Atlas of the Observed Absorption Spectrum of Carbon Monoxide Between 1060 and 1900 Å

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This atlas summarizes the results of a recent investigation of the carbon monoxide absorption spectrum between 1060 and 1900 Å. Twelve electronic transitions are observed in this region; four electric dipole allowed electric transitions from the ground state $X\,^1\Sigma^+$ to the $A\,^1\Pi$, $B\,^1\Sigma^+$, $C\,^1\Sigma^+$, and $E\,^1\Pi$ states, and eight forbidden transitions to the $a'\,^3\Sigma^+$, $e\,^3\Sigma^-$, $a\,^3\Pi$, $D\,^1\Delta$, $d\,^3\Delta_i$, $I\,^1\Sigma^-$, $j\,^3\Sigma^+$, and $c\,^3\Pi$ states. The following items are presented in the atlas:

(1) A photograph of the spectrum with band assignments;
(2) a table of band head measurements and assignments arranged by wavelength;
(3) a summary of the spectroscopic constants and potential curve for each electronic state;
(4) a line list, arranged by wavelength, of the observed rotational lines of the allowed transitions.

Key words: Absorption spectra; carbon monoxide; electronic transitions; identification atlas; potential energy curves; rotational and vibrational constants.

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Foreword

In 1966 Krupenie [1] published a comprehensive and critical review of the literature concerning the spectrum of carbon monoxide for the Standard Reference Data Series. Since that time an extensive investigation of the CO absorption spectrum in the vacuum ultraviolet region between 1060 and 1900 Å has been completed. The purpose of this atlas is threefold: (1) to summarize the new information obtained from the absorption spectrum since Krupenie's review, (2) to collect the vibrational and rotational constants derived from the new data and analyses, and (3) to present the complete observed absorption spectrum in the format of an identification atlas.

1. Summary of New Results

Twenty-three bands of the fourth positive system, $A\,^1\Pi$–$X\,^1\Sigma^+$, which is the dominant feature of the spectrum, have been analyzed [2]. The highest observed vibrational level of the $A\,^1\Pi$ state, $v=23$, lies above the accepted dissociation limit at 89595 cm^{-1} and therefore indicates that the $A\,^1\Pi$ state must have a small potential maximum. Detailed assignments of the numerous perturbations in the $A\,^1\Pi$ state, for the J-values accessible in absorption, have been summarized in table 5 of reference [2]. Many of these assignments disagree with those made by earlier workers as tabulated in table 54 by Krupenie [1]. An S-branch has been observed in the 4–0 fourth positive band [3]. This forbidden branch, which has the selection rule $\Delta J=+2$, can only arise as an electric quadrupole transition. The intensity of the S-branch is approximately 10^{-5} that of the electric-dipole allowed R-branch, which is in order of magnitude agreement with the expected ratio for the two transition probabilities.

The $I\,^1\Sigma^-$ state, which had previously been characterized by mutual perturbations with the $A\,^1\Pi$ state, has now been observed directly in the forbidden $I\,^1\Sigma^-$–$X\,^1\Sigma^+$ transition [4, 5]. This transition is rigorously forbidden as dipole radiation at zero rotation, but can occur for higher rotational levels because of Coriolis interaction between the $I\,^1\Sigma^-$ and $A\,^1\Pi$ states. The bands consist of a single Q-branch in which the lowest J-lines are either missing or very weak. Small "vibrational" perturbations in the I state have been noted which are probably caused by interactions with the $a\,^3\Pi$ state.

The $D\,^1\Delta$ state has been characterized from three weak bands of the forbidden $D\,^1\Delta$–$X\,^1\Sigma^+$ transition [5, 6]. The observed band structure indicates that the intensity of this transition results primarily from Coriolis mixing of the $D\,^1\Delta$ state with presumably the $A\,^1\Pi$ state, and no appreciable intensity can be attributed to an electric quadrupole contribution.

The rotational analyses of 13 bands of the forbidden $d\,^3\Delta_i$–$X\,^1\Sigma^+$ transition have been reported [7]. The intensity distribution in the rotational structure of the three subbands, illustrated by a photograph of the 4–0 band in figure 1 of reference 7, is in conformity with the assumption that the transition occurs because of interaction between the $d\,^3\Delta_i$ and $A\,^1\Pi$ states. The vibrational analysis differs considerably from that reported earlier [8] from a low resolution absorption spectrum.

In addition to the bands analyzed by Herzberg and Hugo [9] for the forbidden $a'\,^3\Sigma^+$–$X\,^1\Sigma^+$ and $e\,^3\Sigma^-$–$X\,^1\Sigma^+$ transitions, the analyses of several new a'–X and e–X bands have been reported [5] since Krupenie's review. The observation of a new e–X band on the long wavelength side of the earlier observations, in addition to the analyses of e–X isotopic bands, indicated that the vibrational numbering of the e state should be increased by one unit. Isotopic bands of the a'–X system were also analyzed which confirmed the vibrational numbering of the a' state.

Krupenie [1] pointed out the need for further experimental work to determine whether the upper state of the two emission bands at 2670 and 2980 Å, tentatively associated with the $f\,^3\Sigma^+$–$a\,^3\Pi$ transition, should be interpreted in terms of a separate electronic state, $f\,^3\Sigma^+$, or interpreted in terms of high vibrational levels of the $a'\,^3\Sigma^+$ state. Arguments have been presented in the reexamination of the a'–X system which favor the latter interpretation, as originally proposed in detail by Stepanov [10], although the vibrational levels observed in the emission bands were not observed directly in the absorption spectrum.

Rotational analyses of the 0–0 and 1–0 bands of the allowed $B\,^1\Sigma^+$–$X\,^1\Sigma^+$ and $C\,^1\Sigma^+$–$X\,^1\Sigma^+$ systems for both $^{12}C^{16}O$ and $^{13}C^{16}O$ isotopic species have been reported [11]. The resolved band at 1099.0 Å, previously identified as the 2–0 band of the B–X system, and an additional band at 1073.5 Å have been attributed to a new transition designated $j\,^3\Sigma^+$–$X\,^1\Sigma^+$ [11].

The c state, previously interpreted as a $^3\Sigma^+$ state, has been reexamined from the c–$a^3\Pi$ emission system [12] as well as from the previously unobserved c–$X\,^1\Sigma^+$ absorption system [13]. A Q-branch was observed in the c–X transition and Λ-doubling was observed in the S_2- amd N_3-branches of the c–a transition. Both of these observations are inconsistent with a $^3\Sigma^+$ assignment and lead to the conclusion that the c state should be assigned as $^3\Pi$. The $c^3\Pi$ state exhibits negligible spin splitting but appreciable Λ-doubling.

The Q-branch J-numbering in the $E\,^1\Pi$–$X\,^1\Sigma^+$ transition [14] reported earlier was based on the assumption that the Λ-doubling was minimal. Since appreciable Λ-doubling was observed in the $c^3\Pi$ state of the same electronic configuration, the above assumption is probably incorrect and the Q-branch numbering may be in error by as much as two or three units.

Table 1 lists the transitions observed in absorption and the references to recent analyses from which the data summarized in this atlas were taken.

2. Vibrational and Rotational Data and Derived Spectroscopic Constants

Tables 2 to 22 give the vibrational and rotational data and the derived spectroscopic constants for each of the excited electronic states of the transitions observed in the absorption spectrum. The B_v-values and band origins given in the tables must be considered "effective" spectroscopic constants, since no attempt was made to obtain completely deperturbed data from a systematic quantitative analysis of the interactions among the various states. Only the effects of strong local perturbations have been taken into account.

The vibrational and rotational constants were obtained from least squares fits of the observed data to expressions of the following form:

$$\nu_{v-0}=T_{e0}^{(n)}+Y_{10}^{(n)}(v+\tfrac{1}{2})+Y_{20}^{(n)}(v+\tfrac{1}{2})^2 + \ldots + Y_{n0}^{(n)}(v+\tfrac{1}{2})^n$$

and

$$B_v=Y_{01}^{(m)}+Y_{11}^{(m)}(v+\tfrac{1}{2})+Y_{21}^{(m)}(v+\tfrac{1}{2})^2 + \ldots + Y_{ml}^{(m)}(v+\tfrac{1}{2})^m,$$

where n and m are labels on the coefficients to indicate the order of the power series in $(v+\frac{1}{2})$ used to fit the observed band origins ν_{v-0} and rotational constants B_v, respectively. T_{e0} is the energy separation between the $v=0$, $J=0$ energy level of the ground electronic state, X $^1\Sigma^+$, and the minimum of the potential energy curve of the excited electronic state. T_e is obtained by adding the zero-point energy of the X $^1\Sigma^+$ state to T_{e0}.

Traditionally, spectroscopic constants would be determined from the empirical fit of all the observed data to the above expressions. The coefficients obtained would be the Dunham [15] coefficients and the equilibrium constants B_e, ω_e, etc. would be obtained by applying the Dunham corrections to these coefficients. Since the Dunham corrections for a molecule like CO are very small, one would normally set the first few Dunham coefficients approximately equal to the equilibrium constants (for example, $B_e \cong Y_{01}$).

We have not followed the traditional procedure here for some of the states in CO for reasons discussed now. For five of the electronic states included in this survey, viz A $^1\Pi$, I $^1\Sigma^-$, a' $^3\Sigma^+$, e $^3\Sigma^-$, and d $^3\Delta_i$, the observed data extend over such a large portion of the potential energy curve that relatively high-order expressions are required to fit the data. The coefficients of the high-order expressions, however, vary considerably as a function of both the order of the expression used and the number of data points included in the fit. Therefore, the first few coefficients of a particular high-order least squares fit including all the observed data do not necessarily represent the best values for the equilibrium constants.

The best equilibrium constants can be determined by fitting the observed data for the lower vibrational levels to relatively low order expressions. The disadvantage of quoting only these values for the spectroscopic constants is that they do not accurately reproduce the observed data for the higher vibrational levels.

We have chosen here to report two sets of constants for the states mentioned above: (1) A high-order set of coefficients, which taken as a set, reproduce the data over the entire observed range, and which further (a) predict rather accurately any missing data points within the range of observed data, even at high vibrational levels, and (b) give a smoothed polynomial for all the observed data from which potential curves and subsequently Franck-Condon factors can be calculated, and (2) A low-order set of coefficients which are individually meaningful within stated error limits and which best correspond to the traditional equilibrium spectroscopic constants.

The set of equilibrium constants were determined in the following way. First, the coefficients were obtained for two or more low orders as a function of the number of data points included in the fit. For example, the B_v-values of the A $^1\Pi$ state were fit to expressions of 2d and 3d orders. For each order the least squares fit is performed repeatedly, successively excluding the highest-v B_v-value of the previous fit until the number of B_v-values included is just greater than the number of coefficients in the expression. Then the values of a particular coefficient, for example Y_{01}, are plotted against the number of vibrational levels included in the fits for the two orders. Such a graph is illustrated in figure 1.[2] The error bars indicated on the plotted values are one standard deviation as given by the NBS least-squares subroutine ORTHO. The quoted value for the equilibrium constant is then determined visually from the graph and the size of the error limits chosen to enclose most of the values in the stable range of the coefficient. Therefore the value quoted is relatively independent of the order of the expression and the number of data points included in the fits.

The set of high order coefficients are those obtained from a single least squares fit of the observed data to expressions of the particular order indicated by the superscript of the coefficients. The limits given in the tables for these coefficients are one standard deviation.

The values of the individual coefficients, particularly those of the higher terms, are very much dependent on the order of the expression and the number of data points included in the fit. For this reason the individual coefficients are rather meaningless, but the set taken as a whole is significant to the extent that it gives a smoothed polynomial which accurately represents the data over the entire observed range. These polynomials are very useful for interpolation, but it would be very dangerous to extrapolate them outside the observed range.

The estimated error limits for the vibrational and rotational data of the D$^1\Delta$, B$^1\Sigma^+$, C$^1\Sigma^+$, $j^3\Sigma^+$, c$^3\Pi$ and E$^1\Pi$ states are given in the footnotes of the appropriate tables. Since only one or two vibrational levels have been observed for these states, the vibrational and rotational constants were determined from the combined data for the $^{12}C^{16}O$ and $^{13}C^{16}O$ isotopes when possible. However, the constants for these states are relatively poor compared to those of the five states for which extensive data are available.

Figure 3 illustrates the RKR potential energy curves [16] for all observed states of CO below 11.77 eV. The turning points from these calculations are included in the tables of band origins and B-values. The $b^3\Sigma^+$ state has been included for completeness, although the $b-$X transition was not observed in absorption. The $b^3\Sigma^+$ and X$^1\Sigma^+$ potential curves were calculated from data given by Krupenie [1]. The remaining curves were calculated from data summarized here.

3. Identification Atlas

The spectrum of CO has recently been shown to be a very important feature in solar, planetary and interstellar observations by rocket and satellite experiments which extend the wavelength coverage into the vacuum-ultraviolet region. The strong

[2] Figures 1 through 3 follow at the end of the text.

allowed band systems of CO are also persistent impurity spectra in laboratory experiments in this wavelength region. Therefore this atlas is designed especially to be used as a convenient identification tool.

Tables 23 to 26 give line lists arranged by wavelength for the observed rotational lines of the allowed electronic transitions. Tables of the observed lines arranged according to vibrational bands and given in wave numbers can be found in the original papers for these transitions (see table 1). Table 27 contains the band head measurements and assignments arranged by wavelength. A photograph of the complete region, 1060–1900 Å is given in figure 2 labeled with the band head measurements and assignments given in table 27.

4. References

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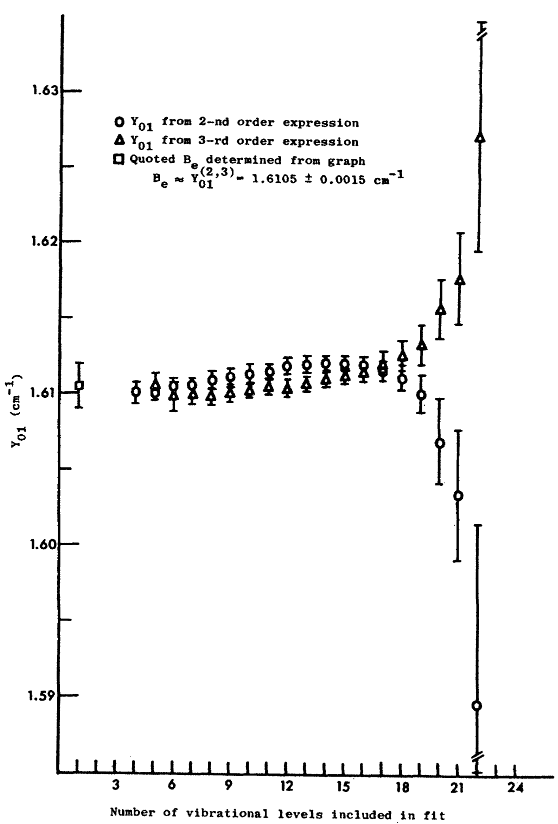


FIGURE 1. *Graphical display of* Y_{01}*-values for the* $A\,^1\Pi$ *state from least squares fits of the* B_v*-values to 2d and 3d order expressions as a function of the number of* B_v*-values included in the fit.*

The error bars on the Y_{01}'s, O and Δ, are one standard deviation as given by the NBS least squares subroutine ORTHO. The equilibrium constant $B_e \cong Y_{01}^{(2,3)}$ and its associated error limits were determined visually from the graph.

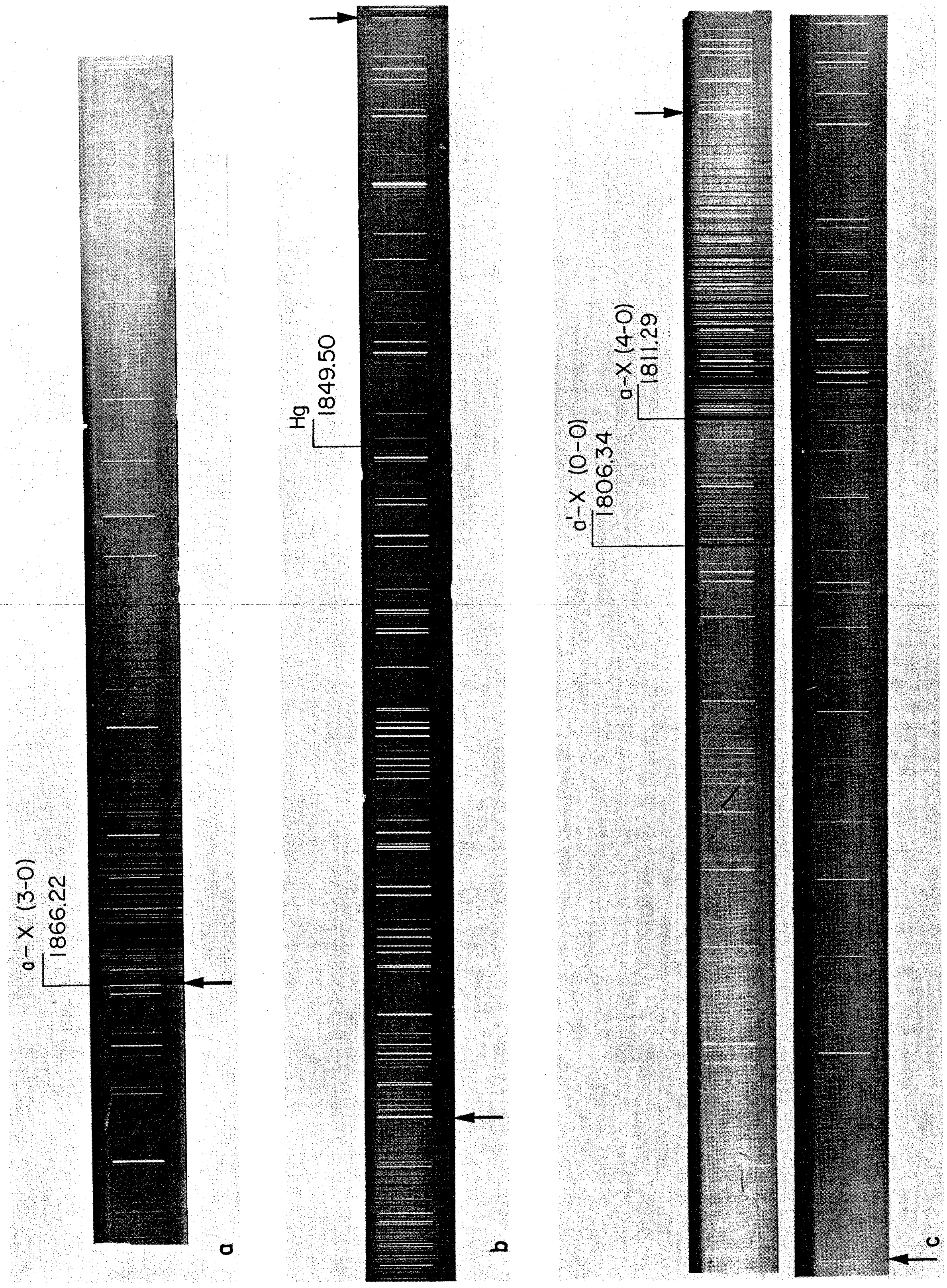
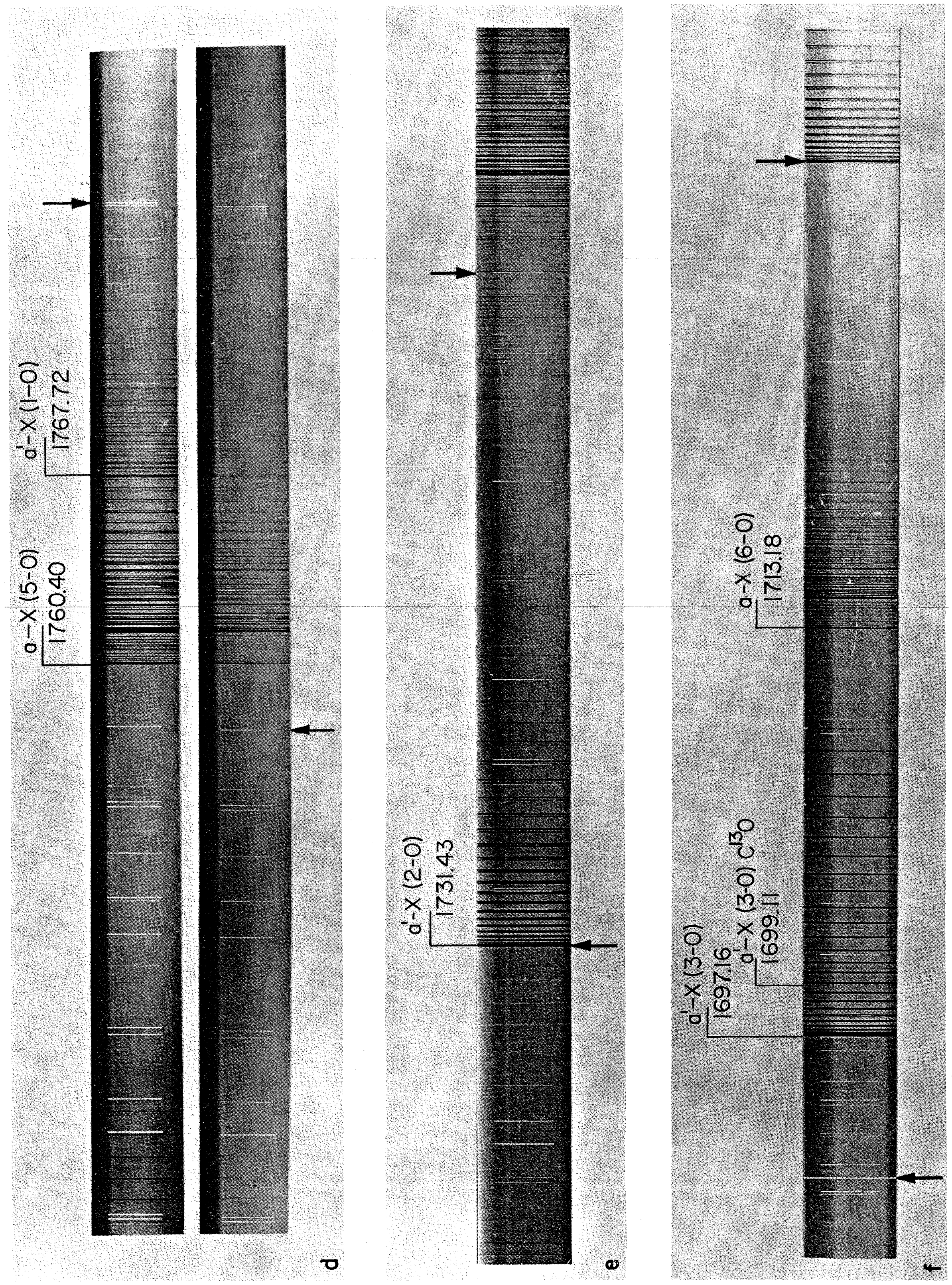


FIGURE 2. *Absorption spectra of room temperature carbon monoxide from 1060 to 1900 Å photographed with a 21-foot Eagle spectrograph.*

Spectra from 1900 to 1500 Å were photographed in the 3d order, from 1500 to 1200 Å in the 4th order, and from 1210 to 1060 Å in the 5th order. The reciprocal plate dispersion is 0.42 Å/mm in the 3d order, 0.31 Å/mm in the 4th order and 0.24 Å/mm in the 5th order. In most regions spectra observed at two pressures are illustrated. In figure 2(a) the center spectrum was observed with the sample at liquid nitrogen temperature. A few impurity atomic emission lines present in the rare gas sources are indicated. Small x's indicate impurity lines of H_2O, H_2, and CO_2. Arrows at the top and bottom of each print indicate the positions of overlap. Below 1150 Å some overlapping order spectra appear; these bands are not labeled.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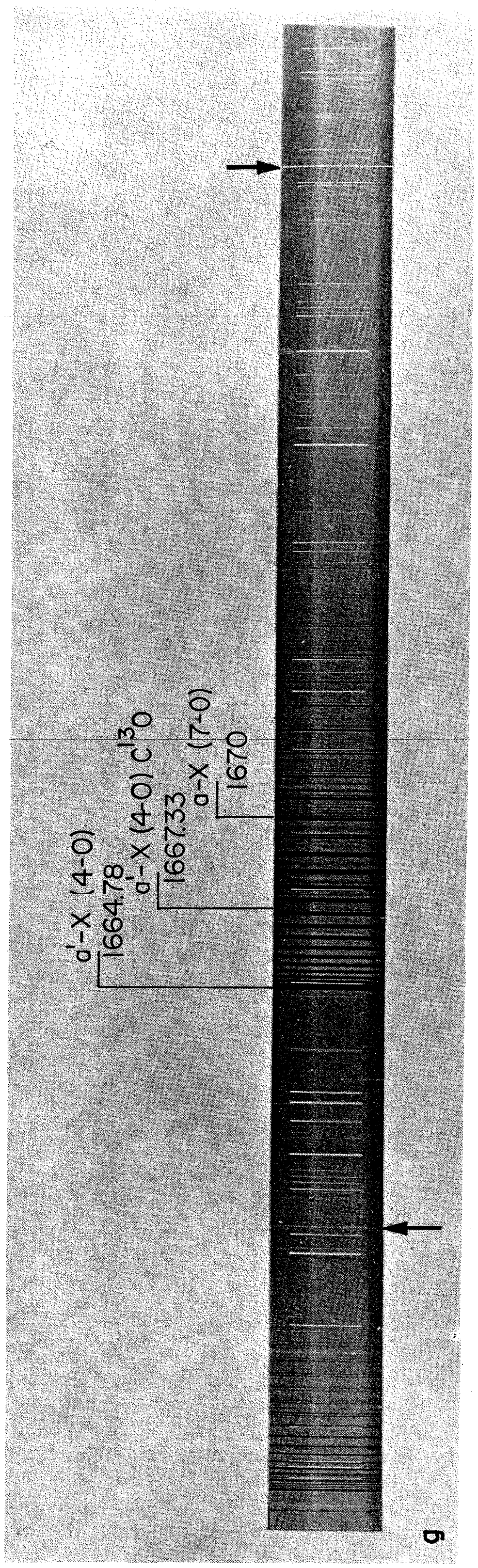
a–X (5–0)
1760.40
a′–X (2–0)
1731.43
a–X (6–0)
1713.18
a′–X (3–0)
1697.16
a′–X (3-0) $C^{13}O$
1699.11
d
e
f



