

# Recommended Rest Frequencies for Observed Interstellar Molecular Microwave Transitions — 1985 Revision

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Accurate transition frequencies for the transitions of the molecular species detected in interstellar clouds are presented. These are recommended for reference in future astronomical observations in the radio and microwave regions. The transition frequencies have been selected through critical examination and analysis of the spectroscopic data in the literature. The species identity, quantum number labels, and probable error limits ( $2\sigma$ ) are presented for each transition. Representative line antenna temperatures are also given for a typical source as a convenience to users. References are cited to both the astronomical and laboratory literature.

Key words: hyperfine structure; interstellar; microwave spectra; molecular; radio astronomy; rotational transitions.

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## 1. Introduction

A wide variety of molecular rotational and hyperfine transitions have been measured by radio astronomical techniques. Six years ago the first summary of the rest frequencies recommended for use in future observations was published<sup>1</sup>. Since this earlier review was published, a large number of new measurements have been reported. The current report updates the previous summary, and provides a current source of radio astronomical observations and improved accuracy in transition frequencies which are critical in identifying the molecular source of these spectral observations as well as physical properties of the molecular clouds.

## 2. Source and Selection of Spectral Frequencies

At this writing 59 interstellar and circumstellar molecular species have been observed in the microwave region. These are listed in Table 1 according to empirical formula. Table 1 also provides the common names of the species, isotopic forms which have been observed and the

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approximate number of transitions detected for each isotopic species. The last column of Table 1 indicates the source of the rest frequencies given, e.g. literature references to laboratory measurements, analysis of the literature data in the present work, or previously published reviews which include accurate frequency predictions of transitions not measured in the laboratory<sup>2-23</sup>. Since the laboratory spectra for all of the interstellar species represented here have not been treated in published reviews, the laboratory literature has been thoroughly searched and spectral fitting carried out where feasible to obtain accurate frequency predictions. In some cases the earlier publications are out of date since new laboratory measurements are now available. The species for which the above is true are identified with footnote e in Table 1 and the corresponding spectral line entries in Table 2 do not show a reference to the laboratory literature.

The primary criterion for selection of the transition frequencies was the quoted accuracy of frequency measurements or calculated standard deviation ( $2\sigma$ ) for calculated frequencies. For well behaved species, i.e. those which can be fit with well established Hamiltonians and whose spectra have been extensively measured, the calculated transition frequencies are often more accurate than any individual measurement. For this reason many of the entries in Table 2 are calculated values and identified with an asterisk (\*) following the frequency entry. For several diatomic species, in particular CO, CS, and SiO, the fit-

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ting included both microwave and high resolution infrared measurements and all isotopic species were included in a simultaneous fit to the Dunham expansion. A similar analysis of the various isotopic forms of SO was carried out as described by Tiemann<sup>24</sup>, however only microwave measurements were included. Analyses carried out for the polyatomic species were limited to individual isotopic forms. For several species which exhibit internal rotation, namely CH<sub>3</sub>OH, CH<sub>3</sub>SH, CH<sub>3</sub>CHO, HCOOCH<sub>3</sub>, and CH<sub>3</sub>NH<sub>2</sub>, the Hamiltonians currently available cannot fit the experimental data to within the accuracy of the measured data, particularly for the E symmetry state. As a result the measured frequencies are more accurate and thus preferable to calculated values.

### 3. Description of the Tables

As described earlier, Table 1 provides the identity of species detected in interstellar clouds and circumstellar shells. The major emphasis of the present work is to present accurate transition frequencies for all of the spectral lines observed. These transition frequencies are given in Table 2. Table 2 provides the recommended frequency in column (1). If the frequency is a calculated value, an asterisk (\*) follows the value and in parentheses the uncertainty ( $2\sigma$ ) is given for each transition frequency. The molecular identification is listed in column (2) and this is followed in column (3) by the quantum numbers identifying the upper and lower states involved in the transition. Columns (4)–(6) show the observed interstellar line antenna temperature,  $T_r^*$  or  $T_a^*$ , the molecular cloud source and telescope employed in the observation, respectively. The reader should note that a number of footnote labels appear in the antenna temperature column. The footnotes are listed at the end of the table. Most often the molecular cloud source is Orion A or Sagittarius B2 since these are the most prolific molecular sources. In some cases the intensities obtained from other molecular clouds are listed when these appeared to be more representative or when the observations are unique to a particular source. The telescope abbreviations shown in column (6) are defined in Table 3. In column (7) the references to the interstellar measurements are given. These generally refer to the first reported observation of the transition, but in some cases a more recent report is given when it is felt that the antenna temperatures are more reliable in the later study. However, no attempt was made to evaluate the accuracy of the temperatures quoted.

The reference codes in columns (7) and (8) employ the first three letters of the last name of the leading author, followed by the last two digits of the year of publication. This method was chosen to provide more latitude in editing the tables and references than could be achieved with the common numerical sequence system. The references to the laboratory measured frequencies are listed in column (8). If no entry appears, the values were calculated in the present work (asterisk after frequency) or were

taken from the previously published reviews<sup>2-23</sup>. The list of references to Table 2 directly follows the table.

Table 3 identifies the telescope abbreviations which appear in Table 2.

#### 3.1. Comments on the Tables

For several species there is significant improvement in the accuracy of the frequencies presented here, compared to the earlier work<sup>1</sup>. In particular, reviews on the species CH<sub>3</sub>CN, CH<sub>3</sub>CH<sub>2</sub>OH, CH<sub>3</sub>CH<sub>2</sub>CN, and SO<sub>2</sub> have provided more precise calculated transition frequencies<sup>20,22,23</sup>. New laboratory data and analyses of CO, CS, SiO, OCS, and SO have also improved the calculated values for these species. Several errors in ref. 1 have been corrected. These include the frequency for the HNO  $1_{01}-0_{00}$  at 81477.49 MHz rather than 81447.49 MHz, and correction of the quantum numbers for the formamide lines at 93811 MHz and 102064 MHz. Several previously unidentified lines have been assigned. These are U90146 assigned to HCOOCH<sub>3</sub>, U101139 assigned to CH<sub>3</sub>SH, U105577 assigned to CH<sub>3</sub>OH, and U115383 assigned to SiC<sub>2</sub>.

