.1338	16 12 5	17 13 4	020-010
1122.58629	.1812	12 7 6	13 8 5	030-020	1150.00788	.0982	10 5 5	11 6 6	030-020
1122.62799	.0929	12 7 5	13 8 6	030-020	1150.64728	.1603	8 5 4	9 6 3	040-030
1123.18801	.2962	20 1 20	20 2 19	020-010	1151.53939	.0937	14 10 5	15 11 4	030-020
1124.23322	.0459	20 15 6	21 16 5	010-000	1151.79495	.0481	22 2 21	23 1 22	020-010
1124.70110	.0553	20 1 20	21 0 21	030-020	1151.86950	.0512	10 9 2	11 10 1	030-020
1124.93644	.0364	3 2 1	4 3 2	060-050	1151.91201	.0566	8 5 3	9 6 4	040-030
1125.89780	.0338	12 3 9	13 4 10	040-030	1151.96391	.0288	18 15 4	19 16 3	020-010
1126.00358	.0933	6 3 4	7 4 3	050-040	1152.18398	.0277	5 3 3	6 4 2	050-040
1126.34773	.0863	17 12 5	18 13 6	020-010	1152.62403	.0386	15 12 3	16 13 4	030-020
1126.45286	.1544	8 3 6	9 4 5	040-030	1152.70447	.1509	15 10 5	16 11 6	020-010
1127.11611	.1528	9 5 4	10 6 5	040-030	1152.96455	.0133	21 3 18	22 4 19	030-020
1127.25387	.0497	11 9 2	12 10 3	030-020	1153.19640	.0923	18 14 5	19 15 4	010-000
1127.28144	.0495	13 3 10	14 4 11	040-030	1153.23265	.1003	5 3 2	6 4 3	050-040
1127.57954	.2189	14 9 6	15 10 5	020-010	1153.27644	.0345	10 0 10	10 1 9	050-040
1128.05672	.1949	13 6 8	14 7 7	020-010	1153.43532	.0167	20 2 19	21 1 20	040-030
1128.35491	.1579	21 0 21	22 1 22	020-010	1153.92723	.0573	8 3 5	9 4 6	040-030
1128.54082	.3049	16 9 8	17 10 7	010-000	1154.11176	.0637	6 1 6	7 2 5	030-020

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1154.27401	.0236	7 7 0	8 8 1	060-050	1183.88041	.6178	11 7 4	12 8 5	020-010
1155.74524	.1379	7 6 1	8 7 2	050-040	1184.02790	.0508	22 3 20	23 2 21	010-000
1156.07539	.2849	22 1 22	22 2 21	010-000	1184.31795	.0733	5 5 0	6 6 1	050-040
1156.27771	.0829	7 0 7	7 1 6	060-050	1184.74362	.0543	18 16 3	19 17 2	010-000
1156.36811	.1069	10 8 3	11 9 2	040-030	1184.82223	.1836	8 7 2	9 8 1	040-030
1157.37846	.0735	7 3 5	8 4 4	040-030	1185.29216	.1049	13 11 2	14 12 3	030-020
1157.92797	.1030	10 4 6	11 5 7	030-020	1185.57073	.0448	18 17 2	19 18 1	020-010
1158.48358	.3248	10 6 5	11 7 4	030-020	1186.17895	.1121	9 0 9	9 1 8	050-040
1158.89413	.1147	10 6 4	11 7 5	030-020	1186.22732	.0247	15 14 1	16 15 2	030-020
1159.00550	.1754	15 11 4	16 12 5	020-010	1187.95006	.1051	15 13 2	16 14 3	020-010
1159.52180	.0928	6 5 2	7 6 1	050-040	1188.67979	.0406	13 1 12	14 2 13	050-040
1159.60092	.0259	26 2 25	26 3 24	020-010	1189.59953	.0386	10 2 9	10 3 8	060-050
1159.67303	.0404	24 2 23	24 3 22	030-020	1189.75600	.0223	9 1 8	9 4 5	030-020
1159.70232	.1929	18 1 18	19 0 19	030-020	1189.80499	.0271	15 2 13	16 3 14	040-030
1160.19613	.1788	9 7 2	10 8 3	040-030	1190.42825	.0214	23 2 22	23 3 21	020-010
1160.83573	.2657	11 8 3	12 9 4	030-020	1190.46447	.0878	23 1 22	23 2 21	020-010
1160.87703	.0212	22 3 20	23 2 21	020-010	1190.87804	.0972	12 1 12	13 0 13	050-040
1160.90002	.0762	5 2 3	6 3 4	050-040	1191.02813	.0507	6 3 3	7 4 4	040-030
1160.94134	.0530	14 1 14	15 0 15	050-040	1191.34669	.0094	13 2 11	13 5 8	020-010
1161.00940	.0339	22 3 20	23 2 21	020-010	1191.37304	.0811	20 2 19	20 3 18	030-020
1161.34736	.0894	14 11 4	15 12 3	030-020	1191.79703	.4271	8 4 5	9 5 4	030-020
1162.13459	.0789	19 16 3	20 17 4	010-000	1191.97434	.0269	21 5 16	22 6 17	010-000
1164.55392	.0296	16 0 16	17 1 17	040-030	1192.22031	.0411	19 4 15	20 5 16	020-010
1164.68662	.0841	16 13 4	17 14 3	020-010	1192.47431	.0856	18 2 17	19 1 18	030-020
1164.81019	.0574	16 1 16	17 0 17	040-030	1192.52728	.0687	20 3 18	21 2 19	020-010
1165.24710	.0166	20 3 18	21 2 19	030-020	1192.81555	.0248	20 3 18	20 4 17	040-030
1165.33732	.0513	20 2 19	21 1 20	030-020	1192.95908	.0774	26 2 25	26 3 24	010-000
1165.80852	.0241	5 4 2	6 5 1	050-040	1193.21724	.0440	17 3 14	18 4 15	030-020
1165.91343	.0924	5 4 1	6 5 2	050-040	1193.27060	.0519	14 2 13	14 3 12	050-040
1166.43218	.0540	7 4 4	8 5 3	040-030	1193.35587	.7297	11 8 3	12 9 4	020-010
1167.03148	.0645	21 1 20	22 2 21	020-010	1193.41298	.0519	15 1 14	15 2 13	050-040
1167.46562	.2879	8 6 3	9 7 2	040-030	1193.70488	.0125	22 4 19	23 3 20	010-000
1167.75936	.0450	23 2 21	24 3 22	010-000	1193.89321	.1121	17 1 17	17 2 16	020-010
1167.88919	.0178	20 2 19	20 3 18	040-030	1194.01435	.0311	19 18 1	20 19 2	010-000
1168.06817	.0291	25 1 24	25 2 23	020-010	1194.44840	.0689	16 5 11	17 6 12	010-000
1168.13397	.1054	6 2 5	7 3 4	040-030	1194.75975	.0825	14 0 14	14 1 13	030-020
1168.63125	.0350	28 2 27	28 3 26	010-000	1195.47201	.0359	16 3 14	17 2 15	040-030
1168.84866	.0717	18 15 4	19 16 3	010-000	1195.49887	.0608	17 1 16	17 2 15	040-030
1169.02347	.0800	15 1 15	15 2 14	030-020	1195.88594	.1878	14 12 3	15 13 2	020-010
1170.30351	.0831	22 2 21	22 3 20	030-020	1195.96770	.0275	18 3 16	19 2 17	030-020
1170.79404	.0561	4 2 3	5 3 2	050-040	1196.07844	.1235	8 4 4	9 5 5	030-020
1171.35288	.1605	12 1 12	12 2 11	040-030	1196.27918	.0200	14 2 13	15 1 14	050-040
1172.39807	.1186	15 12 3	16 13 4	020-010	1196.38748	.0580	16 0 16	17 1 17	030-020
1173.19351	.0632	12 0 12	12 1 11	040-030	1196.39969	.1706	16 1 16	17 0 17	030-020
1173.57726	.0951	9 5 5	10 6 4	030-020	1196.48706	.0847	8 1 8	8 2 7	050-040
1174.82023	.0312	17 15 2	18 16 3	020-010	1196.64145	.1366	17 5 12	18 6 13	010-000
1175.53529	.0516	7 2 6	8 3 5	030-020	1196.66450	.0647	14 4 10	15 5 11	020-010
1175.84922	.6263	11 6 5	12 7 6	020-010	1196.70308	.0176	20 5 15	21 6 16	010-000
1175.87876	.0881	13 10 3	14 11 4	030-020	1197.51537	.0354	22 5 18	23 4 19	010-000
1175.90271	.0308	17 1 16	17 2 15	050-040	1197.68195	.0431	20 4 17	21 3 18	020-010
1176.06203	.0156	16 2 15	16 3 14	050-040	1197.98315	.0279	14 0 14	15 1 15	040-030
1176.22510	.0568	14 12 3	15 13 2	030-020	1198.05831	.0148	16 15 2	17 16 1	020-010
1176.53120	.0517	7 5 3	8 6 2	040-030	1198.16486	.0967	19 1 18	20 2 19	020-010
1176.82916	.0261	21 2 19	22 3 20	020-010	1198.29581	.1044	14 1 14	15 0 15	040-030
1176.86421	.2031	7 5 2	8 6 3	040-030	1198.66171	.0257	19 2 18	20 1 19	020-010
1176.89294	.6251	11 5 6	12 6 7	020-010	1198.81650	.0708	19 5 14	20 6 15	010-000
1177.19905	.4726	12 9 4	13 10 3	020-010	1198.98010	.0308	11 1 10	12 2 11	050-040
1177.28551	.1760	14 10 5	15 11 4	020-010	1199.01290	.3906	20 1 20	20 2 19	010-000
1177.52092	.3346	21 0 21	21 1 20	010-000	1199.06907	.2077	10 6 4	11 7 5	020-010
1177.72059	.0241	4 3 1	5 4 2	050-040	1199.99739	.1732	15 4 11	16 5 12	020-010
1177.89954	.1636	17 0 17	18 1 18	030-020	1200.16392	.0864	21 2 19	22 3 20	010-000
1177.93254	.0535	17 1 17	18 0 18	030-020	1200.17676	.0691	13 12 1	14 13 2	030-020
1178.00934	.0484	19 17 2	20 18 3	010-000	1200.48764	.1211	17 4 13	18 5 14	020-010
1178.40461	.0841	24 2 23	24 3 22	020-010	1200.59697	.1166	12 10 3	13 11 2	030-020
1178.42745	.0548	10 1 10	11 0 11	060-050	1200.84438	.0426	18 17 2	19 18 1	010-000
1178.55941	.0988	23 3 20	24 4 21	010-000	1201.32638	.0432	15 3 12	16 4 13	030-020
1178.69558	.0470	19 1 18	20 2 19	030-020	1201.35169	.0877	13 3 10	14 4 11	030-020
1179.48529	.0435	7 7 0	8 8 1	050-040	1201.83514	.0516	13 2 11	14 3 12	040-030
1179.64581	.0383	4 2 2	5 3 3	050-040	1202.15293	.2128	20 2 19	21 1 20	010-000
1179.70313	.0768	21 1 20	21 2 19	030-020	1202.23003	.6009	11 9 2	12 10 3	020-010
1180.18594	.0298	27 1 26	27 2 25	010-000	1202.42520	.2457	13 10 3	14 11 4	020-010
1180.56851	.1089	9 8 1	10 9 2	040-030	1202.79578	.0221	26 3 24	26 4 23	020-010
1180.67270	.0814	6 6 1	7 7 0	050-040	1203.15509	.0671	11 2 9	12 3 10	040-030
1181.02788	.0529	16 14 3	17 15 2	020-010	1203.60285	.0667	10 3 7	11 4 8	030-020
1181.15418	.0810	15 0 15	16 1 16	040-030	1204.50549	.1051	15 14 1	16 15 2	020-010
1182.05497	.0404	21 3 18	22 4 19	020-010	1204.68022	.0213	14 3 11	15 4 12	030-020
1182.38554	.0911	20 2 19	21 1 20	020-010	1204.72184	.0183	19 2 18	19 3 17	030-020
1182.49600	.0902	18 2 17	18 3 16	040-030	1204.95838	.0789	19 1 18	19 2 17	030-020
1182.58550	.3482	14 11 4	15 12 3	020-010	1205.23761	.0378	9 1 8	10 2 9	050-040
1182.95746	.0279	27 2 25	27 3 24	020-010	1205.75344	.0238	10 2 8	11 3 9	040-030