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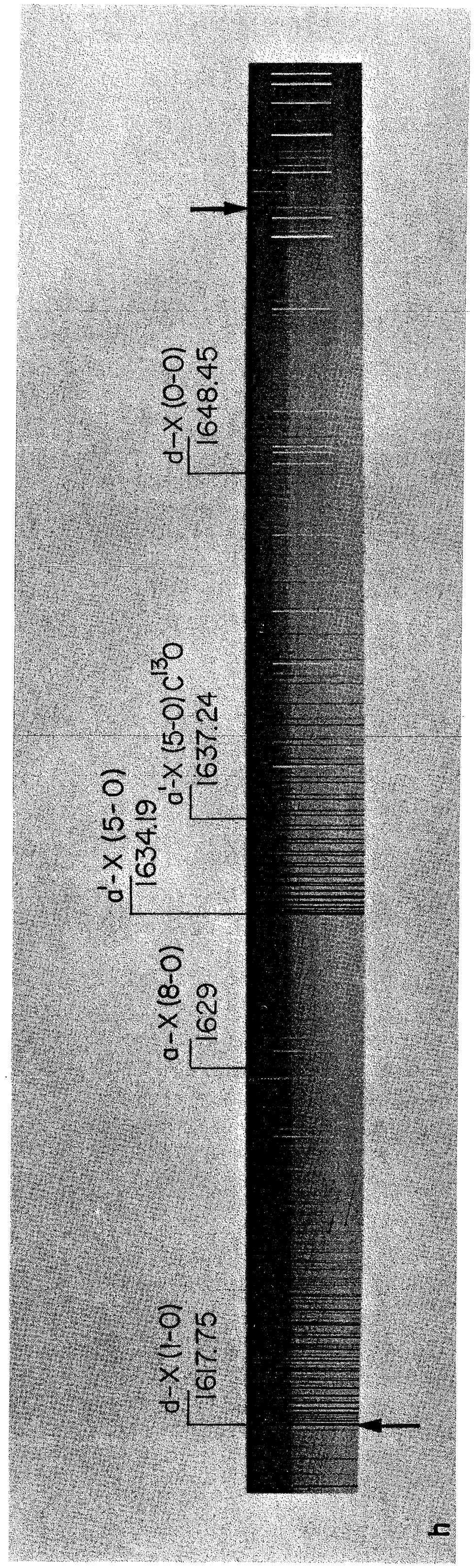
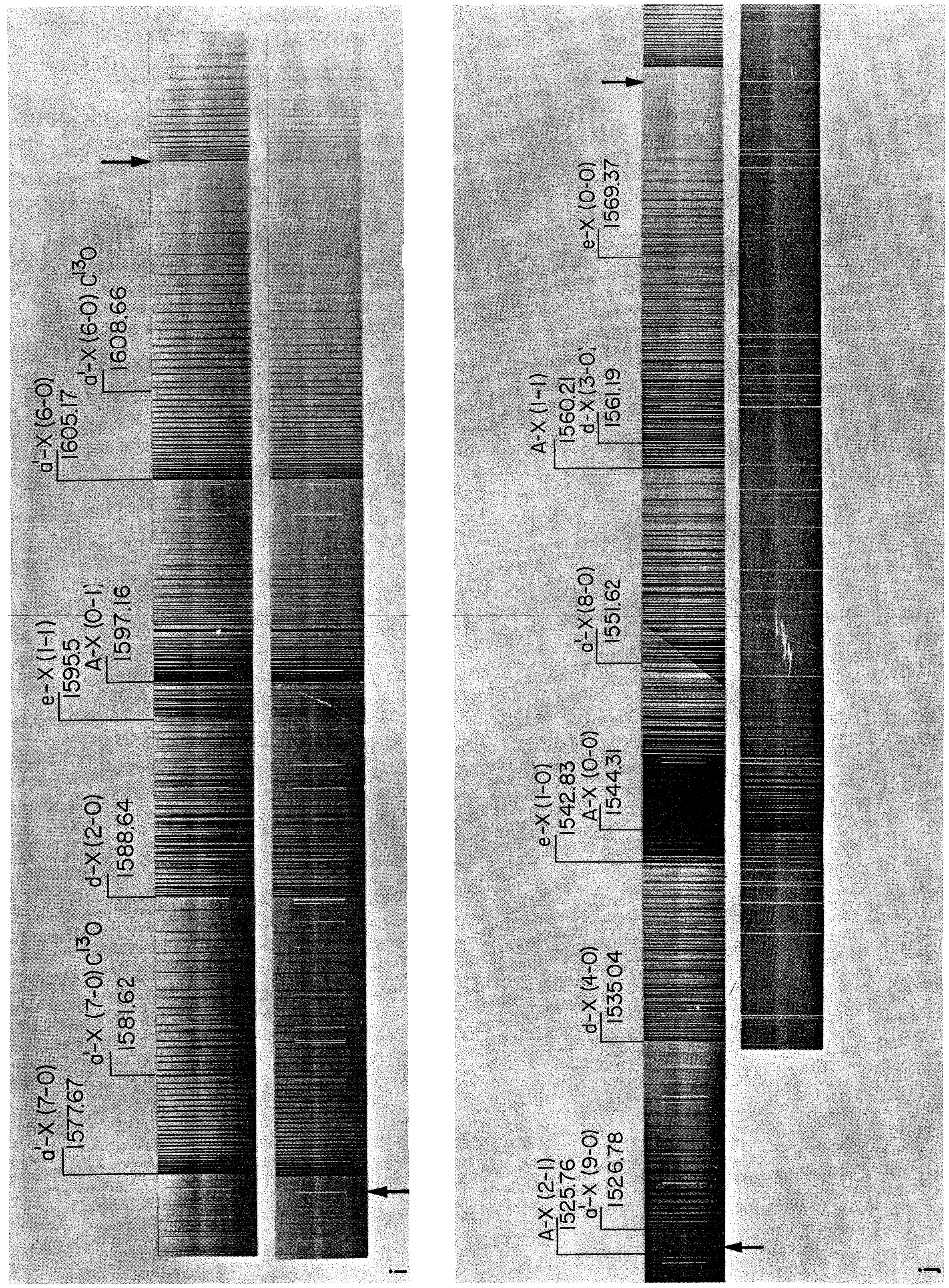
1664.78
a'-X (4-0) C13O
1667.33
a-X (7-0)
1670
g



d-X (1-0)
1617.75
a-X (8-0)
1629
a'-X (5-0)
1634.19
a'-X (5-0) C13O
1637.24
d-X (0-0)
1648.45
h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d'-X (7-0) C13O
1581.62
d-X (2-0)
1588.64
e-X (1-1)
1595.5
A-X (0-1)
1597.16
d'-X (6-0)
1605.17
d'-X (6-0) C13O
1608.66
A-X (2-1)
1525.76
d'-X (9-0)
1526.78
d-X (4-0)
1535.04
e-X (1-0)
1542.83
A-X (0-0)
1544.31
d'-X (8-0)
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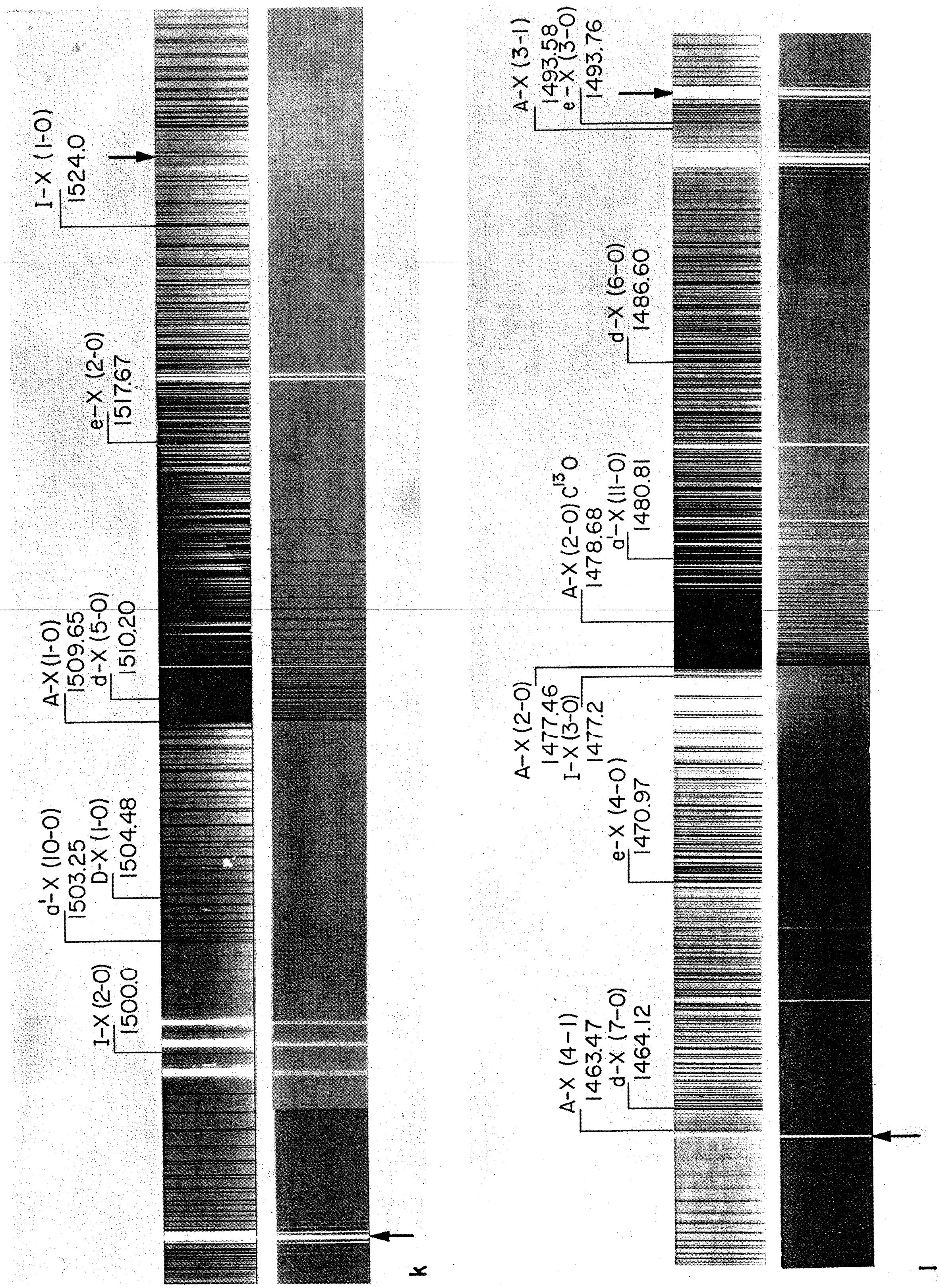
e-X (0-0)
1569.37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e-X (2-0)
1517.67
A-X (1-0)
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d-X (5-0)
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a'-X (10-0)
1503.25
D-X (1-0)
1504.48
I-X (2-0)
1500.0
A-X (3-1)
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e-X (3-0)
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A-X (2-0)
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I-X (3-0)
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d-X (7-0)
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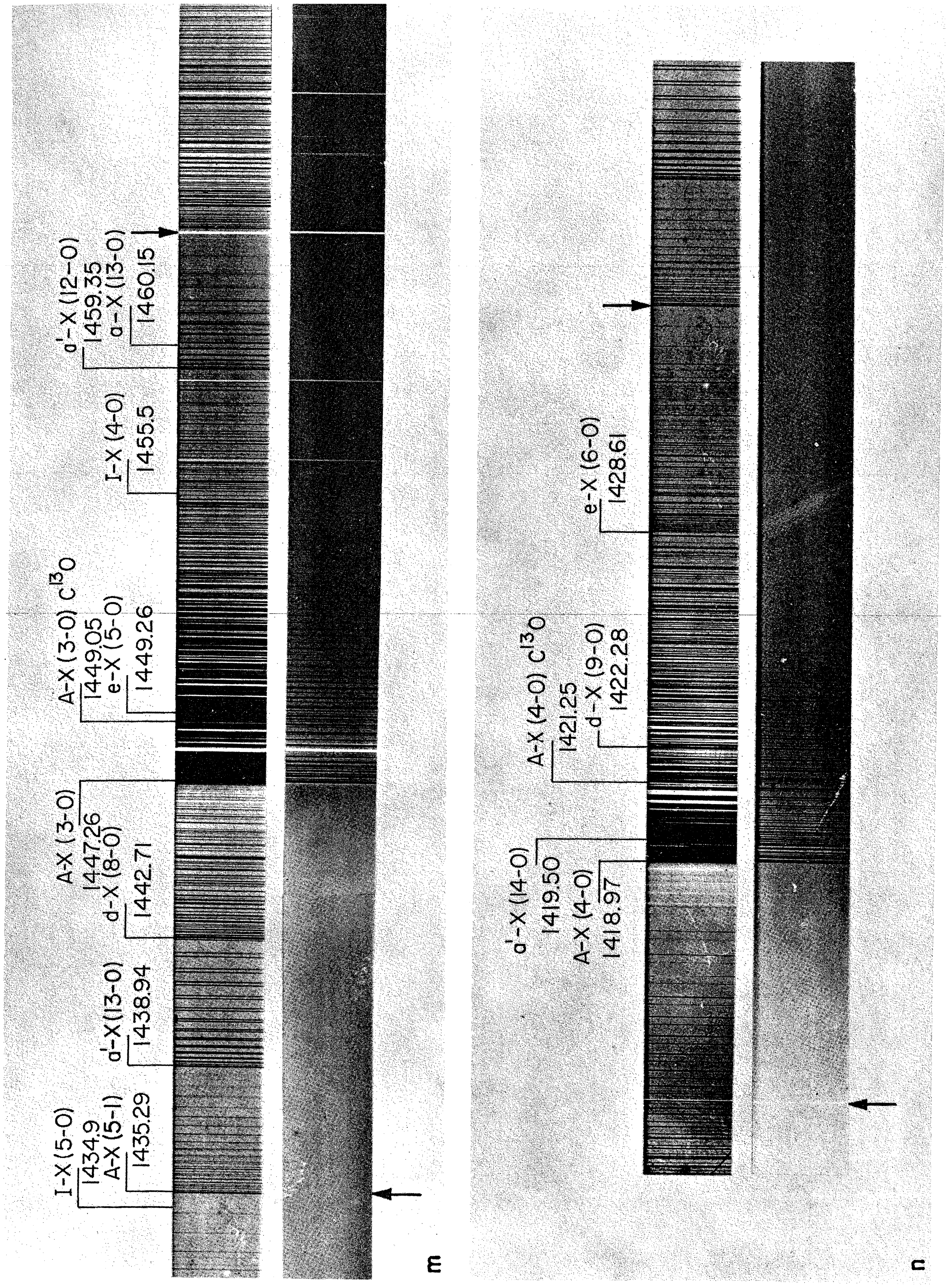
k