Some readers may notice several "omissions" of published interstellar observations on CH<sub>4</sub> and CO<sup>+</sup>. Fox and Jennings<sup>25</sup> reported observations of CH<sub>4</sub> at six frequencies. Subsequently, Elldér et al.<sup>26</sup> examined the frequency region of five of the millimeter lines reported for CH<sub>4</sub> and could only verify a doublet at 76702 MHz and 76711 MHz which they attribute to the  $6_{24}-5_{23}$  E and A lines of methyl formate. Similarly, Snyder et al.<sup>28</sup> have examined the 4.6 GHz region with the MPI 100 m telescope and failed to detect the previously reported feature. Erickson et al.<sup>27</sup> reported the detection of the CO<sup>+</sup>  $J=2-1$   $F=5/2-3/2$  transition at 236.063 GHz. Recently, Blake et al.<sup>29</sup> reexamined this region for transitions of <sup>13</sup>CH<sub>3</sub>OH and assigned the 236.063 GHz line to the  $5_{-2}-4_{-2}$  and  $5_{-2}-4_{-2}$  E transitions of <sup>13</sup>CH<sub>3</sub>OH. Thus, there appears to be little evidence remaining for the identification of these species in the microwave spectral region. The identification of HNO and NaOH are questioned by a number of workers due to the limited number of transitions observed.

A substantial number of interstellar transitions which were originally reported as unidentified were subsequently assigned in later studies by the original authors and others. Attempts were made to footnote these when the assignments are not given in the references cited for a given transition. As a last note, the unidentified line U18148 reported by Henkel et al. (Hen83) was not confirmed by recent more sensitive measurements by Matthews and co-workers<sup>30</sup>.

### 4. Acknowledgments

I would like to acknowledge those who have contributed both laboratory and astronomical data employed in this paper. Several colleagues have been very generous in their efforts to improve the information presented here and it is most appropriate to acknowledge their efforts

directly. I am indebted to R.B. Loren, S.E. Cummins, E. C. Sutton and G.A. Blake for providing prepublication surveys which have been included in the present compilation. A preliminary draft of the present tables was sent to a number of astronomers and I am grateful to the following workers who provided both corrections and new information which were included in the present work: L. Avery, D. Clemens, W. Dent, J.L. Destombes, F. Gardner, P.F. Goldsmith, Å. Hjalmarson, J.M. Hollis, W. Hermsen, W.M. Irvine, W.D. Langer, H.E. Matthews, D. Papoušek, M. Schenewerk, L.E. Snyder, E. Tiemann, B.E. Turner, T.L. Wilson, A. Winnberg, R.C. Woods and L.M. Ziurys. I am also pleased to acknowledge Mrs. Rotter who carried out the coding and editing of the manuscript.

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TABLE 1. A listing by empirical formula of the isotopic forms of the interstellar molecules which appear in Table 2

Empirical formula	Name	Isotopic species	Number of transitions observed <sup>a</sup>	Source of spectral data <sup>b</sup>
CH	Methylidyne radical	CH	5	c
CHN	Hydrogen cyanide	HCN	6	7
		H <sup>13</sup> CN	3	
		HC <sup>15</sup> N	3	
		DCN	7	
CHN	Hydrogen isocyanide	HNC	4	c
		H <sup>15</sup> NC	1	
		HN <sup>13</sup> C	4	
		DNC	3	
CHNO	Isocyanic acid	HNCO	29	11
CHNS	Thioisocyanic acid	HNCS	5	c
CHO	Formyl radical	HCO	8	c
CHO <sup>+</sup>	Formylium	HCO <sup>+</sup>	3	c,e
		H <sup>13</sup> CO <sup>+</sup>	3	
		HC <sup>17</sup> O <sup>+</sup>	1	
		HC <sup>18</sup> O <sup>+</sup>	2	
		DCO <sup>+</sup>	4	
		D <sup>13</sup> CO <sup>+</sup>	1	
CHO <sup>+</sup>	HOC <sup>+</sup> ion	HOC <sup>+</sup>	1	c
CHO <sub>2</sub> <sup>+</sup>	HOCO <sup>+</sup> ion	HOCO <sup>+</sup>	3	c,e
CHS <sup>+</sup>	Thioformylium	HCS <sup>+</sup>	5	c,e
CH <sub>2</sub> N <sub>2</sub>	Cyanamide	NH <sub>2</sub> CN	9	c,e
CH <sub>2</sub> O	Formaldehyde (methanal)	H <sub>2</sub> CO	24	c,e,(2) <sup>d</sup>
		H <sub>2</sub> <sup>13</sup> CO	11	
		H <sub>2</sub> C <sup>18</sup> O	1	
		HDCO	7	
CH <sub>2</sub> O <sub>2</sub>	Formic acid	HCOOH	18	19
CH <sub>2</sub> S	Thioformaldehyde	H <sub>2</sub> CS	21	c,e,(2)
		H <sub>2</sub> <sup>13</sup> CS	3	
		H <sub>2</sub> C <sup>34</sup> S	1	
CH <sub>3</sub> N	Methylenimine	CH <sub>2</sub> NH	5	3
		<sup>13</sup> CH <sub>2</sub> NH	1	
CH <sub>3</sub> NO	Formamide	NH <sub>2</sub> CHO	33	e,(2)
		NH <sub>2</sub> <sup>13</sup> CHO	1	
CH <sub>4</sub> O	Methanol (methyl alcohol)	CH <sub>3</sub> OH <sup>f</sup>	183	c,4
		<sup>13</sup> CH <sub>3</sub> OH	19	
		CH <sub>3</sub> OD	2	
CH <sub>4</sub> S	Methyl mercaptan (methanethiol)	CH <sub>3</sub> SH	11	c
CH <sub>5</sub> N	Methylamine	CH <sub>3</sub> NH <sub>2</sub>	10	c
CN	Cyanogen radical	CN	21	c
		<sup>13</sup> CN	6	
CO	Carbon monoxide	CO	9	e,(8)
		<sup>13</sup> CO	3	
		C <sup>17</sup> O	4	
		C <sup>18</sup> O	2	
		<sup>13</sup> C <sup>18</sup> O	1	
COS	Carbonyl sulfide	OCS	14	c,e,(7)
		O <sup>13</sup> CS	5	
		OC <sup>34</sup> S	5	
CS	Carbon monosulfide	CS	8	e,(8)
		<sup>13</sup> CS	4	
		C <sup>33</sup> S	4	
		C <sup>34</sup> S	6	
C <sub>2</sub> H	Ethynyl radical	HC <sub>2</sub>	14	c
		DC <sub>2</sub>	3	