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1206.20886	.0457	5 2 4	6 3 3	040-030	1232.20831	.0470	12 0 12	13 1 13	040-030
1206.39450	.0762	17 1 16	18 2 17	030-020	1232.38265	.0744	19 3 17	20 2 18	010-000
1206.52080	.2876	13 11 2	14 12 3	020-010	1232.39784	.0988	19 3 17	20 2 18	010-000
1206.61940	.1165	25 1 24	25 2 23	010-000	1232.73666	.1154	15 2 13	16 3 14	030-020
1206.63917	.0525	11 1 11	12 0 12	050-040	1232.86865	.1603	12 1 12	13 0 13	040-030
1207.03424	.4225	17 0 17	18 1 18	020-010	1233.23050	.0812	16 4 13	17 3 14	030-020
1207.22598	.0616	16 2 15	16 3 14	040-030	1233.61275	.1053	14 0 14	15 1 15	030-020
1207.52788	.0660	19 2 17	20 3 18	020-010	1233.73206	.0441	18 5 14	19 4 15	020-010
1207.66860	.0793	17 2 15	18 3 16	030-020	1233.79076	.1730	20 2 19	20 3 18	020-010
1207.82734	.7264	10 7 4	11 8 3	020-010	1233.84390	.0760	20 1 19	20 2 18	020-010
1208.21570	.0659	21 3 18	22 4 19	010-000	1234.28446	.1574	11 11 0	12 12 1	030-020
1208.82159	.0457	8 2 6	9 3 7	040-030	1235.34571	.0699	17 2 16	17 3 15	030-020
1209.48115	.0578	7 1 6	8 2 7	050-040	1235.60595	.2218	13 13 0	14 14 1	020-010
1209.59424	.1500	12 11 2	13 12 1	030-020	1235.91554	.1708	17 1 16	17 2 15	030-020
1209.67788	.2365	7 7 0	8 8 1	040-030	1236.06413	.2177	23 1 22	23 2 21	010-000
1210.20136	.0236	5 0 5	5 1 4	060-050	1236.19547	.0560	3 1 2	3 2 1	060-050
1210.25922	.0252	19 19 0	20 20 1	010-000	1237.08506	.1282	19 3 16	20 4 17	010-000
1210.63262	.0297	17 3 15	18 2 16	030-020	1237.26359	.1796	17 2 15	18 3 16	020-010
1211.27734	.0515	14 14 1	15 15 0	030-020	1237.48034	.1418	14 2 13	14 3 12	040-030
1211.57502	.1615	14 13 2	15 14 1	020-010	1238.15129	.0771	17 3 15	18 2 16	020-010
1212.26449	.0811	7 3 5	8 4 4	030-020	1238.21801	.0403	19 4 16	20 3 17	010-000
1213.80513	.1351	7 2 5	8 3 6	040-030	1238.27190	.0598	24 3 22	24 4 21	020-010
1214.19543	.0856	18 1 17	19 2 18	020-010	1239.84176	.0445	9 1 9	10 0 10	050-040
1214.23287	.1814	18 2 17	19 1 18	020-010	1240.36420	.0403	18 4 14	19 5 15	010-000
1214.53027	.0806	4 1 4	5 2 3	040-030	1240.84653	.2218	15 1 15	15 2 14	020-010
1214.99294	.0771	15 1 15	16 0 16	030-020	1240.88572	.5253	15 0 15	15 1 14	020-010
1215.03311	.1628	13 0 13	14 1 14	040-030	1241.20782	.3633	4 4 1	5 5 0	040-030
1215.35970	.0492	16 16 1	17 17 0	020-010	1241.29978	.5108	6 3 4	7 4 3	030-020
1215.49149	.0862	13 1 13	14 0 14	040-030	1242.12769	.6637	6 4 3	7 5 2	030-020
1216.25578	.0454	20 2 18	21 3 19	010-000	1242.51801	.0673	16 3 13	17 4 14	020-010
1216.30799	.1970	20 3 18	21 2 19	010-000	1242.55093	.2413	6 4 2	7 5 3	030-020
1216.84433	.0402	12 2 11	12 3 10	050-040	1242.63023	.0645	9 1 8	9 2 7	060-050
1216.89058	.0290	21 6 16	22 5 17	010-000	1243.61165	.1068	6 1 6	6 2 5	050-040
1217.07094	.2726	6 6 1	7 7 0	040-030	1243.95881	.3840	12 12 1	13 13 0	020-010
1217.19281	.0505	22 3 20	22 4 19	030-020	1244.06314	.7290	7 7 0	8 8 1	030-020
1217.37872	.1145	13 13 0	14 14 1	030-020	1245.16366	.3376	12 1 12	12 2 11	030-020
1217.41058	.4209	16 1 16	16 2 15	020-010	1245.89965	.1211	12 0 12	12 1 11	030-020
1217.43067	.1717	16 0 16	16 1 15	020-010	1245.99319	.0769	10 2 9	10 3 8	050-040
1217.75926	.9049	10 8 3	11 9 2	020-010	1246.65368	.6689	6 5 2	7 6 1	030-020
1217.83303	.1262	8 3 5	9 4 6	030-020	1246.67563	.6906	15 0 15	16 1 16	020-010
1217.89724	.0664	5 1 5	6 2 4	030-020	1246.76606	.2395	6 5 1	7 6 2	030-020
1218.51812	.1673	21 1 20	21 2 19	020-010	1246.78150	.1085	16 1 15	17 2 16	020-010
1218.67368	.5078	7 4 3	8 5 4	030-020	1247.56909	.0647	12 1 11	12 2 10	050-040
1219.25986	.5494	8 7 2	9 8 1	030-020	1247.69024	.1794	17 4 13	18 5 14	010-000
1219.28979	.0403	19 2 17	19 3 16	040-030	1248.10731	.0440	5 1 4	5 2 3	060-050
1219.46910	.1294	18 2 17	18 3 16	030-020	1249.70792	.1918	6 3 3	7 4 4	030-020
1219.93871	.1232	13 1 13	13 2 12	030-020	1249.92895	.0807	14 1 13	15 2 14	030-020
1220.15692	.0285	20 4 16	21 5 17	010-000	1250.00681	.0957	12 2 11	13 1 12	040-030
1220.52451	.4729	19 0 19	19 1 18	010-000	1250.03224	.2555	19 1 18	19 2 17	020-010
1220.60893	.0342	16 2 14	17 3 15	030-020	1250.37565	.0874	11 1 11	12 0 12	040-030
1220.74466	.0547	16 1 15	17 2 16	030-020	1250.45470	.0765	19 2 18	19 3 17	020-010
1221.02528	.1469	24 2 23	24 3 22	010-000	1250.97092	.1934	14 2 13	15 1 14	030-020
1221.14762	.1135	16 2 15	17 1 16	030-020	1251.03601	.0601	9 1 9	9 2 8	040-030
1221.61243	.0280	12 2 11	13 1 12	050-040	1251.07280	.0565	18 3 15	19 4 16	010-000
1221.75477	.1132	15 15 0	16 1 16	020-010	1251.23774	.2086	10 10 1	11 11 0	030-020
1222.22677	.0504	6 2 4	7 3 5	040-030	1251.25821	.0647	4 2 2	5 3 3	040-030
1222.50696	.0593	18 2 16	19 3 17	020-010	1251.34198	.0371	7 1 6	7 2 5	060-050
1222.77889	.0284	20 3 17	21 4 18	010-000	1251.64907	.1946	22 2 21	22 3 20	010-000
1223.01124	.0843	10 1 10	11 0 11	050-040	1251.72147	.1249	11 1 10	12 2 11	040-030
1223.03759	.1557	18 3 16	19 2 17	020-010	1251.75858	.1140	7 0 7	7 1 6	050-040
1223.43486	.0763	20 4 17	21 3 18	010-000	1251.83730	.1427	15 3 12	16 4 13	020-010
1223.62781	.2544	6 2 5	7 3 4	030-020	1252.18600	.2351	16 2 15	16 3 14	030-020
1224.03563	.0404	5 2 3	5 3 2	060-050	1252.37833	.0524	13 1 13	14 0 14	030-020
1224.32502	.0435	13 1 12	13 2 11	050-040	1252.58960	.0798	16 4 12	17 5 13	010-000
1224.52796	.0956	12 12 1	13 13 0	030-020	1253.23367	.0480	6 1 6	7 0 7	060-050
1224.93116	.0371	2 2 0	3 3 1	050-040	1253.26323	.2300	16 3 14	17 2 15	020-010
1225.07959	.1707	10 1 10	10 2 9	040-030	1253.51452	.0307	17 5 13	18 4 14	020-010
1225.29260	.0761	16 3 14	17 2 15	030-020	1253.98998	.0955	20 3 18	20 4 17	030-020
1225.71405	.1549	11 10 1	12 11 2	030-020	1254.66822	.0628	13 2 12	13 3 11	040-030
1225.96312	.0994	15 1 14	15 2 13	040-030	1254.84242	.0837	23 2 21	23 3 20	020-010
1226.03588	.0379	11 1 10	11 2 9	060-050	1255.58101	.5040	11 11 0	12 12 1	020-010
1226.24442	.0817	20 5 16	21 4 17	010-000	1255.85901	.1266	14 3 12	15 2 13	030-020
1226.40489	.0862	18 4 15	19 3 16	020-010	1256.30229	.9226	6 6 1	7 7 0	030-020
1226.86723	.6159	16 1 16	17 0 17	020-010	1256.46008	.1115	18 5 14	19 4 15	010-000
1228.16800	.2286	12 10 3	13 11 2	020-010	1256.61350	.1404	16 4 13	17 3 14	020-010
1228.41194	.1402	14 14 1	15 15 0	020-010	1256.95765	.0695	14 3 11	15 4 12	020-010
1230.84284	.3865	12 11 2	13 12 1	020-010	1257.29758	.1037	8 1 8	9 0 9	050-040
1231.01664	.0944	19 4 15	20 5 16	010-000	1259.05918	.0384	12 2 10	13 3 11	030-020
1231.52299	.6939	7 6 1	8 7 2	030-020	1259.82676	.2048	9 0 9	9 1 8	040-030
1231.63346	.4280	7 3 4	8 4 5	030-020	1261.24418	.0399	10 1 9	11 2 10	040-030

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1262.19083	.2750	3 3 0	4 4 1	040-030	1299.49187	.0651	5 3 2	5 4 1	050-040
1262.28877	.1369	12 3 9	13 4 10	020-010	1300.51095	.0747	7 3 4	7 4 3	050-040
1262.50066	.0459	12 3 10	12 4 9	050-040	1300.95838	.1470	19 2 18	19 3 17	010-000
1263.21320	.0773	17 2 15	17 3 14	040-030	1300.97580	.3843	19 1 18	19 2 17	010-000
1263.22862	.3782	15 1 14	16 2 15	020-010	1301.14602	.1096	14 3 12	14 4 11	040-030
1263.33257	.0343	5 1 5	5 2 4	050-040	1301.70081	.2092	20 3 18	20 4 17	020-010
1263.39987	.1359	15 2 14	16 1 15	020-010	1301.87181	.4796	16 2 15	16 3 14	020-010
1263.76924	.0552	3 1 3	4 2 2	040-030	1302.13467	.0724	20 2 18	20 3 17	020-010
1264.26187	.1971	14 0 14	14 1 13	020-010	1302.21803	.1538	16 1 15	16 2 14	020-010
1264.39646	.2221	13 1 12	13 2 11	040-030	1302.37468	.1176	12 2 10	13 3 11	020-010
1264.44240	.1144	17 3 15	18 2 16	010-000	1303.22668	.1314	9 1 8	9 2 7	050-040
1264.54023	.3248	17 3 14	18 4 15	010-000	1304.70315	.1153	5 2 3	5 3 2	050-040
1265.29849	.0527	11 2 10	12 1 11	040-030	1305.99542	.0984	13 2 12	13 3 11	030-020
1266.18675	.1118	11 1 10	11 2 9	050-040	1306.17185	.0630	9 3 6	9 4 5	050-040
1266.26734	.0836	13 2 12	14 1 13	030-020	1307.50939	.0790	15 2 13	15 3 12	040-030
1266.46694	.0845	10 0 10	11 1 11	040-030	1307.99817	.1484	17 2 15	17 3 14	030-020
1266.78327	.3292	18 2 17	18 3 16	020-010	1308.30465	.5248	10 1 10	11 0 11	030-020
1266.88306	.1811	18 1 17	18 2 16	020-010	1308.47979	.1303	5 0 5	5 1 4	050-040
1266.90116	.2550	5 4 2	6 5 1	030-020	1310.11637	.2186	11 1 10	11 2 9	040-030
1266.99343	.7529	5 4 1	6 5 2	030-020	1314.21639	.1513	4 2 2	5 3 3	030-020
1267.35735	.0600	3 2 2	4 3 1	040-030	1314.42306	.3239	10 2 9	11 1 10	030-020
1267.71333	.2890	21 1 20	21 2 19	010-000	1315.11647	.0584	11 3 8	11 4 7	050-040
1267.93464	.0975	17 4 14	18 3 15	010-000	1315.70660	.0615	11 2 9	11 3 8	050-040
1268.14438	.2855	5 3 3	6 4 2	030-020	1316.20407	.1136	7 2 5	7 3 4	050-040
1268.33385	.1092	8 2 7	8 3 6	050-040	1317.18408	.0795	19 3 17	19 4 16	020-010
1268.46752	.0866	15 3 13	16 2 14	020-010	1317.81007	.1547	22 3 20	22 4 19	010-000
1269.16649	.0662	12 3 10	13 2 11	040-030	1317.85286	.2430	19 2 17	19 3 16	020-010
1269.67928	.0768	15 2 14	15 3 13	030-020	1318.08618	.1710	18 1 17	18 2 16	010-000
1270.01660	.0857	10 2 8	11 3 9	030-020	1318.32519	.4019	9 1 8	10 2 9	030-020
1270.03432	.0553	1 1 0	2 2 1	050-040	1319.02986	.2402	16 3 14	16 4 13	030-020
1270.15552	.1361	11 1 11	11 2 10	030-020	1319.08554	.0814	9 2 8	9 3 7	040-030
1270.23863	.0897	16 3 14	16 4 13	040-030	1320.60426	.5611	15 1 14	15 2 13	020-010
1270.35770	.1557	12 2 11	12 3 10	040-030	1323.20637	.1182	9 2 7	9 3 6	050-040
1270.52839	.0868	22 3 20	22 4 19	020-010	1323.43975	.4036	9 0 9	9 1 8	030-020
1270.91163	.1932	12 0 12	13 1 13	030-020	1323.98515	.0712	16 4 13	16 5 12	040-030
1271.51111	.4399	11 0 11	11 1 10	030-020	1326.86580	.1983	9 1 9	10 0 10	030-020
1271.54677	.2432	5 5 1	6 6 0	030-020	1327.75168	.1366	7 1 6	7 2 5	050-040
1271.68285	.7665	5 5 0	6 6 1	030-020	1327.99455	.0606	2 1 1	3 2 2	040-030
1272.72120	.0963	19 2 17	19 3 16	030-020	1328.94157	.1211	8 1 7	9 2 8	030-020
1274.00568	.0576	25 2 23	25 3 22	010-000	1331.99216	.1167	9 2 8	10 1 9	030-020
1274.49641	.0527	18 6 13	19 5 14	020-010	1332.02507	.1849	10 3 8	11 2 9	030-020
1275.20805	.1504	4 1 4	5 2 3	030-020	1332.42697	.0479	22 4 19	22 5 18	020-010
1275.66229	.0372	7 1 7	8 0 8	050-040	1332.60864	.1892	21 2 19	21 3 18	010-000
1277.28944	.1305	16 3 13	17 4 14	010-000	1332.72765	.2414	18 3 16	18 4 15	020-010
1277.33189	.0559	7 2 6	7 3 5	050-040	1333.28737	.0692	12 1 11	12 2 10	030-020
1277.78111	.0707	18 6 13	19 5 14	010-000	1333.60465	.0800	10 1 9	10 2 8	040-030
1278.95104	.1192	12 1 11	13 2 12	030-020	1333.63415	.0601	25 3 22	25 4 21	010-000
1279.33027	.1098	14 2 12	15 3 13	020-010	1333.89613	.0787	18 2 16	18 3 15	020-010
1279.69922	.1607	14 1 13	15 2 14	020-010	1334.22632	.0637	15 3 13	15 4 12	030-020
1280.00751	.5335	14 2 13	15 1 14	020-010	1335.30864	.0772	14 5 10	15 4 11	020-010
1280.33169	.0698	4 1 4	4 2 3	050-040	1336.74136	.1870	12 4 9	13 3 10	020-010
1280.62370	.3779	7 2 5	8 3 6	030-020	1337.72765	.0563	16 6 11	17 5 12	010-000
1281.57725	.4086	10 0 11	11 1 10	020-010	1337.96452	.3660	7 1 6	8 2 7	030-020
1281.71167	.1020	10 2 9	11 1 10	040-030	1338.28596	.6167	14 2 13	14 3 12	020-010
1281.85332	.2774	12 2 11	13 1 12	030-020	1339.11628	.1059	4 1 4	5 0 5	050-040
1281.98546	.0547	6 0 6	6 1 5	050-040	1341.50320	.1681	10 3 8	10 4 7	040-030
1282.36260	.0638	10 3 8	10 4 7	050-040	1342.37767	.1524	11 2 10	11 3 9	030-020
1283.69859	.3007	14 3 12	15 2 13	020-010	1342.39358	.3840	8 1 8	8 2 7	030-020
1284.11319	.1206	17 2 16	17 3 15	020-010	1343.05706	.0754	7 2 6	7 3 5	040-030
1284.16401	.3444	20 2 19	20 3 18	010-000	1343.33588	.0821	19 3 16	19 4 15	030-020
1284.30094	.3957	17 1 16	17 2 15	020-010	1343.63371	.0585	17 3 14	17 4 13	040-030
1284.45576	.0565	16 2 14	16 3 13	040-030	1344.79530	.0583	14 5 10	15 4 11	030-020
1284.61119	.0873	6 2 5	6 3 4	050-040	1344.82723	.1558	15 2 13	15 3 12	030-020
1285.73403	.0533	9 1 9	10 0 10	040-030	1345.42285	.6195	8 1 8	9 0 9	030-020
1286.42961	.1277	21 2 19	21 3 18	020-010	1346.31592	.0631	18 4 15	18 5 14	030-020
1287.08929	.0252	6 1 5	7 2 6	040-030	1347.41162	.2760	20 3 18	20 4 17	010-000
1288.04080	.1239	6 2 4	7 3 5	030-020	1347.54946	.0819	20 2 18	20 3 17	010-000
1288.65267	.0511	24 3 22	24 4 21	010-000	1347.58512	.0389	13 4 10	13 5 9	040-030
1290.24188	.0359	18 2 16	18 3 15	030-020	1347.79965	.0706	9 3 7	9 4 6	040-030
1290.29706	.1636	12 3 10	13 2 11	030-020	1347.98121	.1133	21 3 18	21 4 17	020-010
1291.69174	.2670	4 4 0	5 5 1	030-020	1348.32724	.0933	17 3 15	17 4 14	020-010
1292.17459	.4120	13 2 11	14 3 12	020-010	1349.53742	.2437	14 3 12	14 4 11	030-020
1292.33129	.1877	16 5 12	17 4 13	010-000	1350.02043	.1196	13 2 11	13 3 10	040-030
1292.58155	.0334	8 3 6	8 4 5	050-040	1350.35181	.3062	17 2 15	17 3 14	020-010
1293.59701	.2202	2 2 1	3 3 0	040-030	1351.11919	.3275	8 2 7	9 1 8	030-020
1293.73221	.0670	4 2 3	4 3 2	050-040	1351.80860	.1894	6 2 5	6 3 4	040-030
1294.39028	.1973	4 3 1	5 4 2	030-020	1354.78085	.4155	11 1 10	11 2 9	030-020
1294.81395	.3615	10 1 10	10 2 9	030-020	1355.51881	.0492	7 3 5	7 4 4	040-030
1295.44659	.0329	7 3 5	7 4 4	050-040	1355.88752	.0354	11 4 8	11 5 7	040-030
1297.83206	.0507	11 2 10	12 1 11	030-020	1356.77896	.0632	12 4 9	12 5 8	040-030