l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d-X (8-0)
1442.71
A-X (3-0) C13O
1449.05
e-X (5-0)
1449.26
I-X (4-0)
1455.5
d'-X (12-0)
1459.35
a-X (13-0)
1460.15
m
d'-X (14-0)
1419.50
A-X (4-0)
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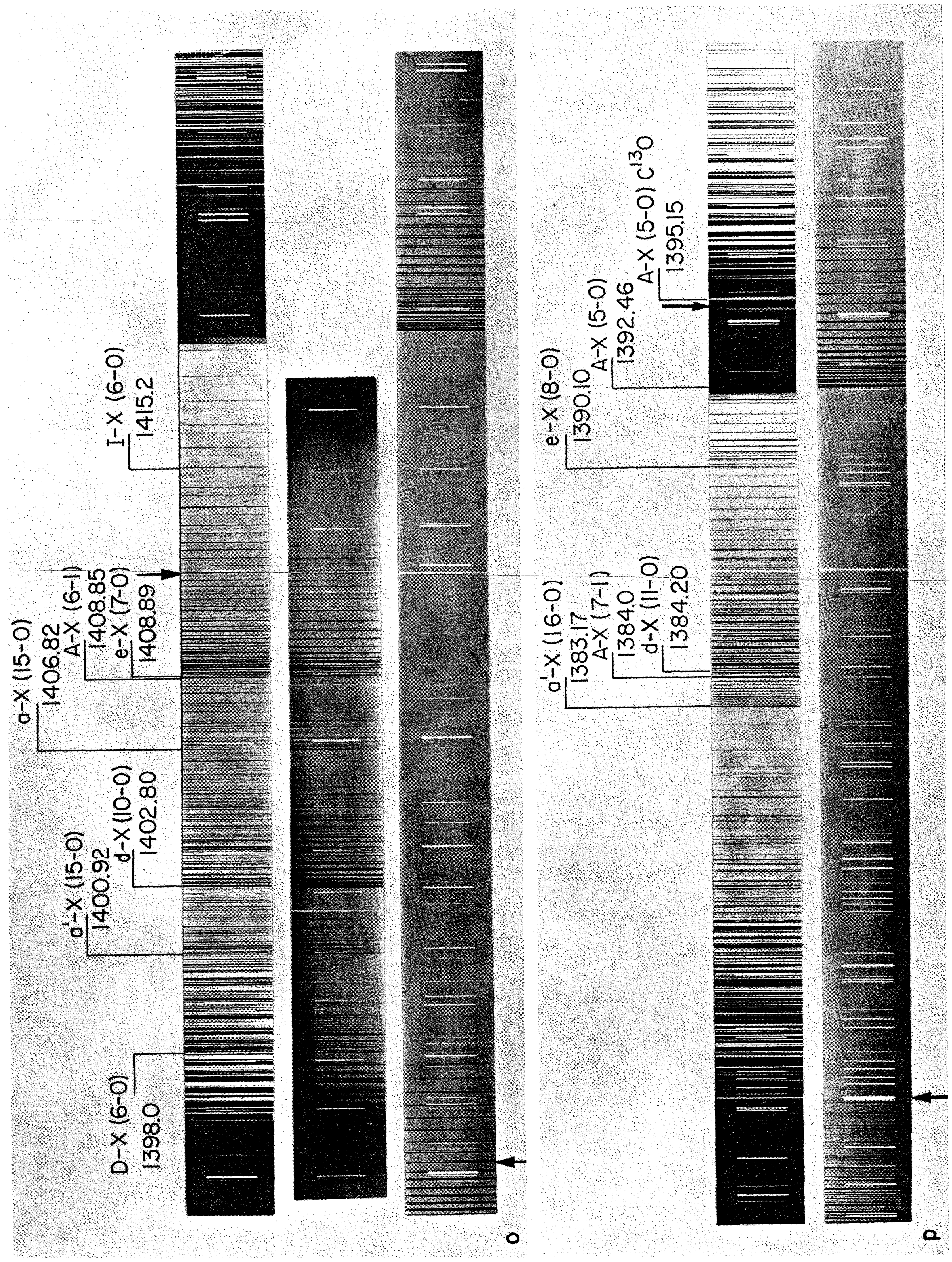
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A-X (6-1)
1408.85
e-X (7-0)
1408.89
I-X (6-0)
1415.2
o
a'-X (16-0)
1383.17
A-X (7-1)
1384.0
d-X (11-0)
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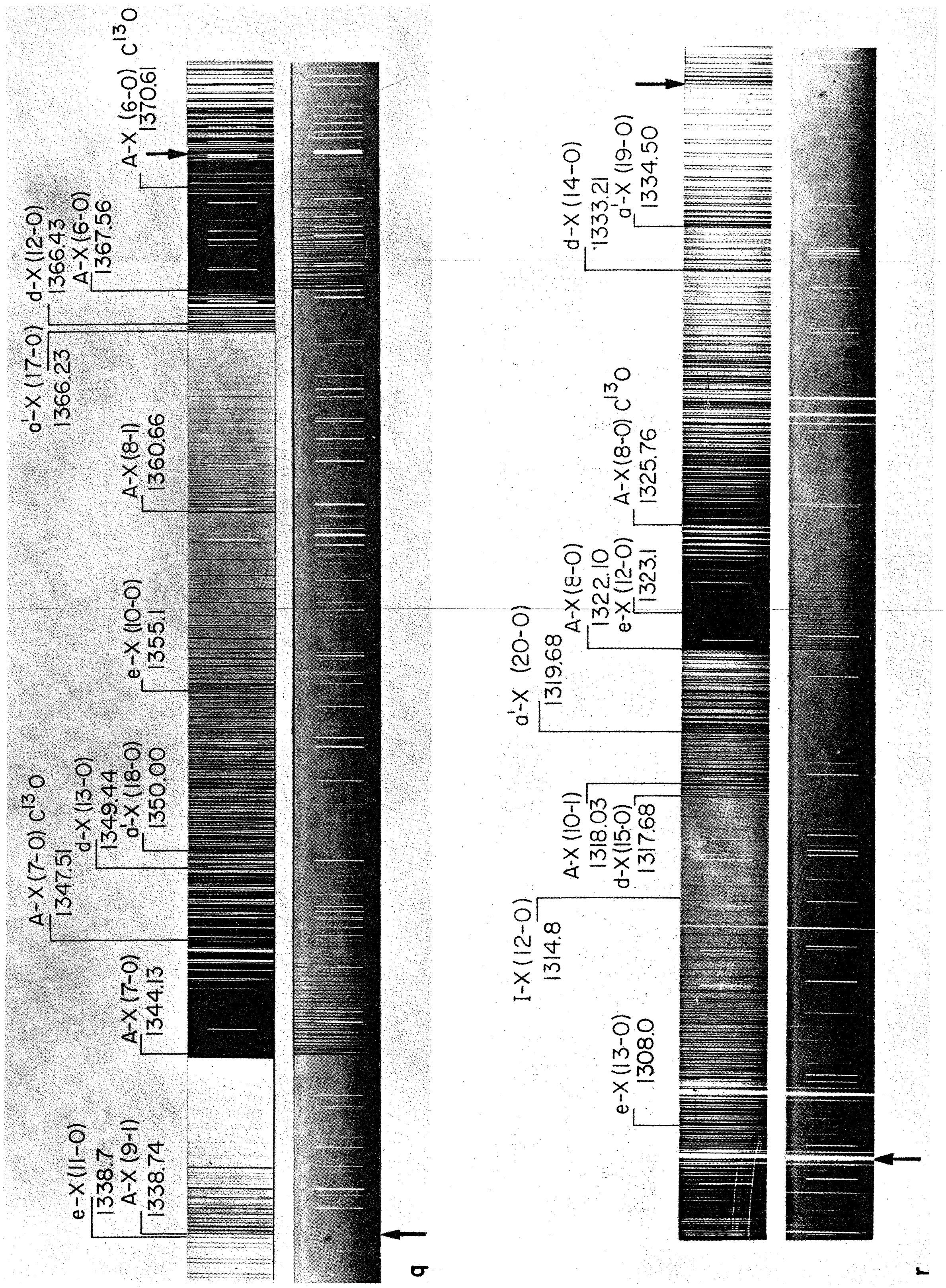
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A-X (8-1)
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1338.74
q
d-X (14-0)
1333.21
d'-X (19-0)
1334.50
A-X (8-0) C13O
1325.76
A-X (8-0)
1322.10
e-X (12-0)
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d'-X (20-0)
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A-X (10-1)
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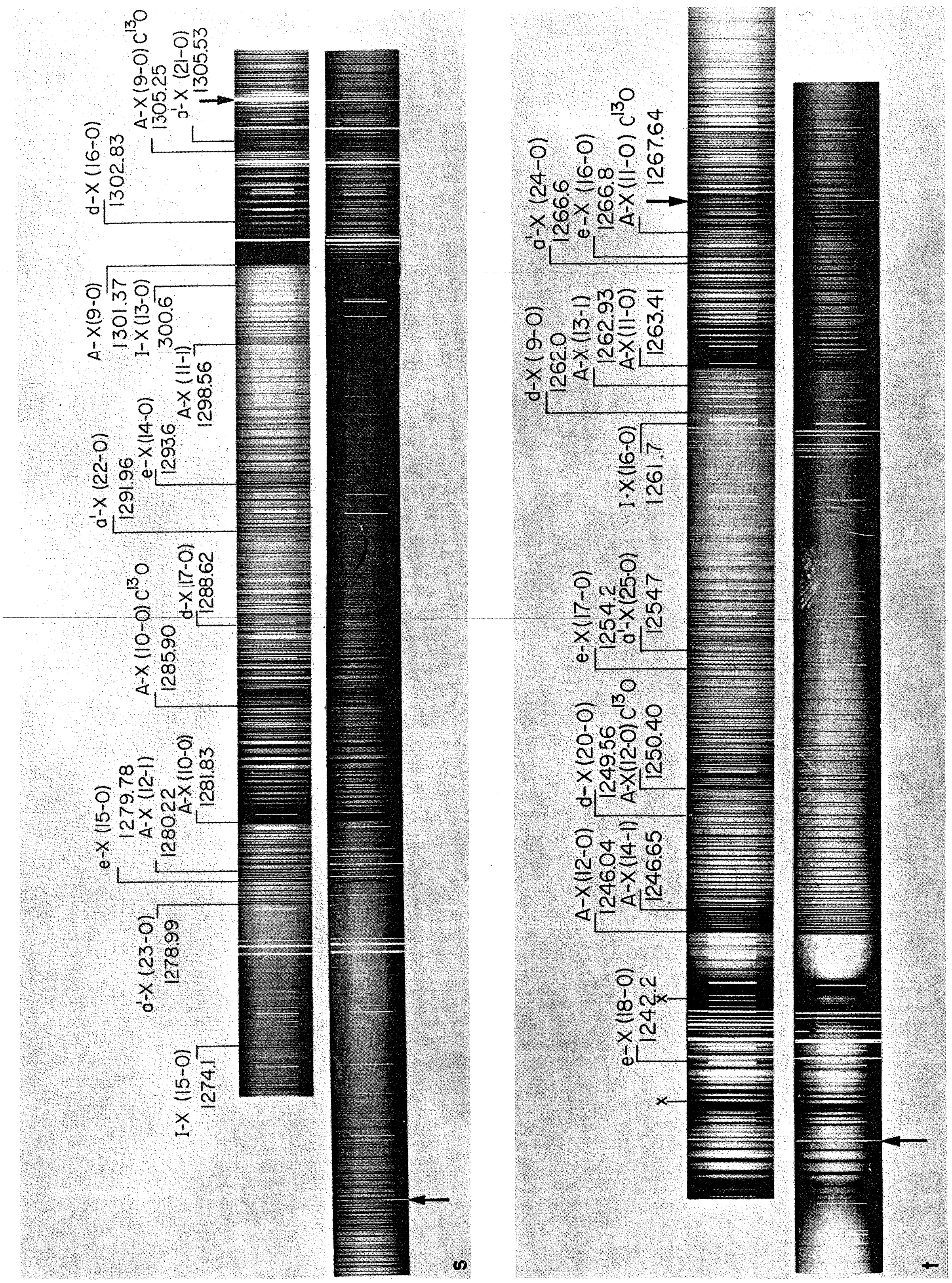
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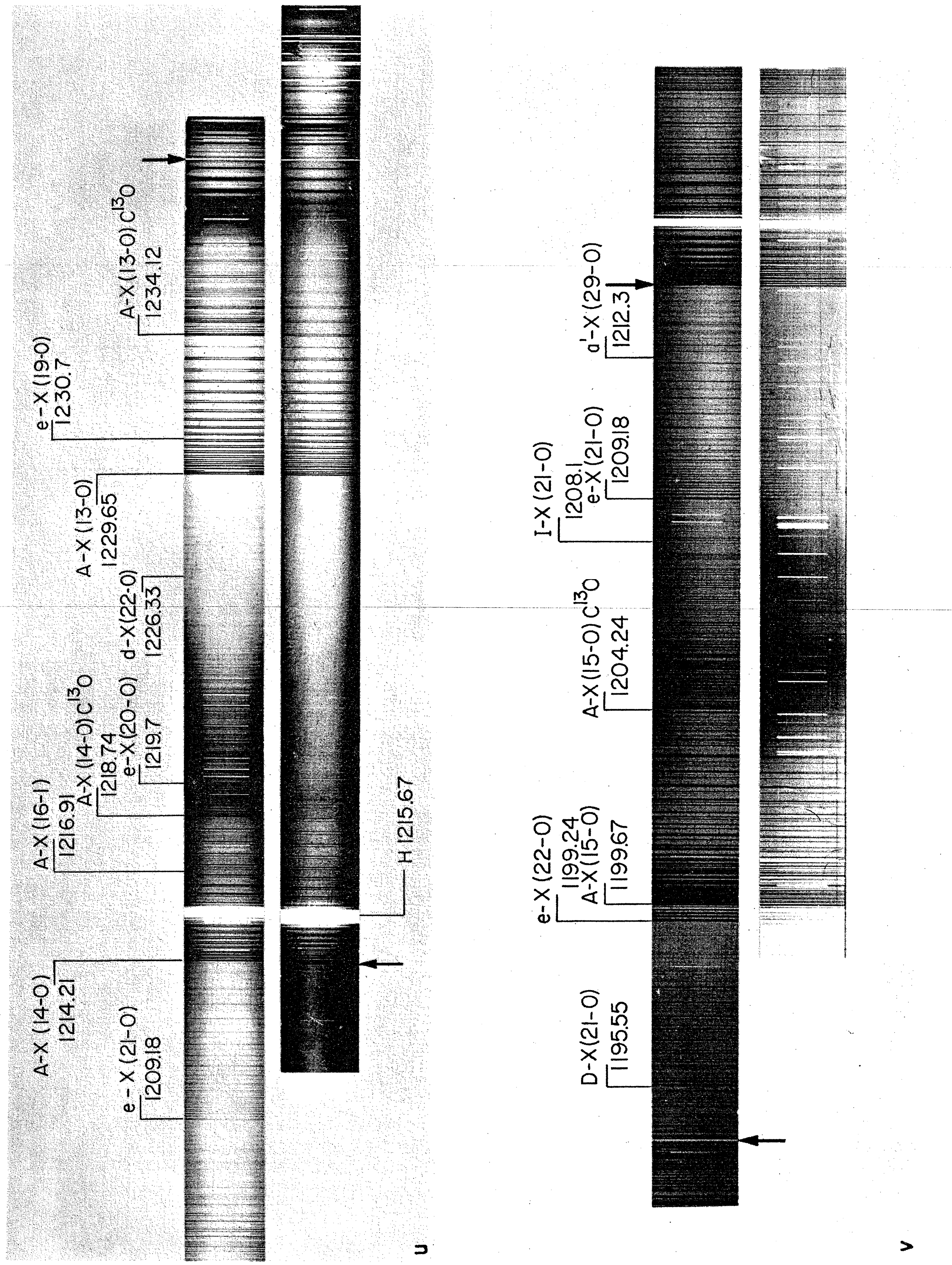
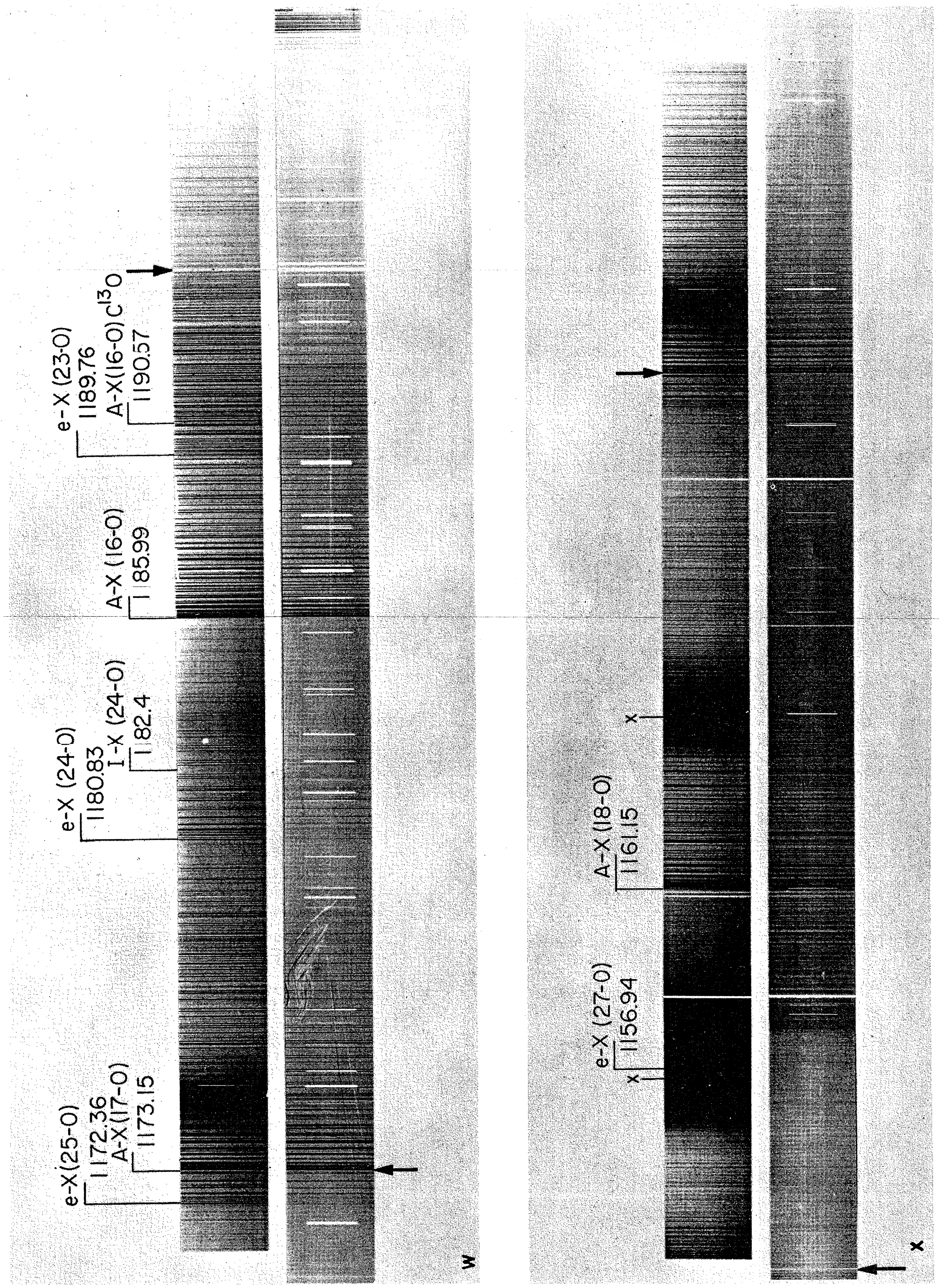
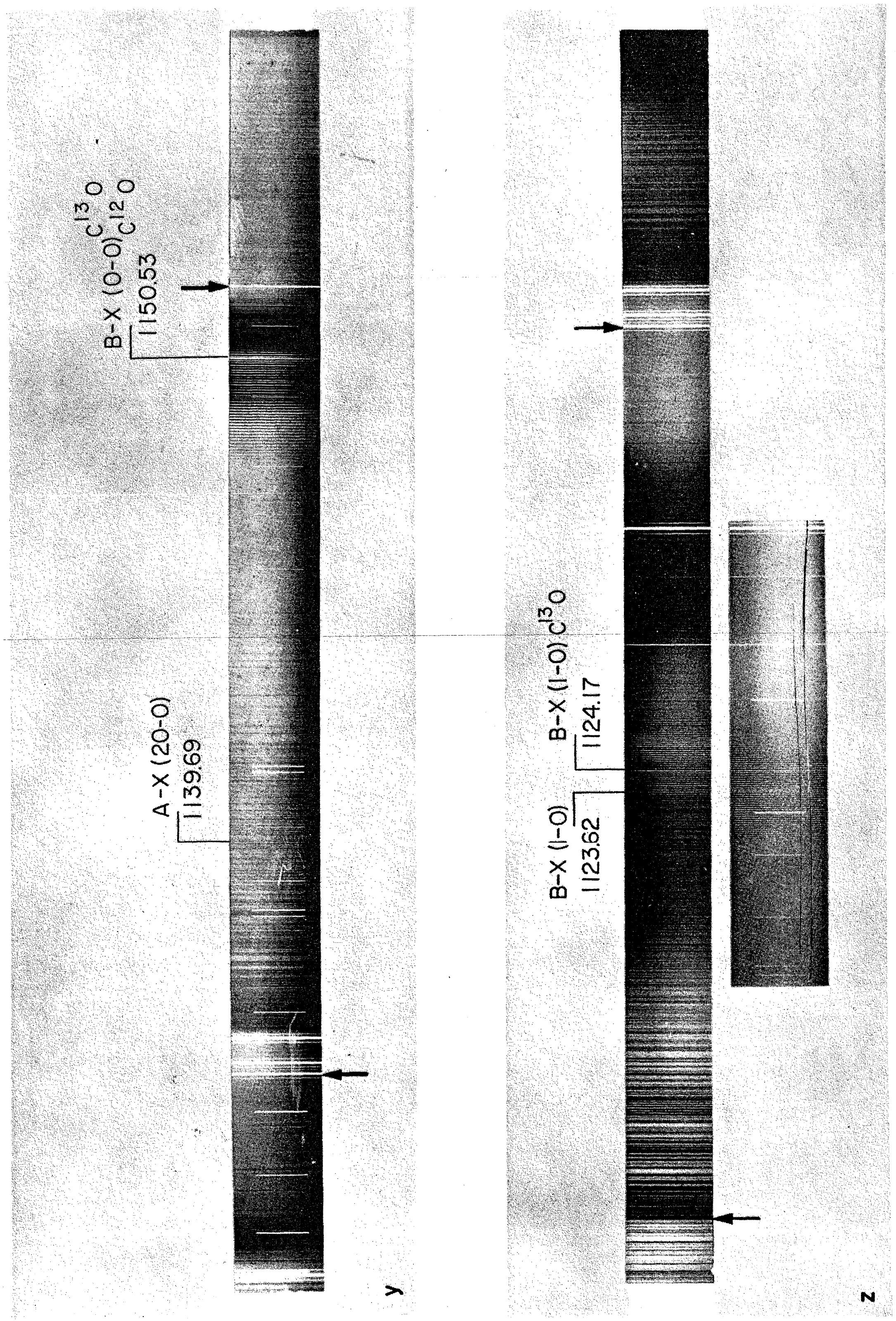
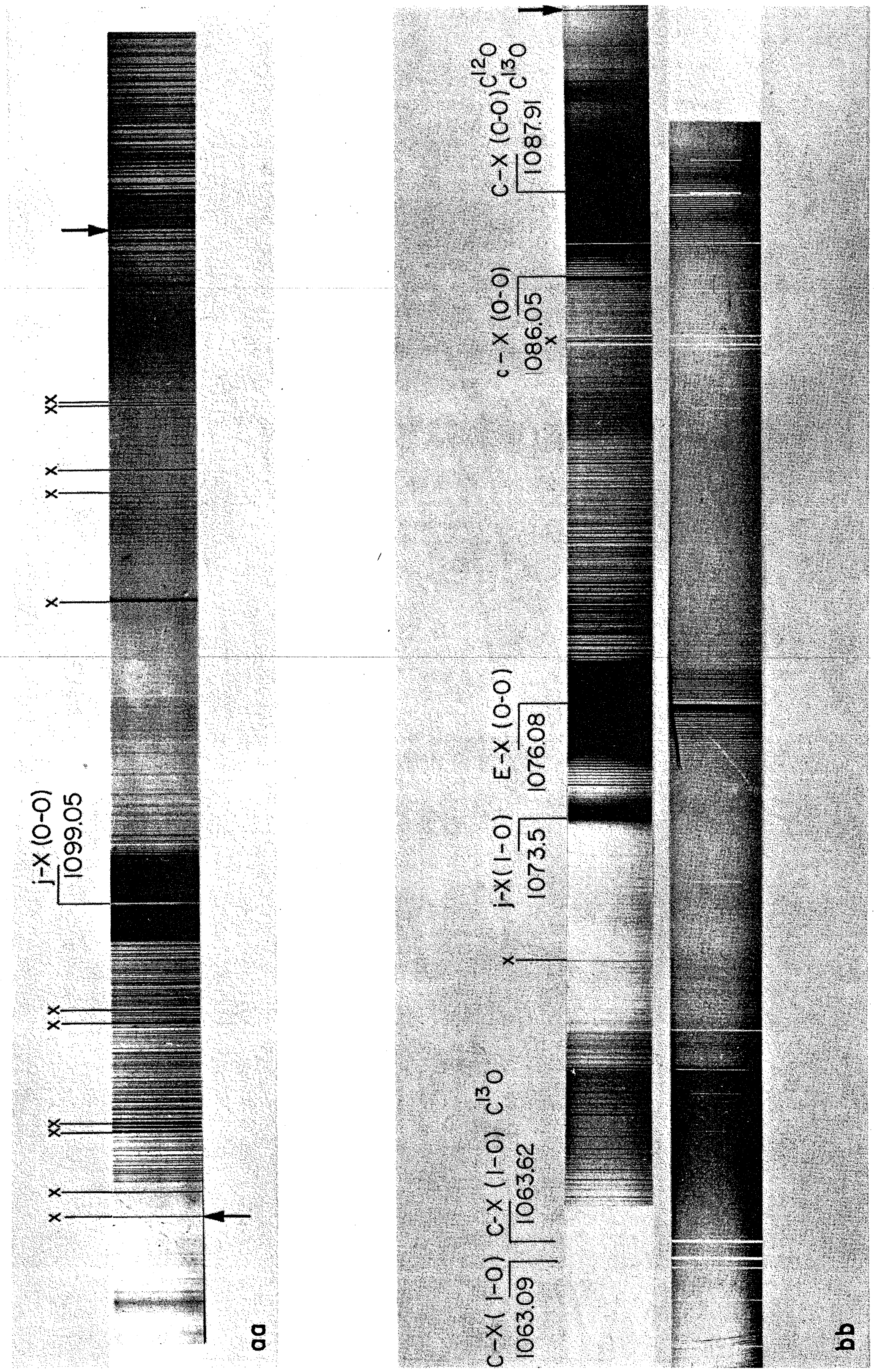
A-X (12-1) 1280.22
A-X (10-0) 1281.83
A-X (10-0) C13O 1285.90
d-X (17-0) 1288.62
d'-X (22-0) 1291.96
e-X (14-0) 1293.6
A-X (11-1) 1298.56
I-X (13-0) 1300.6
A-X (9-0) 1301.37
d-X (16-0) 1302.83
A-X (9-0) C13O 1305.25
d'-X (21-0) 1305.53
e-X (18-0) 1242.2
x
A-X (12-0) 1246.04
A-X (14-1) 1246.65
d-X (20-0) 1249.56
A-X (12-0) C13O 1250.40
e-X (17-0) 1254.2
d'-X (25-0) 1254.7
I-X (16-0) 1261.7
d-X (9-0) 1262.0
A-X (13-1) 1262.93
A-X (11-0) 1263.41
d'-X (24-0) 1266.6
e-X (16-0) 1266.8
A-X (11-0) C13O 1267.64


A-X (13-0) C13O
1234.12
e-X (19-0)
1230.7
A-X (13-0)
1229.65
d-X (22-0)
1226.33
A-X (14-0) C13O
1218.74
e-X (20-0)
1219.7
A-X (16-1)
1216.91
H 1215.67
A-X (14-0)
1214.21
e-X (21-0)
1209.18
d'-X (29-0)
1212.3
I-X (21-0)
1208.1
e-X (21-0)
1209.18
A-X (15-0) C13O
1204.24
e-X (22-0)
1199.24
A-X (15-0)
1199.67
D-X (21-0)
1195.55


e-X (23-0)
1189.76
A-X(16-0) C13O
1190.57
A-X (16-0)
1185.99
e-X (24-0)
1180.83
I-X (24-0)
1182.4
e-X(25-0)
1172.36
A-X(17-0)
1173.15
W
x
A-X (18-0)
1161.15
e-X (27-0)
1156.94
x
X


B-X (0-0) C13O C12O
1150.53
A-X (20-0)
1139.69
y
B-X (1-0) C13O
1124.17
B-X (1-0)
1123.62
z


j-X (0-0)
1099.05
aa
C-X (1-0)
1063.09
C-X (1-0) $C^{13}O$
1063.62
j-X (1-0)
1073.5
E-X (0-0)
1076.08
c-X (0-0)
1086.05
C-X (0-0) $C^{12}O$
1087.91 $C^{13}O$
bb

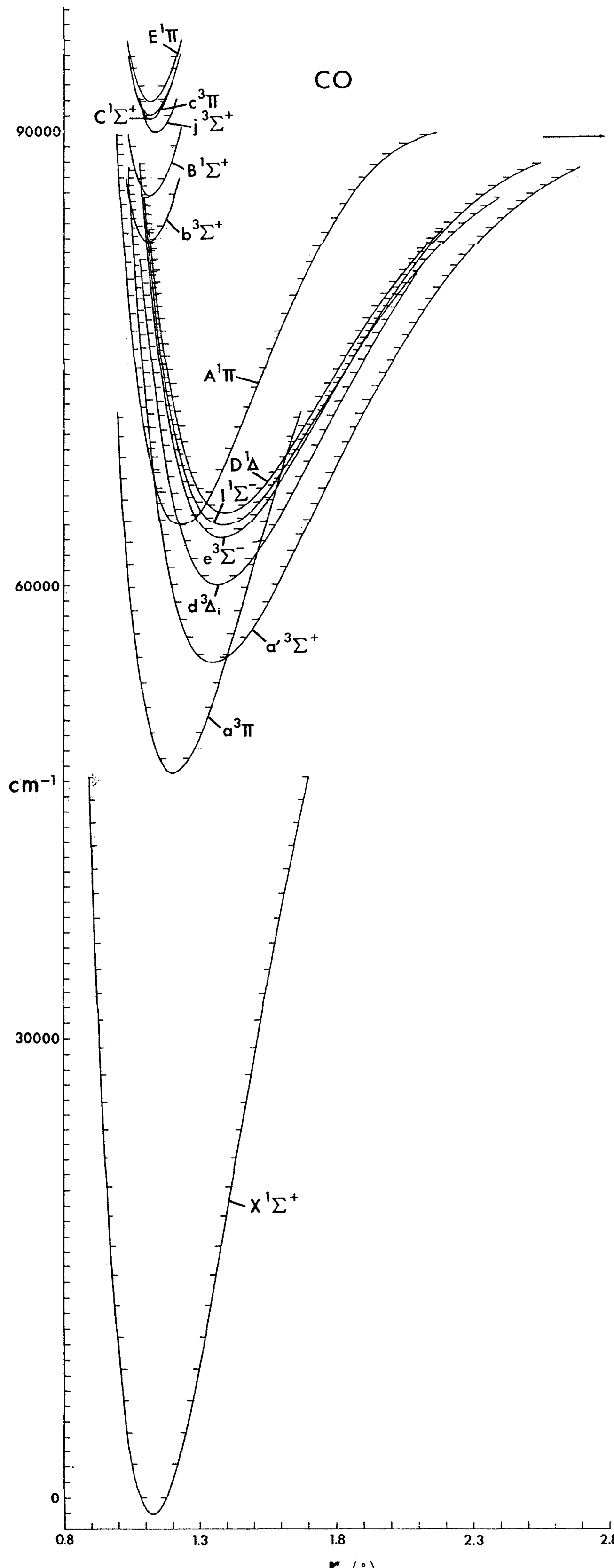


FIGURE 3. *Potential energy curves for the observed states of CO below 11.77 eV.*

The arrow indicates the dissociation energy of CO. The dash marks on the potential curves indicate the vibrational levels.

TABLE 1. *References to analyses of CO absorption systems*

Transition	References
$A\ ^1\Pi - X\ ^1\Sigma^+$	Simmons, Bass, and Tilford [2].
$B\ ^1\Sigma^+ - X\ ^1\Sigma^+$	Tilford and Vanderslice [11].
$C\ ^1\Sigma^+ - X\ ^1\Sigma^+$	Tilford and Vanderslice [11].
$D\ ^1\Delta - X\ ^1\Sigma^+$	Simmons and Tilford [5, 6].
$E\ ^1\Pi - X\ ^1\Sigma^+$	Tilford, Vanderslice, and Wilkinson [14].
$I\ ^1\Sigma^- - X\ ^1\Sigma^+$	Herzberg, Simmons, Bass, and Tilford [4]; Simmons and Tilford [5].
$a'\ ^3\Sigma^+ - X\ ^1\Sigma^+$	Herzberg and Hugo [9]; Simmons and Tilford [5].
$c\ ^3\Pi - X\ ^1\Sigma^+$	Tilford [13] (see also Ginter and Tilford [12] for analysis of $c\ ^3\Pi - a\ ^3\Pi$).
$d\ ^3\Delta_i - X\ ^1\Sigma^+$	Herzberg, Hugo, Tilford, and Simmons [7].
$e\ ^3\Sigma^- - X\ ^1\Sigma^+$	Herzberg and Hugo [9]; Simmons and Tilford [5].
$j\ ^3\Sigma^+ - X\ ^1\Sigma^+$	Tilford and Vanderslice [11].
$a\ ^3\Pi - X\ ^1\Sigma^+$	(see Krupenie [1] for a review of the data on this transition).

E 2. *Band heads, band origins, and rotational constants for the $A\ ^1\Pi - X\ ^1\Sigma^+$ system, and turning points for the $A\ ^1\Pi$ potential energy curve.*

v'	λ head	ν_0 (obs)	ν_0 (calc)[a]	B'_v (obs)	B'_v (calc)[a]	D'_v (theo)[b]	r_{min}	r_{max}
	Å	*cm^{-1}*	*cm^{-1}*	*cm^{-1}*	*cm^{-1}*	*10^{-6} cm^{-1}*	*Å*	*Å*
0	1544.305	64748.48	64748.53	1.6001	1.6002	7.34	1.182	1.297
1	1509.648	66230.15	66229.86	1.5788	1.5787	7.45	1.148	1.348
2	1477.457	67675.66	67676.19	1.5576	1.5571	7.55	1.126	1.387
3	1447.263	69088.40	69088.21	1.5346	1.5348	7.66	1.109	1.421
4	1418.969	70466.27	70465.92	1.5108	1.5115	7.76	1.095	1.453
5	1392.458	71809.04	71809.13	1.4877	1.4876	7.87	1.084	1.483
6	1367.563	73117.55	73117.76	1.4630	1.4633	7.97	1.074	1.513
7	1344.134	74391.73	74391.85	1.4396	1.4389	8.08	1.065	1.542
8	1322.102	75631.75	75631.59	1.4151	1.4146	8.18	1.057	1.570
9	1301.369	76837.33	76837.20	1.3906	1.3903	8.29	1.050	1.599
10	1281.832	78008.66	78008.89	1.3653	1.3660	8.39	1.043	1.627
11	1263.410	79146.91	79146.70	1.3414	1.3413	8.50	1.037	1.656
12	1246.036	80250.51	80250.53	1.3158	1.3162	8.60	1.032	1.684
13	1229.649	81320.05	81320.00	1.2900	1.2905	8.71	1.027	1.713
14	1214.213	82354.43	82354.52	1.2639	1.2639	8.81	1.022	1.743
15	1199.671	83352.97	83353.21	1.2372	1.2364	8.92	1.017	1.774
16	1185.987	84314.94	84314.82	1.2081	1.2078	9.02	1.013	1.805
17	1173.154	85237.75	85237.63	1.1782	1.1779	9.13	1.009	1.838
18	1161.155	86119.25	86119.15	1.1453	1.1460	9.23	1.006	1.872
19	(c)	(c)	86955.60	(c)	1.1108	9.34	1.003	1.909
20	1139.690	87740.86	87741.17	1.0693	1.0700	9.44	1.000	1.950
21	1130.336	88467.04	88466.84	1.0203	1.0195	9.54	0.997	1.997
22	(c)	(c)	89118.77	(c)	0.9529	9.65	0.995	2.054
23	1115.104	89676.05	89676.07	0.8607	0.8608	9.75	0.995	2.131

[a] $\nu_{(calc)}$ and $B'_{v\,(calc)}$ were calculated from polynomials for which the coefficients are given in column 1 of table 3.
[b] Calculated using formulas given by Dunham.
[c] Overlapped by stronger absorption band.