TABLE 1. A listing by empirical formula of the isotopic forms of the interstellar molecules which appear in Table 2 — Continued

Empirical formula	Name	Isotopic species	Number of transitions observed <sup>a</sup>	Source of spectral data <sup>b</sup>
C <sub>2</sub> H <sub>2</sub> O	Ketene	CH <sub>2</sub> CO	22	e
C <sub>2</sub> H <sub>3</sub> N	Acetonitrile	CH <sub>3</sub> CN <sup>f</sup>	103	
		<sup>13</sup> CH <sub>3</sub> CN	4	
		CH <sub>3</sub> <sup>13</sup> CN	6	
C <sub>2</sub> H <sub>4</sub> O	Acetaldehyde	CH <sub>3</sub> CHO	34	c,e10
C <sub>2</sub> H <sub>4</sub> O	Methyl formate	HCOOCH <sub>3</sub>	277	e,17
C <sub>2</sub> H <sub>6</sub> O	Ethanol (ethyl alcohol)	CH <sub>3</sub> CH <sub>2</sub> OH	21	22
C <sub>2</sub> H <sub>6</sub> O	Dimethyl ether	CH <sub>3</sub> OCH <sub>3</sub>	90	18
C <sub>2</sub> Si	Silacyclopropyne	SiC <sub>2</sub>	10	c
C <sub>3</sub> H	C <sub>3</sub> H radical	HC <sub>3</sub>	12	c
C <sub>3</sub> HN	Cyanoacetylene	HC <sub>3</sub> N <sup>f</sup>	47	14
		H <sup>13</sup> CCCN	9	
		HC <sup>13</sup> CCN	7	
		HCC <sup>13</sup> CN	6	
		DC <sub>3</sub> N	4	
C <sub>3</sub> H <sub>2</sub>	Cyclopropenylidene	CH <sub>2</sub> C <sub>2</sub>	10	c
C <sub>3</sub> H <sub>3</sub> N	Acrylonitrile (vinyl cyanide)	CH <sub>2</sub> CHCN	89	c,15
C <sub>3</sub> H <sub>4</sub>	Propyne (methyl acetylene)	CH <sub>3</sub> CCH	42	16
C <sub>3</sub> H <sub>5</sub> N	Propionitrile (ethyl cyanide)	CH <sub>3</sub> CH <sub>2</sub> CN	162	22
C <sub>3</sub> N	Cyanoethynyl radical	C <sub>3</sub> N	20	c
C <sub>3</sub> O	Tricarbon monoxide	C <sub>3</sub> O	4	c
C <sub>4</sub> H	Butadiynyl radical	HC <sub>4</sub>	31	c
C <sub>4</sub> H <sub>3</sub> N	2-butynenitrile	CH <sub>3</sub> CCCN	7	e
C <sub>5</sub> HN	Cyanobutadiyne	HC <sub>5</sub> N	34	c,e
		DC <sub>5</sub> N	2	
C <sub>5</sub> H <sub>4</sub>	Penta-1,3-diyne (methyl diacetylene)	CH <sub>3</sub> C <sub>4</sub> H	4	e
C <sub>7</sub> HN	Cyanoheptatriyne	HC <sub>7</sub> N	9	c,e
C <sub>9</sub> HN	Cyanooctatetrayne	HC <sub>9</sub> N	4	e
C <sub>11</sub> HN	Cyanodecapentyne	HC <sub>11</sub> N	3	c
HNO	Nitroxyl hydride	HNO	1	c
HN <sub>2</sub> <sup>+</sup>	Diazenylium	N <sub>2</sub> H <sup>+</sup>	8	c
		N <sub>2</sub> D <sup>+</sup>	5	
		<sup>15</sup> NNH <sup>+</sup>	1	
		N <sup>15</sup> NH <sup>+</sup>	3	
HNaO	Sodium hydroxyde	NaOH	2	e
HO	Hydroxyl radical	OH	17	13
		<sup>17</sup> OH	2	
		<sup>18</sup> OH	4	
H <sub>2</sub> O	Water	H <sub>2</sub> O	3	c,(6)
		HDO	5	
H <sub>2</sub> S	Hydrogen sulfide	H <sub>2</sub> S	2	c,(5)
H <sub>3</sub> N	Ammonia	NH <sub>3</sub>	41	c
		<sup>15</sup> NH <sub>3</sub>	6	
		NH <sub>2</sub> D	8	
NO	Nitric oxide	NO	4	c
NS	Nitric sulfide	NS	4	c

TABLE 1. A listing by empirical formula of the isotopic forms of the interstellar molecules which appear in Table 2 — Continued

Empirical formula	Name	Isotopic species	Number of transitions observed <sup>a</sup>	Source of spectral data <sup>b</sup>
OS	Sulfur monoxide	SO	20	e,(9)
		<sup>34</sup> SO	12	
		<sup>33</sup> SO	1	
		S <sup>18</sup> O	2	
OSi	Silicon monoxide	SiO <sup>f</sup>	18	e,(8)
		<sup>29</sup> SiO	3	
		<sup>30</sup> SiO	2	
O <sub>2</sub> S	Sulfur dioxide	SO <sub>2</sub> <sup>f</sup>	83	23
		<sup>34</sup> SO <sub>2</sub>	27	
SSi	Silicon monosulfide	SiS	11	12
		Si <sup>34</sup> S	1	
		<sup>29</sup> SiS	2	
		<sup>30</sup> SiS	1	
U	Unidentified	---	172	c

<sup>a</sup>Only resolved lines are enumerated in the table. When a blend of several transitions was reported, e.g. for hyperfine structure, only one line was counted.

<sup>b</sup>These notes and references provide the source of the transition frequencies and spectral assignments for the entries in Table 2.

<sup>c</sup>See the laboratory literature references given for the entries in Table 2.

<sup>d</sup>The references shown in parentheses were not used directly for the transition frequencies, but are given for completeness.