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1357.93959	.1997	10 4 7	10 5 6	040-030	1398.72811	.0839	1 0 1	2 1 2	040-030
1358.28816	.0495	5 2 4	5 3 3	040-030	1398.82247	.0646	4 0 4	4 1 3	040-030
1359.23297	.0628	9 3 7	10 2 8	030-020	1399.04639	.0504	16 3 13	16 4 12	030-020
1359.50574	.4372	10 2 9	10 3 8	030-020	1400.30267	.1095	17 4 14	17 5 13	020-010
1359.74822	.0358	9 4 6	9 5 5	040-030	1400.84361	.1975	16 5 12	16 6 11	030-020
1359.89767	.1288	20 4 17	20 5 16	020-010	1400.99005	.0418	12 7 6	12 8 5	040-030
1360.19857	.0180	27 4 23	27 5 22	010-000	1401.26190	.2251	20 4 17	20 5 16	010-000
1360.81172	.0592	5 1 5	6 0 6	040-030	1402.01085	.5490	9 1 8	9 2 7	030-020
1360.95779	.0695	23 3 20	23 4 19	010-000	1402.11111	.0511	10 4 7	11 3 8	030-020
1361.50962	.0411	6 3 3	6 4 2	040-030	1403.58273	.0512	19 4 15	19 5 14	030-020
1361.91439	.0216	7 4 4	7 5 3	040-030	1405.51202	.0228	9 7 2	9 8 1	040-030
1362.44760	.1029	19 3 17	19 4 16	010-000	1405.85617	.1174	12 2 10	12 3 9	030-020
1362.53960	.0801	13 3 11	13 4 10	030-020	1406.31077	.0935	11 4 8	11 5 7	030-020
1362.62191	.0785	6 4 3	6 5 2	040-030	1406.34174	.0975	20 5 16	20 6 15	020-010
1362.67679	.0314	8 4 4	8 5 3	040-030	1406.68414	.0746	4 1 3	4 2 2	040-030
1362.70581	.3403	19 2 17	19 3 16	010-000	1406.75452	.0722	21 4 17	21 5 16	020-010
1362.73900	.0289	6 4 2	6 5 1	040-030	1406.82625	.0603	15 5 11	15 6 10	030-020
1363.10471	.0317	20 3 17	20 4 16	020-010	1408.37882	.5045	8 3 6	8 4 5	030-020
1363.76096	.1081	9 4 5	9 5 4	040-030	1409.95331	.1791	14 5 10	14 6 9	030-020
1363.92712	.3674	16 3 14	16 4 13	020-010	1410.18954	.0542	18 6 13	18 7 12	030-020
1365.22012	.0554	10 4 6	10 5 5	040-030	1411.68359	.0939	11 5 7	11 6 6	030-020
1366.20478	.0423	20 5 16	20 6 15	030-020	1412.77656	.3836	16 4 13	16 5 12	020-010
1366.68259	.0354	14 5 10	14 6 9	040-030	1412.95472	.0863	23 4 19	23 5 18	010-000
1367.13745	.0579	11 5 6	11 6 5	040-030	1413.08662	.3226	17 3 14	17 4 13	020-010
1367.18606	.0520	11 4 8	12 3 9	020-010	1413.47621	.1299	13 5 9	13 6 8	030-020
1367.40360	.1138	16 2 14	16 3 13	020-010	1413.75806	.0640	5 4 2	5 5 1	030-020
1368.23587	.0930	11 4 7	11 5 6	040-030	1414.10524	.2370	15 3 12	15 4 11	030-020
1368.96136	.0676	12 5 8	12 6 7	040-030	1414.20593	.0718	13 6 7	13 7 6	030-020
1369.18240	.0303	8 3 5	8 4 4	040-030	1414.50955	.0301	17 6 12	17 7 11	030-020
1369.75144	.1381	16 4 13	16 5 12	030-020	1414.85933	.1197	19 4 16	19 5 15	010-000
1370.62892	.0412	3 1 3	3 2 2	040-030	1415.35323	.1321	8 4 4	8 5 3	030-020
1372.41112	.0366	12 4 8	12 5 7	040-030	1416.29476	.0991	9 5 5	9 6 4	030-020
1373.66006	.0236	19 4 16	19 5 15	020-010	1416.48740	.0640	4 3 1	4 4 0	030-020
1374.14577	.0925	22 4 19	22 5 18	010-000	1417.22359	.2201	12 5 8	12 6 7	030-020
1375.48381	.0622	8 1 7	8 2 6	040-030	1417.76591	.5161	9 4 5	9 5 4	030-020
1377.07697	.0750	13 4 9	13 5 8	040-030	1417.83842	.1139	16 6 11	16 7 10	030-020
1377.63355	.4125	18 3 16	18 4 15	010-000	1417.87867	.1012	7 5 3	7 6 2	030-020
1377.75068	.2488	12 3 10	12 4 9	030-020	1418.04808	.0742	19 5 15	19 6 14	020-010
1377.79055	.1910	5 2 3	5 3 2	040-030	1418.21106	.1114	10 5 5	10 6 4	030-020
1378.10692	.1378	18 2 16	18 3 15	010-000	1418.49059	.0777	6 5 1	6 6 0	030-020
1378.27033	.1665	11 2 9	11 3 8	040-030	1418.61703	.2734	11 5 6	11 6 5	030-020
1378.86835	.1389	19 3 16	19 4 15	020-010	1418.69534	.1667	5 2 4	5 3 3	030-020
1379.84897	.0358	15 4 12	15 5 11	030-020	1418.71359	.0190	20 7 14	20 8 13	030-020
1379.91422	.1155	17 3 14	17 4 13	030-020	1420.15230	.0634	12 5 7	12 6 6	030-020
1380.19755	.0205	14 6 9	14 7 8	040-030	1420.35624	.0421	15 6 10	15 7 9	030-020
1381.84407	.0325	10 3 7	10 4 6	040-030	1421.91133	.1130	10 4 6	10 5 5	030-020
1382.27772	.1611	4 1 4	5 0 5	040-030	1422.25694	.1227	14 6 9	14 7 8	030-020
1382.67737	.0367	22 5 18	22 6 17	020-010	1422.30428	.0478	22 6 17	22 7 16	020-010
1383.54639	.0403	12 6 7	12 7 6	040-030	1422.70295	.1154	22 5 18	22 6 17	010-000
1383.68159	.0347	2 0 2	3 1 3	040-030	1422.88880	.0402	20 4 16	20 5 15	020-010
1383.91740	.0417	15 3 12	15 4 11	040-030	1422.96413	.2181	13 5 8	13 6 7	030-020
1384.52658	.0409	6 2 4	6 3 3	040-030	1423.75723	.0633	13 6 8	13 7 7	030-020
1384.77425	.0133	11 6 6	11 7 5	040-030	1424.72649	.1693	12 6 7	12 7 6	030-020
1384.88374	.0202	13 6 7	13 7 6	040-030	1424.97424	.4837	7 3 4	7 4 3	030-020
1385.13368	.0470	18 5 14	18 6 13	030-020	1425.43699	.0561	11 6 6	11 7 5	030-020
1385.24200	.0686	11 6 5	11 7 4	040-030	1426.15883	.0390	22 4 18	22 5 17	010-000
1385.28950	.4650	15 2 13	15 3 12	020-010	1426.47500	.0565	10 6 4	10 7 3	030-020
1386.06079	.1820	11 3 9	11 4 8	030-020	1426.66894	.2675	11 6 5	11 7 4	030-020
1386.16722	.0397	25 4 21	25 5 20	010-000	1427.05973	.0800	14 5 9	14 6 8	030-020
1386.30945	.0644	8 3 6	9 2 7	040-030	1427.24301	.0832	2 0 2	2 1 1	040-030
1386.38437	.1269	13 3 10	13 4 9	040-030	1427.57456	.0654	8 6 2	8 7 1	030-020
1386.82815	.1648	11 3 8	11 4 7	040-030	1428.29330	.1082	7 6 1	7 7 0	030-020
1387.18643	.2123	18 4 15	18 5 14	020-010	1428.33503	.1948	18 5 14	18 6 13	020-010
1387.21378	.0541	9 6 3	9 7 2	040-030	1428.37890	.4821	18 4 15	18 5 14	010-000
1387.67473	.0549	21 4 18	21 5 17	010-000	1428.83889	.0571	12 6 6	12 7 5	030-020
1388.21486	.0934	10 2 8	10 3 7	040-030	1431.60971	.0741	16 3 13	16 4 12	020-010
1388.23754	.0445	8 6 3	8 7 2	040-030	1431.83629	.0272	23 5 18	23 6 17	020-010
1388.45780	.1818	21 3 18	21 4 17	010-000	1431.88530	.1182	15 5 10	15 6 9	030-020
1388.67978	.2170	14 4 11	14 5 10	030-020	1432.01800	.1160	8 3 5	8 4 4	030-020
1388.79836	.0490	12 3 9	12 4 8	040-030	1432.40106	.0679	14 3 11	14 4 10	030-020
1389.07360	.2065	13 2 11	13 2 10	030-020	1432.45022	.1324	18 3 15	18 4 14	010-000
1390.57243	.1314	8 3 6	9 2 7	030-020	1433.93043	.0730	14 7 8	14 8 7	030-020
1393.94243	.0812	8 2 6	8 3 5	040-030	1433.96610	.0404	15 7 8	15 8 7	030-020
1394.38120	.5857	14 3 12	14 4 11	020-010	1434.45545	.1181	12 4 8	12 5 7	030-020
1394.60568	.0671	12 4 9	12 5 8	030-020	1434.48262	.4981	14 4 11	14 5 10	020-010
1395.47719	.0735	18 3 15	18 4 14	020-010	1435.25701	.0461	4 2 3	5 1 4	040-030
1395.54679	.4902	10 3 8	10 4 7	030-020	1435.49352	.0804	13 7 6	13 8 5	030-020
1397.00747	.0747	13 4 10	13 5 9	030-020	1435.78345	.1395	17 4 13	17 5 12	030-020
1398.01767	.0356	20 6 15	20 7 14	030-020	1437.39557	.0919	17 5 13	17 6 12	020-010
1398.11797	.0328	24 5 20	24 6 19	010-000	1437.48495	.1380	15 4 11	15 5 10	030-020

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1437.69929	.0297	11 7 5	11 8 4	030-020	1485.73719	.0758	15 9 6	15 10 5	020-010
1437.72407	.1127	11 7 4	11 8 3	030-020	1486.27451	.2380	11 8 3	11 9 2	020-010
1438.71342	.0338	19 6 13	19 7 12	030-020	1487.71883	.2164	10 8 3	10 9 2	020-010
1438.88133	.1430	10 7 4	10 8 3	030-020	1487.82826	.1836	17 6 11	17 7 10	020-010
1438.95703	.5314	9 3 6	9 4 5	030-020	1487.88330	.0397	21 7 14	21 8 13	020-010
1439.22601	.3831	13 3 10	13 4 9	030-020	1488.89241	.1070	14 9 6	14 10 5	020-010
1439.37426	.2510	10 2 8	10 3 7	030-020	1488.92404	.3405	15 5 10	15 6 9	020-010
1439.94474	.0309	16 4 12	16 5 11	030-020	1488.94749	.1776	19 5 14	19 6 13	020-010
1440.02235	.0983	9 7 2	9 8 1	030-020	1489.34559	.1099	18 4 14	18 5 13	010-000
1440.46388	.3361	13 4 9	13 5 8	030-020	1490.79536	.0528	19 6 14	19 7 13	010-000
1440.72148	.2035	19 4 15	19 5 14	020-010	1491.63555	.2820	12 4 8	12 5 7	020-010
1440.87875	.1856	21 4 17	21 5 16	010-000	1491.85934	.1367	13 9 4	13 10 3	020-010
1441.10946	.1006	8 7 2	8 8 1	030-020	1493.28160	.0751	19 6 13	19 7 12	020-010
1441.67812	.1884	17 4 14	17 5 13	010-000	1494.10941	.0576	22 7 16	22 8 15	010-000
1443.02926	.0613	17 6 11	17 7 10	030-020	1494.53357	.4821	15 4 11	15 5 10	020-010
1443.43435	.2452	13 4 10	13 5 9	020-010	1494.61041	.1121	12 9 4	12 10 3	020-010
1443.74874	.0782	14 4 10	14 5 9	030-020	1494.97261	.0612	21 6 15	21 7 14	020-010
1444.35380	.1003	17 5 12	17 6 11	030-020	1495.82540	.0520	18 5 13	18 6 12	020-010
1444.45889	.0511	19 5 14	19 6 13	030-020	1496.31085	.6740	13 4 9	13 5 8	020-010
1444.95821	.1850	10 3 7	10 4 6	030-020	1496.56659	.1764	14 4 10	14 5 9	020-010
1445.89846	.0415	16 8 9	16 9 8	030-020	1496.77890	.1294	21 5 16	21 6 15	010-000
1446.21175	.1573	12 3 9	12 4 8	030-020	1497.13859	.1080	11 9 2	11 10 1	020-010
1447.31940	.2172	20 5 16	20 6 15	010-000	1497.24182	.2903	18 6 13	18 7 12	010-000
1448.76805	.7068	9 2 7	9 3 6	030-020	1497.68192	.2319	17 5 12	17 6 11	020-010
1450.28592	.0788	13 8 5	13 9 4	030-020	1498.69414	.0759	16 5 11	16 6 10	020-010
1451.33652	.3093	15 3 12	15 4 11	020-010	1499.44437	.0497	10 9 2	10 10 1	020-010
1451.75005	.0659	12 8 5	12 9 4	030-020	1499.98877	.0550	5 0 5	4 1 4	050-040
1451.89104	.0911	15 5 11	15 6 10	020-010	1502.28420	.1543	17 6 12	17 7 11	010-000
1453.21513	.0722	11 8 3	11 9 2	030-020	1505.22382	.1287	20 7 14	20 8 13	010-000
1453.63588	.1242	18 6 13	18 7 12	020-010	1506.26251	.5038	17 4 13	17 5 12	010-000
1457.92558	.0512	18 4 14	18 5 13	020-010	1508.95194	.0587	19 7 13	19 8 12	010-000
1458.18181	.0464	17 6 12	17 7 11	020-010	1511.59405	.2381	18 7 12	18 8 11	010-000
1461.53498	.3379	16 6 11	16 7 10	020-010	1512.43368	.0391	20 5 15	20 6 14	010-000
1462.20918	.0539	6 3 4	7 2 5	030-020	1513.33649	.1067	17 7 11	17 8 10	010-000
1463.91267	.0880	15 6 10	15 7 9	020-010	1513.60626	.1118	3 0 3	2 1 2	040-030
1464.86283	.3480	14 6 9	14 7 8	020-010	1517.40047	.0950	20 8 13	20 9 12	010-000
1466.60553	.0993	18 7 12	18 8 11	020-010	1519.14650	.1281	16 7 9	16 8 8	010-000
1467.27167	.1405	11 6 6	11 7 5	020-010	1520.33854	.1749	18 8 11	18 9 10	010-000
1467.59701	.3815	13 6 7	13 7 6	020-010	1522.09493	.3037	16 8 9	16 9 8	010-000
1467.95994	.2059	14 3 11	14 4 10	020-010	1522.10750	.3287	17 7 10	17 8 9	010-000
1468.94588	.1216	14 6 8	14 7 7	020-010	1522.50909	.2071	17 8 9	17 9 8	010-000
1469.13662	.0296	20 8 13	20 9 12	020-010	1522.64348	.1154	16 8 8	16 9 7	010-000
1469.63619	.3403	18 5 14	18 6 13	010-000	1523.26915	.0615	22 9 14	22 10 13	010-000
1470.38694	.1608	16 7 10	16 8 9	020-010	1523.71334	.1356	19 8 11	19 9 10	010-000
1470.82522	.1982	12 5 7	12 6 6	020-010	1526.42123	.1009	18 7 11	18 8 10	010-000
1471.06236	.2581	15 6 9	15 7 8	020-010	1527.08857	.0942	20 9 12	20 10 11	010-000
1472.38600	.2489	19 4 15	19 5 14	010-000	1527.64917	.0666	21 9 12	21 10 11	010-000
1472.59878	.0560	16 6 10	16 7 9	020-010	1527.75383	.0444	23 9 14	23 10 13	010-000
1472.69697	.2449	14 7 8	14 8 7	020-010	1528.35524	.0878	21 8 13	21 9 12	010-000
1473.37280	.2160	15 7 8	15 8 7	020-010	1529.26387	.0574	19 9 10	19 10 9	010-000
1473.46500	.0914	14 7 7	14 8 6	020-010	1529.98098	.1552	3 1 2	3 0 3	040-030
1473.48288	.2615	17 4 13	17 5 12	020-010	1530.06534	.1975	18 9 10	18 10 9	010-000
1473.63851	.0719	13 7 7	13 8 6	020-010	1530.34400	.0489	18 9 9	18 10 8	010-000
1473.87881	.0278	16 7 9	16 8 8	020-010	1530.60444	.1576	16 6 10	16 7 9	010-000
1473.94596	.2631	13 7 6	13 8 5	020-010	1530.79159	.0324	22 6 16	22 7 15	010-000
1474.09549	.0495	21 6 16	21 7 15	010-000	1530.92337	.0425	17 10 7	17 11 6	020-010
1474.13967	.0528	18 8 11	18 9 10	020-010	1531.37072	.0459	17 9 9	17 10 8	010-000
1474.53463	.3052	12 7 6	12 8 5	020-010	1531.48529	.1555	17 9 8	17 10 7	010-000
1474.64367	.0946	12 7 5	12 8 4	020-010	1531.89541	.1693	19 7 12	19 8 11	010-000
1475.14656	.1353	17 7 10	17 8 9	020-010	1532.59776	.1903	16 9 8	16 10 7	010-000
1475.41719	.0936	11 7 5	11 8 4	020-010	1532.64378	.0703	16 9 7	16 10 6	010-000
1475.45043	.3114	11 7 4	11 8 3	020-010	1532.99934	.0484	4 1 4	3 0 3	050-040
1475.77365	.0544	19 8 11	19 9 10	020-010	1533.44607	.0616	5 1 4	5 0 5	050-040
1476.29580	.8200	13 5 8	13 6 7	020-010	1534.12936	.1371	16 10 7	16 11 6	020-010
1477.95893	.0940	16 8 9	16 9 8	020-010	1536.45940	.0378	7 3 4	6 4 3	040-030
1478.98769	.0542	17 8 9	17 9 8	020-010	1537.40741	.1382	15 10 5	15 11 4	020-010
1479.07099	.0430	17 9 8	17 10 7	020-010	1537.75182	.0523	20 7 13	20 8 12	010-000
1479.44286	.1422	17 5 13	17 6 12	010-000	1538.60878	.0884	20 10 11	20 11 10	010-000
1479.50745	.1280	15 8 7	15 9 6	020-010	1539.74844	.0373	4 0 4	3 1 3	040-030
1479.69336	.0579	15 8 8	15 9 7	020-010	1539.82634	.1205	21 6 15	21 7 14	010-000
1479.82468	.0736	19 7 12	19 8 11	020-010	1540.65819	.0754	19 10 9	19 11 8	010-000
1480.96465	.0296	23 6 17	23 7 16	020-010	1540.78873	.0714	14 10 5	14 11 4	020-010
1481.34182	.0353	14 8 6	14 9 5	020-010	1542.45947	.0904	18 10 9	18 11 8	010-000
1481.40076	.1465	14 8 7	14 9 6	020-010	1542.64917	.0936	21 7 14	21 8 13	010-000
1482.40803	.0541	16 9 8	16 10 7	020-010	1543.23159	.1164	18 6 12	18 7 11	010-000
1482.88204	.1541	14 5 9	14 6 8	020-010	1543.37934	.5302	17 5 12	17 6 11	010-000
1483.02661	.1534	20 6 15	20 7 14	010-000	1544.22153	.1395	17 10 7	17 11 6	010-000
1483.08606	.1708	13 8 5	13 9 4	020-010	1544.33513	.0682	13 10 3	13 11 2	020-010
1484.73035	.2649	12 8 5	12 9 4	020-010	1544.97873	.0482	20 6 14	20 7 13	010-000
1485.50794	.1499	16 4 12	16 5 11	020-010	1545.47918	.0782	2 1 2	1 0 1	040-030