TABLE 3. *Vibrational and rotational constants for the A $^1\Pi$ state* [a]

$Y^{(7)}_{01}$ = 1.6115±0.0012 cm^{-1}	$B_e \cong Y^{(2,3)}_{01}$ = 1.6105±0.0015 cm^{-1}
$Y^{(7)}_{11}$ = (−2.3251±0.1841)×10^{-2} cm^{-1}	$-\alpha_e \cong Y^{(2,3)}_{11}$ = −0.0206±0.0012 cm^{-1}
$Y^{(7)}_{21}$ = (1.5911±0.8949)×10^{-3} cm^{-1}	$T^{(2,3)}_{00}$ = 64748.48 ±0.30 cm^{-1}
$Y^{(7)}_{31}$ = (−5.7160±1.9402)×10^{-4} cm^{-1}	$T^{(2,3)}_{e}$ = 65076.8 ±1.3 cm^{-1}
$Y^{(7)}_{41}$ = (8.2417±2.1610)×10^{-5} cm^{-1}	$\omega_e \cong Y^{(2,3)}_{10}$ = 1515.4 ±0.8 cm^{-1}
$Y^{(7)}_{51}$ = (−5.9413±1.2850)×10^{-6} cm^{-1}	$-x\omega_e \cong Y^{(2,3)}_{20}$ = −17.25 ±0.16 cm^{-1}
$Y^{(7)}_{61}$ = (2.1149±0.3874)×10^{-7} cm^{-1}	I_e = [c] 17.3802×10^{-40} g cm^2
$Y^{(7)}_{71}$ = (−2.991 ±0.465)×10^{-9} cm^{-1}	r_e = [c] 1.235$_6$Å
$T^{(8)}_{e0}$ =[d] 63994.18 ±0.68 cm^{-1}	$D_e \cong Y_{02}$ ≅ [b] 7.29×10^{-6} cm^{-1}
$T^{(8)}_{e}$ =[d] 65075.77 ±0.68 cm^{-1}	$-\beta_e \cong Y_{12}$ ≅ [b] −1.05×10^{-7} cm^{-1}
$Y^{(8)}_{10}$ = 1518.240 ±1.340 cm^{-1}	
$Y^{(8)}_{20}$ = −19.4000±0.8305 cm^{-1}	
$Y^{(8)}_{30}$ = (7.6584±2.355)×10^{-1} cm^{-1}	
$Y^{(8)}_{40}$ = (−1.4117±0.3565)×10^{-1} cm^{-1}	
$Y^{(8)}_{50}$ — (1.434 ±0.306)×10^{-2} cm^{-1}	
$Y^{(8)}_{60}$ = (−8.051 ±1.498)×10^{-4} cm^{-1}	
$Y^{(8)}_{70}$ = (2.36 ±0.39)×10^{-5} cm^{-1}	
$Y^{(8)}_{80}$ = (2.90 ±0.41)×10^{-7} cm^{-1}	

[a] Note that two sets of rotational and vibrational constants are given in the table. See section 2 of the text, Vibrational and Rotational Data and Derived Spectroscopic Constants, for a discussion of the method of determinations, limitations and applications of the two sets. The superscripts on the Y's are labels to indicate the order of the least squares polynomial fit from which the Y's are determined. The error limits on the high order coefficients are one standard deviation as given by the NBS least squares subroutine ORTHO. The method for determining the uncertainties on the equilibrium constants is described in the text.

[b] Theoretical value calculated from Dunham's expression (Herzberg [15]).

[c] Calculated from Physical Constants recommended by NAS–NRC (Cohen and Dumond [17]).

[d] T_{e0} corresponds to the energy difference between the $v''=0$ level of X $^1\Sigma^+$ and the minimum of the potential curve of the A $^1\Pi$ state. T_e has the usual spectroscopic connotation, i.e., it corresponds to the energy difference between the minima of both X $^1\Sigma^+$ and A $^1\Pi$ potential curves.

TABLE 4. *Band origins and rotational constants for the B $^1\Sigma^+$–X $^1\Sigma^+$ system of $^{12}C^{16}O$ and $^{13}C^{16}O$, and turning points for the B $^1\Sigma^+$ potential energy curve.*

	v'	λ_{origin}	ν_0 [a]	B'_v [b]	D'_v	r_{min}	r_{max}
		Å	cm^{-1}	cm^{-1}	10^{-6} cm^{-1}	Å	Å
$^{12}C^{16}O$	0	1150.5640	86916.16	1.9481	6.7	1.075	1.172
	1	1123.6155	88998.42	1.9220	7.5	1.046	1.215
$^{13}C^{16}O$	0	1150.5253	86916.82	1.8624	6.3		
	1	1124.1749	88954.13	1.8380	5.6		

[a] The estimated uncertainty of the band origins is ±0.3 cm^{-1}.

[b] The estimated uncertainty of the B'_vs is ±0.001 cm^{-1}.

TABLE 5. *Vibrational and rotational constants for the B $^1\Sigma^+$ state* [a]

$B_e \cong Y_{01}$ = 1.9612 cm^{-1}	T_e = 86945.2 cm^{-1}
$-\alpha_e \cong Y_{11}$ = −0.0261 cm^{-1}	I_e = 14.272×10^{-40} g cm^2
$\omega_e \cong Y_{10}$ = 2112.7 cm^{-1}	r_e = 1.1197 Å
$-x\omega_e \cong Y_{20}$ = −15.2 cm^{-1}	T_{00} = 86916.16 cm^{-1}

[a] The constants in this table were obtained from the combined data for the $^{12}C^{16}O$ and $^{13}C^{16}O$ isotopes.

TABLE 6. *Band origins and rotational constants for the C $^1\Sigma^+$–X $^1\Sigma^+$ system of $^{12}C^{16}O$ and $^{13}C^{16}O$, and turning points for the C $^1\Sigma^+$ potential energy curve*

	v'	λ_{origin}	ν_0 [a]	B'_v [b]	D'_v	r_{min}	r_{max}
		Å	cm^{-1}	cm^{-1}	10^{-6} cm^{-1}	Å	Å
$^{12}C^{16}O$	0	1087.9126	91919.15	1.9435	6.3	1.077	1.173
	1	1063.0886	94065.54	1.9239	6.1	1.048	1.214
$^{13}C^{16}O$	0	1087.9132	91919.10	1.8590	7.6		
	1	1063.6209	94018.46	1.8389	6.1		

[a] The estimated uncertainty of the band origins is ±0.3 cm^{-1}.

[b] The estimated uncertainty of the B_v's is ±0.001 cm^{-1}.

TABLE 7. *Vibrational and rotational constants for the C $^1\Sigma^+$ state* [a]

$B_e \cong Y_{01}$ = 1.9533 cm^{-1}	T_e = 91916.47 cm^{-1}
$-\alpha_e \cong Y_{11}$ = −0.0196 cm^{-1}	I_e = 14.330×10^{-40} g cm^2
$\omega_e \cong Y_{10}$ = 2175.92 cm^{-1}	r_e = 1.1219 Å
$-x\omega_e \cong Y_{20}$ = −14.76 cm^{-1}	T_{00} = 91919.15 cm^{-1}

[a] The constants in this table were obtained from the combined data for the $^{12}C^{16}O$ and $^{13}C^{16}O$ isotopes.

TABLE 8. *Band origins and B'_v-values for the $D\ ^1\Delta$–$X\ ^1\Sigma^+$ system, and turning points for the $D\ ^1\Delta$ potential energy curve*

v'	ν_0 [a]	B'_v [b]	r_{min}	r_{max}
	cm^{-1}	cm^{-1}	Å	Å
1........	66464.7	1.2318	1.336	1.471
6........	[c] 71527	....	1.209	1.719
21.......	83655.4	0.8977	1.109	2.190

[a] The estimated uncertainty for the band origins is ±0.3 cm^{-1}.
[b] The estimated uncertainty for the B'_v-values is ±0.001 cm^{-1}.
[c] Band origin estimated from band head measurement.

TABLE 9. *Vibrational and rotational constants for the $D\ ^1\Delta$ state*

$B_e \cong Y_{01} =$ 1.257 cm^{-1}	$\omega_e \cong Y_{10} =$ 1094.0 cm^{-1}
$-\alpha_e \cong Y_{11} = -0.017$ cm^{-1}	$-x\omega_e \cong Y_{20} = -10.20$ cm^{-1}
$T_{00} = 65391$ cm^{-1}	

TABLE 10. *Band origin and rotational constants for the (0–0) $E\ ^1\Pi - X\ ^1\Sigma^+$ band*

$B'_0 =$ 1.9645 cm^{-1}
$D'_0 =$ 6.50×10^{-6} cm^{-1}
$T_{00} = 92930.03$ cm^{-1}

TABLE 11. *Band origins and B'_v-values for the $I\ ^1\Sigma^-$–$X\ ^1\Sigma^+$ system, and turning points for the $I\ ^1\Sigma^-$ potential energy curve*

v'	ν_0 (obs)	ν_0 (calc)[a]	B'_v (obs)	B'_v (calc)[a]	r_{min}	r_{max}
	cm^{-1}	cm^{-1}	cm^{-1}	cm^{-1}	Å	Å
0.......		64546.23		1.2613	1.329	1.464
1.......	65617.32	65617.24	1.2427	1.2434	1.289	1.524
2.......	66667.04	66667.28	1.2268	1.2258	1.263	1.569
3.......	67696.60	67696.65		1.2085	1.244	1.609
4.......	68706.08	68705.60	1.1915	1.1915	1.228	1.646
5.......	69692.39	69694.34	1.1748	1.1745	1.214	1.680
6.......	70662.70	70663.05	1.1568	1.1576	1.202	1.713
7.......		71611.85		1.1406	1.191	1.745
8.......		72540.86		1.1235	1.182	1.776
9.......	73450.10	73450.12	1.1060	1.1062	1.173	1.807
10......		74339.65		1.0888	1.165	1.838
11......		75209.42		1.0710	1.158	1.869
12......	76059.70	76059.33	1.0538	1.0530	1.152	1.899
13......	76889.00	76889.26		1.0347	1.146	1.930
14......		77699.02		1.0160	1.140	1.961
15......	78488.45	78488.37	0.9967	0.9971	1.135	1.993
16......	79256.90	79257.01		0.9778	1.130	2.024
17......		80004.59		0.9582	1.126	2.057
18......		80730.67		0.9384	1.122	2.090
19......		81434.80		0.9183	1.118	2.124
20......		82116.40		0.8979	1.114	2.159
21......	82774.91	82774.87	0.8775	0.8775	1.111	2.195
22......		83409.53		0.8569	1.108	2.232
23......		84019.61		0.8363	1.104	2.271
24......	84604.27	84604.28	0.8158	0.8158	1.101	2.311

[a] ν_0 (calc) and B'_v (calc) were calculated from polynomials for which the coefficients are given in column 1 of table 12.

TABLE 12. *Vibrational and rotational constants for the $I\ ^1\Sigma^-$ state*[a]

$Y^{(4)}_{01} =$ 1.2705±0.0014 cm^{-1}	$B_e \cong Y^{(1,2)}_{01} =$ 1.2688±0.0014 cm^{-1}
$Y^{(4)}_{11} =$ (−1.8480±0.0762)×10^{-2} cm^{-1}	$-\alpha_e \cong Y^{(1,2)}_{11} =$ −0.0170±0.0008 cm^{-1}
$Y^{(4)}_{21} =$ (2.9114±1.2118)×10^{-4} cm^{-1}	$T_{00} =$ 64546.2 ±1.3 cm^{-1} (calc)
$Y^{(4)}_{31} =$ (−2.0925±0.7242)×10^{-5} cm^{-1}	$T^{(2,3)}_e =$ 65086.6 ±2.5 cm^{-1}
$Y^{(4)}_{41} =$ (3.6358±1.4306)×10^{-7} cm^{-1}	$\omega_e \cong Y^{(2,3)}_{10} =$ 1090.0 ±2.1 cm^{-1}
$T^{(5)}_{e0} =$ 64002.81 ±0.96 cm^{-1}	$-x\omega_e \cong Y^{(2,3)}_{20} =$ −10.1 ±0.15 cm^{-1}
$T^{(5)}_e =$ 65084.40 ±0.96 cm^{-1}	$D =$ [b] 9.0×10^{-6} cm^{-1}
$Y^{(5)}_{10} =$ 1092.218 ±0.69 cm^{-1}	$I_e =$ 22.061 ×10^{-40} g cm^2
$Y^{(5)}_{20} =$ −10.7043±0.1572 cm^{-1}	$r_e =$ 1.392 Å
$Y^{(5)}_{30} =$ (5.5376±1.5139)×10^{-2} cm^{-1}	
$Y^{(5)}_{40} =$ (−1.0798±0.6418)×10^{-3} cm^{-1}	
$Y^{(5)}_{50} =$ (−1.7895±0.9896)×10^{-5} cm^{-1}	

[a] See footnotes of table 3.
[b] Used as constant for all levels (determined from the analysis of the 2–0 band).

TABLE 13. *Vibrational and rotational constants for the* a $^3\Pi$ *state* [a]

$B_e \approx Y^{(2)}_{01} =$	1.6901 ± 0.0011 cm^{-1}
$-\alpha_e \approx Y^{(2)}_{11} =$	$(-1.8478 \pm 0.0883) \times 10^{-2}$ cm^{-1}
$Y^{(2)}_{21} =$	$(-1.678 \pm 1.431) \times 10^{-4}$ cm^{-1}
$T^{(3)}_{e0} =$	47605.5 ± 2.5 cm^{-1}
$T^{(3)}_{e} =$	48687.1 ± 2.5 cm^{-1}
$\omega_e \approx Y^{(3)}_{10} =$	1743.75 ± 0.34 cm^{-1}
$-x\omega_e \approx Y^{(3)}_{20} =$	-14.61 ± 0.05 cm^{-1}
$Y^{(3)}_{30} =$	$(2.53 \pm 2.09) \times 10^{-3}$ cm^{-1}
$I_e =$	16.56×10^{-40} g cm^2
$r_e =$	1.206 Å

[a] The rotational constants were obtained by fitting the data compiled by Krupenie [1]. The vibrational constants were obtained from approximate band origins determined from unpublished band head measurements of Tilford and Simmons. The error limits quoted are the statistical error limits of the least squares fit and do not reflect the absolute error of the observed data.

TABLE 14. *Band origins and* B'_v*-values for the* a$'^3\Sigma$–$X^1\Sigma^+$ *system, and turning points for the* a$'^3\Sigma^+$ *potential energy curve*

v'	ν_0 (obs)	ν_0 (calc)[a]	B'_v (obs)	B'_v (calc)[a]	r_{min}	r_{max}
	cm^{-1}	*cm*$^{-1}$	*cm*$^{-1}$	*cm*$^{-1}$	*Å*	*Å*
0	55355.75	55355.58	1.3350	1.3352	1.294	1.421
1	56563.26	56563.30	1.3165	1.3169	1.256	1.477
2	57750.16	57750.22	1.2995	1.2991	1.232	1.520
3	58916.49	58916.51	1.2823	1.2818	1.213	1.557
4	60062.64	60062.36	1.2658	1.2647	1.198	1.590
5	61187.95	61187.98	1.2480	1.2479	1.185	1.622
6	62293.64	62293.59	1.2307	1.2313	1.174	1.652
7	63379.44	63379.42	1.2140	1.2143	1.164	1.682
8	64445.71	64445.72	1.1993	1.1985	1.155	1.710
9	65492.53	65492.70	1.1813	1.1823	1.146	1.738
10	66520.49	66520.57	1.1649	1.1661	1.139	1.766
11		67529.52		1.1499	1.132	1.793
12	[b](68520.0)	68519.70	[b](1.131)	1.1338	1.125	1.820
13	69491.36	69491.26	1.1171	1.1176	1.119	1.847
14	[b]70443.55	70444.28	1.1053	1.1015	1.113	1.873
15		71378.82		1.0855	1.108	1.900
16	72295.04	72294.92	1.0691	1.0694	1.103	1.927
17		73192.56		1.0533	1.098	1.954
18		74071.67		1.0373	1.094	1.981
19	74932.04	74932.17	1.0206	1.0213	1.090	2.008
20	75773.91	75773.91	1.0037	1.0053	1.086	2.036
21		76596.73		0.9892	1.082	2.064
22		77400.42		0.9732	1.078	2.092
23	78184.77	78184.74	0.9580	0.9570	1.074	2.121
24		78949.42		0.9408	1.071	2.150
25		79694.18		0.9245	1.068	2.179
26		80418.69		0.9080	1.065	2.210
27		81122.64		0.8911	1.061	2.241
28		81805.71		0.8740	1.058	2.273
29		82467.56		0.8565	1.056	2.306
30		83107.88		0.8384	1.053	2.340
31	[b]83744	83726.37	[b]0.83	0.8196	1.050	2.375
32		84322.77		0.8001	1.048	2.412
33		84896.84		0.7796	1.046	2.450
34		85448.41		0.7579	1.044	2.489
35	[b]85969	85977.35	[b]0.75	0.7349	1.042	2.531
36		86483.62		0.7104	1.041	2.574
37		86967.26		0.6840	1.040	2.620
38	87428.42	87428.42	0.6556	0.6556	1.040	2.669

[a] $\nu_{(calc)}$ and $B'_{v(calc)}$ were calculated from polynomials for which the coefficients are given in column 1 of table 15.
[b] Data points not included in the least squares fit (see ref. [5]).

TABLE 15. *Vibrational and rotational constants for the* a′ $^3\Sigma^+$ *state* [a]

$Y^{(5)}_{01}=$ 1.3446 ± 0.0016 cm^{-1}	$B_e \cong Y^{(1,2)}_{01}=$ 1.3430 ± 0.0012 cm^{-1}
$Y^{(5)}_{11}=$ (−1.8921 ± 0.1163) × 10^{-2} cm^{-1}	$-\alpha_e \cong Y^{(1,2)}_{11}=$ −0.0173 ± 0.0007 cm^{-1}
$Y^{(5)}_{21}=$ (3.4542 ± 2.4550) × 10^{-4} cm^{-1}	$T_{00}=$ 55355.75 ± 0.30 cm^{-1}
$Y^{(5)}_{31}=$ (2.2037 ± 2.0532) × 10^{-5} cm^{-1}	$T^{(2,3)}_e=$ 55826.0 ± 1.8 cm^{-1}
$Y^{(5)}_{41}=$ (7.2205 ± 7.1937) × 10^{-7} cm^{-1}	$\omega_e \cong Y^{(2,3)}_{10}=$ 1227.8 ± 1.1 cm^{-1}
$Y^{(5)}_{51}=$ (−9.4737 ± 8.6378) × 10^{-9} cm^{-1}	$-x\omega_e \cong Y^{(2,3)}_{20}=$ −10.22 ± 0.38 cm^{-1}
$T^{(6)}_{e0}=$ 54743.90 ± 0.30 cm^{-1}	$D=$ [b] 6.0×10^{-6} cm^{-1}
$T^{(6)}_{e}=$ 55825.49 ± 0.30 cm^{-1}	$I_e=$ 20.842×10^{-40} g cm^2
$Y^{(6)}_{10}=$ 1228.604 ± 0.230 cm^{-1}	$r_e=$ 1.353 Å
$Y^{(6)}_{20}=$ −10.4675 ± 0.0710 cm^{-1}	
$Y^{(6)}_{30}=$ (9.0719 ± 9.3079) × 10^{-3} cm^{-1}	
$Y^{(6)}_{40}=$ (2.5910 ± 0.5757) × 10^{-3} cm^{-1}	
$Y^{(6)}_{50}=$ (−1.0168 ± 0.1646) × 10^{-4} cm^{-1}	
$Y^{(6)}_{60}=$ (1.0100 ± 0.1727) × 10^{-6} cm^{-1}	

[a] See footnotes of table 3.
[b] Constant D-value used to determine B_v-values.

TABLE 16. *Band origins and* B'_v*-values for the* e $^3\Sigma^-$ — $X\,^1\Sigma^+$ *system, and turning points for the* e $^3\Sigma^-$ *potential energy curve*

v'	ν_0 (obs)	ν_0 (calc)[a]	B'_v (obs)	B'_v (calc)[a]	r_{min}	r_{max}
	cm^{-1}	cm^{-1}	cm^{-1}	cm^{-1}	Å	Å
0	63704.85	63704.85	1.2748	1.2748	1.322	1.456
1	[b] 64802.74	64801.55	[b] 1.2582	1.2573	1.282	1.515
2	65877.91	65877.79	1.2403	1.2399	1.257	1.560
3	66933.75	66934.05	1.2225	1.2225	1.238	1.599
4	67970.84	67970.71	1.2048	1.2053	1.222	1.635
5		68988.08		1.1882	1.209	1.668
6	69986.64	69986.41	1.1712	1.1712	1.197	1.701
7	70965.85	70965.88	1.1540	1.1544	1.187	1.732
8	71926.47	71926.63	[b] 1.1360	1.1377	1.177	1.762
9		72868.75		1.1210	1.169	1.792
10	73792.28	73792.29	1.1052	1.1045	1.161	1.822
11		74697.27		1.0880	1.154	1.851
12	75583.55	75583.66	[b] 1.0636	1.0714	1.147	1.881
13		76451.39		1.0549	1.141	1.910
14	77300.59	77300.35	1.0404	1.0382	1.135	1.939
15	78130.39	78130.37	1.0198	1.0214	1.130	1.968
16		78941.22		1.0045	1.125	1.998
17	79732.45	79732.61	0.9857	0.9872	1.120	2.028
18		80504.15		0.9695	1.115	2.059
19		81255.38		0.9514	1.111	2.090
20		81985.69		0.9328	1.107	2.121
21	82694.39	82694.37	0.9144	0.9135	1.104	2.154
22	[b] 83379.8	83380.56		0.8934	1.100	2.188
23		84043.20		0.8725	1.097	2.223
24	84681.14	84681.06	0.8511	0.8506	1.094	2.260
25	85292.60	85292.68	0.8269	0.8275	1.091	2.299
26		85876.34		0.8032	1.089	2.340
27	86430.08	86430.07	0.7775	0.7775	1.086	2.384

[a] ν_0 (calc) and B'_v (calc) were calculated from polynomial for which the coefficients are given in column 1 of table 17.
[b] Data points not included in the least squares fit (see ref. [5]).

TABLE 17. *Vibrational and rotational constants for the* $e^3\Sigma^-$ *state* [a]

$Y_{01}^{(4)} = 1.2836 \pm 0.0013\ cm^{-1}$	$B_e \cong Y_{01}^{(1,2)} = 1.2836 \pm 0.0024\ cm^{-1}$
$Y_{11}^{(4)} = (-1.7528 \pm 0.0657) \times 10^{-2}\ cm^{-1}$	$-\alpha_e \cong Y_{11}^{(1,2)} = -0.0174 \pm 0.0005\ cm^{-1}$
$Y_{21}^{(4)} = (0.0707 \pm 0.9809) \times 10^{-4}\ cm^{-1}$	$T_{00} = 63074.85 \pm 0.30\ cm^{-1}$
$Y_{31}^{(4)} = (6.6755 \pm 5.4187) \times 10^{-6}\ cm^{-1}$	$T_e^{(2,3)} = 64230.9 \pm 2.0\ cm^{-1}$
$Y_{41}^{(4)} = (-2.9415 \pm 0.9810) \times 10^{-7}\ cm^{-1}$	$\omega_e \cong Y_{10}^{(2,3)} = 1116.5 \pm 1.5\ cm^{-1}$
$T_{e0}^{(6)} = 63148.65 \pm 0.30\ cm^{-1}$	$-x\omega_e \cong Y_{20}^{(2,3)} = -9.8 \pm 0.4\ cm^{-1}$
$T_e^{(6)} = 64230.24 \pm 0.30\ cm^{-1}$	$D' =$ [b] $6.0 \times 10^{-6}\ cm^{-1}$
$Y_{10}^{(6)} = 1117.72 \pm 0.28\ cm^{-1}$	$I_e = 21.806 \times 10^{-40}\ g\ cm^2$
$Y_{20}^{(6)} = -10.686 \pm 0.092\ cm^{-1}$	$r_e = 1.384$ Å
$Y_{30}^{(6)} = (1.1744 \pm 0.1284) \times 10^{-1}\ cm^{-1}$	
$Y_{40}^{(6)} = (-5.5044 \pm 0.8598) \times 10^{-3}\ cm^{-1}$	
$Y_{50}^{(6)} = (1.5900 \pm 0.2725) \times 10^{-4}\ cm^{-1}$	
$Y_{60}^{(6)} = (-2.7042 \pm 0.3278) \times 10^{-6}\ cm^{-1}$	

[a] See footnotes of table 3.
[b] Constant D'-value used to determine B'_v-values of table 16.

TABLE 18. *Effective subband origins and* B'_v*-values for the* $d\,^3\Delta_i - X\,^1\Sigma^+$ *system, and turning points for the* $d\,^3\Delta_i$ *potential energy curve*

v'	Triplet component of subband	Effective subband origin	Calculated subband origin [a]	Effective B'_v (obs)	Effective B'_v (calc)[a]	Turning points [c]	
						r_{min}	r_{max}
		cm^{-1}	*cm*$^{-1}$	*cm*$^{-1}$	*cm*$^{-1}$	*Å*	*Å*
0..........	Ω=1	60658.47	60658.50	1.3863	1.3864	1.309	1.439
	2		60621.88		1.3019		
1..........	1	61809.91	61809.77	1.3671	1.3671	1.270	1.497
	2	61772.75	61772.79	1.2839	1.2843		
2..........	1	[b] 62941.88	62940.42	[b] 1.3717	1.3479	1.246	1.541
	2	[b] (62905)	62903.10	[b] (1.43)	1.2670		
3..........	1	[b] 64049.40	64050.85	[b] 1.3298	1.3286	1.227	1.579
	2	64012.14	64013.18	1.2500	1.2498		
4..........	1	65141.03	65141.41	1.3099	1.3095	1.211	1.613
	2	65102.74	65103.39	1.2341	1.2329		
	3	65065.45		1.1538			
5..........	1	[b] 66208.97	66212.42	1.3003	1.2905	1.198	1.646
	2		66174.06		1.2162		
6..........	1	67264.40	67264.16	1.2717	1.2717	1.187	1.677
	2	67225.80	67225.44	1.1986	1.1997		
7..........	1	68296.99	68296.85	1.2530	1.2532	1.176	1.707
	2	68257.91	68257.79	1.1834	1.1835		
8..........	1	69310.59	69310.69	1.2349	1.2348	1.167	1.737
	2	69271.19	69271.28	1.1675	1.1675		
9..........	1		70305.85		1.2167	1.158	1.765
	2		70266.09		1.1517		
10..........	1	71282.54	71282.43	1.1980	1.1987	1.150	1.794
	2	71242.37	71242.33	1.1364	1.1362		
11..........	1		72240.52		1.1810	1.143	1.821
12..........	1		73180.16		1.1633	1.136	1.849
13..........	1		74101.34		1.1458	1.130	1.877
14..........	1		75004.03		1.1282	1.124	1.904
15..........	1	75887.90	75888.15	1.1116	1.1106	1.118	1.931
16..........	1		76753.57		1.0928	1.112	1.959
17..........	1		77600.16		1.0747	1.106	1.986
18..........	1		78427.69		1.0562	1.101	2.014
19..........	1	79236.16	79235.96	1.0364	1.0372	1.096	2.042
20..........	1		80024.67		1.0175	1.091	2.070
21..........	1		80793.51		0.9970	1.085	2.099
22..........	1	81542.07	81542.14	0.9757	0.9755	1.080	2.127

[a] Calculated subband origins were obtained by two separate least squares fits of the observed subband origins; one for the $\Omega=1$ triplet component and one for the $\Omega=2$ component. The coefficients given in column 1 of Table 19 are those for the $\Omega=2$ component. Similarly the fits of the observed effective B-values were performed separately for the two triplet components.
[b] Data points not included in least squares fit (see ref. [7]).
[c] The turning points are those calculated for the $\Omega=2$ triplet component.