<sup>e</sup>Transition frequencies were calculated from least squares fitting of the literature data in the present work.

<sup>f</sup>Vibrationally excited states of this species are also observed.

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_a$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
701.679 (4)	CH	$^2\Pi_{3/2} J=3/2 F=2-2$	-0.6	W51	Arecibo	350m	Ziu85
724.791 (4)	CH	$^2\Pi_{3/2} J=3/2 F=1-1$	-0.5	W51	Arecibo	350m	Ziu85
834.267 (2)	CH <sub>3</sub> OH	1(1,0)-1(1,1) A	0.58	Sgr A	NRAO	43m	Bal70
1065.075 (5)	CH <sub>3</sub> CHO	1(1,0)-1(1,1) A	0.3	Sgr A	NRAO	43m	Got73
1371.709*(2)	HC <sub>2</sub> CHCN	2(1,1)-2(1,2) F=1-1	0.012	Sgr B2	Parkes	64m	Gar75
1371.794*(2)	HC <sub>2</sub> CHCN	2(1,1)-2(1,2) F=3-3	0.034	Sgr B2	Parkes	64m	Gar75
1371.947*(2)	HC <sub>2</sub> CHCN	2(1,1)-2(1,2) F=2-2	0.019	Sgr B2	Parkes	64m	Gar75
1538.113*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=1-1	0.08	Sgr B2	NRAO	43m	Got73a
1538.678*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=1-2	0.09	Sgr B2	NRAO	43m	Got73a
1539.265*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=2-1	0.10	Sgr B2	NRAO	43m	Got73a
1539.526*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=1-0	0.08	Sgr B2	NRAO	43m	Got73a
1539.831*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=2-2	0.36	Sgr B2	NRAO	43m	Got73a
1540.994*(1)	NH <sub>2</sub> CHO	1(1,0)-1(1,1) F=0-1	0.10	Sgr B2	NRAO	43m	Got73a
1570.805 (5)	NH <sub>2</sub> <sup>13</sup> CHO	1(1,0)-1(1,1) F=2-2	0.04	Sgr B2	Parkes	64m	Gar80
1584.274 (2)	<sup>18</sup> OH	$^2\Pi_{3/2} J=3/2 F=1-2$	-0.05	Sgr B2	Parkes	64m	Wil81a
1610.249 (3)	HCOOCH <sub>3</sub>	1(1,0)-1(1,1) A	0.07	Sgr B2	Parkes	64m	Bro75
1610.906 (3)	HCOOCH <sub>3</sub>	1(1,0)-1(1,1) E	0.061	Sgr B2	MPI	100m	Chu75
1612.2310(2)	OH	$^2\Pi_{3/2} J=3/2 F=1-2$	-0.80	OriMC-2	Parkes	64m	Gar64
1624.518 (10)	<sup>17</sup> OH	$^2\Pi_{3/2} J=3/2 F, F_1=7/2, 4-7/2, 4$	-0.045	Sgr A	Parkes	64m	Gar76
1626.161 (10)	<sup>17</sup> OH	$^2\Pi_{3/2} J=3/2 F, F_1=9/2, 4-9/2, 4$	-0.056	Sgr A	Parkes	64m	Gar76
1637.564 (2)	<sup>18</sup> OH	$^2\Pi_{3/2} J=3/2 F=1-1$	-0.2	Sgr A	Parkes	64m	Gar70
1638.805 (3)	HCOOH	1(1,0)-1(1,1)	0.04	Sgr B2	NRAO	43m	Zuc71
1639.503 (2)	<sup>18</sup> OH	$^2\Pi_{3/2} J=3/2 F=2-2$	-0.5	Sgr A	Parkes	64m	Gar70
1665.4018(1)	OH	$^2\Pi_{3/2} J=3/2 F=1-1$	-5.15	OriMC-2	NRAO	43m	Wei68
1667.3590(1)	OH	$^2\Pi_{3/2} J=3/2 F=2-2$	-6.30	OriMC-2	NRAO	43m	Wei63
1692.795 (2)	<sup>18</sup> OH	$^2\Pi_{3/2} J=3/2 F=2-1$	-0.04	Sgr B2	Parkes	64m	Whi81
1720.5300(1)	OH	$^2\Pi_{3/2} J=3/2 F=2-1$	-1.10	OriMC-2	Parkes	64m	Gar64
2661.61 *(5)	HC <sub>3</sub> N	1-0 F=1-1	0.020	Sgr B2	Parkes	64m	Bro76
2662.87 *(5)	HC <sub>3</sub> N	1-0 F=2-1	0.036	Sgr B2	Parkes	64m	Bro76
2664.76 *(5)	HC <sub>3</sub> N	1-0 F=0-1	0.023	Sgr B2	Parkes	64m	Bro76
3139.402*(1)	H <sub>2</sub> CS	2(1,1)-2(1,2)	-0.33	Sgr B2	Parkes	64m	Sin73
3195.167 (10)	CH <sub>3</sub> CHO	2(1,1)-2(1,2) A	0.2	Sgr B2	Parkes	64m	Fou74
3263.794 (3)	CH	$^2\Pi_{1/2} J=1/2 F=0-1$	0.24	Cas A	OSO	25.6m	Ryd76
3335.481 (2)	CH	$^2\Pi_{1/2} J=1/2 F=1-1$	0.25	Cas A	OSO	25.6m	Ryd76
3349.193 (3)	CH	$^2\Pi_{1/2} J=1/2 F=1-0$	0.18	Cas A	OSO	25.6m	Ryd76
4388.7786(3)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=1-0	b	Sgr B2	Parkes	64m	Gar71a
4388.7960*(4)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=0-1	b	Sgr B2	Parkes	64m	Gar71a
4388.7963(2)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=2-2	n.r.c	Sgr B2	Parkes	64m	Gar71a
4388.8011(2)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=2-1	b	Sgr B2	Parkes	64m	Gar71a
4388.8035(3)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=1-2	b	Sgr B2	Parkes	64m	Gar71a
4388.8084(3)	H <sub>2</sub> C <sup>18</sup> O	1(1,0)-1(1,1) F=1-1	b	Sgr B2	Parkes	64m	Gar71a
4592.9563(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,1/2-1/2,3/2	b	W33	MPI	100m	Wil76b
4592.9738(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,1/2-3/2,3/2	b	W33	MPI	100m	Wil76b
4592.9759(3)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,1/2-1/2,3/2	-0.1b	W33	MPI	100m	Wil76b
4592.9857(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,1/2-5/2,3/2	b	W33	MPI	100m	Wil76b
4592.9934(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,1/2-3/2,3/2	b	W33	MPI	100m	Wil76b
4593.0494(2)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,1/2-1/2,1/2	b	W33	MPI	100m	Wil76b
4593.0690(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,1/2-1/2,1/2	b	W33	MPI	100m	Wil76b
4593.0800(3)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,1/2-3/2,1/2	b	W33	MPI	100m	Wil76b
4593.0812(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,3/2-1/2,3/2	b	W33	MPI	100m	Wil76b
4593.0864(3)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,3/2-1/2,3/2	b	W33	MPI	100m	Wil76b
4593.08654(5)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)5/2,3/2-5/2,3/2	-0.55b	W33	MPI	100m	Wil76b
4593.0942(2)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)5/2,3/2-3/2,3/2	b	W33	MPI	100m	Wil76b
4593.0961(2)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,3/2-5/2,3/2	b	W33	MPI	100m	Wil76b
4593.0985(2)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,3/2-3/2,3/2	b	W33	MPI	100m	Wil76b
4593.0994(3)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,1/2-3/2,1/2	b	W33	MPI	100m	Wil76b
4593.1039(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,3/2-3/2,3/2	b	W33	MPI	100m	Wil76b
4593.1741(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,3/2-1/2,1/2	b	W33	MPI	100m	Wil76b
4593.1795(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,3/2-1/2,1/2	b	W33	MPI	100m	Wil76b
4593.2003(1)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)5/2,3/2-3/2,1/2	-0.1b	W33	MPI	100m	Wil76b
4593.2046(3)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)1/2,3/2-3/2,1/2	b	W33	MPI	100m	Wil76b
4593.2099(2)	H <sub>2</sub> <sup>13</sup> CO	1(1,0)-1(1,1)3/2,3/2-3/2,1/2	b	W33	MPI	100m	Wil76b
4617.126*(1)	NH <sub>2</sub> CHO	2(1,1)-2(1,2) F=2-2	0.07	Sgr B2	NRAO	43m	Rub71
4618.966*(1)	NH <sub>2</sub> CHO	2(1,1)-2(1,2) F=3-3	0.30d	Sgr B2	NRAO	43m	Rub71
4619.989*(1)	NH <sub>2</sub> CHO	2(1,1)-2(1,2) F=1-1	~0.05	Sgr B2	NRAO	43m	Rub71