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1545.87433	.1595	16 10 7	16 11 6	010-000	1665.11569	.0000	10 3 7	10 2 8	030-020
1546.01346	.2653	19 6 13	19 7 12	010-000	1665.78359	.0417	10 0 10	9 1 9	040-030
1546.39715	.0638	15 11 4	15 12 3	020-010	1667.72949	.0940	10 1 10	9 0 9	040-030
1547.15168	.0391	22 11 12	22 12 11	010-000	1668.38409	.0182	4 2 3	3 1 2	040-030
1548.67609	.0518	5 1 4	4 2 3	040-030	1671.08746	.0464	7 1 6	7 0 7	030-020
1548.97797	.0811	14 11 4	14 12 3	020-010	1698.98949	.0376	10 4 6	10 3 7	030-020
1549.85564	.0825	7 0 7	6 1 6	050-040	1700.86462	.0485	11 4 7	10 5 6	030-020
1551.48463	.0711	13 11 2	13 12 1	020-010	1702.04067	.0743	12 0 12	11 1 11	040-030
1552.07251	.0444	11 10 1	11 11 0	020-010	1702.32085	.0575	14 1 14	13 0 13	050-040
1553.73298	.0647	6 2 5	5 3 2	030-020	1702.83410	.2542	12 1 12	11 0 11	040-030
1553.94751	.0442	12 11 2	12 12 1	020-010	1703.01473	.1224	8 1 7	7 2 6	030-020
1554.88977	.0662	19 11 8	19 12 7	010-000	1704.41170	.0580	7 3 5	7 2 6	030-020
1557.15102	.0952	18 11 8	18 12 7	010-000	1708.62355	.1400	9 4 5	9 3 6	030-020
1559.28859	.1113	17 11 6	17 12 5	010-000	1708.75533	.2902	10 0 10	9 1 9	030-020
1561.30910	.1363	16 11 6	16 12 5	010-000	1712.34613	.0980	12 4 8	12 3 9	020-010
1564.38406	.1874	5 0 5	4 1 4	040-030	1712.49131	.2906	8 2 7	7 1 6	040-030
1566.16599	.0566	5 2 3	4 3 2	030-020	1717.98598	.1720	9 2 7	8 3 6	030-020
1567.55516	.0439	7 2 5	7 1 6	050-040	1718.38016	.1306	8 3 6	8 2 7	030-020
1568.22087	.0445	20 12 9	20 13 8	010-000	1719.01767	.0678	8 2 7	8 1 8	030-020
1573.61609	.0694	18 12 7	18 13 6	010-000	1719.84479	.0413	8 4 4	8 3 5	030-020
1573.64856	.1437	4 1 4	3 0 3	040-030	1720.04014	.2328	13 0 13	12 1 12	040-030
1573.78130	.1009	5 1 4	5 0 5	040-030	1720.57514	.0682	13 1 13	12 0 12	040-030
1574.22439	.0592	7 2 5	6 3 4	040-030	1722.25221	.0577	15 0 15	14 1 14	050-040
1574.31428	.1144	5 2 3	5 1 4	040-030	1722.32950	.1079	7 2 6	6 1 5	030-020
1575.57177	.0447	10 3 8	9 4 5	040-030	1724.88438	.0506	9 4 5	9 3 6	040-030
1576.09878	.0861	17 12 5	17 13 4	010-000	1725.35162	.0400	9 2 8	8 1 7	040-030
1577.27216	.1192	3 2 1	3 1 2	040-030	1725.86282	.7507	11 0 11	10 1 10	030-020
1578.46258	.0525	16 12 5	16 13 4	010-000	1726.18318	.2441	11 1 11	10 0 10	030-020
1584.31447	.0346	6 1 5	5 2 4	040-030	1729.14741	.2137	13 4 9	13 3 10	020-010
1585.00853	.0654	13 12 1	13 13 0	010-000	1729.81970	.4036	9 1 8	8 2 7	030-020
1585.41477	.0277	20 13 8	20 14 7	010-000	1729.87086	.0994	7 4 3	7 3 4	030-020
1587.05592	.0750	5 1 5	4 0 4	040-030	1732.78005	.0443	11 2 9	10 3 8	040-030
1587.16585	.0708	6 0 6	5 1 5	040-030	1732.84935	.0730	9 1 8	9 0 9	030-020
1588.53798	.0314	19 13 6	19 14 5	010-000	1735.20947	.0431	9 3 7	9 2 8	030-020
1588.78006	.0832	8 1 8	7 0 7	050-040	1738.12359	.0722	14 0 14	13 1 13	040-030
1591.50432	.0481	18 13 6	18 14 5	010-000	1738.48808	.3351	14 1 14	13 0 13	040-030
1594.22006	.1052	7 2 5	7 1 6	040-030	1740.32966	.1336	11 1 10	10 2 9	040-030
1594.35158	.0380	17 13 4	17 14 3	010-000	1740.59277	.1402	10 2 9	9 1 8	040-030
1594.48300	.1253	9 0 9	8 1 8	050-040	1741.60209	.0923	5 4 1	5 3 2	030-020
1597.09366	.0409	16 13 4	16 14 3	010-000	1742.64283	.0618	14 5 9	14 4 10	020-010
1597.85604	.0935	7 3 4	6 4 3	030-020	1742.73687	.2393	12 0 12	11 1 11	030-020
1599.75829	.0497	15 13 2	15 14 1	010-000	1742.91704	.7053	12 1 12	11 0 11	030-020
1600.02639	.0432	2 2 1	2 1 2	040-030	1744.17613	.0412	13 3 10	13 2 11	030-020
1601.44672	.2073	6 1 6	5 0 5	040-030	1744.32108	.0551	4 4 1	4 3 2	030-020
1601.72009	.0609	8 3 6	7 4 3	030-020	1744.63863	.0745	11 2 9	11 1 10	030-020
1605.77796	.0387	9 1 9	8 0 8	050-040	1744.96997	.1798	13 5 8	13 4 9	020-010
1607.81778	.0194	8 4 5	7 5 2	030-020	1745.79949	.1557	6 4 3	6 3 4	030-020
1608.29616	.2297	7 0 7	6 1 6	040-030	1747.29895	.1160	15 5 10	15 4 11	020-010
1608.57298	.0910	6 2 4	6 1 5	030-020	1749.07893	.0716	3 3 0	2 2 1	040-030
1613.06741	.0186	9 6 3	10 5 6	020-010	1749.54644	.1306	9 2 8	8 1 7	030-020
1613.70165	.0266	8 2 6	7 3 5	040-030	1750.05550	.0775	11 3 8	10 4 7	030-020
1615.09016	.0242	8 2 6	8 1 7	040-030	1751.87965	.2021	8 4 5	8 3 6	030-020
1616.99021	.0668	7 1 7	6 0 6	040-030	1752.13845	.0480	14 4 10	14 3 11	020-010
1619.39959	.0740	7 1 6	6 2 5	040-030	1752.47349	.0593	13 5 8	13 4 9	030-020
1622.89349	.0284	12 3 10	11 4 7	030-020	1753.01438	.0735	12 5 7	12 4 8	020-010
1623.16941	.0502	4 2 3	4 1 4	040-030	1754.33905	.1447	10 1 9	9 2 8	030-020
1623.72136	.1329	10 1 10	9 0 9	050-040	1754.37265	.0483	12 5 8	11 6 5	020-010
1625.87468	.2432	7 2 5	7 1 6	030-020	1754.45123	.0900	10 3 8	10 2 9	030-020
1627.29683	.0313	12 1 12	11 0 11	060-050	1755.16624	.0651	10 2 8	9 3 7	030-020
1628.19156	.0704	8 0 8	7 1 7	040-030	1756.41555	.1833	15 0 15	14 1 14	040-030
1631.76307	.0370	8 3 5	7 4 4	030-020	1756.64363	.0719	15 1 15	14 0 14	040-030
1633.42457	.2377	8 1 8	7 0 7	040-030	1757.72738	.0446	12 6 7	11 7 4	020-010
1635.29114	.0741	9 3 6	9 2 7	040-030	1758.03546	.0822	11 2 10	10 1 9	040-030
1636.02448	.0264	8 3 5	8 2 6	040-030	1759.43033	.6326	13 0 13	12 1 12	030-020
1636.45348	.0918	11 0 11	10 1 10	050-040	1759.53600	.2122	13 1 13	12 0 12	030-020
1638.39592	.0446	9 4 5	8 5 4	030-020	1760.27396	.0387	12 2 11	11 1 10	050-040
1639.01717	.0374	7 1 6	7 0 7	040-030	1762.22382	.0358	10 1 9	10 0 10	030-020
1640.01799	.0395	6 1 5	6 0 6	030-020	1762.86052	.0494	8 4 5	8 3 6	040-030
1640.24389	.0737	7 2 5	6 3 4	030-020	1765.84844	.0502	12 1 11	11 2 10	040-030
1642.00508	.0647	7 3 4	7 2 5	040-030	1766.09122	.4058	10 2 9	9 1 8	030-020
1642.57129	.0488	9 2 7	9 1 8	040-030	1766.76220	.0940	10 4 7	10 3 8	030-020
1645.10540	.0633	8 3 5	8 2 6	030-020	1768.77329	.0590	10 2 9	10 1 10	030-020
1645.88060	.1996	7 3 4	7 2 5	030-020	1770.20713	.0632	4 3 2	3 2 1	040-030
1647.25266	.2184	9 0 9	8 1 8	040-030	1772.16618	.0434	17 0 17	16 1 16	050-040
1650.03870	.0525	8 2 6	8 1 7	030-020	1774.94911	.0400	16 0 16	15 1 15	040-030
1650.41751	.0774	9 1 9	8 0 8	040-030	1775.18871	.1504	16 1 16	15 0 15	040-030
1651.21017	.1774	9 3 6	9 2 7	030-020	1775.99106	.1983	14 0 14	13 1 13	030-020
1654.01233	.0131	9 2 7	8 3 6	040-030	1776.05546	.5411	14 1 14	13 0 13	030-020
1655.31315	.0276	11 3 8	11 2 9	040-030	1777.20628	.3746	11 1 10	10 2 9	030-020
1661.53538	.0415	12 1 12	11 0 11	050-040	1777.22626	.0928	12 2 11	11 1 10	040-030