TABLE 19. *Vibrational and rotational constants for the* d $^3\Delta_i$ *state* [a]

$Y^{(2)}_{01}=$ 1.3108 ±0.0014 cm^{-1}	$B_e \cong Y^{(1,2)}_{01}=$ 1.3094 ± 0.0016 cm^{-1}
$Y^{(2)}_{11}=$ (−1.7823 ±0.0514) × 10^{-2} cm^{-1}	$-\alpha_e \cong Y^{(1,2)}_{11}=$ −0.0168 ± 0.0007 cm^{-1}
$Y^{(2)}_{21}=$ (1.1331 ±0.4197) × 10^{-4} cm^{-1}	T_{00} = 60621.9 ±1.0 cm^{-1} (calc)
$T^{(4)}_{e0}=$ 60038.56 ±0.32 cm^{-1}	$T_e^{(2,3)}=$ 61123.9 ±1.7 cm^{-1}
$T^{(4)}_{e}=$ 61122.39 ±0.32 cm^{-1}	$\omega_e \cong Y^{(2,3)}_{10}=$ 1168.2 ±0.6 cm^{-1}
$Y^{(4)}_{10}=$ 1171.937 ±0.245 cm^{-1}	$-x\omega_e \cong Y^{(2,3)}_{20}=$ −9.70 ±0.10 cm^{-1}
$Y^{(4)}_{20}=$ −10.6351 ±0.0477 cm^{-1}	[b] $D'=$ (6.0 ±1.0) × 10^{-6} cm^{-1}
$Y^{(4)}_{30}=$ 0.07845 ± 0.00319 cm^{-1}	$I_e=$ 21.377 × 10^{-40} g cm^2
$Y^{(4)}_{40}=$ (−1.634 ±0.069) × 10^{-3} cm^{-1}	$r_e=$ 1.370 Å
	$A_4=$ −16.56 ± 0.15 cm^{-1}

[a] See footnotes of table 3.
[b] Constant *D*-value used to determine B_v-values.

TABLE 20. *Band origin and rotational constants for the* (0–0) j $^3\Sigma^+$–X $^1\Sigma^+$ *band, and turning points for the* j $^3\Sigma^+$ *potential energy curve*

v'	λ_{origin}	$\nu_{0\ (obs)}$	B'_v	D'_v	r_{min}	r_{max}
	Å	*cm^{-1}*	*cm^{-1}*	10^{-6}*cm^{-1}*	*Å*	*Å*
0..	1099.0455	90988.04	1.8785	7.9	1.097	1.191
1..	1073.49	[a] 93154.				

[a] Estimated band origin for the unanalyzed (1–0) band.

TABLE 21. *Vibrational and rotational constants for the j* $^3\Sigma^+$ *state*

$B_e \cong Y_{01}=$ [a] 1.889 cm^{-1}	$T_e=$ [b] 90975 cm^{-1}
$-\alpha_e \cong Y_{11} \cong$ −0.020 cm^{-1}	$I_e=$ 14.82 × 10^{-40} g cm^2
$\omega_e \cong Y_{10}=$ [b] 2196 cm^{-1}	$r_e=$ 1.141
$-x\omega_e \cong Y_{20} \cong$ −15 cm^{-1}	$T_{00}=$ 90988.04 cm^{-1}

[a] Assuming $\alpha_e \approx 0.020$ cm^{-1}.
[b] Assuming $x\omega_e \approx 15.0$ cm^{-1}.

TABLE 22. *Band origin and rotational constants for the* (0–0) $c\ ^3\Pi$–$X\ ^1\Sigma^+$ *band*

$c\ ^3\Pi_+$ component	$B'_0=$	1.9551 cm^{-1}
	$D'_0=$	−3.53 × 10^{-5} cm^{-1}
$c\ ^3\Pi_-$ component	$B'_0=$	1.9386 cm^{-1}
	$D'_0=$	−3.71 × 10^{-5} cm^{-1}
	$T_{00}=$	92076.8 cm^{-1}

TABLE 23. *Observed lines of the* $A\ ^1\Pi - X\ ^1\Sigma^+$ *transition of* CO [a]

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1552.367	(0 − 0)	P(27)	1545.946	(0 − 0)	P(10)	1544.204	(0 − 0)	R(8)
1551.863	(0 − 0)	P(26)	1545.878	(0 − 0)	Q(12)	1544.015	(0 − 0)	Q(7)
1551.380	(0 − 0)	P(25)	1545.883	(0 − 0)	R(17)	1544.010	(0 − 0)	R(7)
1551.192	(0 − 0)	Q(29)	1545.841	(0 − 0)	R(19)	1543.808	(0 − 0)	R(6)
1550.913	(0 − 0)	P(24)	1545.747	(0 − 0)	Q(13)	1543.800	(0 − 0)	Q(6)
1550.721	(0 − 0)	Q(28)	1545.717	(0 − 0)	P(8)	1517.846	(1 − 0)	P(27)
1550.463	(0 − 0)	P(23)	1545.624	(0 − 0)	Q(11)	1517.718	(1 − 0)	P(27)
1550.363	(0 − 0)	Q(27)	1545.619	(0 − 0)	R(18)	1517.306	(1 − 0)	P(26)
1550.213	(0 − 0)	Q(27)	1545.566	(0 − 0)	P(9)	1517.211	(1 − 0)	Q(30)
1550.027	(0 − 0)	P(22)	1545.505	(0 − 0)	P(7)	1516.814	(1 − 0)	P(25)
1549.881	(0 − 0)	Q(26)	1545.505	(0 − 0)	R(16)	1516.773	(1 − 0)	Q(29)
1549.607	(0 − 0)	P(21)	1545.460	(0 − 0)	Q(12)	1516.680	(1 − 0)	Q(29)
1549.471	(0 − 0)	Q(25)	1545.420	(0 − 0)	Q(10)	1516.344	(1 − 0)	P(24)
1549.286	(0 − 0)	P(19)	1545.399	(0 − 0)	R(17)	1516.283	(1 − 0)	Q(28)
1549.197	(0 − 0)	P(20)	1545.317	(0 − 0)	P(6)	1515.892	(1 − 0)	P(23)
1549.081	(0 − 0)	Q(24)	1545.248	(0 − 0)	Q(9)	1515.836	(1 − 0)	Q(27)
1548.796	(0 − 0)	P(19)	1545.208	(0 − 0)	R(15)	1515.456	(1 − 0)	P(22)
1548.716	(0 − 0)	P(18)	1545.183	(0 − 0)	P(8)	1515.401	(1 − 0)	Q(26)
1548.709	(0 − 0)	Q(23)	1545.175	(0 − 0)	R(16)	1515.037	(1 − 0)	P(21)
1548.388	(0 − 0)	P(18)	1545.146	(0 − 0)	P(5)	1515.008	(1 − 0)	Q(25)
1548.352	(0 − 0)	Q(22)	1545.146	(0 − 0)	Q(11)	1514.633	(1 − 0)	P(20)
1548.237	(0 − 0)	P(17)	1545.099	(0 − 0)	Q(8)	1514.603	(1 − 0)	Q(24)
1548.077	(0 − 0)	Q(17)	1544.998	(0 − 0)	R(14)	1514.243	(1 − 0)	P(19)
1548.011	(0 − 0)	Q(21)	1544.986	(0 − 0)	P(4)	1514.243	(1 − 0)	Q(23)
1547.938	(0 − 0)	P(17)	1544.986	(0 − 0)	R(10)	1513.994	(1 − 0)	Q(23)
1547.857	(0 − 0)	R(26)	1544.970	(0 − 0)	Q(7)	1513.873	(1 − 0)	P(18)
1547.845	(0 − 0)	P(16)	1544.910	(0 − 0)	R(15)	1513.873	(1 − 0)	Q(22)
1547.685	(0 − 0)	Q(20)	1544.852	(0 − 0)	P(3)	1513.520	(1 − 0)	P(17)
1547.545	(0 − 0)	Q(16)	1544.852	(0 − 0)	Q(6)	1513.520	(1 − 0)	Q(21)
1547.498	(0 − 0)	P(15)	1544.837	(0 − 0)	Q(10)	1513.190	(1 − 0)	Q(20)
1547.498	(0 − 0)	R(25)	1544.837	(0 − 0)	R(13)	1513.190	(1 − 0)	R(25)
1547.449	(0 − 0)	P(16)	1544.762	(0 − 0)	Q(5)	1513.179	(1 − 0)	P(16)
1547.375	(0 − 0)	Q(19)	1544.726	(0 − 0)	P(2)	1513.059	(1 − 0)	R(25)
1547.177	(0 − 0)	P(14)	1544.699	(0 − 0)	R(9)	1512.876	(1 − 0)	Q(19)
1547.177	(0 − 0)	R(24)	1544.699	(0 − 0)	R(12)	1512.853	(1 − 0)	P(15)
1547.093	(0 − 0)	P(12)	1544.684	(0 − 0)	Q(4)	1512.823	(1 − 0)	R(24)
1547.079	(0 − 0)	Q(18)	1544.621	(0 − 0)	Q(3)	1512.577	(1 − 0)	Q(18)
1547.051	(0 − 0)	Q(15)	1544.605	(0 − 0)	R(14)	1512.543	(1 − 0)	P(14)
1546.960	(0 − 0)	P(15)	1544.578	(0 − 0)	R(11)	1512.509	(1 − 0)	R(23)
1546.874	(0 − 0)	P(13)	1544.574	(0 − 0)	Q(2)	1512.293	(1 − 0)	Q(17)
1546.874	(0 − 0)	R(23)	1544.539	(0 − 0)	Q(1)	1512.250	(1 − 0)	P(13)
1546.796	(0 − 0)	Q(17)	1544.539	(0 − 0)	Q(9)	1512.215	(1 − 0)	R(22)
1546.627	(0 − 0)	P(11)	1544.501	(0 − 0)	R(8)	1512.026	(1 − 0)	Q(16)
1546.597	(0 − 0)	Q(14)	1544.467	(0 − 0)	R(10)	1511.970	(1 − 0)	P(12)
1546.597	(0 − 0)	R(22)	1544.452	(0 − 0)	R(0)	1511.937	(1 − 0)	R(21)
1546.579	(0 − 0)	P(12)	1544.394	(0 − 0)	R(1)	1511.772	(1 − 0)	Q(15)
1546.527	(0 − 0)	Q(16)	1544.394	(0 − 0)	R(7)	1511.705	(1 − 0)	P(11)
1546.327	(0 − 0)	R(21)	1544.351	(0 − 0)	R(9)	1511.681	(1 − 0)	R(20)
1546.280	(0 − 0)	P(11)	1544.343	(0 − 0)	R(2)	1511.536	(1 − 0)	Q(14)
1546.266	(0 − 0)	Q(15)	1544.343	(0 − 0)	R(6)	1511.455	(1 − 0)	P(10)
1546.246	(0 − 0)	P(10)	1544.316	(0 − 0)	R(3)	1511.438	(1 − 0)	R(19)
1546.202	(0 − 0)	Q(13)	1544.310	(0 − 0)	R(5)	1511.315	(1 − 0)	Q(13)
1546.078	(0 − 0)	R(20)	1544.305	(0 − 0)	R(4)	1511.211	(1 − 0)	R(18)
1546.011	(0 − 0)	Q(14)	1544.298	(0 − 0)	R(13)	1511.221	(1 − 0)	P(9)
1545.954	(0 − 0)	P(9)	1544.263	(0 − 0)	Q(8)	1511.108	(1 − 0)	Q(12)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\ ^1\Pi - X\ ^1\Sigma^+$ *transition of* CO [a] — Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1511.002	(1 − 0)	P(8)	1482.583	(2 − 0)	R(29)	1478.052	(2 − 0)	Q(7)
1511.002	(1 − 0)	R(17)	1482.447	(2 − 0)	Q(24)	1477.996	(2 − 0)	R(12)
1510.915	(1 − 0)	Q(11)	1482.359	(2 − 0)	P(20)	1477.972	(2 − 0)	Q(6)
1510.804	(1 − 0)	R(16)	1482.173	(2 − 0)	R(28)	1477.936	(2 − 0)	P(3)
1510.799	(1 − 0)	P(7)	1482.060	(2 − 0)	Q(23)	1477.875	(2 − 0)	Q(5)
1510.743	(1 − 0)	Q(10)	1481.969	(2 − 0)	P(19)	1477.875	(2 − 0)	R(11)
1510.624	(1 − 0)	R(15)	1481.785	(2 − 0)	R(27)	1477.833	(2 − 0)	Q(6)
1510.609	(1 − 0)	P(6)	1481.688	(2 − 0)	Q(22)	1477.821	(2 − 0)	P(2)
1510.577	(1 − 0)	Q(9)	1481.596	(2 − 0)	P(18)	1477.796	(2 − 0)	Q(4)
1510.458	(1 − 0)	R(14)	1481.409	(2 − 0)	R(26)	1477.765	(2 − 0)	R(10)
1510.439	(1 − 0)	P(5)	1481.333	(2 − 0)	Q(21)	1477.732	(2 − 0)	Q(3)
1510.434	(1 − 0)	Q(8)	1481.239	(2 − 0)	P(17)	1477.682	(2 − 0)	Q(2)
1510.308	(1 − 0)	R(13)	1481.039	(2 − 0)	R(25)	1477.676	(2 − 0)	R(9)
1510.294	(1 − 0)	Q(7)	1480.995	(2 − 0)	Q(20)	1477.651	(2 − 0)	Q(1)
1510.280	(1 − 0)	P(4)	1480.898	(2 − 0)	P(16)	1477.599	(2 − 0)	R(8)
1510.183	(1 − 0)	Q(6)	1480.813	(2 − 0)	R(24)	1477.569	(2 − 0)	R(0)
1510.177	(1 − 0)	R(12)	1480.674	(2 − 0)	Q(19)	1477.538	(2 − 0)	R(7)
1510.137	(1 − 0)	P(3)	1480.574	(2 − 0)	P(15)	1477.516	(2 − 0)	R(1)
1510.083	(1 − 0)	Q(5)	1480.561	(2 − 0)	R(24)	1477.494	(2 − 0)	R(6)
1510.056	(1 − 0)	R(11)	1480.444	(2 − 0)	R(23)	1477.479	(2 − 0)	R(2)
1510.013	(1 − 0)	P(2)	1480.369	(2 − 0)	Q(18)	1477.463	(2 − 0)	R(5)
1509.996	(1 − 0)	Q(4)	1480.265	(2 − 0)	P(14)	1477.457	(2 − 0)	R(3)
1509.952	(1 − 0)	R(10)	1480.131	(2 − 0)	R(22)	1477.457	(2 − 0)	R(4)
1509.927	(1 − 0)	Q(3)	1480.080	(2 − 0)	Q(17)	1456.990	(3 − 0)	P(30)
1509.869	(1 − 0)	Q(2)	1479.973	(2 − 0)	P(13)	1456.420	(3 − 0)	P(29)
1509.865	(1 − 0)	R(9)	1479.842	(2 − 0)	R(21)	1455.878	(3 − 0)	P(28)
1509.838	(1 − 0)	Q(1)	1479.807	(2 − 0)	Q(16)	1455.350	(3 − 0)	P(27)
1509.790	(1 − 0)	R(8)	1479.698	(2 − 0)	P(12)	1455.042	(3 − 0)	Q(30)
1509.749	(1 − 0)	R(0)	1479.570	(2 − 0)	R(20)	1454.841	(3 − 0)	P(26)
1509.732	(1 − 0)	R(7)	1479.548	(2 − 0)	Q(15)	1454.541	(3 − 0)	Q(29)
1509.697	(1 − 0)	R(1)	1479.437	(2 − 0)	P(11)	1454.347	(3 − 0)	P(25)
1509.689	(1 − 0)	R(6)	1479.313	(2 − 0)	Q(14)	1454.106	(3 − 0)	Q(28)
1509.659	(1 − 0)	R(2)	1479.313	(2 − 0)	R(19)	1453.964	(3 − 0)	Q(28)
1509.659	(1 − 0)	R(5)	1479.194	(2 − 0)	P(10)	1453.872	(3 − 0)	P(24)
1509.648	(1 − 0)	R(3)	1479.084	(2 − 0)	Q(13)	1453.615	(3 − 0)	Q(27)
1509.648	(1 − 0)	R(4)	1479.084	(2 − 0)	R(18)	1453.412	(3 − 0)	P(23)
1487.145	(2 − 0)	P(30)	1478.967	(2 − 0)	P(9)	1453.164	(3 − 0)	Q(26)
1486.588	(2 − 0)	P(29)	1478.879	(2 − 0)	Q(12)	1452.971	(3 − 0)	P(22)
1486.102	(2 − 0)	Q(32)	1478.858	(2 − 0)	R(17)	1452.738	(3 − 0)	Q(25)
1486.043	(2 − 0)	P(28)	1478.755	(2 − 0)	P(8)	1452.545	(3 − 0)	P(21)
1485.578	(2 − 0)	Q(31)	1478.689	(2 − 0)	Q(11)	1452.326	(3 − 0)	Q(24)
1485.503	(2 − 0)	P(27)	1478.654	(2 − 0)	R(16)	1452.212	(3 − 0)	R(28)
1485.109	(2 − 0)	P(26)	1478.583	(2 − 0)	Q(9)	1452.136	(3 − 0)	P(20)
1485.060	(2 − 0)	Q(30)	1478.559	(2 − 0)	P(7)	1451.931	(3 − 0)	Q(23)
1484.854	(2 − 0)	P(26)	1478.512	(2 − 0)	Q(10)	1451.815	(3 − 0)	R(27)
1484.569	(2 − 0)	P(25)	1478.465	(2 − 0)	R(15)	1451.743	(3 − 0)	P(19)
1484.535	(2 − 0)	Q(29)	1478.379	(2 − 0)	P(6)	1451.553	(3 − 0)	Q(22)
1484.241	(2 − 0)	Q(28)	1478.353	(2 − 0)	Q(9)	1451.429	(3 − 0)	R(26)
1484.086	(2 − 0)	P(24)	1478.302	(2 − 0)	Q(8)	1451.369	(3 − 0)	P(18)
1483.731	(2 − 0)	Q(27)	1478.293	(2 − 0)	R(14)	1451.192	(3 − 0)	Q(21)
1483.628	(2 − 0)	P(23)	1478.212	(2 − 0)	Q(8)	1451.064	(3 − 0)	R(25)
1483.280	(2 − 0)	Q(26)	1478.207	(2 − 0)	P(5)	1451.010	(3 − 0)	P(17)
1483.188	(2 − 0)	P(22)	1478.137	(2 − 0)	R(13)	1450.845	(3 − 0)	Q(20)
1482.854	(2 − 0)	Q(25)	1478.088	(2 − 0)	Q(7)	1450.720	(3 − 0)	R(24)
1482.765	(2 − 0)	P(21)	1478.068	(2 − 0)	P(4)	1450.667	(3 − 0)	P(16)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\,^1\Pi - X\,^1\Sigma^+$ *transition of* CO [a] — Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1450.520	(3 − 0)	Q(19)	1447.263	(3 − 0)	R(3)	1420.141	(4 − 0)	R(15)
1450.389	(3 − 0)	R(23)	1447.263	(3 − 0)	R(4)	1420.031	(4 − 0)	Q(10)
1450.342	(3 − 0)	P(15)	1427.612	(4 − 0)	P(28)	1420.007	(4 − 0)	P(7)
1450.209	(3 − 0)	Q(18)	1427.079	(4 − 0)	P(27)	1419.953	4 − 0)	R(14)
1450.074	(3 − 0)	R(22)	1426.896	(4 − 0)	Q(30)	1419.863	4 − 0)	Q(9)
1450.031	(3 − 0)	P(14)	1426.564	(4 − 0)	P(26)	1419.828	4 − 0)	P(6)
1449.908	(3 − 0)	Q(17)	1426.390	(4 − 0)	Q(29)	1419.777	4 − 0)	R(13)
1449.777	(3 − 0)	R(21)	1426.067	(4 − 0)	P(25)	1419.713	(4 − 0)	Q(8)
1449.739	(3 − 0)	P(13)	1425.901	(4 − 0)	Q(28)	1419.664	(4 − 0)	P(5)
1449.638	(3 − 0)	Q(16)	1425.586	(4 − 0)	P(24)	1419.625	(4 − 0)	R(12)
1449.497	(3 − 0)	R(20)	1425.431	(4 − 0)	Q(27)	1419.576	(4 − 0)	Q(7)
1449.463	(3 − 0)	P(12)	1425.122	(4 − 0)	P(23)	1419.520	(4 − 0)	P(4)
1449.377	(3 − 0)	Q(15)	1424.977	(4 − 0)	Q(26)	1419.481	(4 − 0)	R(11)
1449.234	(3 − 0)	R(19)	1424.677	(4 − 0)	P(22)	1419.462	(4 − 0)	Q(6)
1449.204	(3 − 0)	P(11)	1424.540	(4 − 0)	Q(25)	1419.392	(4 − 0)	P(3)
1449.132	(3 − 0)	Q(14)	1424.247	(4 − 0)	P(21)	1419.362	(4 − 0)	Q(5)
1448.989	(3 − 0)	R(18)	1424.121	(4 − 0)	Q(24)	1419.362	(4 − 0)	R(10)
1448.958	(3 − 0)	P(10)	1423.835	(4 − 0)	P(20)	1419.277	(4 − 0)	P(2)
1448.903	(3 − 0)	Q(13)	1423.734	(4 − 0)	Q(23)	1419.277	(4 − 0)	Q(4)
1448.757	(3 − 0)	R(17)	1423.709	(4 − 0)	Q(23)	1419.257	(4 − 0)	R(9)
1448.732	(3 − 0)	P(9)	1423.440	(4 − 0)	P(19)	1419.209	(4 − 0)	Q(3)
1448.690	(3 − 0)	Q(12)	1423.335	(4 − 0)	Q(22)	1419.163	(4 − 0)	Q(2)
1448.544	(3 − 0)	R(16)	1423.335	(4 − 0)	R(26)	1419.163	(4 − 0)	R(8)
1448.521	(3 − 0)	P(8)	1423.062	(4 − 0)	P(18)	1419.125	(4 − 0)	Q(1)
1448.495	(3 − 0)	O(11)	1422.965	(4 − 0)	Q(21)	1419.096	(4 − 0)	R(7)
1448.347	(3 − 0)	R(15)	1422.960	(4 − 0)	R(25)	1419.044	(4 − 0)	R(0)
1448.325	(3 − 0)	P(7)	1422.701	(4 − 0)	P(17)	1419.038	(4 − 0)	R(6)
1448.320	(3 − 0)	Q(10)	1422.617	(4 − 0)	Q(20)	1419.001	(4 − 0)	R(1)
1448.166	(3 − 0)	R(14)	1422.602	(4 − 0)	R(24)	1419.001	(4 − 0)	R(5)
1448.151	(3 − 0)	P(6)	1422.358	(4 − 0)	P(16)	1418.975	(4 − 0)	R(2)
1448.151	(3 − 0)	Q(9)	1422.281	(4 − 0)	Q(19)	1418.975	(4 − 0)	R(4)
1448.004	(3 − 0)	Q(8)	1422.260	(4 − 0)	R(23)	1418.969	(4 − 0)	R(3)
1448.004	(3 − 0)	R(13)	1422.028	(4 − 0)	P(15)	1400.568	(5 − 0)	P(27)
1447.987	(3 − 0)	P(5)	1421.966	(4 − 0)	Q(18)	1400.510	(5 − 0)	Q(30)
1447.876	(3 − 0)	Q(7)	1421.934	(4 − 0)	R(22)	1400.047	(5 − 0)	P(26)
1447.855	(3 − 0)	R(12)	1421.718	(4 − 0)	P(14)	1399.983	(5 − 0)	Q(29)
1447.841	(3 − 0)	P(4)	1421.666	(4 − 0)	Q(17)	1399.545	(5 − 0)	P(25)
1447.763	(3 − 0)	Q(6)	1421.633	(4 − 0)	R(21)	1399.490	(5 − 0)	Q(28)
1447.723	(3 − 0)	R(11)	1421.423	(4 − 0)	P(13)	1399.059	(5 − 0)	P(24)
1447.712	(3 − 0)	P(3)	1421.379	(4 − 0)	Q(16)	1399.007	(5 − 0)	Q(27)
1447.665	(3 − 0)	Q(5)	1421.339	(4 − 0)	R(20)	1398.593	(5 − 0)	P(23)
1447.608	(3 − 0)	R(10)	1421.145	(4 − 0)	P(12)	1398.544	(5 − 0)	Q(26)
1447.598	(3 − 0)	P(2)	1421.115	(4 − 0)	Q(15)	1398.144	(5 − 0)	P(22)
1447.584	(3 − 0)	Q(4)	1421.065	(4 − 0)	R(19)	1398.099	(5 − 0)	Q(25)
1447.515	(3 − 0)	Q(3)	1420.883	(4 − 0)	P(11)	1397.710	(5 − 0)	P(21)
1447.511	(3 − 0)	R(9)	1420.864	(4 − 0)	Q(14)	1397.673	(5 − 0)	Q(24)
1447.469	(3 − 0)	Q(2)	1420.810	(4 − 0)	R(18)	1397.295	(5 − 0)	P(20)
1447.434	(3 − 0)	Q(1)	1420.636	(4 − 0)	P(10)	1397.263	(5 − 0)	Q(23)
1447.430	(3 − 0)	R(8)	1420.630	(4 − 0)	Q(13)	1396.897	(5 − 0)	P(19)
1447.362	(3 − 0)	R(7)	1420.569	(4 − 0)	R(17)	1396.871	(5 − 0)	Q(22)
1447.359	(3 − 0)	R(0)	1420.413	(4 − 0)	P(9)	1396.601	(5 − 0)	R(25)
1447.314	(3 − 0)	R(6)	1420.413	(4 − 0)	Q(12)	1396.515	(5 − 0)	P(18)
1447.309	(3 − 0)	R(1)	1420.346	(4 − 0)	R(16)	1396.496	(5 − 0)	Q(21)
1447.278	(3 − 0)	R(2)	1420.214	(4 − 0)	Q(11)	1396.231	(5 − 0)	R(24)
1447.278	(3 − 0)	R(5)	1420.202	(4 − 0)	P(8)	1396.152	(5 − 0)	P(17)

See footnotes at end of table.