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
4660.242 ( 3)	OH	$^2\Pi_{1/2} J=1/2 F=0-1$	0.3	Sgr B2	NRAO	43m	Tha70	Rad68
4750.656 ( 3)	OH	$^2\Pi_{1/2} J=1/2 F=1-1$	0.3e	Sgr B2	Parkes	64m	Gar71	Rad68
4765.562 ( 3)	OH	$^2\Pi_{1/2} J=1/2 F=1-0$	1.7	W3	NRAO	43m	Zuc68	Rad68
4829.6412( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=1-0$	-0.2	TMC-1	NRAO	43m	Pal69	Kuk75
4829.6587( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=0-1$	b	TMC-1	NRAO	43m	Pal69	Kuk75
4829.6594( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=2-2$	b	TMC-1	NRAO	43m	Pal69	Kuk75
4829.6639( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=2-1$	-0.8b	TMC-1	NRAO	43m	Pal69	Kuk75
4829.6664( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=1-2$	b	TMC-1	NRAO	43m	Pal69	Kuk75
4829.6710( 2)	H <sub>2</sub> CO	$1(1,0)-1(1,1) F=1-1$	b	TMC-1	NRAO	43m	Pal69	Kuk75
4916.312*( 8)	HCOOH	$2(1,1)-2(1,2)$	0.04	Sgr B2	MPI	100m	Win75	Win75
5005.3208( 2)	CH <sub>3</sub> OH	$3(1)-3(1) A$	0.05d	Sgr B2	Parkes	64m	Rob74	Heu73
5289.015*(19)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=0-1$	0.05	Sgr B2	Parkes	64m	God73	
5289.678*(22)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=1-0$	b	Sgr B2	Parkes	64m	God73	
5289.813*( 6)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=2-2$	0.15b	Sgr B2	Parkes	64m	God73	
5290.614*(13)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=2-1$	b	Sgr B2	Parkes	64m	God73	
5290.879*(11)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=1-2$	0.07b	Sgr B2	Parkes	64m	God73	
5291.680*(18)	CH <sub>2</sub> NH	$1(1,0)-1(1,1) F=1-1$	0.05	Sgr B2	Parkes	64m	God73	
5324.058*(35)	HC <sub>3</sub> N	$2-1 F=2-2$	0.01	Sgr B2	Parkes	64m	Gar78a	Gar78a
5324.270*(35)	HC <sub>3</sub> N	$2-1 F=1-0$	b	Sgr B2	Parkes	64m	Gar78a	Gar78a
5325.330*(27)	HC <sub>3</sub> N	$2-1 F=2-1$	b	Sgr B2	Parkes	64m	Gar78a	Gar78a
5325.421*(27)	HC <sub>3</sub> N	$2-1 F=3-2$	0.044	Sgr B2	Parkes	64m	Gar78a	Gar78a
5327.451*(41)	HC <sub>3</sub> N	$2-1 F=1-1$	0.01	Sgr B2	Parkes	64m	Gar78a	Gar78a
6016.746 ( 8)	OH	$^2\Pi_{3/2} J=5/2 F=2-3$	-0.12	G291.3-0.7	Parkes	64m	Whi76	Rad68
6030.747 ( 5)	OH	$^2\Pi_{3/2} J=5/2 F=2-2$	7	W3(OH)	NRAO	43m	Zuc72a	Mee75
6035.092 ( 5)	OH	$^2\Pi_{3/2} J=5/2 F=3-3$	20	W3(OH)	NRAO	43m	Zuc72a	Mee75
6049.084 ( 8)	OH	$^2\Pi_{3/2} J=5/2 F=3-2$	0.04	W33	MPI	100m	Gar83	Bea78
6278.623*( 1)	H <sub>2</sub> CS	$3(1,2)-3(1,3)$	n.r.	Sgr B2	ARO	46m	Mac75	
6389.936*( 7)	CH <sub>3</sub> CHO	$3(1,2)-3(1,3)$	n.r.	Sgr B2	ARO	46m	Mac75	
7895.983*	HC <sub>7</sub> N	$7-6 F=6-5$	b	TMC-1	NEROC	37m	Rod80	Rod80
7896.005*	HC <sub>7</sub> N	$7-6 F=7-6$	0.006b	TMC-1	NEROC	37m	Rod80	Rod80
7896.017*	HC <sub>7</sub> N	$7-6 F=8-7$	b	TMC-1	NEROC	37m	Rod80	Rod80
7987.782*	HC <sub>5</sub> N	$3-2 F=2-1$	0.040	TMC-1	NEROC	37m	Rod80	Rod80
7987.994*	HC <sub>5</sub> N	$3-2 F=3-2$	0.039	TMC-1	NEROC	37m	Rod80	Rod80
7988.044*	HC <sub>5</sub> N	$3-2 F=4-3$	0.055	TMC-1	NEROC	37m	Rod80	Rod80
8135.868 ( 5)	OH	$^2\Pi_{1/2} J=5/2 F=2-2$	0.13f	W3(OH)	NEROC	37m	Bal71	Bal71
8775.088 (10)	CH <sub>3</sub> NH <sub>2</sub>	$2(0,2)-1(0,1) F=1-0 Aa$	0.05	Sgr B2	Parkes	64m	Fou74a	Lov85
8777.442 (10)	CH <sub>3</sub> NH <sub>2</sub>	$2(0,2)-1(0,1) F=3-2 Aa$	0.18	Sgr B2	Parkes	64m	Fou74a	Lov85
8778.200 (10)	CH <sub>3</sub> NH <sub>2</sub>	$2(0,2)-1(0,1) F=2-2 Aa$	0.04b	Sgr B2	Parkes	64m	Fou74a	Lov85
8778.260 (10)	CH <sub>3</sub> NH <sub>2</sub>	$2(0,2)-1(0,1) F=1-1 Aa$	b	Sgr B2	Parkes	64m	Fou74a	Lov85
8779.496 ( 8)	CH <sub>3</sub> NH <sub>2</sub>	$2(0,2)-1(0,1) F=2-1 Aa$	0.1	Sgr B2	Parkes	64m	Fou74a	Lov85
8815.814*( 6)	H <sup>13</sup> CCCN	$1-0 F=1-1$	0.039	Sgr B2	MPI	100m	Chu77	
8817.096*( 2)	H <sup>13</sup> CCCN	$1-0 F=2-1$	0.080	Sgr B2	MPI	100m	Chu77	
8819.019*( 9)	H <sup>13</sup> CCCN	$1-0 F=0-1$	0.025	Sgr B2	MPI	100m	Chu77	
9024.004	HC <sub>7</sub> N	$8-7$	0.16	TMC-1	MPI	100m	Tol81	
9058.447*( 6)	HC <sup>13</sup> CCN	$1-0 F=1-1$	0.025	Sgr B2	MPI	100m	Chu77	
9059.318*( 2)	HCC <sup>13</sup> CN	$1-0 F=1-1$	n.r.	Sgr B2	MPI	100m	Chu77	
9059.736*( 3)	HC <sup>13</sup> CCN	$1-0 F=2-1$	0.055	Sgr B2	MPI	100m	Chu77	
9060.6080*(9)	HCC <sup>13</sup> CN	$1-0 F=2-1$	0.05	Sgr B2	MPI	100m	Chu77	
9097.0346( 3)	HC <sub>3</sub> N	$1-0 F=1-1$	0.82	Sgr B2	MPI	100m	Chu77	deZ71
9098.3321( 3)	HC <sub>3</sub> N	$1-0 F=2-1$	2.11	Sgr B2	MPI	100m	Chu77	deZ71
9100.2727( 5)	HC <sub>3</sub> N	$1-0 F=0-1$	0.16	Sgr B2	MPI	100m	Chu77	deZ71
9118.818 (15)	CH <sub>3</sub> OCH <sub>3</sub>	$2(0,2)-1(1,1) AA$	b	Sgr B2	Parkes	64m	Win76	Win76
9119.670 (15)	CH <sub>3</sub> OCH <sub>3</sub>	$2(0,2)-1(1,1) EE$	0.05bg	Sgr B2	Parkes	64m	Win76	Win76
9120.517 (15)	CH <sub>3</sub> OCH <sub>3</sub>	$2(0,2)-1(1,1) AE+EA$	b	Sgr B2	Parkes	64m	Win76	Win76
9235.124*( 1)	NH <sub>2</sub> CHO	$3(1,2)-3(1,3) F=3-3$	0.055	Sgr B2	NRAO	43m	God84	
9237.032*( 1)	NH <sub>2</sub> CHO	$3(1,2)-3(1,3) F=4-4$	0.080	Sgr B2	NRAO	43m	God84	
9237.700*( 1)	NH <sub>2</sub> CHO	$3(1,2)-3(1,3) F=2-2$	b	Sgr B2	NRAO	43m	God84	
U 9486.71	unidentified		0.025	TMC-1	NRAO	43m	Mat83a	
U 9493.061*( 4)	C <sub>4</sub> H	$1-0 J=3/2-1/2 F=1-0$	0.090	TMC-1	NARO	43m	Bel83a	Got83
U 9496.4 ( 1)	unidentified		0.008	CasA	NRAO	43m	Bel83	
9497.616*( 2)	C <sub>4</sub> H	$1-0 J=3/2-1/2 F=2-1$	0.245	TMC-1	NARO	43m	Bel83a	Got83
9508.005*( 4)	C <sub>4</sub> H	$1-0 J=3/2-1/2 F=1-1$	0.080	TMC-1	NRAO	43m	Bel83a	Got83
9547.953 ( 5)	C <sub>4</sub> H	$1-0 J=1/2-1/2 F=1-0$	0.095	TMC-1	NRAO	43m	Bel83a	Gue82a
9551.717*( 4)	C <sub>4</sub> H	$1-0 J=1/2-1/2 F=0-1$	0.080	TMC-1	NEROC	37m	Bel83a	Got83