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1777.67114	.0988	13 3 10	13 2 11	020-010	1835.00028	.0502	14 4 11	14 3 12	020-010
1779.38110	.0816	11 5 6	11 4 7	030-020	1835.42832	.0416	10 3 8	9 2 7	040-030
1782.01694	.0604	15 4 11	15 3 12	020-010	1836.88981	.0130	19 5 14	19 4 15	020-010
1782.14267	.0492	13 6 7	12 7 6	020-010	1837.76144	.0307	6 3 3	5 2 4	030-020
1782.84661	.0530	17 5 12	17 4 13	020-010	1838.13584	.1298	10 3 8	9 2 7	030-020
1784.07345	.1254	11 2 10	10 1 9	030-020	1838.40334	.0750	15 1 14	14 2 13	040-030
1787.18377	.0403	14 5 10	13 6 7	020-010	1839.18511	.0222	15 3 12	15 2 13	020-010
1789.72086	.1678	11 2 9	10 3 8	030-020	1839.41555	.0361	19 0 19	18 1 18	040-030
1790.42173	.0946	13 1 12	12 2 11	040-030	1839.90429	.0194	16 6 11	15 7 8	020-010
1790.69830	.0406	11 1 10	11 0 11	030-020	1840.68368	.0064	12 2 11	12 1 12	050-040
1791.42702	.1146	17 6 11	17 5 12	010-000	1840.80892	.0124	11 3 9	10 2 8	040-030
1791.72403	.0473	16 5 11	16 4 12	010-000	1840.98410	.1062	14 1 13	13 2 12	030-020
1792.46469	.4280	15 0 15	14 1 14	030-020	1841.43818	.0946	13 4 9	12 5 8	020-010
1792.50041	.1247	15 1 15	14 0 14	030-020	1841.48248	.0485	15 2 14	14 1 13	040-030
1794.10032	.0993	19 0 17	16 1 16	040-030	1841.64062	.0086	8 3 6	7 2 5	050-040
1795.72289	.0621	13 5 8	12 6 7	020-010	1841.95132	.0902	18 0 18	17 1 17	030-020
1797.70560	.0955	15 6 9	15 5 10	020-010	1841.97290	.2333	18 1 18	17 0 17	030-020
1799.00299	.1037	12 1 11	11 2 10	030-020	1842.35083	.2418	14 2 13	13 1 12	030-020
1800.08003	.0136	9 5 4	9 4 5	030-020	1842.99127	.0756	17 7 10	17 6 11	010-000
1800.37817	.0056	12 4 8	11 5 7	020-010	1843.81478	.0080	20 6 14	20 5 15	010-000
1801.21417	.0080	14 6 9	13 7 6	020-010	1844.71612	.0188	15 3 12	14 4 11	040-030
1802.99188	.0570	12 2 11	11 1 10	030-020	1845.30264	.0148	13 2 12	13 1 13	020-010
1803.02722	.0068	5 3 2	4 2 3	040-030	1845.67580	.0048	6 3 3	5 2 4	050-040
1803.90253	.0090	13 2 11	12 3 10	040-030	1846.04713	.0186	13 1 12	13 0 13	030-020
1804.18987	.0060	6 3 4	5 2 3	040-030	1846.25101	.0178	14 3 12	14 2 13	030-020
1804.75196	.0034	14 2 13	13 1 12	050-040	1847.05856	.0086	15 2 13	15 1 14	040-030
1806.38885	.0131	11 5 7	11 4 8	020-010	1847.10561	.0214	14 2 12	14 1 13	020-010
1807.04122	.0042	14 6 8	13 7 7	020-010	1847.48524	.0210	13 2 12	13 1 13	030-020
1807.87514	.0060	13 2 11	13 1 12	030-020	1847.57543	.0686	11 3 9	10 2 8	030-020
1808.44856	.0111	7 5 2	7 4 3	030-020	1848.17027	.0146	15 5 11	15 4 12	020-010
1808.90534	.1354	16 0 16	15 1 15	030-020	1849.47818	.0170	15 4 11	14 5 10	030-020
1808.92132	.0718	16 1 16	15 0 15	030-020	1849.95263	.1953	13 2 11	12 3 10	030-020
1809.61393	.0104	14 7 8	13 8 5	020-010	1850.60121	.0739	14 3 12	14 2 13	020-010
1809.73882	.0052	5 5 0	5 4 1	030-020	1851.24901	.0248	16 7 10	15 8 7	020-010
1809.80798	.0671	14 3 11	14 2 12	020-010	1852.24637	.0108	16 7 10	15 8 7	020-010
1810.11663	.0096	6 5 2	6 4 3	030-020	1853.54520	.0623	12 3 10	11 2 9	040-030
1810.19210	.0056	7 5 3	7 4 4	030-020	1855.60946	.1322	12 6 7	12 5 8	020-010
1810.22932	.0148	8 5 4	8 4 5	030-020	1855.66002	.0120	16 7 9	15 8 8	020-010
1811.25015	.0138	10 5 6	10 4 7	030-020	1856.29705	.0284	20 0 20	19 1 19	040-030
1811.57435	.0032	11 5 7	11 4 8	030-020	1856.45792	.0288	16 2 15	15 1 14	050-040
1811.66414	.0644	16 4 12	16 3 13	020-010	1856.50718	.0456	16 7 9	16 6 10	010-000
1812.06600	.0050	14 6 8	14 5 9	020-010	1856.56218	.0925	20 1 20	19 0 19	040-030
1813.89838	.0152	7 3 5	6 2 4	030-020	1858.77942	.3112	19 0 19	18 1 18	030-020
1813.97391	.0052	15 6 9	15 5 10	030-020	1858.80012	.0698	19 1 19	18 0 18	030-020
1814.49992	.0084	14 1 13	13 2 12	040-030	1859.43304	.0230	16 8 9	15 9 6	020-010
1815.44531	.0046	7 3 5	6 2 4	040-030	1859.73483	.0636	14 6 9	14 5 10	020-010
1816.16230	.0080	13 4 10	13 3 11	020-010	1861.64716	.1992	12 3 10	11 2 9	030-020
1816.18479	.0058	5 3 2	4 2 3	050-040	1861.66033	.3978	15 1 14	14 2 13	030-020
1816.36979	.0072	18 5 14	17 6 11	010-000	1861.66508	.3664	15 1 14	14 2 13	030-020
1816.63832	.0660	12 5 8	12 4 9	020-010	1861.90018	.0126	6 3 4	5 2 3	060-050
1817.37750	.0233	17 5 12	17 4 13	010-000	1862.17449	.0164	12 3 10	11 2 9	050-040
1818.41388	.0062	15 1 14	14 2 13	050-040	1862.48287	.1962	15 2 14	14 1 13	030-020
1818.51211	.0022	12 1 11	12 0 12	030-020	1862.83430	.0346	17 7 10	17 6 11	020-010
1819.19585	.0267	14 2 13	13 1 12	040-030	1863.03293	.1082	16 5 12	16 4 13	020-010
1820.09281	.0203	12 2 10	11 3 9	030-020	1863.36090	.0238	13 3 11	12 2 10	040-030
1820.16166	.0912	13 1 12	12 2 11	030-020	1864.49012	.1110	16 2 15	15 1 14	040-030
1820.32730	.0153	19 6 13	19 5 14	010-000	1864.60973	.0060	12 6 6	12 5 7	030-020
1820.94620	.0052	12 2 11	12 1 12	030-020	1865.12082	.0128	16 9 8	15 10 5	020-010
1821.26730	.0068	6 3 4	5 2 3	050-040	1865.14950	.0260	15 6 10	15 5 11	020-010
1822.48648	.0371	13 2 12	12 1 11	030-020	1865.46182	.0236	18 6 13	17 7 10	020-010
1822.62599	.0579	8 3 6	7 2 5	030-020	1865.53498	.0860	5 4 2	4 3 1	030-020
1822.74862	.0272	13 5 9	13 4 10	020-010	1865.68935	.0080	7 2 5	6 1 6	050-040
1822.95598	.0286	13 2 11	13 1 12	020-010	1866.56020	.0050	7 5 2	7 4 3	050-040
1823.66943	.0190	8 3 6	7 2 5	040-030	1867.37146	.0198	14 1 13	14 0 14	020-010
1823.79867	.0107	12 5 8	12 4 9	030-020	1867.63167	.0608	14 2 13	14 1 14	020-010
1823.83642	.0119	12 5 8	12 4 9	030-020	1868.24542	.0068	8 5 4	8 4 5	050-040
1824.37910	.0196	19 7 12	19 6 13	010-000	1868.85609	.0204	16 4 13	16 3 14	030-020
1825.00931	.0060	12 2 11	12 1 12	040-030	1869.14740	.0406	13 10 3	12 11 2	010-000
1825.38808	.0458	17 1 17	16 0 16	030-020	1869.61287	.1150	17 4 13	17 3 14	010-000
1830.48075	.0088	14 5 9	13 6 8	020-010	1870.15317	.0388	21 8 13	21 7 14	010-000
1830.52656	.0114	21 7 14	21 6 15	010-000	1870.40071	.0723	15 2 13	15 1 14	020-010
1830.67750	.0124	8 5 4	8 4 5	040-030	1870.47347	.0156	10 6 4	10 5 5	030-020
1831.43436	.0092	18 7 11	18 6 12	010-000	1870.50241	.0244	21 6 15	21 5 16	010-000
1831.57123	.0096	6 5 2	6 4 3	040-030	1870.75283	.0836	7 3 4	6 2 5	040-030
1831.63226	.0432	13 3 10	12 4 9	030-020	1871.13456	.0084	6 6 0	6 5 1	030-020
1832.83209	.0126	15 7 8	14 8 7	020-010	1871.15642	.0294	6 6 1	6 5 2	030-020
1833.18657	.0142	15 6 9	14 7 8	020-010	1871.43450	.0450	14 3 11	13 4 10	030-020
1833.84266	.0502	14 5 10	14 4 11	020-010	1871.83766	.0654	9 6 3	9 5 4	030-020
1833.91085	.0170	19 1 19	18 0 18	040-030	1871.86118	.1142	7 6 1	7 5 2	030-020
1834.41862	.0116	6 3 3	5 2 4	040-030	1871.93213	.0290	7 6 2	7 5 3	030-020

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1872.01103	.0660	16 6 11	16 5 12	020-010	1902.33075	.0616	18 6 13	17 7 10	010-000
1872.50176	.0518	15 3 13	15 2 14	020-010	1902.63700	.0088	19 6 13	18 7 12	030-020
1872.75425	.0176	9 6 4	9 5 5	030-020	1903.21355	.0777	13 7 6	13 6 7	020-010
1872.83607	.0550	10 6 5	10 5 6	030-020	1903.35235	.0360	7 2 5	6 1 6	030-020
1873.04038	.0144	11 6 6	11 5 7	030-020	1903.44963	.1157	17 2 16	16 1 15	030-020
1873.63014	.0426	14 2 12	13 3 11	030-020	1903.89401	.0578	16 8 9	15 9 6	010-000
1873.86470	.0514	14 9 6	13 10 3	010-000	1904.51066	.1219	15 3 12	14 4 11	030-020
1873.95396	.0296	14 6 9	14 5 10	030-020	1904.58345	.0210	16 8 8	15 9 7	010-000
1874.04103	.0590	19 5 14	19 4 15	010-000	1906.25348	.3907	16 1 15	15 2 14	020-010
1874.41884	.0316	15 7 9	14 8 6	010-000	1906.43272	.0951	18 5 14	18 4 15	010-000
1875.39399	.0642	16 4 13	16 3 14	020-010	1906.59918	.0384	12 7 5	12 6 6	020-010
1875.68039	.0094	15 6 10	15 5 11	030-020	1907.13187	.3067	14 2 12	13 3 11	020-010
1875.88390	.0858	14 3 12	13 2 11	040-030	1907.22134	.0240	15 7 9	15 6 10	020-010
1876.19743	.1096	20 0 20	19 1 19	030-020	1907.54836	.0828	14 7 8	14 6 9	020-010
1876.32801	.0707	13 3 11	12 2 10	030-020	1907.58985	.0558	16 7 10	16 6 11	020-010
1876.41526	.3115	20 1 20	19 0 19	030-020	1907.78704	.0908	7 4 4	6 3 3	030-020
1877.01190	.0198	16 7 9	16 6 10	020-010	1908.08086	.0910	18 7 12	18 6 13	010-000
1877.19832	.1615	7 3 4	6 2 5	030-020	1908.18770	.0236	13 7 7	13 6 8	020-010
1878.52821	.0300	17 1 16	16 2 15	050-040	1908.25637	.0646	22 1 22	21 0 21	040-030
1878.69404	.0312	5 4 2	4 3 1	040-030	1908.28222	.1270	11 7 4	11 6 5	020-010
1879.34762	.0945	5 4 1	4 3 2	040-030	1908.64598	.0384	9 7 3	9 6 4	020-010
1879.84214	.0148	17 5 13	17 4 14	020-010	1908.79805	.1248	12 7 6	12 6 7	020-010
1880.20602	.0865	21 0 21	20 1 20	040-030	1909.04844	.0208	17 7 11	17 6 12	020-010
1880.32346	.0252	16 6 11	16 5 12	030-020	1909.09773	.1268	10 7 4	10 6 5	020-010
1880.52737	.0292	21 1 21	20 0 20	040-030	1909.13942	.0398	11 7 5	11 6 6	020-010
1881.05569	.0106	17 6 12	17 5 13	020-010	1909.84965	.0614	17 2 15	16 3 14	040-030
1881.80046	.0288	4 4 1	3 3 0	050-040	1910.01444	.0836	15 3 13	14 2 12	030-020
1881.85083	.0098	4 4 0	3 3 1	050-040	1910.25966	.0274	15 10 5	14 11 4	010-000
1881.92518	.0142	17 8 9	16 9 8	020-010	1911.13216	.0064	18 4 15	18 3 16	030-020
1882.31832	.0184	7 2 5	6 1 6	040-030	1911.40971	.2171	22 1 22	21 0 21	030-020
1882.35942	.1380	16 1 15	15 2 14	030-020	1911.94078	.0280	18 7 12	18 6 13	020-010
1882.46892	.0682	14 4 10	13 5 9	020-010	1912.09536	.0410	18 1 17	17 2 16	040-030
1882.67016	.0300	15 8 8	14 9 5	010-000	1912.17206	.0348	16 2 15	16 1 16	020-010
1882.70968	.0104	14 10 5	13 11 2	020-010	1912.44717	.0232	19 6 14	19 5 15	010-000
1882.86181	.4344	16 2 15	15 1 14	030-020	1912.58456	.0122	17 2 15	17 1 16	030-020
1882.94606	.0687	15 8 7	14 9 6	010-000	1912.71288	.0860	18 2 17	17 1 16	040-030
1884.12290	.0424	17 6 12	17 5 13	010-000	1912.91557	.0442	16 5 11	15 6 10	020-010
1884.22035	.0114	20 8 12	20 7 13	010-000	1913.49106	.0152	8 3 5	7 2 6	040-030
1884.74754	.0072	8 3 6	7 2 5	060-050	1913.69004	.0190	18 8 10	18 7 11	010-000
1886.14268	.0096	17 6 12	17 5 13	030-020	1913.83958	.0430	17 3 15	17 2 16	010-000
1886.93578	.1058	17 1 16	16 2 15	040-030	1913.97755	.0248	18 2 17	17 1 16	050-040
1887.62742	.0238	16 2 14	15 3 13	040-030	1914.14081	.0388	17 2 15	17 1 16	020-010
1888.21847	.0324	17 2 16	16 1 15	040-030	1914.88383	.0130	17 3 15	17 2 16	020-010
1888.40257	.0092	13 6 7	13 5 8	040-030	1915.79839	.0274	17 7 11	16 8 8	010-000
1888.43545	.0386	17 5 13	17 4 14	010-000	1915.94619	.0306	17 3 14	16 4 13	040-030
1888.76315	.0693	15 7 8	15 6 9	020-010	1915.97703	.0442	18 4 15	18 3 16	020-010
1888.98804	.0224	18 7 12	17 8 9	020-010	1916.47823	.0138	19 7 13	19 6 14	020-010
1889.18800	.0112	14 2 13	14 1 14	040-030	1916.83059	.0560	19 4 15	19 3 16	010-000
1889.76630	.0546	15 1 14	15 0 15	020-010	1917.16371	.0200	15 7 8	15 6 9	030-020
1889.91795	.0456	14 10 5	13 11 2	010-000	1917.74237	.2496	7 4 3	6 3 4	030-020
1890.02465	.0112	18 5 14	18 4 15	030-020	1918.47169	.0126	20 7 14	19 8 11	020-010
1890.54642	.0028	21 8 13	21 7 14	020-010	1918.74297	.0136	20 6 15	20 5 16	020-010
1892.07723	.0346	18 6 13	18 5 14	020-010	1919.07111	.0242	18 3 15	18 2 16	010-000
1892.36330	.2879	14 3 12	13 2 11	030-020	1919.17768	.8680	21 0 21	20 1 20	020-010
1892.84951	.2686	21 0 21	20 1 20	030-020	1920.23036	.0090	15 1 14	15 0 15	040-030
1892.94104	.0945	21 1 21	20 0 20	030-020	1920.65185	.0670	18 4 15	18 3 16	010-000
1893.80181	.0160	18 6 13	18 5 14	030-020	1922.39865	.0254	7 4 4	6 3 3	040-030
1893.90178	.0504	16 3 14	16 2 15	020-010	1922.46116	.0946	16 2 14	15 3 13	030-020
1894.76425	.0428	15 9 6	14 10 5	010-000	1922.55331	.0656	16 6 10	15 7 9	010-000
1896.29626	.0644	15 7 9	15 6 10	010-000	1922.60030	.0188	17 3 15	16 2 14	040-030
1896.34907	.0148	11 6 5	11 5 6	040-030	1922.71068	.0144	20 7 14	20 6 15	020-010
1897.45883	.0286	14 7 7	14 6 8	020-010	1923.62202	.2290	8 4 5	7 3 4	030-020
1897.59054	.0728	18 6 13	18 5 14	010-000	1924.16202	.0424	8 3 5	7 2 6	030-020
1897.72966	.0062	14 6 9	14 5 10	040-030	1924.21820	.0964	18 1 17	17 2 16	030-020
1897.77861	.0160	18 8 11	17 9 8	020-010	1924.38604	.2870	18 2 17	17 1 16	030-020
1897.92206	.0130	7 6 1	7 5 2	040-030	1924.48041	.0178	23 9 14	23 8 15	010-000
1898.47297	.1488	16 7 10	16 6 11	010-000	1924.50661	.0184	19 5 15	19 4 16	010-000
1898.84594	.0144	8 6 3	8 5 4	040-030	1924.68993	.0192	17 8 10	16 9 7	010-000
1899.51313	.0532	19 8 11	19 7 12	010-000	1924.68993	.0192	17 8 10	16 9 7	010-000
1900.21277	.0138	10 6 5	10 5 6	040-030	1924.88909	.2245	15 4 11	14 5 10	020-010
1900.31666	.2756	15 2 13	14 3 12	030-020	1924.93983	.8763	17 1 16	16 2 15	020-010
1900.78818	.0182	15 1 14	15 0 15	030-020	1925.01460	.3323	17 2 16	16 1 15	020-010
1900.91145	.0118	15 10 5	14 11 4	020-010	1925.28906	.0894	17 8 9	17 7 10	010-000
1900.96176	.0150	16 4 12	15 5 11	030-020	1925.48471	.0384	20 7 14	20 6 15	010-000
1901.12141	.0120	20 5 15	20 4 16	010-000	1926.01204	.0272	21 5 16	21 4 17	010-000
1901.33281	.0062	15 2 14	15 1 15	030-020	1926.28175	.0550	17 8 9	16 9 8	010-000
1901.68958	.0928	6 4 3	5 3 2	040-030	1926.48726	.0242	13 7 6	13 6 7	030-020
1901.92897	.0338	17 4 14	17 3 15	010-000	1926.55637	.0200	7 7 0	7 6 1	030-020
1902.01044	.1073	17 6 11	16 7 10	020-010	1926.65409	.0082	7 7 1	7 6 2	030-020
1902.21063	.0300	16 7 9	15 8 8	010-000	1926.84295	.0082	4 4 1	3 3 0	060-050