TABLE 23. *Observed lines of the A* $^1\Pi$–*X* $^1\Sigma^+$ *transition of* CO [a]—Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1396.140	(5 − 0)	Q(20)	1392.486	(5 − 0)	R(5)	1368.455	(6 − 0)	Q(9)
1395.880	(5 − 0)	R(23)	1392.483	(5 − 0)	R(1)	1368.391	(6 − 0)	R(12)
1395.802	(5 − 0)	P(16)	1392.457	(5 − 0)	R(2)	1368.374	(6 − 0)	P(6)
1395.802	(5 − 0)	Q(19)	1392.457	(5 − 0)	R(3)	1368.363	(6 − 0)	R(13)
1395.546	(5 − 0)	R(22)	1392.457	(5 − 0)	R(4)	1368.288	(6 − 0)	Q(8)
1395.476	(5 − 0)	P(15)	1374.639	(6 − 0)	P(25)	1368.210	(6 − 0)	P(5)
1395.476	(5 − 0)	Q(18)	1374.150	(6 − 0)	P(24)	1368.193	(6 − 0)	R(11)
1395.229	(5 − 0)	R(21)	1373.676	(6 − 0)	P(23)	1368.178	(6 − 0)	Q(7)
1395.167	(5 − 0)	P(14)	1373.221	(6 − 0)	P(22)	1368.101	(6 − 0)	Q(7)
1395.167	(5 − 0)	Q(17)	1372.783	(6 − 0)	P(21)	1368.101	(6 − 0)	R(12)
1394.927	(5 − 0)	R(20)	1372.415	(6 − 0)	Q(23)	1368.069	(6 − 0)	P(4)
1394.881	(5 − 0)	Q(16)	1372.362	(6 − 0)	P(20)	1368.043	(6 − 0)	Q(6)
1394.871	(5 − 0)	P(13)	1372.014	(6 − 0)	Q(22)	1368.043	(6 − 0)	R(10)
1394.646	(5 − 0)	R(19)	1371.958	(6 − 0)	P(19)	1367.939	(6 − 0)	P(3)
1394.610	(5 − 0)	Q(15)	1371.632	(6 − 0)	Q(21)	1367.939	(6 − 0)	Q(5)
1394.593	(5 − 0)	P(12)	1371.568	(6 − 0)	P(18)	1367.914	(6 − 0)	R(9)
1394.381	(5 − 0)	R(18)	1371.267	(6 − 0)	Q(20)	1367.850	(6 − 0)	Q(4)
1394.357	(5 − 0)	Q(14)	1371.194	(6 − 0)	P(17)	1367.804	(6 − 0)	R(8)
1394.331	(5 − 0)	P(11)	1371.102	(6 − 0)	R(23)	1367.780	(6 − 0)	Q(3)
1394.132	(5 − 0)	R(17)	1370.917	(6 − 0)	Q(19)	1367.729	(6 − 0)	Q(2)
1394.120	(5 − 0)	Q(13)	1370.829	(6 − 0)	P(16)	1367.715	(6 − 0)	R(7)
1394.088	(5 − 0)	P(10)	1370.757	(6 − 0)	R(22)	1367.694	(6 − 0)	Q(1)
1393.900	(5 − 0)	Q(12)	1370.661	(6 − 0)	P(15)	1367.674	(6 − 0)	R(6)
1393.900	(5 − 0)	R(16)	1370.585	(6 − 0)	Q(18)	1367.617	(6 − 0)	R(0)
1393.860	(5 − 0)	P(9)	1370.447	(6 − 0)	P(15)	1367.617	(6 − 0)	R(5)
1393.692	(5 − 0)	Q(11)	1370.429	(6 − 0)	R(21)	1367.599	(6 − 0)	R(6)
1393.692	(5 − 0)	R(15)	1370.335	(6 − 0)	P(14)	1367.582	(6 − 0)	R(1)
1393.651	(5 − 0)	P(8)	1370.264	(6 − 0)	Q(17)	1367.582	(6 − 0)	R(4)
1393.516	(5 − 0)	R(14)	1370.120	(6 − 0)	R(20)	1367.563	(6 − 0)	R(2)
1393.510	(5 − 0)	Q(10)	1370.044	(6 − 0)	P(14)	1367.563	(6 − 0)	R(3)
1393.490	(5 − 0)	R(14)	1370.032	(6 − 0)	Q(16)	1352.840	(7 − 0)	P(28)
1393.458	(5 − 0)	P(7)	1369.992	(6 − 0)	P(13)	1352.315	(7 − 0)	P(27)
1393.341	(5 − 0)	Q(9)	1369.931	(6 − 0)	Q(16)	1351.765	(7 − 0)	P(26)
1393.312	(5 − 0)	R(13)	1369.826	(6 − 0)	R(19)	1351.388	(7 − 0)	Q(28)
1393.283	(5 − 0)	P(6)	1369.694	(6 − 0)	P(12)	1351.250	(7 − 0)	P(25)
1393.189	(5 − 0)	Q(8)	1369.694	(6 − 0)	Q(15)	1350.886	(7 − 0)	Q(27)
1393.149	(5 − 0)	R(12)	1369.599	(6 − 0)	Q(14)	1350.756	(7 − 0)	P(24)
1393.123	(5 − 0)	P(5)	1369.550	(6 − 0)	R(18)	1350.407	(7 − 0)	Q(26)
1393.054	5 − 0)	Q(7)	1369.423	(6 − 0)	P(11)	1350.280	(7 − 0)	P(23)
1393.004	5 − 0)	R(11)	1369.383	(6 − 0)	Q(14)	1349.946	(7 − 0)	Q(25)
1392.981	(5 − 0)	P(4)	1369.287	(6 − 0)	Q(13)	1349.821	(7 − 0)	P(22)
1392.936	(5 − 0)	Q(6)	1369.287	(6 − 0)	R(17)	1349.504	(7 − 0)	Q(24)
1392.876	(5 − 0)	R(10)	1369.173	(6 − 0)	P(10)	1349.381	(7 − 0)	P(21)
1392.856	(5 − 0)	P(3)	1369.046	(6 − 0)	R(16)	1349.081	(7 − 0)	Q(23)
1392.834	(5 − 0)	Q(5)	1369.028	(6 − 0)	Q(12)	1348.959	(7 − 0)	P(20)
1392.764	(5 − 0)	R(9)	1368.935	(6 − 0)	P(9)	1348.674	(7 − 0)	Q(22)
1392.750	(5 − 0)	P(2)	1368.873	(6 − 0)	Q(11)	1348.617	(7 − 0)	R(25)
1392.750	(5 − 0)	Q(4)	1368.815	(6 − 0)	R(15)	1348.551	(7 − 0)	P(19)
1392.682	(5 − 0)	Q(3)	1368.766	(6 − 0)	Q(11)	1348.286	(7 − 0)	Q(21)
1392.671	(5 − 0)	R(8)	1368.753	(6 − 0)	P(8)	1348.206	(7 − 0)	R(24)
1392.632	(5 − 0)	Q(2)	1368.678	(6 − 0)	P(8)	1348.168	(7 − 0)	P(18)
1392.596	(5 − 0)	Q(1)	1368.640	(6 − 0)	Q(10)	1347.916	(7 − 0)	Q(20)
1392.596	(5 − 0)	R(7)	1368.595	(6 − 0)	R(14)	1347.832	(7 − 0)	R(23)
1392.529	(5 − 0)	R(0)	1368.572	(6 − 0)	R(13)	1347.800	(7 − 0)	P(17)
1392.529	(5 − 0)	R(6)	1368.549	(6 − 0)	P(7)	1347.566	(7 − 0)	Q(19)

See footnotes at end of table.