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
9562.904*(3)	C <sub>4</sub> H	1-0 $J=1/2-1/2$ $F=1-1$	0.115	TMC-1	NRAO	43m	Bel83a	Got83
9885.89*(1)	C <sub>3</sub> N	1-0 $J=3/2-1/2$ $F=5/2-3/2$	0.02	TMC-1	ARO	46m	Mac81a	Gue82a
10152.002*(6)	HC <sub>7</sub> N	9-8	0.08	TMC-1	ARO	46m	Kro78	
10458.639*(19)	HC <sub>9</sub> N	18-17	0.021	TMC-1	ARO	46m	Bro78	
10463.956*(1)	H <sub>2</sub> CS	4(1,3)-4(1,4)	-0.040	Sgr B2	ARO	46m	Doh74	
10648.428(20)	CH <sub>3</sub> CHO	4(1,3)-4(1,4) A	0.021	Sgr B2	ARO	46m	Bel83b	Bau76
10650.654*(1)	HC <sub>5</sub> N	4-3	0.036	Sgr B2	ARO	46m	Ave76	
13043.811*(14)	SO	1(2)-1(1)	0.4	Sgr B2	NRAO	43m	Cla78	
13441.4173(2)	OH	<sup>2</sup> Π <sub>3/2</sub> $J=7/2$ $F=4-4$	3.2	W3(OH) <sub>2</sub>	NRAO	43m	Tur70	ter76
13778.804*(1)	H <sub>2</sub> <sup>13</sup> CO	2(1,1)-2(1,2)	-0.47	Sgr B2	MPI	100m	Hen83a	
13880.537(3)	HC <sub>11</sub> N	41-40	0.014	TMC-1	NRAO	43m	Bel85	Bel85
13944.841(3)	HC <sub>9</sub> N	24-23	0.058	TMC-1	NRAO	43m	Bel85	Bel85
14488.4589(2)	H <sub>2</sub> CO	2(1,1)-2(1,2) $F=1-1$	b	Sgr B2	NRL	26m	Eva70	Kuk75
14488.4712(2)	H <sub>2</sub> CO	2(1,1)-2(1,2) $F=1-2$	b	Sgr B2	NRL	26m	Eva70	Kuk75
14488.4801(2)	H <sub>2</sub> CO	2(1,1)-2(1,2) $F=3-3$	-1.3b	Sgr B2	NRL	26m	Eva70	kuk75
14488.4899(2)	H <sub>2</sub> CO	2(1,1)-2(1,2) $F=2-2$	b	Sgr B2	NRL	26m	Eva70	Kuk75
14525.857*(32)	HC <sub>9</sub> N	25-24	0.073	TMC-1	NRAO	43m	Bro78	
14663.985*(9)	HC <sub>7</sub> N	13-12	0.06	TMC-1	Parkes	64m	Gar78	
18154.887*(2)	SiS	1-0	1.0	IRC+10216	MPI	100m	Gra81	
18194.9206*(8)	HC <sub>3</sub> N	2-1 $F=2-2$	b	Sgr B2	Parkes	64m	McG77	
18195.3176*(6)	HC <sub>3</sub> N	2-1 $F=1-0$	b	Sgr B2	Parkes	64m	McG77	
18196.2183*(5)	HC <sub>3</sub> N	2-1 $F=2-1$	0.36b	Sgr B2	Parkes	64m	McG77	
18196.3119*(7)	HC <sub>3</sub> N	2-1 $F=3-2$	b	Sgr B2	Parkes	64m	McG77	
18197.078*(1)	HC <sub>3</sub> N	2-1 $F=1-2$	b	Sgr B2	Parkes	64m	McG77	
18198.3756*(9)	HC <sub>3</sub> N	2-1 $F=1-1$	b	Sgr B2	Parkes	64m	McG77	
18343.145(2)	C <sub>3</sub> H <sub>2</sub>	1(1,0)-1(0,1)	1.82	TMC-1	NRAO	43m	Mat85a	Mat85a
18396.7252*(7)	CH <sub>3</sub> CN	1(0)-0(0) $F=1-1$	0.081	TMC-1	NRAO	43m	Mat83	
18397.9965*(6)	CH <sub>3</sub> CN	1(0)-0(0) $F=2-1$	0.120	TMC-1	NRAO	43m	Mat83	
18399.8924*(3)	CH <sub>3</sub> CN	1(0)-0(0) $F=0-1$	0.031	TMC-1	NRAO	43m	Mat83	
18513.316*(5)	HC <sub>2</sub> CHCN	2(1,2)-1(1,1) $F=3-2$	0.021	TMC-1	NRAO	43m	Mat83a	
18638.617*(1)	HC <sub>5</sub> N	7-6	0.5	TMC-1	NRAO	43m	Jen82	
18808.507(5)	NH <sub>3</sub>	8(5)-8(5)	0.39	OriMC-1	MPI	100m	Her85a	Poy75
18884.695(5)	NH <sub>3</sub>	6(2)-6(2)	0.50	OriMC-1	MPI	100m	Her85a	Poy75
18965.589*(5)	HC <sub>2</sub> CHCN	2(0,2)-1(0,1) $F=1-0$	0.010	TMC-1	NRAO	43m	Mat83a	