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1927.02013	.0206	9 7 2	9 6 3	030-020	1955.45908	.0056	18 9 9	17 10 8	010-000
1927.48728	.0350	14 7 8	14 6 9	030-020	1955.48400	.0190	10 7 4	10 6 5	040-030
1927.77811	.0388	8 7 2	8 6 3	030-020	1956.53221	.0180	21 9 12	21 8 13	010-000
1928.21822	.0352	20 6 15	20 5 16	010-000	1956.70048	.0636	9 8 1	9 7 2	020-010
1928.53651	.2415	16 3 14	15 2 13	030-020	1956.77672	.0838	6 5 1	5 4 2	030-020
1928.56612	.0959	17 7 10	16 8 9	010-000	1956.89327	.0226	21 4 17	21 3 18	010-000
1928.67927	.7637	15 2 13	14 3 12	020-010	1956.93083	.0302	19 1 18	19 0 19	010-000
1928.91577	.0322	12 7 6	12 6 7	030-020	1957.12024	.0120	14 8 6	14 7 7	020-010
1929.15462	.0424	10 7 4	10 6 5	030-020	1957.25791	.0254	18 7 11	17 8 10	010-000
1929.25749	.0266	18 2 16	17 3 15	040-030	1957.28616	.0152	15 8 8	15 7 9	020-010
1929.75926	.0196	6 4 3	5 3 2	050-040	1957.33957	.1786	13 4 10	12 3 9	020-010
1929.92009	.0787	7 4 3	6 3 4	040-030	1957.45362	.0560	13 4 10	12 3 9	030-020
1930.12924	.0108	10 7 3	10 6 4	030-020	1957.94694	.0658	10 8 3	10 7 4	020-010
1930.16415	.0302	16 10 7	15 11 4	010-000	1958.41311	.0458	14 8 7	14 7 8	020-010
1930.45465	.1588	23 0 23	22 1 22	030-020	1958.59064	.0424	13 8 5	13 7 6	020-010
1930.53421	.0230	19 7 12	18 8 11	020-010	1958.77327	.0562	11 8 3	11 7 4	020-010
1931.12446	.0062	16 11 6	15 12 3	020-010	1958.82426	.0202	11 8 4	11 7 5	020-010
1932.03058	.0548	18 3 16	18 2 17	010-000	1959.05643	.0174	12 8 4	12 7 5	020-010
1932.26734	.2832	15 3 13	14 2 12	020-010	1959.08667	.0254	13 8 6	13 7 7	020-010
1932.54030	.0040	22 7 16	21 8 13	020-010	1959.22609	.0506	12 8 5	12 7 6	020-010
1932.99513	.0254	20 8 13	19 9 10	020-010	1959.42208	.0152	9 3 6	8 2 7	050-040
1933.30139	.0136	20 5 16	20 4 17	020-010	1959.64145	.1231	17 6 11	16 7 10	010-000
1933.73493	.0334	16 8 8	16 7 9	010-000	1959.83191	.0080	21 5 17	21 4 18	010-000
1933.93145	.0620	18 7 12	17 8 9	010-000	1960.44493	.0310	20 7 14	19 8 11	010-000
1934.38343	.2198	22 0 22	21 1 21	020-010	1960.56755	.0566	10 4 7	9 3 6	040-030
1934.40337	.5101	22 1 22	21 0 21	020-010	1962.33036	.5999	19 1 18	18 2 17	020-010
1934.99036	.0136	18 8 10	18 7 11	020-010	1962.75105	.0620	16 4 12	15 5 11	020-010
1935.09802	.0712	9 4 6	8 3 5	030-020	1962.82721	.1796	19 2 18	18 1 17	020-010
1935.39683	.0108	17 9 9	16 10 6	010-000	1963.59397	.0334	9 3 6	8 2 7	040-030
1935.54359	.0352	17 9 8	16 10 7	010-000	1963.66452	.0126	20 1 19	19 2 18	040-030
1936.42425	.0062	17 10 7	16 11 6	020-010	1963.69766	.0516	18 2 16	17 3 15	030-020
1936.60982	.0088	18 3 16	18 2 17	030-020	1963.81201	.0778	14 4 11	13 3 10	030-020
1936.77844	.0134	21 7 15	21 6 16	010-000	1963.86330	.0114	11 4 8	10 3 7	040-030
1936.97694	.0733	19 1 18	18 2 17	040-030	1964.25163	.4245	24 1 24	23 0 23	020-010
1937.60840	.0098	20 4 16	20 3 17	010-000	1964.42673	.0290	20 3 18	19 2 17	040-030
1937.99576	.0338	19 3 16	19 2 17	010-000	1965.66679	.1145	17 3 14	16 4 13	030-020
1938.03076	.0358	19 2 18	18 1 17	040-030	1966.12967	.1630	18 3 16	17 2 15	030-020
1938.16970	.0484	18 3 16	17 2 15	040-030	1966.81936	.0202	17 11 6	16 12 5	010-000
1938.92280	.0142	19 4 16	19 3 17	010-000	1967.02075	.4813	14 4 11	13 3 10	020-010
1939.18309	.0406	18 2 17	18 1 18	010-000	1967.07086	.0140	20 3 18	20 2 19	010-000
1939.25923	.1323	15 8 7	15 7 8	010-000	1967.07328	.0220	20 3 18	20 2 19	010-000
1939.60648	.0733	8 4 5	7 3 4	040-030	1967.41187	.1588	20 2 19	19 1 18	030-020
1942.06238	.0536	17 4 13	16 5 12	030-020	1968.24694	.0222	20 1 19	19 2 18	030-020
1942.38494	.0316	20 5 16	20 4 17	010-000	1968.63955	.0390	18 10 9	17 11 6	010-000
1942.57701	.0725	18 8 11	18 7 12	010-000	1968.93606	.0098	20 9 11	20 8 12	010-000
1942.69381	.1886	10 4 7	9 3 6	030-020	1969.13270	.5460	17 2 15	16 3 14	020-010
1943.08240	.0104	19 8 12	19 7 13	010-000	1970.07403	.0300	21 2 19	20 3 18	040-030
1943.61881	.4187	18 1 17	17 2 16	020-010	1970.32146	.1906	17 3 15	16 2 14	020-010
1943.66120	.7474	18 2 17	17 1 16	020-010	1970.53835	.0288	19 6 13	18 7 12	020-010
1943.91001	.0428	15 8 8	15 7 9	010-000	1970.87229	.0220	14 4 11	13 3 10	040-030
1945.60031	.2486	19 1 18	18 2 17	030-020	1971.05643	.0594	19 8 11	18 9 10	010-000
1945.87668	.0734	20 8 13	20 7 14	010-000	1971.89945	.0340	24 1 24	23 0 23	040-030
1946.10420	.0730	8 4 4	7 3 5	030-020	1972.26328	.0102	21 3 18	21 2 19	020-010
1946.32503	.0384	19 2 17	18 3 16	040-030	1973.49205	.0216	21 3 18	21 2 19	010-000
1947.36981	.0580	17 3 15	16 2 14	030-020	1973.83026	.0132	16 8 9	16 7 10	030-020
1947.73547	.1187	12 4 9	11 3 8	030-020	1973.87413	.0096	15 8 7	15 7 8	030-020
1947.92946	.0164	16 11 6	15 12 3	010-000	1973.90626	.1020	25 0 25	24 1 24	030-020
1948.30264	.0128	18 8 10	17 9 9	010-000	1974.20316	.0182	20 3 18	20 2 19	020-010
1948.81209	.5179	23 0 23	22 1 22	020-010	1974.40878	.0122	19 3 16	18 4 15	040-030
1949.21675	.2437	16 2 14	15 3 13	020-010	1974.54323	.0148	20 2 19	20 1 20	010-000
1949.36286	.0122	22 7 16	22 6 17	010-000	1975.01368	.0096	8 8 1	8 7 2	030-020
1949.63286	.0280	17 10 7	16 11 6	010-000	1975.21310	.0246	19 9 10	18 10 9	010-000
1949.71121	.0334	19 2 17	19 1 18	010-000	1975.45983	.1350	16 3 13	15 4 12	020-010
1949.74696	.0056	21 8 14	21 7 15	010-000	1975.91943	.0148	15 4 12	14 3 11	040-030
1949.78441	.0102	19 3 17	19 2 18	010-000	1976.49362	.0132	22 5 18	22 4 19	010-000
1949.79092	.0124	19 3 17	19 2 18	010-000	1976.72024	.9947	23 0 23	22 1 22	010-000
1949.87088	.3258	15 3 12	14 4 11	020-010	1977.10688	.0084	9 3 6	8 2 7	060-050
1950.71087	.0112	6 3 4	5 0 5	030-020	1977.21391	.0130	14 8 7	14 7 8	030-020
1950.76992	.0150	20 8 13	20 7 14	020-010	1977.48979	.0206	10 8 3	10 7 4	030-020
1951.27755	.6460	16 3 14	15 2 13	020-010	1977.78083	.0384	13 8 5	13 7 6	030-020
1951.37266	.0966	17 5 12	16 6 11	020-010	1977.84160	.1624	9 4 5	8 3 6	030-020
1951.73187	.1325	24 1 24	23 0 23	030-020	1977.94284	.0474	12 4 9	11 3 8	040-030
1952.41434	.0200	9 4 6	8 3 5	040-030	1978.12424	.0192	6 5 1	5 4 2	040-030
1952.57417	.0166	18 8 11	18 7 12	020-010	1978.15998	.0132	11 8 3	11 7 4	030-020
1953.29563	.0910	5 5 0	4 4 1	040-030	1978.22180	.0316	19 9 10	19 8 11	010-000
1954.18713	.0034	17 8 10	17 7 11	020-010	1978.41849	.0160	12 8 5	12 7 6	030-020
1954.25783	.0218	15 8 7	15 7 8	020-010	1979.01871	.0718	9 3 6	8 2 7	030-020
1954.87322	.0288	19 2 17	19 1 18	020-010	1979.21854	.0104	19 1 18	19 0 19	020-010
1955.12412	.0328	18 9 10	17 10 7	010-000	1979.85976	.1839	15 4 12	14 3 11	020-010
1955.17687	.0512	8 8 1	8 7 2	020-010	1979.88354	.2899	25 0 25	24 1 24	020-010

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
1980.70975	.0712	7 5 3	6 4 2	030-020	2017.98415	.2130	6 6 1	5 5 0	030-020
1980.94692	.0960	16 4 13	15 3 12	030-020	2018.47749	.7240	21 1 20	20 2 19	010-000
1981.02701	.0676	20 1 19	19 2 18	020-010	2019.26049	.2860	22 2 21	21 1 20	020-010
1981.13855	.6062	20 2 19	19 1 18	020-010	2019.33598	.0880	22 1 21	21 2 20	020-010
1982.32987	.0230	20 8 13	19 9 10	010-000	2020.31259	.0290	22 2 21	21 1 20	040-030
1982.67789	.1256	19 2 17	18 3 16	030-020	2020.48975	.0130	20 11 10	19 12 7	010-000
1982.73413	.0262	16 4 13	15 3 12	040-030	2021.00179	.0200	21 8 13	20 9 12	010-000
1983.83088	.0114	21 2 19	21 1 20	010-000	2021.80650	.0910	18 3 15	17 4 14	020-010
1984.12662	.0414	19 3 17	18 2 16	030-020	2022.44339	.0110	21 3 18	20 4 17	040-030
1985.21226	.0092	18 11 8	17 12 5	010-000	2023.28304	.0130	21 10 11	20 11 10	010-000
1985.52178	.0510	9 4 5	8 3 6	040-030	2023.47306	.0130	20 7 13	19 8 12	010-000
1986.86011	.0192	20 9 12	20 8 13	010-000	2024.43370	.0390	8 5 4	7 4 3	040-030
1986.98567	.0204	5 5 0	4 4 1	050-040	2024.68098	.0420	9 5 5	8 4 4	030-020
1987.27884	.0126	19 10 9	18 11 8	010-000	2025.52950	.0420	27 0 27	26 1 26	030-020
1988.44588	.0070	19 9 11	19 8 12	010-000	2025.81315	.0910	20 2 18	19 3 17	020-010
1988.52373	.1565	18 2 16	17 3 15	020-010	2026.07082	.2670	20 3 18	19 2 17	020-010
1988.72635	.0498	17 9 8	17 8 9	010-000	2026.72581	.0160	8 5 3	7 4 4	040-030
1988.85170	.0510	19 7 12	18 8 11	010-000	2027.30469	.0330	19 4 16	18 3 15	030-020
1989.06757	.0150	17 4 14	16 3 13	040-030	2028.39476	.0080	22 9 14	21 10 11	010-000
1989.21764	.4396	18 3 16	17 2 15	020-010	2028.61126	.2920	27 0 27	26 1 26	010-000
1989.52731	.1283	21 1 20	20 2 19	030-020	2029.06514	.2510	18 4 15	17 3 14	020-010
1989.68451	.1111	21 2 20	20 1 19	030-020	2029.99665	.0240	22 10 13	22 9 14	010-000
1989.91951	.7749	24 1 24	23 0 23	010-000	2030.13986	.1500	9 5 4	8 4 5	030-020
1990.02867	.0376	18 9 10	18 8 11	010-000	2030.19117	.0440	18 4 14	17 5 13	020-010
1990.37469	.0116	22 4 19	22 3 20	010-000	2030.45878	.2660	19 3 17	18 2 16	010-000
1990.95642	.0378	21 1 20	20 2 19	040-030	2030.98955	.0970	28 1 28	27 0 27	020-010
1991.06135	.0188	16 9 7	16 8 8	010-000	2031.49400	.0540	19 5 14	18 6 13	020-010
1991.18605	.0278	18 3 15	17 4 14	030-020	2035.04185	.0130	20 10 11	20 9 12	010-000
1991.35882	.0206	17 9 9	17 8 10	010-000	2035.31567	.5560	22 2 21	21 1 20	010-000
1991.48263	.0098	21 7 14	20 8 13	020-010	2035.68877	.0560	14 10 5	14 9 6	010-000
1992.04895	.0054	21 1 20	21 0 21	010-000	2035.92520	.0150	20 3 17	19 4 16	030-020
1992.09995	.0716	15 9 6	15 8 7	010-000	2036.22917	.0650	23 1 22	22 2 21	030-020
1992.17249	.0250	14 9 5	14 8 6	010-000	2036.37716	.0220	23 2 22	22 1 21	030-020
1992.24016	.0584	16 9 8	16 8 9	010-000	2037.09043	.0390	15 10 5	15 9 6	010-000
1992.58888	.0504	18 5 13	17 6 12	020-010	2037.12505	.0100	15 10 6	15 9 7	010-000
1993.11971	.0208	20 9 12	19 10 9	010-000	2037.85838	.0240	18 10 9	18 9 10	010-000
1994.55764	.0138	17 9 8	17 8 9	020-010	2038.00109	.0540	17 10 7	17 9 8	010-000
1994.79501	.3722	16 4 13	15 3 12	020-010	2038.70012	.0880	23 2 22	22 1 21	020-010
1995.49995	.0390	17 4 14	16 3 13	030-020	2038.71412	.1620	23 1 22	22 2 21	020-010
1996.59277	.2040	26 1 26	25 0 25	020-010	2039.78836	.0720	19 6 13	18 7 12	010-000
1997.50086	.0208	9 9 0	9 8 1	020-010	2039.85464	.0040	22 10 13	21 11 10	010-000
1998.31726	.0108	16 9 8	16 8 9	020-010	2041.09076	.0130	10 3 7	9 2 8	030-020
1998.38559	.0710	26 1 26	25 0 25	030-020	2041.54508	.1780	28 1 28	27 0 27	010-000
1998.52986	.1800	17 4 13	16 5 12	020-010	2041.58719	.1060	10 5 6	9 4 5	030-020
1999.12099	.0510	10 9 2	10 8 3	020-010	2042.02048	.0110	20 4 16	19 5 15	030-020
1999.55227	.3265	17 3 14	16 4 13	020-010	2042.39273	.0430	23 2 21	22 3 20	030-020
1999.74340	.0206	18 4 15	17 3 14	040-030	2042.68392	.1960	19 3 16	18 4 15	020-010
2000.09103	.1334	21 2 20	20 1 19	020-010	2043.12262	.0540	7 6 2	6 5 1	030-020
2000.19236	.3650	21 1 20	20 2 19	020-010	2043.14827	.1480	7 6 1	6 5 2	030-020
2000.39594	.0340	11 9 2	11 8 3	020-010	2043.61660	.2880	21 2 19	20 3 18	020-010
2000.43316	.0280	20 2 18	19 3 17	030-020	2043.87617	.0600	6 6 1	5 5 0	040-030
2001.09526	.0230	14 9 6	14 8 7	020-010	2044.13832	.0630	21 3 19	20 2 18	020-010
2001.20403	.0310	12 9 4	12 8 5	020-010	2044.33097	.0700	20 4 17	19 3 16	030-020
2001.33568	.0960	20 3 18	19 2 17	030-020	2047.10420	.0670	19 4 16	18 3 15	020-010
2001.43344	.0180	13 9 4	13 8 5	020-010	2047.31223	.0160	9 2 7	8 1 8	030-020
2001.97184	.0190	7 5 3	6 4 2	040-030	2047.56865	.2020	18 3 15	17 4 14	010-000
2002.41643	.5490	25 0 25	24 1 24	010-000	2048.25386	.2040	20 2 18	19 3 17	010-000
2002.61431	.0590	7 5 2	6 4 3	040-030	2048.32258	.5610	20 3 18	19 2 17	010-000
2003.11442	.0130	19 11 8	18 12 7	010-000	2049.15030	.0180	23 1 22	22 2 21	040-030
2003.57112	.1880	8 5 4	7 4 3	030-020	2049.70330	.0150	26 1 26	25 0 25	040-030
2004.67936	.0100	16 4 13	15 3 12	050-040	2050.08031	.0600	29 0 29	28 1 28	020-010
2005.28260	.0130	20 10 11	19 11 8	010-000	2050.56727	.0430	9 5 4	8 4 5	040-030
2005.67481	.0620	8 5 3	7 4 4	030-020	2052.13194	.5260	23 1 22	22 2 21	010-000
2006.74265	.0210	19 4 15	18 5 14	030-020	2052.93284	.0240	11 5 7	10 4 6	030-020
2007.42507	.3490	19 2 17	18 3 16	020-010	2053.22328	.0220	24 3 22	23 2 21	030-020
2007.83798	.1220	19 3 17	18 2 16	020-010	2053.36284	.0960	13 5 9	12 4 8	020-010
2009.47361	.0210	25 0 25	24 1 24	040-030	2054.34828	.0270	11 4 7	10 3 8	040-030
2010.92733	.0120	20 6 14	19 7 13	020-010	2054.57072	.1380	29 0 29	28 1 28	010-000
2011.45278	.1350	17 4 14	16 3 13	020-010	2055.13414	.0380	10 5 5	9 4 6	030-020
2012.50607	.0570	22 1 21	21 2 20	030-020	2055.68041	.0290	28 1 28	27 0 27	030-020
2012.52898	.0770	22 2 21	21 1 20	030-020	2055.85540	.2180	14 5 10	13 4 9	020-010
2013.04046	.2040	17 5 12	16 6 11	010-000	2055.98368	.0370	21 3 18	20 4 17	030-020
2013.16026	.1450	27 0 27	26 1 26	020-010	2056.16319	.0080	23 9 14	22 10 13	010-000
2014.45119	.0700	19 3 16	18 4 15	030-020	2058.09652	.0080	23 10 13	22 11 12	010-000
2014.68246	.0100	21 9 12	20 10 11	010-000	2058.20198	.0690	11 4 7	10 3 8	030-020
2014.78150	.0330	10 4 6	9 3 7	030-020	2058.30218	.1150	19 4 15	18 5 14	020-010
2015.68358	.4170	26 1 26	25 0 25	010-000	2058.58178	.1370	24 2 23	23 1 22	020-010
2016.33985	.0540	21 2 19	20 3 18	030-020	2059.17299	.0600	15 5 11	14 4 10	020-010
2017.24889	.0220	21 3 19	20 2 18	030-020	2060.26554	.0220	25 2 23	24 3 22	030-020
2017.39833	.0160	10 4 6	9 3 7	040-030	2060.57428	.0290	21 7 14	20 8 13	010-000