TABLE 23. *Observed lines of the A* $^1\Pi$–*X* $^1\Sigma^+$ *transition of* CO [a]—Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1347.479	(7 – 0)	R(22)	1344.134	(7 – 0)	R(3)	1322.997	(8 – 0)	Q(9)
1347.449	(7 – 0)	P(16)	1329.753	(8 – 0)	P(26)	1322.942	(8 – 0)	R(12)
1347.230	(7 – 0)	Q(18)	1329.317	(8 – 0)	P(25)	1322.867	(8 – 0)	P(6)
1347.142	(7 – 0)	R(21)	1329.196	(8 – 0)	P(25)	1322.837	(8 – 0)	Q(8)
1347.116	(7 – 0)	P(15)	1328.755	(8 – 0)	P(24)	1322.779	(8 – 0)	R(11)
1346.913	(7 – 0)	Q(17)	1328.267	(8 – 0)	P(23)	1322.710	(8 – 0)	P(5)
1346.824	(7 – 0)	R(20)	1327.996	(8 – 0)	Q(25)	1322.695	(8 – 0)	Q(7)
1346.801	(7 – 0)	P(14)	1327.802	(8 – 0)	P(22)	1322.632	(8 – 0)	R(10)
1346.615	(7 – 0)	Q(16)	1327.628	(8 – 0)	Q(24)	1322.571	(8 – 0)	P(4)
1346.524	(7 – 0)	R(19)	1327.507	(8 – 0)	Q(24)	1322.571	(8 – 0)	Q(6)
1346.503	(7 – 0)	P(13)	1327.356	(8 – 0)	P(21)	1322.503	(8 – 0)	R(9)
1346.334	(7 – 0)	Q(15)	1327.132	(8 – 0)	Q(23)	1322.463	(8 – 0)	Q(5)
1346.241	(7 – 0)	R(18)	1326.920	(8 – 0)	P(20)	1322.452	(8 – 0)	P(3)
1346.224	(7 – 0)	P(12)	1326.715	(8 – 0)	Q(22)	1322.393	(8 – 0)	R(8)
1346.071	(7 – 0)	Q(14)	1326.562	(8 – 0)	P(19)	1322.375	(8 – 0)	Q(4)
1345.977	(7 – 0)	R(17)	1326.448	(8 – 0)	P(19)	1322.348	(8 – 0)	P(2)
1345.962	(7 – 0)	P(11)	1326.318	(8 – 0)	Q(21)	1322.301	(8 – 0)	Q(3)
1345.826	(7 – 0)	Q(13)	1326.310	(8 – 0)	R(24)	1322.301	(8 – 0)	R(7)
1345.731	(7 – 0)	R(16)	1326.146	(8 – 0)	P(18)	1322.250	(8 – 0)	Q(2)
1345.717	(7 – 0)	P(10)	1326.006	(8 – 0)	R(23)	1322.224	(8 – 0)	R(6)
1345.598	(7 – 0)	Q(12)	1325.937	(8 – 0)	Q(20)	1322.215	(8 – 0)	Q(1)
1345.503	(7 – 0)	R(15)	1325.889	(8 – 0)	R(23)	1322.166	(8 – 0)	R(5)
1345.491	(7 – 0)	P(9)	1325.770	(8 – 0)	P(17)	1322.147	(8 – 0)	R(0)
1345.389	(7 – 0)	Q(11)	1325.584	(8 – 0)	Q(19)	1322.126	(8 – 0)	R(4)
1345.291	(7 – 0)	R(14)	1325.584	(8 – 0)	R(22)	1322.114	(8 – 0)	R(1)
1345.282	(7 – 0)	P(8)	1325.414	(8 – 0)	P(16)	1322.102	(8 – 0)	R(2)
1345.197	(7 – 0)	Q(10)	1325.243	(8 – 0)	Q(18)	1322.102	(8 – 0)	R(3)
1345.095	(7 – 0)	R(13)	1325.230	(8 – 0)	R(21)	1309.051	(9 – 0)	P(26)
1345.091	(7 – 0)	P(7)	1325.078	(8 – 0)	P(15)	1308.831	(9 – 0)	Q(28)
1345.021	(7 – 0)	Q(9)	1324.901	(8 – 0)	R(20)	1308.530	(9 – 0)	P(25)
1344.918	(7 – 0)	P(6)	1324.877	(8 – 0)	Q(17)	1308.317	(9 – 0)	Q(27)
1344.918	(7 – 0)	R(12)	1324.761	(8 – 0)	P(14)	1308.027	(9 – 0)	P(24)
1344.865	(7 – 0)	Q(8)	1324.660	(8 – 0)	Q(16)	1307.823	(9 – 0)	Q(26)
1344.764	(7 – 0)	R(11)	1324.592	(8 – 0)	R(19)	1307.541	(9 – 0)	P(23)
1344.758	(7 – 0)	P(5)	1324.581	(8 – 0)	Q(16)	1307.460	(9 – 0)	R(28)
1344.724	(7 – 0)	Q(7)	1324.461	(8 – 0)	P(13)	1307.348	(9 – 0)	Q(25)
1344.624	(7 – 0)	R(10)	1324.339	(8 – 0)	Q(15)	1307.073	(9 – 0)	P(22)
1344.618	(7 – 0)	P(4)	1324.293	(8 – 0)	R(18)	1307.001	(9 – 0)	R(27)
1344.602	(7 – 0)	Q(6)	1324.179	(8 – 0)	P(12)	1306.892	(9 – 0)	Q(24)
1344.499	(7 – 0)	P(3)	1324.068	(8 – 0)	Q(14)	1306.626	(9 – 0)	P(21)
1344.499	(7 – 0)	Q(5)	1324.068	(8 – 0)	R(17)	1306.552	(9 – 0)	R(26)
1344.499	(7 – 0)	R(9)	1323.953	(8 – 0)	R(17)	1306.454	(9 – 0)	Q(23)
1344.409	(7 – 0)	Q(4)	1323.916	(8 – 0)	P(11)	1306.197	(9 – 0)	P(20)
1344.395	(7 – 0)	P(2)	1323.819	(8 – 0)	Q(13)	1306.123	(9 – 0)	R(25)
1344.395	(7 – 0)	R(8)	1323.787	(8 – 0)	R(16)	1306.034	(9 – 0)	Q(22)
1344.340	(7 – 0)	Q(3)	1323.671	(8 – 0)	P(10)	1305.785	(9 – 0)	P(19)
1344.308	(7 – 0)	R(7)	1323.585	(8 – 0)	Q(12)	1305.715	(9 – 0)	R(24)
1344.288	(7 – 0)	Q(2)	1323.547	(8 – 0)	R(15)	1305.634	(9 – 0)	Q(21)
1344.252	(7 – 0)	Q(1)	1323.442	(8 – 0)	P(9)	1305.393	(9 – 0)	P(18)
1344.239	(7 – 0)	R(6)	1323.372	(8 – 0)	Q(11)	1305.324	(9 – 0)	R(23)
1344.184	(7 – 0)	R(0)	1323.327	(8 – 0)	R(14)	1305.253	(9 – 0)	Q(20)
1344.184	(7 – 0)	R(5)	1323.223	(8 – 0)	P(8)	1305.020	(9 – 0)	P(17)
1344.149	(7 – 0)	R(1)	1323.176	(8 – 0)	Q(10)	1304.951	(9 – 0)	R(22)
1344.149	(7 – 0)	R(4)	1323.126	(8 – 0)	R(13)	1304.888	(9 – 0)	Q(19)
1344.134	(7 – 0)	R(2)	1323.041	(8 – 0)	P(7)	1304.664	(9 – 0)	P(16)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\,^1\Pi$–$X\,^1\Sigma^+$ *transition of* CO [a]—Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1304.599	(9 − 0)	R(21)	1301.369	(9 − 0)	R(3)	1282.735	(10 − 0)	P(7)
1304.544	(9 − 0)	Q(18)	1289.009	(10 − 0)	P(25)	1282.735	(10 − 0)	Q(9)
1304.327	(9 − 0)	P(15)	1288.878	(10 − 0)	Q(27)	1282.582	(10 − 0)	R(11)
1304.263	(9 − 0)	R(20)	1288.499	(10 − 0)	P(24)	1282.567	(10 − 0)	P(6)
1304.217	(9 − 0)	Q(17)	1288.372	(10 − 0)	Q(26)	1282.567	(10 − 0)	Q(8)
1304.008	(9 − 0)	P(14)	1287.996	(10 − 0)	P(23)	1282.423	(10 − 0)	Q(7)
1303.947	(9 − 0)	R(19)	1287.887	(10 − 0)	Q(25)	1282.423	(10 − 0)	R(10)
1303.909	(9 − 0)	Q(16)	1287.568	(10 − 0)	P(22)	1282.409	(10 − 0)	P(5)
1303.708	(9 − 0)	P(13)	1287.422	(10 − 0)	Q(24)	1282.293	(10 − 0)	Q(6)
1303.649	(9 − 0)	R(18)	1287.116	(10 − 0)	P(21)	1282.286	(10 − 0)	R(9)
1303.619	(9 − 0)	Q(15)	1286.970	(10 − 0)	Q(23)	1282.273	(10 − 0)	P(4)
1303.425	(9 − 0)	P(12)	1286.668	(10 − 0)	P(20)	1282.184	(10 − 0)	Q(5)
1303.370	(9 − 0)	R(17)	1286.554	(10 − 0)	Q(22)	1282.164	(10 − 0)	R(8)
1303.347	(9 − 0)	Q(14)	1286.249	(10 − 0)	P(19)	1282.154	(10 − 0)	P(3)
1303.161	(9 − 0)	P(11)	1286.162	(10 − 0)	P(18)	1282.092	(10 − 0)	Q(4)
1303.109	(9 − 0)	R(16)	1286.143	(10 − 0)	Q(21)	1282.063	(10 − 0)	R(7)
1303.094	(9 − 0)	Q(13)	1285.850	(10 − 0)	P(18)	1282.056	(10 − 0)	P(2)
1302.924	(9 − 0)	Q(12)	1285.750	(10 − 0)	Q(20)	1282.019	(10 − 0)	Q(3)
1302.915	(9 − 0)	P(10)	1285.602	(10 − 0)	P(17)	1281.979	(10 − 0)	R(6)
1302.864	(9 − 0)	R(15)	1285.514	(10 − 0)	R(22)	1281.964	(10 − 0)	Q(2)
1302.860	(9 − 0)	Q(12)	1285.460	(10 − 0)	P(17)	1281.928	(10 − 0)	Q(1)
1302.687	(9 − 0)	P(9)	1285.367	(10 − 0)	Q(19)	1281.915	(10 − 0)	R(5)
1302.643	(9 − 0)	Q(11)	1285.141	(10 − 0)	R(21)	1281.866	(10 − 0)	R(0)
1302.643	(9 − 0)	R(14)	1285.141	(10 − 0)	P(16)	1281.866	(10 − 0)	R(4)
1302.558	(9 − 0)	Q(11)	1285.099	(10 − 0)	Q(18)	1281.838	(10 − 0)	R(1)
1302.478	(9 − 0)	P(8)	1284.987	(10 − 0)	P(16)	1281.838	(10 − 0)	R(3)
1302.441	(9 − 0)	Q(10)	1284.942	(10 − 0)	Q(18)	1281.832	(10 − 0)	R(2)
1302.437	(9 − 0)	R(13)	1284.836	(10 − 0)	R(20)	1270.619	(11 − 0)	P(25)
1302.286	(9 − 0)	P(7)	1284.790	(10 − 0)	P(15)	1270.549	(11 − 0)	Q(27)
1302.263	(9 − 0)	Q(9)	1284.733	(10 − 0)	Q(17)	1270.108	(11 − 0)	P(24)
1302.247	(9 − 0)	R(12)	1284.516	(10 − 0)	R(19)	1270.038	(11 − 0)	Q(26)
1302.111	(9 − 0)	P(6)	1284.467	(10 − 0)	P(14)	1269.612	(11 − 0)	P(23)
1302.101	(9 − 0)	Q(8)	1284.412	(10 − 0)	Q(16)	1269.549	(11 − 0)	Q(25)
1302.077	(9 − 0)	R(11)	1284.196	(10 − 0)	R(18)	1269.135	(11 − 0)	P(22)
1301.956	(9 − 0)	P(5)	1284.163	(10 − 0)	P(13)	1269.077	(11 − 0)	Q(24)
1301.956	(9 − 0)	Q(7)	1284.114	(10 − 0)	Q(15)	1268.680	(11 − 0)	P(21)
1301.926	(9 − 0)	R(10)	1283.941	(10 − 0)	R(16)	1268.625	(11 − 0)	Q(23)
1301.828	(9 − 0)	Q(6)	1283.906	(10 − 0)	R(17)	1268.434	(11 − 0)	R(25)
1301.820	(9 − 0)	P(4)	1283.879	(10 − 0)	P(12)	1268.241	(11 − 0)	P(20)
1301.792	(9 − 0)	R(9)	1283.837	(10 − 0)	Q(14)	1268.192	(11 − 0)	Q(22)
1301.721	(9 − 0)	Q(5)	1283.633	(10 − 0)	R(16)	1268.007	(11 − 0)	R(24)
1301.700	(9 − 0)	P(3)	1283.613	(10 − 0)	P(11)	1267.820	(11 − 0)	P(19)
1301.677	(9 − 0)	R(8)	1283.579	(10 − 0)	Q(13)	1267.778	(11 − 0)	Q(21)
1301.631	(9 − 0)	Q(4)	1283.512	(10 − 0)	R(15)	1267.597	(11 − 0)	R(23)
1301.599	(9 − 0)	P(2)	1283.368	(10 − 0)	P(10)	1267.561	(11 − 0)	P(18)
1301.579	(9 − 0)	R(7)	1283.368	(10 − 0)	R(15)	1267.410	(11 − 0)	P(18)
1301.559	(9 − 0)	Q(3)	1283.340	(10 − 0)	Q(12)	1267.384	(11 − 0)	Q(20)
1301.503	(9 − 0)	Q(2)	1283.178	(10 − 0)	R(14)	1267.208	(11 − 0)	R(22)
1301.503	(9 − 0)	R(6)	1283.138	(10 − 0)	P(9)	1267.079	(11 − 0)	P(17)
1301.469	(9 − 0)	Q(1)	1283.119	(10 − 0)	Q(11)	1267.008	(11 − 0)	Q(19)
1301.439	(9 − 0)	R(5)	1283.024	(10 − 0)	R(14)	1266.960	(11 − 0)	P(17)
1301.401	(9 − 0)	R(0)	1282.955	(10 − 0)	R(13)	1266.837	(11 − 0)	R(21)
1301.398	(9 − 0)	R(4)	1282.927	(10 − 0)	P(8)	1266.701	(11 − 0)	P(16)
1301.369	(9 − 0)	R(1)	1282.917	(10 − 0)	Q(10)	1266.649	(11 − 0)	Q(18)
1301.369	(9 − 0)	R(2)	1282.758	(10 − 0)	R(12)	1266.486	(11 − 0)	R(20)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\,^1\Pi - X\,^1\Sigma^+$ *transition of* CO [a] – Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1266.453	(11 − 0)	P(16)	1263.658	(11 − 0)	Q(4)	1247.794	(12 − 0)	P(11)
1266.453	(11 − 0)	Q(17)	1263.658	(11 − 0)	R(7)	1247.712	(12 − 0)	R(15)
1266.355	(11 − 0)	P(15)	1263.617	(11 − 0)	P(2)	1247.571	(12 − 0)	Q(12)
1266.336	(11 − 0)	Q(18)	1263.587	(11 − 0)	Q(3)	1247.545	(12 − 0)	P(10)
1266.300	(11 − 0)	Q(17)	1263.566	(11 − 0)	R(6)	1247.469	(12 − 0)	R(14)
1266.154	(11 − 0)	R(19)	1263.532	(11 − 0)	Q(2)	1247.344	(12 − 0)	Q(11)
1266.031	(11 − 0)	P(14)	1263.496	(11 − 0)	Q(1)	1247.316	(12 − 0)	P(9)
1266.031	(11 − 0)	Q(16)	1263.496	(11 − 0)	R(5)	1247.245	(12 − 0)	R(13)
1265.912	(11 − 0)	Q(16)	1263.447	(11 − 0)	R(4)	1247.137	(12 − 0)	Q(10)
1265.876	(11 − 0)	P(13)	1263.433	(11 − 0)	R(0)	1247.105	(12 − 0)	P(8)
1265.839	(11 − 0)	R(18)	1263.410	(11 − 0)	R(1)	1247.040	(12 − 0)	R(12)
1265.720	(11 − 0)	P(13)	1263.410	(11 − 0)	R(2)	1246.948	(12 − 0)	Q(9)
1265.720	(11 − 0)	Q(15)	1263.410	(11 − 0)	R(3)	1246.913	(12 − 0)	P(7)
1265.542	(11 − 0)	R(17)	1253.824	(12 − 0)	Q(28)	1246.854	(12 − 0)	R(11)
1265.466	(11 − 0)	P(12)	1253.262	(12 − 0)	Q(27)	1246.779	(12 − 0)	Q(8)
1265.466	(11 − 0)	Q(15)	1252.784	(12 − 0)	P(24)	1246.741	(12 − 0)	P(6)
1265.430	(11 − 0)	P(12)	1252.784	(12 − 0)	Q(26)	1246.687	(12 − 0)	R(10)
1265.430	(11 − 0)	Q(14)	1252.644	(12 − 0)	R(28)	1246.627	(12 − 0)	Q(7)
1265.407	(11 − 0)	R(16)	1252.276	(12 − 0)	P(23)	1246.587	(12 − 0)	P(5)
1265.256	(11 − 0)	R(16)	1252.276	(12 − 0)	Q(25)	1246.541	(12 − 0)	R(9)
1265.173	(11 − 0)	P(11)	1252.140	(12 − 0)	R(27)	1246.495	(12 − 0)	Q(6)
1265.173	(11 − 0)	Q(13)	1251.794	(12 − 0)	P(22)	1246.451	(12 − 0)	P(4)
1265.075	(11 − 0)	Q(12)	1251.794	(12 − 0)	Q(24)	1246.411	(12 − 0)	R(8)
1265.049	(11 − 0)	P(11)	1251.653	(12 − 0)	R(26)	1246.383	(12 − 0)	Q(5)
1265.049	(11 − 0)	R(15)	1251.334	(12 − 0)	P(21)	1246.335	(12 − 0)	P(3)
1264.926	(11 − 0)	P(10)	1251.334	(12 − 0)	Q(23)	1246.300	(12 − 0)	R(7)
1264.926	(11 − 0)	Q(12)	1251.204	(12 − 0)	R(25)	1246.288	(12 − 0)	Q(4)
1264.926	(11 − 0)	R(15)	1250.896	(12 − 0)	P(20)	1246.239	(12 − 0)	P(2)
1264.794	(11 − 0)	R(14)	1250.896	(12 − 0)	Q(22)	1246.212	(12 − 0)	Q(3)
1264.729	(11 − 0)	Q(11)	1250.761	(12 − 0)	R(24)	1246.212	(12 − 0)	R(6)
1264.694	(11 − 0)	P(9)	1250.475	(12 − 0)	P(19)	1246.155	(12 − 0)	Q(2)
1264.694	(11 − 0)	Q(11)	1250.475	(12 − 0)	Q(21)	1246.137	(12 − 0)	R(5)
1264.571	(11 − 0)	R(13)	1250.350	(12 − 0)	R(23)	1246.119	(12 − 0)	Q(1)
1264.547	(11 − 0)	R(14)	1250.073	(12 − 0)	P(18)	1246.084	(12 − 0)	R(4)
1264.499	(11 − 0)	Q(10)	1250.073	(12 − 0)	Q(20)	1246.057	(12 − 0)	R(0)
1264.489	(11 − 0)	P(8)	1249.957	(12 − 0)	R(22)	1246.048	(12 − 0)	R(3)
1264.384	(11 − 0)	Q(10)	1249.692	(12 − 0)	P(17)	1246.036	(12 − 0)	R(1)
1264.371	(11 − 0)	R(12)	1249.692	(12 − 0)	Q(19)	1246.036	(12 − 0)	R(2)
1264.337	(11 − 0)	R(11)	1249.578	(12 − 0)	R(21)	1237.003	(13 − 0)	Q(27)
1264.312	(11 − 0)	Q(9)	1249.331	(12 − 0)	Q(18)	1236.953	(13 − 0)	P(25)
1264.296	(11 − 0)	P(7)	1249.325	(12 − 0)	P(16)	1236.472	(13 − 0)	Q(26)
1264.187	(11 − 0)	R(11)	1249.219	(12 − 0)	R(20)	1236.424	(13 − 0)	P(24)
1264.145	(11 − 0)	Q(8)	1248.993	(12 − 0)	Q(17)	1235.977	(13 − 0)	Q(25)
1264.123	(11 − 0)	P(6)	1248.981	(12 − 0)	P(15)	1235.916	(13 − 0)	P(23)
1264.053	(11 − 0)	R(10)	1248.875	(12 − 0)	R(19)	1235.489	(13 − 0)	Q(24)
1264.014	(11 − 0)	R(10)	1248.669	(12 − 0)	Q(16)	1235.439	(13 − 0)	P(22)
1263.997	(11 − 0)	Q(7)	1248.656	(12 − 0)	P(14)	1235.424	(13 − 0)	R(26)
1263.968	(11 − 0)	P(5)	1248.558	(12 − 0)	R(18)	1235.022	(13 − 0)	Q(23)
1263.886	(11 − 0)	R(9)	1248.366	(12 − 0)	Q(15)	1234.973	(13 − 0)	P(21)
1263.866	(11 − 0)	Q(6)	1248.349	(12 − 0)	P(13)	1234.951	(13 − 0)	R(25)
1263.833	(11 − 0)	P(4)	1248.256	(12 − 0)	R(17)	1234.573	(13 − 0)	Q(22)
1263.758	(11 − 0)	Q(5)	1248.082	(12 − 0)	Q(14)	1234.528	(13 − 0)	P(20)
1263.758	(11 − 0)	R(8)	1248.063	(12 − 0)	P(12)	1234.518	(13 − 0)	R(24)
1263.758	(11 − 0)	R(9)	1247.975	(12 − 0)	R(16)	1234.153	(13 − 0)	Q(21)
1263.715	(11 − 0)	P(3)	1247.817	(12 − 0)	Q(13)	1234.103	(13 − 0)	P(19)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\,^1\Pi - X\,^1\Sigma^+$ *transition of* CO [a]—Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1234.088	(13 − 0)	R(23)	1229.727	(13 − 0)	Q(1)	1215.473	(14 − 0)	P(9)
1233.746	(13 − 0)	Q(20)	1229.705	(13 − 0)	R(4)	1215.334	(14 − 0)	Q(10)
1233.697	(13 − 0)	P(18)	1229.668	(13 − 0)	R(0)	1215.298	(14 − 0)	R(12)
1233.680	(13 − 0)	R(22)	1229.668	(13 − 0)	R(3)	1215.263	(14 − 0)	P(8)
1233.359	(13 − 0)	Q(19)	1229.649	(13 − 0)	R(1)	1215.139	(14 − 0)	Q(9)
1233.311	(13 − 0)	P(17)	1229.649	(13 − 0)	R(2)	1215.101	(14 − 0)	R(11)
1233.289	(13 − 0)	R(21)	1222.114	(14 − 0)	P(26)	1215.070	(14 − 0)	P(7)
1232.993	(13 − 0)	Q(18)	1221.678	(14 − 0)	Q(27)	1214.964	(14 − 0)	Q(8)
1232.943	(13 − 0)	P(16)	1221.678	(14 − 0)	R(29)	1214.924	(14 − 0)	R(10)
1232.927	(13 − 0)	R(20)	1221.562	(14 − 0)	P(25)	1214.896	(14 − 0)	P(6)
1232.646	(13 − 0)	Q(17)	1221.144	(14 − 0)	Q(26)	1214.810	(14 − 0)	Q(7)
1232.597	(13 − 0)	P(15)	1221.144	(14 − 0)	R(28)	1214.767	(14 − 0)	R(9)
1232.580	(13 − 0)	R(19)	1221.029	(14 − 0)	P(24)	1214.743	(14 − 0)	P(5)
1232.318	(13 − 0)	Q(16)	1220.627	(14 − 0)	Q(25)	1214.672	(14 − 0)	Q(6)
1232.270	(13 − 0)	P(14)	1220.627	(14 − 0)	R(27)	1214.628	(14 − 0)	R(8)
1232.252	(13 − 0)	R(18)	1220.523	(14 − 0)	P(23)	1214.609	(14 − 0)	P(4)
1232.011	(13 − 0)	Q(15)	1220.137	(14 − 0)	Q(24)	1214.556	(14 − 0)	Q(5)
1231.960	(13 − 0)	P(13)	1220.137	(14 − 0)	R(26)	1214.509	(14 − 0)	R(7)
1231.945	(13 − 0)	R(17)	1220.026	(14 − 0)	P(22)	1214.495	(14 − 0)	P(3)
1231.718	(13 − 0)	Q(14)	1219.661	(14 − 0)	Q(23)	1214.459	(14 − 0)	Q(4)
1231.673	(13 − 0)	P(12)	1219.661	(14 − 0)	R(25)	1214.407	(14 − 0)	R(6)
1231.655	(13 − 0)	R(16)	1219.564	(14 − 0)	P(21)	1214.397	(14 − 0)	P(2)
1231.453	(13 − 0)	Q(13)	1219.207	(14 − 0)	Q(22)	1214.384	(14 − 0)	Q(3)
1231.402	(13 − 0)	P(11)	1219.207	(14 − 0)	R(24)	1214.328	(14 − 0)	Q(2)
1231.387	(13 − 0)	R(15)	1219.111	(14 − 0)	P(20)	1214.328	(14 − 0)	R(5)
1231.204	(13 − 0)	Q(12)	1218.772	(14 − 0)	Q(21)	1214.278	(14 − 0)	Q(1)
1231.153	(13 − 0)	P(10)	1218.772	(14 − 0)	R(23)	1214.278	(14 − 0)	R(4)
1231.138	(13 − 0)	R(14)	1218.682	(14 − 0)	P(19)	1214.229	(14 − 0)	R(0)
1230.973	(13 − 0)	Q(11)	1218.360	(14 − 0)	Q(20)	1214.229	(14 − 0)	R(3)
1230.921	(13 − 0)	P(9)	1218.360	(14 − 0)	R(22)	1214.213	(14 − 0)	R(1)
1230.907	(13 − 0)	R(13)	1218.272	(14 − 0)	P(18)	1214.213	(14 − 0)	R(2)
1230.762	(13 − 0)	Q(10)	1217.967	(14 − 0)	Q(19)	1205.683	(15 − 0)	Q(24)
1230.710	(13 − 0)	P(8)	1217.967	(14 − 0)	R(21)	1205.530	(15 − 0)	P(22)
1230.697	(13 − 0)	R(12)	1217.882	(14 − 0)	P(17)	1205.204	(15 − 0)	Q(23)
1230.571	(13 − 0)	Q(9)	1217.596	(14 − 0)	Q(18)	1205.050	(15 − 0)	P(21)
1230.517	(13 − 0)	P(7)	1217.589	(14 − 0)	R(20)	1204.794	(15 − 0)	R(24)
1230.506	(13 − 0)	R(11)	1217.512	(14 − 0)	P(16)	1204.742	(15 − 0)	Q(22)
1230.398	(13 − 0)	Q(8)	1217.246	(14 − 0)	Q(17)	1204.594	(15 − 0)	P(20)
1230.344	(13 − 0)	P(6)	1217.229	(14 − 0)	R(19)	1204.350	(15 − 0)	R(23)
1230.334	(13 − 0)	R(10)	1217.162	(14 − 0)	P(15)	1204.302	(15 − 0)	Q(21)
1230.245	(13 − 0)	Q(7)	1216.914	(14 − 0)	Q(16)	1204.160	(15 − 0)	P(19)
1230.189	(13 − 0)	P(5)	1216.891	(14 − 0)	R(18)	1203.923	(15 − 0)	R(22)
1230.182	(13 − 0)	R(9)	1216.831	(14 − 0)	P(14)	1203.882	(15 − 0)	Q(20)
1230.110	(13 − 0)	Q(6)	1216.601	(14 − 0)	Q(15)	1203.746	(15 − 0)	P(18)
1230.054	(13 − 0)	P(4)	1216.576	(14 − 0)	R(17)	1203.519	(15 − 0)	R(21)
1230.049	(13 − 0)	R(8)	1216.520	(14 − 0)	P(13)	1203.483	(15 − 0)	Q(19)
1229.996	(13 − 0)	Q(5)	1216.308	(14 − 0)	Q(14)	1203.354	(15 − 0)	P(17)
1229.936	(13 − 0)	P(3)	1216.282	(14 − 0)	R(16)	1203.134	(15 − 0)	R(20)
1229.936	(13 − 0)	R(7)	1216.230	(14 − 0)	P(12)	1203.104	(15 − 0)	Q(18)
1229.900	(13 − 0)	Q(4)	1216.036	(14 − 0)	Q(13)	1202.978	(15 − 0)	P(16)
1229.842	(13 − 0)	P(2)	1216.006	(14 − 0)	R(15)	1202.772	(15 − 0)	R(19)
1229.837	(13 − 0)	R(6)	1215.959	(14 − 0)	P(11)	1202.746	(15 − 0)	Q(17)
1229.824	(13 − 0)	Q(3)	1215.785	(14 − 0)	Q(12)	1202.624	(15 − 0)	P(15)
1229.764	(13 − 0)	Q(2)	1215.546	(14 − 0)	Q(11)	1202.428	(15 − 0)	R(18)
1229.764	(13 − 0)	R(5)	1215.515	(14 − 0)	R(13)	1202.407	(15 − 0)	Q(16)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\,^1\Pi$–$X\,^1\Sigma^+$ *transition of* CO [a] — Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1202.289	(15 − 0)	P(14)	1199.738	(15 − 0)	Q(1)	1186.452	(16 − 0)	Q(6)
1202.105	(15 − 0)	R(17)	1199.738	(15 − 0)	R(4)	1186.452	(16 − 0)	R(8)
1202.090	(15 − 0)	Q(15)	1199.692	(15 − 0)	R(3)	1186.366	(16 − 0)	P(4)
1202.042	(15 − 0)	P(13)	1199.677	(15 − 0)	R(0)	1186.327	(16 − 0)	Q(5)
1201.970	(15 − 0)	P(13)	1199.671	(15 − 0)	R(1)	1186.327	(16 − 0)	R(7)
1201.799	(15 − 0)	R(16)	1199.671	(15 − 0)	R(2)	1186.251	(16 − 0)	P(3)
1201.795	(15 − 0)	Q(14)	1192.111	(16 − 0)	Q(24)	1186.230	(16 − 0)	Q(4)
1201.695	(15 − 0)	P(12)	1191.896	(16 − 0)	P(22)	1186.214	(16 − 0)	R(6)
1201.637	(15 − 0)	P(12)	1191.619	(16 − 0)	Q(23)	1186.155	(16 − 0)	P(2)
1201.517	(15 − 0)	Q(13)	1191.414	(16 − 0)	P(21)	1186.152	(16 − 0)	Q(3)
1201.517	(15 − 0)	R(15)	1191.150	(16 − 0)	Q(22)	1186.127	(16 − 0)	R(5)
1201.414	(15 − 0)	P(11)	1190.950	(16 − 0)	P(20)	1186.088	(16 − 0)	Q(2)
1201.288	(15 − 0)	P(11)	1190.699	(16 − 0)	Q(21)	1186.059	(16 − 0)	R(4)
1201.256	(15 − 0)	Q(12)	1190.514	(16 − 0)	P(19)	1186.051	(16 − 0)	Q(1)
1201.256	(15 − 0)	R(14)	1190.273	(16 − 0)	Q(20)	1186.014	(16 − 0)	R(3)
1201.159	(15 − 0)	P(10)	1190.094	(16 − 0)	P(18)	1185.987	(16 − 0)	R(0)
1201.016	(15 − 0)	Q(11)	1189.954	(16 − 0)	R(21)	1185.987	(16 − 0)	R(1)
1201.016	(15 − 0)	R(13)	1189.867	(16 − 0)	Q(19)	1185.987	(16 − 0)	R(2)
1200.959	(15 − 0)	Q(10)	1189.695	(16 − 0)	P(17)	1180.722	(17 − 0)	P(25)
1200.924	(15 − 0)	P(9)	1189.560	(16 − 0)	R(20)	1180.455	(17 − 0)	Q(26)
1200.794	(15 − 0)	P(8)	1189.481	(16 − 0)	Q(18)	1180.165	(17 − 0)	P(24)
1200.794	(15 − 0)	Q(10)	1189.316	(16 − 0)	P(16)	1179.911	(17 − 0)	Q(25)
1200.794	(15 − 0)	R(12)	1189.186	(16 − 0)	R(19)	1179.634	(17 − 0)	P(23)
1200.706	(15 − 0)	P(8)	1189.116	(16 − 0)	Q(17)	1179.392	(17 − 0)	Q(24)
1200.670	(15 − 0)	Q(9)	1188.959	(16 − 0)	P(15)	1179.122	(17 − 0)	P(22)
1200.655	(15 − 0)	R(11)	1188.836	(16 − 0)	R(18)	1178.887	(17 − 0)	Q(23)
1200.588	(15 − 0)	Q(9)	1188.772	(16 − 0)	Q(16)	1178.637	(17 − 0)	P(21)
1200.588	(15 − 0)	R(11)	1188.622	(16 − 0)	P(14)	1178.577	(17 − 0)	R(24)
1200.533	(15 − 0)	P(7)	1188.506	(16 − 0)	R(17)	1178.411	(17 − 0)	Q(22)
1200.484	(15 − 0)	P(7)	1188.449	(16 − 0)	Q(15)	1178.176	(17 − 0)	P(20)
1200.444	(15 − 0)	Q(8)	1188.305	(16 − 0)	P(13)	1178.112	(17 − 0)	R(23)
1200.420	(15 − 0)	R(10)	1188.195	(16 − 0)	R(16)	1177.956	(17 − 0)	Q(21)
1200.401	(15 − 0)	P(6)	1188.146	(16 − 0)	Q(14)	1177.721	(17 − 0)	P(19)
1200.367	(15 − 0)	Q(8)	1188.009	(16 − 0)	P(12)	1177.663	(17 − 0)	R(22)
1200.367	(15 − 0)	R(10)	1187.905	(16 − 0)	R(15)	1177.516	(17 − 0)	Q(20)
1200.351	(15 − 0)	P(6)	1187.862	(16 − 0)	Q(13)	1177.294	(17 − 0)	P(18)
1200.276	(15 − 0)	Q(7)	1187.732	(16 − 0)	P(11)	1177.239	(17 − 0)	R(21)
1200.251	(15 − 0)	R(9)	1187.635	(16 − 0)	R(14)	1177.103	(17 − 0)	P(17)
1200.193	(15 − 0)	P(5)	1187.600	(16 − 0)	Q(12)	1177.103	(17 − 0)	Q(19)
1200.164	(15 − 0)	Q(7)	1187.476	(16 − 0)	P(10)	1176.888	(17 − 0)	P(17)
1200.137	(15 − 0)	Q(6)	1187.387	(16 − 0)	R(13)	1176.836	(17 − 0)	R(20)
1200.129	(15 − 0)	R(9)	1187.359	(16 − 0)	Q(11)	1176.709	(17 − 0)	Q(18)
1200.108	(15 − 0)	R(8)	1187.242	(16 − 0)	P(9)	1176.503	(17 − 0)	P(16)
1200.058	(15 − 0)	P(4)	1187.158	(16 − 0)	R(12)	1176.454	(17 − 0)	R(19)
1200.014	(15 − 0)	Q(5)	1187.137	(16 − 0)	Q(10)	1176.337	(17 − 0)	Q(17)
1199.983	(15 − 0)	R(7)	1187.026	(16 − 0)	P(8)	1176.145	(17 − 0)	P(15)
1199.960	(15 − 0)	R(6)	1186.949	(16 − 0)	R(11)	1176.095	(17 − 0)	R(18)
1199.941	(15 − 0)	P(3)	1186.935	(16 − 0)	Q(9)	1176.071	(17 − 0)	P(15)
1199.915	(15 − 0)	Q(4)	1186.831	(16 − 0)	P(7)	1175.986	(17 − 0)	Q(16)
1199.876	(15 − 0)	R(6)	1186.758	(16 − 0)	Q(8)	1175.802	(17 − 0)	P(14)
1199.845	(15 − 0)	P(2)	1186.758	(16 − 0)	R(10)	1175.755	(17 − 0)	R(17)
1199.839	(15 − 0)	Q(3)	1186.656	(16 − 0)	P(6)	1175.656	(17 − 0)	Q(15)
1199.815	(15 − 0)	R(5)	1186.594	(16 − 0)	Q(7)	1175.620	(17 − 0)	P(14)
1199.775	(15 − 0)	Q(2)	1186.594	(16 − 0)	R(9)	1175.481	(17 − 0)	P(13)
1199.765	(15 − 0)	R(5)	1186.501	(16 − 0)	P(5)	1175.431	(17 − 0)	R(16)

See footnotes at end of table.

TABLE 23. *Observed lines of the A* $^1\Pi$–$X\ ^1\Sigma^+$ *transition of* CO[a]—Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1175.346	(17 − 0)	P(12)	1168.829	(18 − 0)	P(25)	1161.806	(18 − 0)	P(6)
1175.346	(17 − 0)	R(15)	1168.608	(18 − 0)	Q(26)	1161.766	(18 − 0)	Q(7)
1175.345	(17 − 0)	Q(14)	1168.260	(18 − 0)	P(24)	1161.679	(18 − 0)	P(5)
1175.181	(17 − 0)	P(12)	1168.056	(18 − 0)	Q(25)	1161.654	(18 − 0)	R(8)
1175.181	(17 − 0)	Q(13)	1167.719	(18 − 0)	P(23)	1161.639	(18 − 0)	P(5)
1175.137	(17 − 0)	R(15)	1167.518	(18 − 0)	Q(24)	1161.619	(18 − 0)	Q(6)
1175.054	(17 − 0)	Q(13)	1167.253	(18 − 0)	R(25)	1161.523	(18 − 0)	P(4)
1174.922	(17 − 0)	P(11)	1167.199	(18 − 0)	P(22)	1161.523	(18 − 0)	R(7)
1174.922	(17 − 0)	R(14)	1166.995	(18 − 0)	Q(23)	1161.490	(18 − 0)	P(4)
1174.893	(17 − 0)	P(11)	1166.750	(18 − 0)	R(24)	1161.490	(18 − 0)	Q(5)
1174.858	(17 − 0)	R(14)	1166.701	(18 − 0)	P(21)	1161.419	(18 − 0)	P(3)
1174.806	(17 − 0)	Q(12)	1166.520	(18 − 0)	Q(22)	1161.419	(18 − 0)	Q(4)
1174.771	(17 − 0)	Q(12)	1166.261	(18 − 0)	R(23)	1161.406	(18 − 0)	R(6)
1174.645	(17 − 0)	P(10)	1166.216	(18 − 0)	P(20)	1161.380	(18 − 0)	Q(4)
1174.606	(17 − 0)	R(13)	1166.053	(18 − 0)	Q(21)	1161.352	(18 − 0)	P(3)
1174.544	(17 − 0)	Q(11)	1165.812	(18 − 0)	R(22)	1161.313	(18 − 0)	P(2)
1174.533	(17 − 0)	P(10)	1165.768	(18 − 0)	P(19)	1161.313	(18 − 0)	Q(3)
1174.533	(17 − 0)	R(13)	1165.607	(18 − 0)	Q(20)	1161.313	(18 − 0)	R(5)
1174.413	(17 − 0)	Q(11)	1165.374	(18 − 0)	R(21)	1161.280	(18 − 0)	Q(3)
1174.407	(17 − 0)	P(9)	1165.337	(18 − 0)	P(18)	1161.251	(18 − 0)	Q(2)
1174.370	(17 − 0)	R(12)	1165.181	(18 − 0)	Q(19)	1161.231	(18 − 0)	R(4)
1174.320	(17 − 0)	Q(10)	1164.957	(18 − 0)	R(20)	1161.211	(18 − 0)	R(3)
1174.186	(17 − 0)	P(8)	1164.925	(18 − 0)	P(17)	1161.211	(18 − 0)	Q(1)
1174.186	(17 − 0)	R(12)	1164.782	(18 − 0)	Q(18)	1161.200	(18 − 0)	Q(2)
1174.156	(17 − 0)	R(11)	1164.562	(18 − 0)	R(19)	1161.167	(18 − 0)	R(3)
1174.131	(17 − 0)	R(10)	1164.536	(18 − 0)	P(16)	1161.155	(18 − 0)	R(0)
1174.114	(17 − 0)	Q(9)	1164.400	(18 − 0)	Q(17)	1161.155	(18 − 0)	R(1)
1173.993	(17 − 0)	P(7)	1164.192	(18 − 0)	R(18)	1161.155	(18 − 0)	R(2)
1173.962	(17 − 0)	R(10)	1164.167	(18 − 0)	P(15)	1161.126	(18 − 0)	R(2)
1173.930	(17 − 0)	Q(8)	1164.040	(18 − 0)	Q(16)	1161.093	(18 − 0)	R(1)
1173.814	(17 − 0)	P(6)	1163.843	(18 − 0)	R(17)	1144.027	(20 − 0)	P(18)
1173.814	(17 − 0)	R(9)	1163.820	(18 − 0)	P(14)	1143.598	(20 − 0)	P(17)
1173.784	(17 − 0)	R(9)	1163.702	(18 − 0)	Q(15)	1143.530	(20 − 0)	Q(18)
1173.767	(17 − 0)	Q(7)	1163.517	(18 − 0)	R(16)	1143.402	(20 − 0)	R(19)
1173.661	(17 − 0)	P(5)	1163.489	(18 − 0)	P(13)	1143.190	(20 − 0)	P(16)
1173.636	(17 − 0)	R(8)	1163.386	(18 − 0)	Q(14)	1143.125	(20 − 0)	Q(17)
1173.624	(17 − 0)	Q(6)	1163.209	(18 − 0)	R(15)	1143.002	(20 − 0)	R(18)
1173.522	(17 − 0)	P(4)	1163.189	(18 − 0)	P(12)	1142.804	(20 − 0)	P(15)
1173.522	(17 − 0)	R(8)	1163.091	(18 − 0)	Q(13)	1142.745	(20 − 0)	Q(16)
1173.503	(17 − 0)	Q(5)	1162.922	(18 − 0)	R(14)	1142.627	(20 − 0)	R(17)
1173.503	(17 − 0)	R(7)	1162.906	(18 − 0)	P(11)	1142.441	(20 − 0)	P(14)
1173.417	(17 − 0)	P(3)	1162.818	(18 − 0)	Q(12)	1142.387	(20 − 0)	Q(15)
1173.395	(17 − 0)	Q(4)	1162.658	(18 − 0)	R(13)	1142.273	(20 − 0)	R(16)
1173.395	(17 − 0)	R(6)	1162.644	(18 − 0)	P(10)	1142.102	(20 − 0)	P(13)
1173.313	(17 − 0)	P(2)	1162.566	(18 − 0)	Q(11)	1142.053	(20 − 0)	Q(14)
1173.313	(17 − 0)	Q(3)	1162.416	(18 − 0)	R(12)	1141.944	(20 − 0)	R(15)
1173.313	(17 − 0)	R(5)	1162.403	(18 − 0)	P(9)	1141.785	(20 − 0)	P(12)
1173.251	(17 − 0)	Q(2)	1162.335	(18 − 0)	Q(10)	1141.741	(20 − 0)	Q(13)
1173.234	(17 − 0)	R(4)	1162.190	(18 − 0)	P(8)	1141.637	(20 − 0)	R(14)
1173.212	(17 − 0)	Q(1)	1162.190	(18 − 0)	R(11)	1141.490	(20 − 0)	P(11)
1173.184	(17 − 0)	R(3)	1162.124	(18 − 0)	Q(9)	1141.452	(20 − 0)	Q(12)
1173.154	(17 − 0)	R(0)	1161.992	(18 − 0)	R(10)	1141.352	(20 − 0)	R(13)
1173.154	(17 − 0)	R(1)	1161.985	(18 − 0)	P(7)	1141.219	(20 − 0)	P(10)
1173.154	(17 − 0)	R(2)	1161.936	(18 − 0)	Q(8)	1141.185	(20 − 0)	Q(11)
1169.190	(18 − 0)	Q(27)	1161.812	(18 − 0)	R(9)	1141.091	(20 − 0)	R(12)

See footnotes at end of table.