18966.535*(5)	HC <sub>2</sub> CHCN	2(0,2)-1(0,1) $F=2-1$	0.032	TMC-1	NRAO	43m	Mat83a	
18966.616*(4)	HC <sub>2</sub> CHCN	2(0,2)-1(0,1) $F=3-2$	0.045	TMC-1	NRAO	43m	Mat83a	
U U 18968.48	unidentified		0.011	TMC-1	NRAO	43m	Mat83a	
18968.66	unidentified		0.009	TMC-1	NRAO	43m	Mat83a	
19014.7204(15)	C <sub>4</sub> H	2-1 $J=5/2-3/2$ $F=2-1$	0.44	TMC-1	NRAO	43m	Gue82a	Gue82a
19015.1435(15)	C <sub>4</sub> H	2-1 $J=5/2-3/2$ $F=3-2$	0.65	TMC-1	NRAO	43m	Gue82a	Gue82a
19025.107(4)	C <sub>4</sub> H	2-1 $J=5/2-3/2$ $F=2-2$	0.048	TMC-1	NRAO	43m	Gue82a	Gue82a
19044.760(4)	C <sub>4</sub> H	2-1 $J=3/2-1/2$ $F=1-1$	0.055	TMC-1	NRAO	43m	Gue82a	Gue82a
19054.4762(15)	C <sub>4</sub> H	2-1 $J=3/2-1/2$ $F=2-1$	0.42	TMC-1	NRAO	43m	Gue82a	Gue82a
19055.9468(15)	C <sub>4</sub> H	2-1 $J=3/2-1/2$ $F=1-0$	0.15	TMC-1	NRAO	43m	Gue82a	Gue82a
19099.656(6)	C <sub>4</sub> H	2-1 $J=3/2-3/2$ $F=1-1$	0.039	TMC-1	NRAO	43m	Gue82a	Gue82a
19174.07*(6)	HC <sub>9</sub> N	33-32	0.003	IRC+10216	NRAO	43m	Mat85	
19175.950*(10)	HC <sub>7</sub> N	17-16	0.465	TMC-1	NRAO	43m	Mat85	
19218.465(5)	NH <sub>3</sub>	7(4)-7(4)	0.64	OriMC-1	MPI	100m	Her85a	Poy75
19243.531(20)	C <sub>3</sub> O	2-1	0.035	TMC-1	NRAO	43m	Mat84	Mat84
19262.160(20)	CH <sub>3</sub> CHO	1(0,1)-0(0,0) E	0.014	TMC-1	NRAO	43m	Mat85	Bau76
19265.156(20)	CH <sub>3</sub> CHO	1(0,1)-0(0,0) A	0.016	TMC-1	NRAO	43m	Mat85	Bau76
19426.677*(5)	HC <sub>2</sub> CHCN	2(1,1)-1(1,0) $F=2-1$	0.010	TMC-1	NRAO	43m	Mat83a	
19427.848*(5)	HC <sub>2</sub> CHCN	2(1,1)-1(1,0) $F=3-2$	0.021	TMC-1	NRAO	43m	Mat83a	
19429.120*(20)	HC <sub>2</sub> CHCN	2(1,1)-1(1,0) $F=1-0$	0.010	TMC-1	NRAO	43m	Mat83a	
19757.538(5)	NH <sub>3</sub>	6(3)-6(3)	1.2	OriMC-1	MPI	100m	Her85a	Poy75
19780.800(3)	C <sub>3</sub> N	2-1 $J=5/2-3/2$ $F=5/2-3/2$	0.058	TMC-1	NRAO	43m	Gue82a	Gue82a
19780.826(4)	C <sub>3</sub> N	2-1 $J=5/2-3/2$ $F=3/2-1/2$	0.050	TMC-1	NRAO	43m	Gue82a	Gue82a
19781.094(3)	C <sub>3</sub> N	2-1 $J=5/2-3/2$ $F=7/2-5/2$	0.094	TMC-1	NRAO	43m	Gue82a	Gue82a
19799.951(5)	C <sub>3</sub> N	2-1 $J=5/2-3/2$ $F=3/2-1/2$	0.022	TMC-1	NRAO	43m	Gue82a	Gue82a
19800.121(3)	C <sub>3</sub> N	2-1 $J=5/2-3/2$ $F=5/2-3/2$	0.055	TMC-1	NRAO	43m	Gue82a	Gue82a
19838.346(5)	NH <sub>3</sub>	5(1)-5(1)	0.56	OriMC-1	MPI	100m	Her85a	Poy75
19967.416(33)	CH <sub>3</sub> OH	2(1)-3(0) E	73.2	W3(OH)	MPI	100m	Wil85	Wil85
20357.226(14)	CH <sub>3</sub> C <sub>4</sub> H	5(1)-4(1)	0.073	TMC-1	MPI	100m	Wal84	Wal84
20357.423(14)	CH <sub>3</sub> C <sub>4</sub> H	5(0)-4(0)	0.077	TMC-1	MPI	100m	Wal84	Wal84
20371.45(10)	NH <sub>3</sub>	5(2)-5(2)	0.9	SgrB2N	MPI	100m	Wal84	Poy75
20657.336*(4)	CH <sub>3</sub> CCCN	5(0)-4(0)	0.043	TMC-1	NRAO	43m	Bro84	