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
2060.74131	.1390	22 3 20	21 2 19	020-010	2105.12243	.0850	21 4 18	20 3 17	010-000
2061.00780	.0190	24 1 23	23 2 22	030-020	2105.61168	.0530	25 2 23	24 3 22	020-010
2061.24328	.0430	24 2 23	23 1 22	030-020	2105.69662	.0160	25 3 23	24 2 22	020-010
2061.32813	.0140	21 4 18	20 3 17	030-020	2105.89798	.0900	19 5 15	18 4 14	010-000
2061.60886	.0140	8 5 4	7 4 3	050-040	2106.52101	.0600	21 4 17	20 5 16	020-010
2062.49624	.0510	20 3 17	19 4 16	020-010	2108.41317	.0120	14 12 3	14 11 4	010-000
2062.53527	.1970	16 5 12	15 4 11	020-010	2108.43926	.0090	14 11 4	14 10 5	020-010
2065.20024	.1440	20 4 17	19 3 16	020-010	2108.79191	.0150	12 4 8	11 3 9	030-020
2066.21783	.0100	26 3 24	25 2 23	030-020	2108.95776	.0400	11 3 8	10 2 9	030-020
2066.32572	.0100	11 4 7	10 3 8	050-040	2109.02584	.0560	12 5 7	11 4 8	020-010
2067.20480	.4360	19 3 16	18 4 15	010-000	2110.87457	.0200	12 5 7	11 4 8	030-020
2067.77998	.1260	30 1 30	29 0 29	010-000	2111.06079	.0140	14 5 10	13 4 9	040-030
2067.87807	.1280	8 6 3	7 5 2	030-020	2111.98901	.0110	15 12 3	15 11 4	010-000
2068.00386	.1180	18 4 14	17 5 13	010-000	2114.25065	.0660	20 4 16	19 5 15	010-000
2068.09644	.0230	12 11 2	12 10 3	010-000	2115.09871	.0080	16 12 5	16 11 6	010-000
2068.76002	.1530	19 4 16	18 3 15	010-000	2115.24816	.0880	10 6 5	9 5 4	030-020
2068.93967	.1050	12 5 8	11 4 7	030-020	2116.23663	.1690	24 3 22	23 2 21	010-000
2068.96657	.3730	24 2 23	23 1 22	010-000	2116.64482	.0270	10 6 4	9 5 5	030-020
2069.12850	.0380	7 6 1	6 5 2	040-030	2117.09217	.0550	23 3 20	22 4 19	020-010
2070.73635	.0360	30 1 30	29 0 29	020-010	2117.66838	.0190	26 2 24	25 3 23	020-010
2071.40318	.0240	13 11 2	13 10 3	010-000	2117.91197	.0260	26 3 24	25 2 23	020-010
2072.11213	.0240	13 5 9	12 4 8	030-020	2118.59744	.0370	9 6 3	8 5 4	040-030
2072.85543	.0510	16 5 12	15 4 11	030-020	2118.99763	.0450	20 5 15	19 6 14	010-000
2073.07958	.0580	14 5 10	13 4 9	030-020	2119.15062	.0400	21 6 15	20 7 14	010-000
2074.36041	.0280	14 11 4	14 10 5	010-000	2119.66142	.0080	18 12 7	18 11 8	010-000
2074.39299	.0320	10 5 6	9 4 5	040-030	2119.74672	.0160	21 5 17	20 4 16	020-010
2075.30958	.0220	15 5 11	14 4 10	030-020	2120.08000	.1190	27 1 26	26 2 25	010-000
2076.88947	.0250	15 11 4	15 10 5	010-000	2122.51837	.0610	22 3 19	21 4 18	010-000
2076.92911	.0350	23 3 21	22 2 20	020-010	2122.54387	.1870	20 5 16	19 4 15	010-000
2076.96631	.1410	23 2 21	22 3 20	020-010	2122.82121	.2020	22 4 19	21 3 18	010-000
2078.38992	.0230	22 4 19	21 3 18	030-020	2123.60507	.0740	8 7 2	7 6 1	030-020
2078.51596	.0120	11 10 1	11 9 2	020-010	2123.70079	.0370	8 7 1	7 6 2	030-020
2078.92388	.0220	16 11 6	16 10 7	010-000	2124.43539	.0060	12 5 7	11 4 8	040-030
2078.95789	.0890	25 1 24	24 2 23	020-010	2125.15868	.0230	7 7 0	6 6 1	040-030
2078.98180	.0290	25 2 24	24 1 23	020-010	2125.54939	.0080	23 6 17	22 7 16	020-010
2079.12954	.0130	12 10 3	12 9 4	020-010	2126.78028	.0140	22 4 18	21 5 17	020-010
2079.73547	.0260	13 10 3	13 9 4	020-010	2127.61968	.0220	12 4 8	11 3 9	020-010
2079.80860	.0090	17 10 7	17 9 8	020-010	2127.78779	.0220	27 2 25	26 3 24	020-010
2080.24496	.0310	20 6 14	19 7 13	010-000	2128.51907	.0170	27 1 26	26 2 25	020-010
2080.38153	.0140	17 11 6	17 10 7	010-000	2130.20187	.0100	22 5 17	21 6 16	020-010
2080.45859	.0070	16 10 7	16 9 8	020-010	2131.91465	.1050	25 2 23	24 3 22	010-000
2080.50757	.0130	15 10 5	15 9 6	020-010	2132.07867	.0380	25 3 23	24 2 22	010-000
2080.66542	.0100	23 8 15	22 9 14	010-000	2133.89994	.0100	24 3 21	23 4 20	020-010
2080.82188	.0100	20 11 10	20 10 11	010-000	2134.12670	.0350	24 4 21	23 3 20	020-010
2081.28163	.0530	31 0 31	30 1 30	010-000	2134.71976	.1440	21 4 17	20 5 16	010-000
2081.43900	.1080	21 3 18	20 4 17	020-010	2135.27760	.0420	22 5 18	21 4 17	020-010
2081.65835	.0900	11 5 6	10 4 7	030-020	2137.02182	.0210	11 6 6	10 5 5	030-020
2082.98452	.0100	24 2 23	23 1 22	040-030	2137.75699	.0770	28 2 27	27 1 26	010-000
2083.06436	.1130	22 2 20	21 3 19	010-000	2138.69359	.0130	23 7 16	22 8 15	010-000
2083.09424	.3070	22 3 20	21 2 19	010-000	2139.69987	.0480	21 5 17	20 4 16	010-000
2085.85775	.2700	25 1 24	24 2 23	010-000	2139.93107	.1310	23 3 20	22 4 19	010-000
2086.18731	.1130	20 3 17	19 4 16	010-000	2140.11353	.0440	23 4 20	22 3 19	010-000
2087.07542	.3310	20 4 17	19 3 16	010-000	2140.14956	.0210	28 2 27	27 1 26	020-010
2087.21651	.1380	19 5 14	18 6 13	010-000	2141.02145	.0610	11 6 5	10 5 6	030-020
2087.33906	.0160	11 5 7	10 4 6	040-030	2141.71853	.0150	10 6 5	9 5 4	040-030
2088.60175	.0120	25 2 24	24 1 23	030-020	2144.20883	.0060	13 4 9	12 3 10	040-030
2090.37289	.3130	18 5 14	17 4 13	010-000	2144.87935	.0270	13 5 8	12 4 9	030-020
2090.50793	.0190	24 2 22	23 3 21	020-010	2145.85059	.0310	23 4 19	22 5 18	020-010
2092.00713	.0720	24 3 22	23 2 21	020-010	2145.94423	.0540	12 6 6	11 5 7	020-010
2092.03227	.0420	9 6 4	8 5 3	030-020	2147.08664	.0810	21 5 16	20 6 15	010-000
2092.19411	.2540	19 4 15	18 5 14	010-000	2147.25402	.0770	26 3 24	25 2 23	010-000
2092.46228	.1050	9 6 3	8 5 4	030-020	2148.12983	.0970	13 5 8	12 4 9	020-010
2092.72976	.0220	20 5 16	19 4 15	030-020	2148.25645	.0180	9 7 3	8 6 2	030-020
2093.27913	.0230	31 0 31	30 1 30	020-010	2148.54129	.0590	9 7 2	8 6 3	030-020
2097.83026	.0210	12 5 8	11 4 7	040-030	2150.09280	.0280	25 3 22	24 4 21	020-010
2098.37799	.0340	7 7 1	6 6 0	030-020	2150.16426	.0090	25 4 22	24 3 21	020-010
2098.48820	.0870	7 7 0	6 6 1	030-020	2150.27453	.0440	13 6 8	12 5 7	020-010
2098.73334	.0230	11 5 6	10 4 7	040-030	2150.31814	.0240	8 7 2	7 6 1	040-030
2099.40758	.0070	22 7 15	21 8 14	010-000	2153.23168	.0570	17 6 12	16 5 11	010-000
2099.61775	.0240	22 3 19	21 4 18	020-010	2153.74803	.0310	22 4 18	21 5 17	010-000
2099.89609	.2220	23 2 21	22 3 20	010-000	2155.34418	.0120	22 6 16	21 7 15	010-000
2099.95816	.0890	23 3 21	22 2 20	010-000	2155.70656	.0180	23 5 18	22 6 17	020-010
2100.31996	.0210	26 1 25	25 2 24	020-010	2156.16310	.1430	18 6 13	17 5 12	010-000
2100.37942	.0580	26 2 25	25 1 24	020-010	2156.63134	.0680	12 6 7	11 5 6	030-020
2100.70522	.0770	22 4 19	21 3 18	020-010	2156.73536	.1020	22 5 18	21 4 17	010-000
2100.99201	.0330	21 5 16	20 6 15	020-010	2156.84136	.0310	24 3 21	23 4 20	010-000
2102.30134	.0100	12 11 2	12 10 3	020-010	2156.96175	.0870	24 4 21	23 3 20	010-000
2102.86701	.1810	26 2 25	25 1 24	010-000	2159.43610	.0980	14 6 9	13 5 8	020-010
2104.42198	.0120	13 12 1	13 11 2	010-000	2161.42856	.0360	19 6 14	18 5 13	010-000
2104.60071	.2460	21 3 18	20 4 17	010-000	2161.63610	.0730	27 2 25	26 3 24	010-000