TABLE 23. *Observed lines of the* $A\ ^1\Pi - X\ ^1\Sigma^+$ *transition of* CO [a] — Continued

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1140.968	(20 − 0)	P(9)	1140.341	(20 − 0)	Q(7)	1139.886	(20 − 0)	R(5)
1140.940	(20 − 0)	Q(10)	1140.268	(20 − 0)	R(8)	1139.853	(20 − 0)	Q(3)
1140.851	(20 − 0)	R(11)	1140.188	(20 − 0)	P(5)	1139.843	(20 − 0)	P(2)
1140.740	(20 − 0)	P(8)	1140.188	(20 − 0)	Q(6)	1139.803	(20 − 0)	R(4)
1140.718	(20 − 0)	Q(9)	1140.118	(20 − 0)	R(7)	1139.787	(20 − 0)	Q(2)
1140.634	(20 − 0)	R(10)	1140.053	(20 − 0)	P(4)	1139.743	(20 − 0)	Q(1)
1140.536	(20 − 0)	P(7)	1140.053	(20 − 0)	Q(5)	1139.743	(20 − 0)	R(3)
1140.518	(20 − 0)	Q(8)	1139.992	(20 − 0)	R(6)	1139.704	(20 − 0)	R(2)
1140.440	(20 − 0)	R(9)	1139.941	(20 − 0)	P(3)	1139.690	(20 − 0)	R(1)
1140.353	(20 − 0)	P(6)	1139.941	(20 − 0)	Q(4)	1139.690	(20 − 0)	R(0)

[a] Double entries for a single wavelength indicate blended lines. Double entries for a single assignment indicate perturbed lines: one line belongs to the A–X transition and the other line belongs to the transition terminating on the state which perturbs the $A^1\Pi$ state (Simmons, Bass and Tilford, 1969).

TABLE 24. *Observed lines of the* $B\ ^1\Sigma^+ - X\ ^1\Sigma^+$ *transition of* CO

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1151.825	(0 – 0)	P(32)	1149.752	(0 – 0)	R(13)	1124.005	(1 – 0)	P(8)
1151.796	(0 – 0)	P(31)	1149.691	(0 – 0)	R(14)	1123.956	(1 – 0)	P(7)
1151.767	(0 – 0)	P(30)	1149.630	(0 – 0)	R(15)	1123.906	(1 – 0)	P(6)
1151.734	(0 – 0)	P(29)	1149.568	(0 – 0)	R(16)	1123.857	(1 – 0)	P(5)
1151.702	(0 – 0)	P(28)	1149.506	(0 – 0)	R(17)	1123.810	(1 – 0)	P(4)
1151.669	(0 – 0)	P(27)	1149.442	(0 – 0)	R(18)	1123.760	(1 – 0)	P(3)
1151.636	(0 – 0)	P(26)	1149.379	(0 – 0)	R(19)	1123.713	(1 – 0)	P(2)
1151.602	(0 – 0)	P(25)	1149.315	(0 – 0)	R(20)	1123.666	(1 – 0)	P(1)
1151.567	(0 – 0)	P(24)	1149.250	(0 – 0)	R(21)	1123.570	(1 – 0)	R(0)
1151.532	(0 – 0)	P(23)	1149.184	(0 – 0)	R(22)	1123.522	(1 – 0)	R(1)
1151.497	(0 – 0)	P(22)	1149.118	(0 – 0)	R(23)	1123.472	(1 – 0)	R(2)
1151.460	(0 – 0)	P(21)	1149.051	(0 – 0)	R(24)	1123.423	(1 – 0)	R(3)
1151.424	(0 – 0)	P(20)	1148.984	(0 – 0)	R(25)	1123.372	(1 – 0)	R(4)
1151.383	(0 – 0)	P(19)	1148.916	(0 – 0)	R(26)	1123.326	(1 – 0)	R(5)
1151.346	(0 – 0)	P(18)	1148.850	(0 – 0)	R(27)	1123.277	(1 – 0)	R(6)
1151.305	(0 – 0)	P(17)	1148.780	(0 – 0)	R(28)	1123.229	(1 – 0)	R(7)
1151.267	(0 – 0)	P(16)	1148.711	(0 – 0)	R(29)	1123.181	(1 – 0)	R(8)
1151.227	(0 – 0)	P(15)	1148.643	(0 – 0)	R(30)	1123.133	(1 – 0)	R(9)
1151.186	(0 – 0)	P(14)	1148.570	(0 – 0)	R(31)	1123.084	(1 – 0)	R(10)
1151.144	(0 – 0)	P(13)	1148.498	(0 – 0)	R(32)	1123.037	(1 – 0)	R(11)
1151.103	(0 – 0)	P(12)	1148.433	(0 – 0)	R(33)	1122.988	(1 – 0)	R(12)
1151.058	(0 – 0)	P(11)	1125.195	(1 – 0)	P(32)	1122.939	(1 – 0)	R(13)
1151.013	(0 – 0)	P(10)	1125.133	(1 – 0)	P(31)	1122.892	(1 – 0)	R(14)
1150.968	(0 – 0)	P(9)	1125.086	(1 – 0)	P(30)	1122.845	(1 – 0)	R(15)
1150.922	(0 – 0)	P(8)	1125.034	(1 – 0)	P(29)	1122.796	(1 – 0)	R(16)
1150.875	(0 – 0)	P(7)	1124.985	(1 – 0)	P(28)	1122.751	(1 – 0)	R(17)
1150.829	(0 – 0)	P(6)	1124.934	(1 – 0)	P(27)	1122.703	(1 – 0)	R(18)
1150.782	(0 – 0)	P(5)	1124.885	(1 – 0)	P(26)	1122.654	(1 – 0)	R(19)
1150.734	(0 – 0)	P(4)	1124.836	(1 – 0)	P(25)	1122.607	(1 – 0)	R(20)
1150.685	(0 – 0)	P(3)	1124.785	(1 – 0)	P(24)	1122.560	(1 – 0)	R(21)
1150.635	(0 – 0)	P(2)	1124.735	(1 – 0)	P(23)	1122.514	(1 – 0)	R(22)
1150.585	(0 – 0)	P(1)	1124.688	(1 – 0)	P(22)	1122.466	(1 – 0)	R(23)
1150.481	(0 – 0)	R(0)	1124.639	(1 – 0)	P(21)	1122.419	(1 – 0)	R(24)
1150.430	(0 – 0)	R(1)	1124.591	(1 – 0)	P(20)	1122.372	(1 – 0)	R(25)
1150.377	(0 – 0)	R(2)	1124.544	(1 – 0)	P(19)	1122.328	(1 – 0)	R(26)
1150.325	(0 – 0)	R(3)	1124.494	(1 – 0)	P(18)	1122.283	(1 – 0)	R(27)
1150.272	(0 – 0)	R(4)	1124.446	(1 – 0)	P(17)	1122.238	(1 – 0)	R(28)
1150.218	(0 – 0)	R(5)	1124.396	(1 – 0)	P(16)	1122.190	(1 – 0)	R(29)
1150.158	(0 – 0)	R(6)	1124.345	(1 – 0)	P(15)	1122.145	(1 – 0)	R(30)
1150.103	(0 – 0)	R(7)	1124.297	(1 – 0)	P(14)	1122.097	(1 – 0)	R(31)
1150.047	(0 – 0)	R(8)	1124.249	(1 – 0)	P(13)	1122.056	(1 – 0)	R(32)
1149.989	(0 – 0)	R(9)	1124.199	(1 – 0)	P(12)			
1149.930	(0 – 0)	R(10)	1124.151	(1 – 0)	P(11)			
1149.872	(0 – 0)	R(11)	1124.109	(1 – 0)	P(10)			
1149.812	(0 – 0)	R(12)	1124.052	(1 – 0)	P(9)			

TABLE 25. *Observed lines of the* $C\ ^1\Sigma^+ - X\ ^1\Sigma^+$ *transition of* CO

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1089.059	(0 − 0)	P(30)	1087.380	(0 − 0)	R(10)	1063.522	(1 − 0)	P(10)
1089.026	(0 − 0)	P(29)	1087.329	(0 − 0)	R(11)	1063.478	(1 − 0)	P(9)
1088.995	(0 − 0)	P(28)	1087.277	(0 − 0)	R(12)	1063.434	(1 − 0)	P(8)
1088.964	(0 − 0)	P(27)	1087.225	(0 − 0)	R(13)	1063.392	(1 − 0)	P(7)
1088.931	(0 − 0)	P(26)	1087.172	(0 − 0)	R(14)	1063.349	(1 − 0)	P(6)
1088.898	(0 − 0)	P(25)	1087.119	(0 − 0)	R(15)	1063.310	(1 − 0)	P(5)
1088.865	(0 − 0)	P(24)	1087.065	(0 − 0)	R(16)	1063.218	(1 − 0)	P(3)
1088.831	(0 − 0)	P(23)	1087.011	(0 − 0)	R(17)	1063.175	(1 − 0)	P(2)
1088.797	(0 − 0)	P(22)	1086.957	(0 − 0)	R(18)	1063.131	(1 − 0)	P(1)
1088.762	(0 − 0)	P(21)	1086.902	(0 − 0)	R(19)	1063.044	(1 − 0)	R(0)
1088.727	(0 − 0)	P(20)	1086.847	(0 − 0)	R(20)	1063.003	(1 − 0)	R(1)
1088.691	(0 − 0)	P(19)	1086.790	(0 − 0)	R(21)	1062.957	(1 − 0)	R(2)
1088.655	(0 − 0)	P(18)	1086.735	(0 − 0)	R(22)	1062.913	(1 − 0)	R(3)
1088.618	(0 − 0)	P(17)	1086.678	(0 − 0)	R(23)	1062.870	(1 − 0)	R(4)
1088.581	(0 − 0)	P(16)	1086.621	(0 − 0)	R(24)	1062.827	(1 − 0)	R(5)
1088.544	(0 − 0)	P(15)	1086.563	(0 − 0)	R(25)	1062.782	(1 − 0)	R(6)
1088.504	(0 − 0)	P(14)	1086.505	(0 − 0)	R(26)	1062.740	(1 − 0)	R(7)
1088.465	(0 − 0)	P(13)	1086.446	(0 − 0)	R(27)	1062.696	(1 − 0)	R(8)
1088.426	(0 − 0)	P(12)	1086.388	(0 − 0)	R(28)	1062.652	(1 − 0)	R(9)
1088.385	(0 − 0)	P(11)	1086.328	(0 − 0)	R(29)	1062.613	(1 − 0)	R(10)
1088.345	(0 − 0)	P(10)	1086.269	(0 − 0)	R(30)	1062.565	(1 − 0)	R(11)
1088.304	(0 − 0)	P(9)	1064.322	(1 − 0)	P(29)	1062.523	(1 − 0)	R(12)
1088.262	(0 − 0)	P(8)	1064.285	(1 − 0)	P(28)	1062.478	(1 − 0)	R(13)
1088.221	(0 − 0)	P(7)	1064.244	(1 − 0)	P(27)	1062.435	(1 − 0)	R(14)
1088.177	(0 − 0)	P(6)	1064.203	(1 − 0)	P(26)	1062.394	(1 − 0)	R(15)
1088.135	(0 − 0)	P(5)	1064.160	(1 − 0)	P(25)	1062.350	(1 − 0)	R(16)
1088.090	(0 − 0)	P(4)	1064.119	(1 − 0)	P(24)	1062.304	(1 − 0)	R(17)
1088.046	(0 − 0)	P(3)	1064.077	(1 − 0)	P(23)	1062.260	(1 − 0)	R(18)
1088.002	(0 − 0)	P(2)	1064.035	(1 − 0)	P(22)	1062.217	(1 − 0)	R(19)
1087.957	(0 − 0)	P(1)	1063.994	(1 − 0)	P(21)	1062.173	(1 − 0)	R(20)
1087.867	(0 − 0)	R(0)	1063.951	(1 − 0)	P(20)	1062.129	(1 − 0)	R(21)
1087.822	(0 − 0)	R(1)	1063.908	(1 − 0)	P(19)	1062.084	(1 − 0)	R(22)
1087.775	(0 − 0)	R(2)	1063.867	(1 − 0)	P(18)	1062.042	(1 − 0)	R(23)
1087.725	(0 − 0)	R(3)	1063.823	(1 − 0)	P(17)	1061.998	(1 − 0)	R(24)
1087.679	(0 − 0)	R(4)	1063.780	(1 − 0)	P(16)	1061.954	(1 − 0)	R(25)
1087.630	(0 − 0)	R(5)	1063.737	(1 − 0)	P(15)	1061.914	(1 − 0)	R(26)
1087.581	(0 − 0)	R(6)	1063.697	(1 − 0)	P(14)	1061.868	(1 − 0)	R(27)
1087.532	(0 − 0)	R(7)	1063.643	(1 − 0)	P(13)	1061.825	(1 − 0)	R(28)
1087.481	(0 − 0)	R(8)	1063.608	(1 − 0)	P(12)	1061.781	(1 − 0)	R(29)
1087.431	(0 − 0)	R(9)	1063.564	(1 − 0)	P(11)	1061.741	(1 − 0)	R(30)

TABLE 26. *Observed lines of the* $E\ ^1\Pi$–$X\ ^1\Sigma^+$ *transition of* CO[a]

Wavelength	Band	Assignment	Wavelength	Band	Assignment	Wavelength	Band	Assignment
1077.059	(0 − 0)	P(36)	1076.168	(0 − 0)	P(2)	1075.414	(0 − 0)	R(12)
1077.043	(0 − 0)	P(35)	1076.077	(0 − 0)	Q(1)	1075.351	(0 − 0)	R(13)
1077.043	(0 − 0)	P(34)	1076.077	(0 − 0)	Q(2)	1075.299	(0 − 0)	R(14)
1077.021	(0 − 0)	P(33)	1076.077	(0 − 0)	Q(3)	1075.237	(0 − 0)	R(15)
1077.021	(0 − 0)	P(32)	1076.077	(0 − 0)	Q(4)	1075.175	(0 − 0)	R(16)
1077.015	(0 − 0)	P(32)	1075.936	(0 − 0)	Q(17)	1075.113	(0 − 0)	R(17)
1077.001	(0 − 0)	P(31)	1075.936	(0 − 0)	R(2)	1075.051	(0 − 0)	R(18)
1076.988	(0 − 0)	P(30)	1075.918	(0 − 0)	Q(18)	1074.988	(0 − 0)	R(19)
1076.972	(0 − 0)	P(29)	1075.893	(0 − 0)	Q(19)	1074.923	(0 − 0)	R(20)
1076.955	(0 − 0)	P(28)	1075.893	(0 − 0)	R(3)	1074.858	(0 − 0)	R(21)
1076.936	(0 − 0)	P(27)	1075.870	(0 − 0)	Q(20)	1074.793	(0 − 0)	R(22)
1076.918	(0 − 0)	P(26)	1075.846	(0 − 0)	Q(21)	1074.726	(0 − 0)	R(23)
1076.898	(0 − 0)	P(25)	1075.846	(0 − 0)	R(4)	1074.658	(0 − 0)	R(24)
1076.877	(0 − 0)	P(24)	1075.846	(0 − 0)	Q(22)	1074.589	(0 − 0)	R(25)
1076.857	(0 − 0)	P(23)	1075.811	(0 − 0)	Q(23)	1074.520	(0 − 0)	R(26)
1076.831	(0 − 0)	P(22)	1075.782	(0 − 0)	R(5)	1074.449	(0 − 0)	R(27)
1076.807	(0 − 0)	P(21)	1075.782	(0 − 0)	Q(24)	1074.378	(0 − 0)	R(28)
1076.784	(0 − 0)	P(20)	1075.757	(0 − 0)	Q(25)	1074.305	(0 − 0)	R(29)
1076.758	(0 − 0)	P(19)	1075.743	(0 − 0)	R(6)	1074.237	(0 − 0)	R(30)
1076.731	(0 − 0)	P(18)	1075.743	(0 − 0)	Q(26)	1074.227	(0 − 0)	R(30)
1076.703	(0 − 0)	P(17)	1075.709	(0 − 0)	Q(27)	1074.158	(0 − 0)	R(31)
1076.672	(0 − 0)	P(16)	1075.685	(0 − 0)	R(7)	1074.083	(0 − 0)	R(32)
1076.645	(0 − 0)	P(15)	1075.685	(0 − 0)	Q(28)	1074.007	(0 − 0)	R(33)
1076.615	(0 − 0)	P(14)	1075.659	(0 − 0)	Q(29)	1073.931	(0 − 0)	R(34)
1076.577	(0 − 0)	P(13)	1075.637	(0 − 0)	R(8)	1073.854	(0 − 0)	R(35)
1076.550	(0 − 0)	P(12)	1075.637	(0 − 0)	Q(30)	1073.776	(0 − 0)	R(36)
1076.518	(0 − 0)	P(11)	1075.598	(0 − 0)	Q(31)			
1076.481	(0 − 0)	P(10)	1075.584	(0 − 0)	R(9)			
1076.445	(0 − 0)	P(9)	1075.555	(0 − 0)	Q(32)			
1076.403	(0 − 0)	P(8)	1075.529	(0 − 0)	R(10)			
1076.372	(0 − 0)	P(7)	1075.529	(0 − 0)	Q(33)			
1076.332	(0 − 0)	P(6)	1075.502	(0 − 0)	Q(34)			
1076.291	(0 − 0)	P(5)	1075.467	(0 − 0)	R(11)			
1076.251	(0 − 0)	P(4)	1075.467	(0 − 0)	Q(35)			
1076.210	(0 − 0)	P(3)	1075.431	(0 − 0)	Q(36)			

[a] Double entries for a single wavelength indicate blended lines. Double entries for a single assignment indicate perturbed lines.

TABLE 27. *Band head measurements and assignments of* CO *absorption bands*

Band head wavelength	Electronic transition	$v'-v''$	Isotope [b]
Å			
[a] 1053	E–X	1–0	
[a] 1063.09	C–X	1–0	
[a] 1063.62	C–X	1–0	$^{13}C^{16}O$
[a] 1073.49	*j*–X	1–0	
[a] 1076.08	E–X	0–0	
1086.05	*c*–X	0–0	
[a] 1087.91	C–X	0–0	
[a] 1087.91	C–X	0–0	$^{13}C^{16}O$
[a] 1099.05	*j*–X	0–0	
1115.10	A–X	23–0	
[a] 1123.62	B–X	1–0	
[a] 1124.17	B–X	1–0	$^{13}C^{16}O$
1130.34	A–X	21–0	
1139.69	A–X	20–0	
[a] 1150.53	B–X	0–0	
[a] 1150.53	B–X	0–0	$^{13}C^{16}O$
1156.94	*e*–X	27–0	
1161.15	A–X	18–0	
1172.36	*e*–X	25–0	
1173.15	A–X	17–0	
1180.83	*e*–X	24–0	
[a] 1182.4	I–X	24–0	
1185.99	A–X	16–0	
1189.76	*e*–X	23–0	
1190.57	A–X	16–0	$^{13}C^{16}O$
1195.55	D–X	21–0	
1199.24	*e*–X	22–0	
1199.67	A–X	15–0	
1204.24	A–X	15–0	$^{13}C^{16}O$
[a] 1208.1	I–X	21–0	
1209.18	*e*–X	21–0	
1214.21	A–X	14–0	
1216.91	A–X	16–1	
1218.74	A–X	14–0	$^{13}C^{16}O$
1219.7	*e*–X	20–0	
1226.33	*d*–X	22–0	
1229.65	A–X	13–0	
1230.7	*e*–X	19–0	
1234.12	A–X	13–0	$^{13}C^{16}O$
1242.2	*e*–X	18–0	
1246.04	A–X	12–0	
1246.65	A–X	14–1	
1249.56	*d*–X	20–0	
1250.40	A–X	12–0	$^{13}C^{16}O$
1254.2	*e*–X	17–0	
1254.7	*a′*–X	25–0	
[a] 1261.7	I–X	16–0	
1262.01	*d*–X	19–0	
1262.93	A–X	13–1	
1263.41	A–X	11–0	
1266.6	*a′*–X	24–0	
1266.8	*e*–X	16–0	
1267.64	A–X	11–0	$^{13}C^{16}O$
[a] 1274.1	I–X	15–0	
1275.02	*d*–X	18–0	
1278.99	*a′*–X	23–0	
1279.6	*e*–X	15–0	
1280.22	A–X	12–1	
1281.83	A–X	10–0	
1285.90	A–X	10–0	$^{13}C^{16}O$
1288.62	*d*–X	17–0	
1291.96	*a′*–X	22–0	
1293.6	*e*–X	14–0	
1298.56	A–X	11–1	
[a] 1300.6	I–X	13–0	
1301.37	A–X	9–0	
1302.83	*d*–X	16–0	
1305.25	A–X	9–0	$^{13}C^{16}O$
1305.53	*a′*–X	21–0	
1308.0	*e*–X	13–0	
[a] 1314.8	I–X	12–0	
1317.68	*d*–X	15–0	
1318.03	A–X	10–1	
1319.68	*a′*–X	20–0	
1322.10	A–X	8–0	
1323.1	*e*–X	12–0	
1325.76	A–X	8–0	$^{13}C^{16}O$
1333.21	*d*–X	14–0	
1334.50	*a′*–X	19–0	
1338.7	*e*–X	11–0	
1338.74	A–X	9–1	
1344.13	A–X	7–0	
1347.51	A–X	7–0	$^{13}C^{16}O$
1349.45	*d*–X	13–0	
1350.00	*a′*–X	18–0	
1355.1	*e*–X	10–0	
1360.66	A–X	8–1	
[a] 1361.5	I–X	9–0	
1366.23	*a′*–X	17–0	
1366.43	*d*–X	12–0	
1367.56	A–X	6–0	
1370.61	A–X	6–0	$^{13}C^{16}O$
1372	*e*–X	9–0	
1380.98	*a*–X	16–0	
1383.17	*a′*–X	16–0	
1384.00	A–X	7–1	
1384.20	*d*–X	11–0	
1390.10	*e*–X	8–0	
1392.46	A–X	5–0	
1395.15	A–X	5–0	$^{13}C^{16}O$
1398	D–X	6–0	
1400.92	*a′*–X	15–0	
1402.80	*d*–X	10–0	
1406.82	*a*–X	15–0	
1408.85	A–X	6–1	
1408.89	*e*–X	7–0	
[a] 1415.2	I–X	6–0	
1418.97	A–X	4–0	
1419.50	*a′*–X	14–0	
1421.25	A–X	4–0	$^{13}C^{16}O$
1422.28	*d*–X	9–0	
1428.61	*e*–X	6–0	
[a] 1434.9	I–X	5–0	
1435.29	A–X	5–1	
1438.94	*a′*–X	13–0	
1442.71	*d*–X	8–0	
1447.26	A–X	3–0	
1449.05	A–X	3–0	$^{13}C^{16}O$
1449.26	*e*–X	5–0	
[a] 1455.5	I–X	4–0	
1459.35	*a′*–X	12–0	
1460.15	*a*–X	13–0	
1463.47	A–X	4–1	
1464.12	*d*–X	7–0	
1470.97	*e*–X	4–0	
[a] 1477.2	I–X	3–0	
1477.46	A–X	2–0	
1478.68	A–X	2–0	$^{13}C^{16}O$
1480.81	*a′*–X	11–0	
1486.60	*d*–X	6–0	
1493.58	A–X	3–1	
1493.76	*e*–X	3–0	
[a] 1500.0	I–X	2–0	
1503.25	*a′*–X	10–0	
1504.48	D–X	1–0	
1509.65	A–X	1–0	
1510.20	*d*–X	5–0	
1517.67	*e*–X	2–0	
[a] 1524.0	I–X	1–0	
1525.76	A–X	2–1	
1526.78	*a′*–X	9–0	
1535.04	*d*–X	4–0	
1542.83	*e*–X	1–0	
1544.31	A–X	0–0	
1551.62	*a′*–X	8–0	
1560.21	A–X	1–1	
1561.19	*d*–X	3–0	
1577.67	*a′*–X	7–0	
1581.62	*a′*–X	7–0	$^{13}C^{16}O$
1588.64	*d*–X	2–0	
1595.59	*e*–X	1–1	
1597.16	A–X	0–1	
1605.17	*a′*–X	6–0	

TABLE 27. *Band head measurements and assignments of* CO *absorption bands* — Continued

Band head wavelength	Electronic transition	$v'-v''$	Isotope [b]	Band head wavelength	Electronic transition	$v'-v''$	Isotope [b]
1608.66	a'–X	6–0	$^{13}C^{16}O$	1697.16	a'–X	3–0	
1617.75	d–X	1–0		1713.18	a–X	6–0	
1629	a–X	8–0		1731.43	a'–X	2–0	
1634.18	a'–X	5–0		1760.40	a–X	5–0	
1637.24	a'–X	5–0	$^{13}C^{16}O$	1767.72	a'–X	1–0	
1648.45	d–X	0–0		1806.34	a'–X	0–0	
1664.78	a'–X	4–0		1811.29	a–X	4–0	
1667.33	a'–X	4–0	$^{13}C^{16}O$	1866.22	a–X	3–0	
1670	a–X	7–0					

[a] Band origins.
[b] $^{12}C^{16}O$ unless otherwise indicated.