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
2162.05153	.0140	29 1 28	28 2 27	010-000	2241.82784	.0220	13 7 6	12 6 7	030-020
2162.97400	.0330	29 1 28	28 2 27	020-010	2243.39136	.0050	12 7 6	11 6 5	040-030
2165.06848	.0570	18 6 13	17 5 12	020-010	2244.22158	.0630	10 9 2	9 8 1	020-010
2165.59190	.0120	13 4 9	12 3 10	030-020	2245.05718	.0210	14 7 7	13 6 8	020-010
2165.61829	.0150	26 4 23	25 3 22	020-010	2245.78399	.0180	11 8 3	10 7 4	030-020
2166.04748	.0210	17 6 12	16 5 11	020-010	2245.83494	.0180	15 5 10	14 4 11	020-010
2166.40086	.0190	24 5 20	23 4 19	020-010	2246.72091	.0110	30 4 27	29 3 26	010-000
2166.54647	.0730	16 6 11	15 5 10	020-010	2250.14682	.0680	12 8 5	11 7 4	020-010
2166.76115	.0140	11 6 5	10 5 6	040-030	2250.19969	.0220	12 8 4	11 7 5	020-010
2167.24498	.0500	20 6 15	19 5 14	020-010	2252.20703	.0110	28 5 24	27 4 23	010-000
2169.58786	.0990	20 6 15	19 5 14	010-000	2252.49851	.0180	26 6 21	25 5 20	010-000
2170.94860	.1100	13 6 7	12 5 8	020-010	2252.93274	.0400	20 7 14	19 6 13	010-000
2171.20991	.0270	10 7 4	9 6 3	030-020	2253.15586	.0220	17 7 11	16 6 10	010-000
2171.62145	.0320	30 2 29	29 1 28	010-000	2254.16720	.0270	22 7 16	21 6 15	010-000
2171.78302	.0510	8 8 1	7 7 0	030-020	2254.21163	.0160	19 7 13	18 6 12	010-000
2171.92081	.0220	22 5 17	21 6 16	010-000	2254.74704	.0220	15 7 9	14 6 8	020-010
2172.13488	.0120	21 6 16	20 5 15	020-010	2254.81409	.0590	18 7 12	17 6 11	010-000
2172.73546	.0730	23 4 19	22 5 18	010-000	2258.57818	.0110	23 7 17	22 6 16	010-000
2172.84851	.0310	10 7 3	9 6 4	030-020	2261.10233	.0100	14 7 8	13 6 7	030-020
2173.23643	.0620	25 3 22	24 4 21	010-000	2262.87696	.0080	22 7 16	21 6 15	020-010
2173.36366	.0190	25 4 22	24 3 21	010-000	2265.76679	.0140	24 7 18	23 6 17	010-000
2174.54652	.0230	23 5 19	22 4 18	010-000	2266.63786	.0390	16 7 10	15 6 9	020-010
2174.97693	.0110	9 7 2	8 6 3	040-030	2267.68253	.0460	15 7 8	14 6 9	020-010
2175.06900	.0410	28 3 26	27 2 25	010-000	2269.07497	.0110	12 8 5	11 7 4	030-020
2176.38758	.0520	11 7 5	10 6 4	020-010	2271.96813	.0140	20 7 14	19 6 13	020-010
2177.92232	.0080	27 3 24	26 4 23	020-010	2273.13663	.0560	13 8 5	12 7 6	020-010
2179.69249	.0240	22 6 17	21 5 16	020-010	2273.94234	.0100	17 7 11	16 6 10	020-010
2180.48050	.0270	21 6 16	20 5 15	010-000	2275.26246	.0030	25 7 19	24 6 18	010-000
2184.80362	.0120	12 6 7	11 5 6	040-030	2275.68840	.0050	19 7 13	18 6 12	020-010
2184.84075	.0360	14 6 9	13 5 8	030-020	2276.67620	.0190	18 7 12	17 6 11	020-010
2187.34337	.0240	29 2 27	28 3 26	010-000	2277.19892	.0150	16 6 10	15 5 11	010-000
2188.04938	.0270	23 6 17	22 7 16	010-000	2283.51712	.0250	16 7 9	15 6 10	010-000
2188.99132	.0440	26 4 23	25 3 22	010-000	2285.49508	.0190	15 7 8	14 6 9	030-020
2189.18036	.0140	18 6 13	17 5 12	030-020	2291.22944	.0110	16 7 9	15 6 10	020-010
2189.53464	.0280	13 4 9	12 3 10	020-010	2291.61612	.0120	13 8 5	12 7 6	030-020
2190.13262	.0290	24 4 20	23 5 19	010-000	2292.77568	.0300	12 9 4	11 8 3	020-010
2191.22827	.0570	24 5 20	23 4 19	010-000	2293.76350	.0100	16 7 10	15 6 9	030-020
2192.21961	.0130	15 6 10	14 5 9	030-020	2294.76720	.0380	14 8 7	13 7 6	020-010
2193.47857	.0590	22 6 17	21 5 16	010-000	2295.20590	.0150	14 8 6	13 7 7	020-010
2193.84461	.0150	14 5 9	13 4 10	020-010	2301.57565	.0270	15 8 8	14 7 7	010-000
2194.10377	.0440	23 5 18	22 6 17	010-000	2304.34284	.0040	12 9 4	11 8 3	030-020
2195.55094	.0210	16 6 11	15 5 10	030-020	2312.48602	.0170	17 6 11	16 5 12	020-010
2196.51498	.0360	11 7 4	10 6 5	030-020	2312.65293	.0450	17 7 10	16 6 11	010-000
2197.01833	.0350	9 8 1	8 7 2	030-020	2314.45956	.0090	17 6 11	16 5 12	030-020
2197.45424	.0100	11 7 5	10 6 4	030-020	2315.31431	.0130	15 8 8	14 7 7	020-010
2197.96719	.0240	14 6 8	13 5 9	020-010	2315.86386	.0220	13 9 4	12 8 5	020-010
2198.33609	.0170	30 3 28	29 2 27	010-000	2316.38128	.0360	15 8 7	14 7 8	020-010
2198.90082	.0070	10 7 4	9 6 3	040-030	2316.53518	.0190	17 7 10	16 6 11	020-010
2198.93610	.1140	12 7 6	11 6 5	020-010	2320.12027	.0600	16 8 9	15 7 8	010-000
2199.94546	.0400	12 7 5	11 6 6	020-010	2324.65743	.0570	10 10 1	9 9 0	020-010
2201.13594	.0050	12 5 8	12 2 11	020-010	2325.41041	.0080	15 4 11	14 3 12	020-010
2204.43058	.0250	27 3 24	26 4 23	010-000	2325.68733	.0200	16 8 8	15 7 9	010-000
2206.92134	.0370	25 4 21	24 5 20	010-000	2326.17793	.0220	17 6 11	16 5 12	010-000
2207.60664	.0120	25 5 21	24 4 20	010-000	2329.44175	.0260	14 9 5	13 8 6	010-000
2207.82783	.0160	23 6 18	22 5 17	010-000	2331.61762	.0060	16 5 11	15 4 12	010-000
2208.35058	.0070	31 2 29	30 3 28	010-000	2334.18174	.0250	16 8 9	15 7 8	020-010
2209.48096	.0130	13 6 7	12 5 8	040-030	2338.01389	.0100	14 9 6	13 8 5	020-010
2214.18568	.0160	24 5 19	23 6 18	010-000	2342.76522	.0040	26 8 19	25 7 18	010-000
2218.33750	.0090	14 6 9	13 5 8	040-030	2344.06355	.0050	17 5 12	16 4 13	030-020
2218.96122	.0910	9 9 0	8 8 1	020-010	2347.32951	.0380	17 8 9	16 7 10	010-000
2219.04149	.0180	28 4 25	27 3 24	010-000	2347.67229	.0400	18 8 11	17 7 10	010-000
2219.26543	.0100	9 8 1	8 7 2	040-030	2348.47067	.0480	11 10 1	10 9 2	020-010
2219.50261	.0100	12 7 5	11 6 6	030-020	2350.83580	.0040	17 8 10	16 7 9	020-010
2219.87496	.0270	12 7 6	11 6 5	030-020	2352.00904	.0160	15 9 7	14 8 6	010-000
2219.98864	.0260	13 7 7	12 6 6	020-010	2352.20975	.0490	15 9 6	14 8 7	010-000
2221.72056	.0290	10 8 3	9 7 2	030-020	2353.90382	.0090	22 8 15	21 7 14	010-000
2222.43042	.0090	26 4 22	25 5 21	010-000	2358.13033	.0160	20 8 13	19 7 12	010-000
2222.43623	.0090	26 4 22	25 5 21	010-000	2364.39971	.0080	18 8 11	17 7 10	020-010
2222.63941	.0810	13 7 6	12 6 7	020-010	2369.40283	.0110	10 10 1	9 9 0	030-020
2222.85526	.0290	24 6 19	23 5 18	010-000	2369.57481	.0090	18 8 10	17 7 11	010-000
2222.87877	.0200	26 5 22	25 4 21	010-000	2370.88217	.0290	11 11 0	10 10 1	020-010
2225.46569	.0090	15 5 10	14 4 11	030-020	2372.04738	.0390	12 10 3	11 9 2	020-010
2225.96929	.0060	15 6 9	14 5 10	030-020	2373.31736	.0470	14 10 5	13 9 4	010-000
2226.46244	.1010	11 8 3	10 7 4	020-010	2373.57304	.0300	16 9 8	15 8 7	010-000
2228.05779	.0440	15 6 9	14 5 10	020-010	2374.12654	.0140	16 9 7	15 8 8	010-000
2232.52995	.0230	25 5 20	24 6 19	010-000	2375.87090	.0070	19 7 12	18 6 13	020-010
2233.10922	.0120	29 3 26	28 4 25	010-000	2379.32631	.0040	20 8 13	19 7 12	020-010
2233.67721	.0130	9 9 0	8 8 1	030-020	2385.33246	.0120	19 7 12	18 6 13	010-000
2237.93576	.0070	25 6 20	24 5 19	010-000	2388.01559	.0340	13 11 2	12 10 3	010-000
2238.87951	.0650	14 7 8	13 6 7	020-010	2393.28814	.0150	19 8 11	18 7 12	010-000

TABLE 1—Continued

$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band	$\nu/\text{cm}^{-1}$	Int	$J'' K''_a K''_c$	$J' K'_a K'_c$	band
2393.81633	.0080	17 9 9	16 8 8	010-000	2440.36412	.0176	15 10 5	14 9 6	020-010
2395.18575	.0250	17 9 8	16 8 9	010-000	2441.15545	.0060	17 4 13	16 3 14	030-020
2395.29543	.0280	13 10 3	12 9 4	020-010	2441.65960	.0083	17 10 8	16 9 7	010-000
2395.51968	.0080	11 10 1	10 9 2	030-020	2441.77279	.0145	17 10 7	16 9 8	010-000
2395.98203	.0030	17 5 12	16 4 13	010-000	2442.08369	.0122	20 9 12	19 8 11	010-000
2396.30005	.0260	12 12 1	11 11 0	010-000	2447.98644	.0103	14 11 4	13 10 3	020-010
2396.97167	.0100	15 10 6	14 9 5	010-000	2449.38278	.0132	14 12 3	13 11 2	010-000
2397.00195	.0270	15 10 5	14 9 6	010-000	2449.48335	.0070	21 8 13	20 7 14	010-000
2397.20961	.0220	12 11 2	11 10 1	020-010	2454.66253	.0049	20 9 11	19 8 12	010-000
2406.09208	.0243	15 3 12	14 2 13	020-010	2457.28194	.0033	22 9 14	21 8 13	010-000
2412.36850	.0204	18 9 10	17 8 9	010-000	2461.59358	.0136	16 11 6	15 10 5	010-000
2413.31471	.0305	14 11 4	13 10 3	010-000	2461.93398	.0084	16 10 7	15 9 6	020-010
2415.13239	.0084	14 2 12	13 1 13	030-020	2462.41503	.0064	18 10 9	17 9 8	010-000
2415.45273	.0042	18 9 9	17 8 10	010-000	2462.72320	.0066	18 10 8	17 9 9	010-000
2418.10863	.0224	14 10 5	13 9 4	020-010	2472.25965	.0061	15 11 4	14 10 5	020-010
2419.80497	.0202	16 10 7	15 9 6	010-000	2474.79985	.0091	15 12 3	14 11 4	010-000
2419.84422	.0093	16 10 6	15 9 7	010-000	2481.43452	.0088	14 13 2	13 12 1	010-000
2422.94431	.0175	13 11 2	12 10 3	020-010	2482.67890	.0077	19 10 9	18 9 10	010-000
2423.19306	.0223	13 12 1	12 11 2	010-000	2482.75350	.0113	17 10 7	16 9 8	020-010
2426.69626	.0052	14 5 10	13 2 11	040-030	2484.43257	.0074	17 11 6	16 10 7	010-000
2427.24738	.0108	12 12 1	11 11 0	020-010	2488.17125	.0044	16 9 8	15 8 7	030-020
2435.17809	.0116	19 9 10	18 8 11	010-000	2499.38982	.0088	16 12 5	15 11 4	010-000
2437.65085	.0031	13 11 2	12 10 3	030-020	2499.96494	.0055	20 10 11	19 9 10	010-000
2437.86640	.0225	15 11 4	14 10 5	010-000					

their sunspot spectrum to (001)–(010) using trivial assignments. In previous work, we assigned rotational difference bands corresponding to the (020)–(100) and (100)–(020) transitions in among the pure rotational lines (25). These transitions arose from intensity stealing between nearby levels, and the assignments could be confirmed using combinational differences. Subsequent analysis (16, 25) also revealed rotational difference transitions belonging to (030)–(110). The difference bands assigned here do not appear to arise from any particular intensity stealing interactions but are simply weak bands that the experiment is sensitive enough to detect.

TABLE 2  
Number of New Assignment  
N Made for Each Band

band	N	band	N
000-000	154	040-110	4
010-010	96	001-010	220
020-020	35	110-100	304
020-010	630	011-001	326
100-100	6	120-110	80
001-001	4	120-030	20
040-030	365	030-001	4
030-020	598	011-100	10
030-030	6	110-001	10
050-040	130	130-120	2
010-000	539	040-011	1
060-050	34	011-020	305
030-100	27	021-030	130
110-020	167	111-101	2
100-010	188	101-110	15
021-011	138	031-040	1
100-000	2	001-000	3

In comparing our newly assigned transitions with those given in HITRAN92 (20) and HITRAN96 (21), a number of differences were detected. Table 3 presents 53 transitions in which our results differ in frequency by at least  $0.02 \text{ cm}^{-1}$  from those given by HITRAN96. It is likely that these lines were computed for the HITRAN database rather than measured. For water, the only difference between HITRAN92 and HITRAN96 is that some of the water transition frequencies computed for HITRAN92 were replaced by measured frequencies in HITRAN96. Fourteen of these transitions were observed in the present experiments and in each case were found to be within  $0.02 \text{ cm}^{-1}$  of the HITRAN96 value. In performing the present analysis, we found six mistakes in our previous assignments. One of these errors, the transition previously assigned at  $1415.879 \text{ cm}^{-1}$  was typographical and the other five were misassignments. The corrected results are presented in Table 4 and new assignments of the original features are given in Table 1, except for the line at  $1101.449 \text{ cm}^{-1}$ , which was not observed in the present experiments. All these new assignments are trivial.

The many new assignments given here can be used to extend the standard tables of observed energy levels which, in turn, can be used to make further assignments in other spectral regions. Our new assignments give direct information on 63 levels for (050) and 27 for (060). We have combined the new data given here with that obtained by us at other wavelengths, in particular, at room temperature in the near infrared (26) and in sunspots in the  $2\text{-}\mu\text{m}$  region (19). These tables extend the known levels up to  $K_a = 30$  and contain levels for  $J$  up to 33 for (010), up to  $K_a = 29$  and  $J = 30$  for (020), up to  $K_a = 27$  and  $J = 28$  for (030), up to  $K_a = 8$  and  $J = 18$  for (040), up to  $K_a = 7$  and  $J = 16$  for (050), and up to  $K_a = 5$  and  $J = 14$  for (060). Full results will be given elsewhere (18).

## IV. CONCLUSION

We present new laboratory emission spectra for water obtained at 1500°C. Assignment of the majority of the transitions in these spectra show that they are due to at least 34 separate vibrational bands, including bending hot band transitions and 14 distinct difference bands. We expect this data to be useful for modeling the transmission of radiation through hot steam. An important new feature of this work is the large number of

TABLE 3  
Corrected Wavenumbers for Transitions Present in the  
HITRAN Database (2f)

$\nu_{\text{lab}}/\text{cm}^{-1}$	$\nu_{\text{hitran}}/\text{cm}^{-1}$	$J''$	$K''_a$	$K''_c$	$J'$	$K'_a$	$K'_c$	band
997.61982	997.64000	16	6	10	15	3	13	000-000
1151.00759	1151.05010	13	5	9	14	6	8	010-000
1409.91216	1409.88260	16	2	14	16	3	13	010-000
1443.96058	1443.93830	14	2	12	14	3	11	010-000
1465.57158	1465.61750	16	3	13	16	4	12	010-000
1466.69999	1466.73330	15	4	12	15	5	11	010-000
1495.06270	1495.03590	15	5	11	15	6	10	010-000
1510.32635	1510.29250	13	6	8	13	7	7	010-000
1516.39859	1515.64010	14	7	7	14	8	6	010-000
1521.69987	1522.39180	16	4	12	16	5	11	010-000
1536.90854	1536.82920	14	5	9	14	6	8	010-000
1545.28700	1545.51790	16	5	11	16	6	10	010-000
1757.51620	1757.39400	14	5	9	14	4	10	010-000
1785.81103	1785.78870	14	4	10	14	3	11	010-000
1801.60477	1801.63180	14	6	8	14	5	9	010-000
1824.29451	1824.26320	13	6	8	12	7	5	010-000
1836.81342	1836.84270	15	5	11	14	6	8	010-000
1842.81904	1843.52310	16	4	12	16	3	13	010-000
1843.94710	1844.29430	16	1	16	15	0	15	020-010
1850.37931	1849.96550	13	2	12	12	1	11	020-010
1850.86960	1850.83800	13	6	8	13	5	9	010-000
1853.66998	1852.89420	14	7	7	13	8	6	010-000
1855.39728	1854.38710	15	5	11	15	4	12	010-000
1857.92428	1857.95150	14	6	8	13	7	7	010-000
1862.98177	1862.82090	15	6	10	15	5	11	010-000
1863.66140	1863.69280	15	4	12	15	3	13	010-000
1866.00851	1865.81440	15	6	10	14	7	7	010-000
1868.63782	1868.43770	14	1	13	13	2	12	020-010
1869.06815	1868.86090	14	2	13	13	1	12	020-010
1878.28114	1878.32170	16	3	13	16	2	14	010-000
1880.03024	1879.30160	14	7	7	14	6	8	010-000
1887.50631	1887.30200	15	1	14	14	2	13	020-010
1887.73994	1887.52140	15	2	14	14	1	13	020-010
1890.25116	1890.12760	14	5	9	13	6	8	010-000
1895.45785	1895.61310	13	3	11	12	2	10	020-010
1972.29696	1972.52500	16	5	11	15	6	10	010-000
2005.47147	2005.52560	16	3	13	15	4	12	010-000
2010.55608	2011.28950	16	4	12	15	5	11	010-000
2012.10301	2012.12470	18	2	16	17	3	15	010-000
2031.90658	2032.04200	17	4	14	16	3	13	010-000
2076.72159	2076.42800	17	5	13	16	4	12	010-000
2118.22197	2118.08720	11	6	6	10	5	5	020-010
2136.22604	2135.82680	12	6	7	11	5	6	020-010
2136.71465	2136.68270	13	6	8	12	5	7	010-000
2149.12580	2148.95680	15	6	10	14	5	9	010-000
2151.56005	2151.52430	8	8	1	7	7	0	020-010
2176.72206	2176.65680	11	7	4	10	6	5	020-010
2198.46969	2198.49700	14	6	8	13	5	9	010-000
2202.03434	2201.60210	10	8	3	9	7	2	020-010
2212.15475	2212.03120	14	5	9	13	4	10	010-000
2233.36923	2232.60000	14	7	7	13	6	8	010-000
2238.04878	2238.01200	15	7	9	14	6	8	010-000

TABLE 4  
Corrected List of Assignments from Paper I (f)

$\nu_{\text{lab}}/\text{cm}^{-1}$	$\nu_{\text{l}}/\text{cm}^{-1}$	$J''$	$K''_a$	$K''_c$	$J'$	$K'_a$	$K'_c$	band
1102.73711	1101.44909	14	6	9	15	7	8	020-010
1201.90341	1203.35011	6	5	1	7	6	2	040-030
1254.55329	1255.16694	11	10	1	12	11	2	020-010
1262.12089	1262.19107	3	3	1	4	4	0	040-030
1271.56985	1271.54659	3	2	1	4	3	2	040-030
1359.29162	1415.87900	4	3	2	4	4	1	040-030

difference bands observed. These bands have not been featured in previous compilations of experimental data.

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