TABLE 2. Recommended Rest Frequencies for Observed Interstellar Molecular Lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
20719.221 ( 5)	NH <sub>3</sub>	8(6)–8(6)	0.70	OriMC-1	MPI	100m	Her85a Poy75
20735.452 ( 5)	NH <sub>3</sub>	9(7)–9(7)	0.25	OriMC-1	MPI	100m	Her85a Poy75
20804.830 ( 5)	NH <sub>3</sub>	7(5)–7(5)	0.82	OriMC-1	MPI	100m	Her85a Poy75
20852.527 ( 5)	NH <sub>3</sub>	10(8)–10(8)	0.17	OriMC-1	MPI	100m	Her85a Poy75
20970.65 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	10(1)–11(2) A+	0.2	W3(OH)	MPI	100m	Sny85b Lee68
20994.617 ( 5)	NH <sub>3</sub>	6(4)–6(4)	1.3	OriMC-1	MPI	100m	Her85a Poy75
21134.311 ( 5)	NH <sub>3</sub>	4(1)–4(1)	0.94	OriMC-1	MPI	100m	Her85a Poy75
21285.275 ( 5)	NH <sub>3</sub>	5(3)–5(3)	2.1	OriMC-1	MPI	100m	Her85a Poy75
21301.262*( 1)	HC <sub>3</sub> N	8–7	0.031	Sgr B2	ARO	46m	Bro76
21431.923*(10)	HC <sub>7</sub> N	19–18	0.89	TMC-1	NRAO	43m	Buj81
21498.16 *(10)	HC <sub>3</sub> N	37–36	0.06	TMC-1	NRAO	43m	Buj81
21550.31 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	12(2)–11(1) A-	-0.4	W3(OH)	MPI	100m	Sny85b Lee68
21703.3580( 2)	NH <sub>3</sub>	4(2)–4(2)	0.6	OriMC-1	MPI	100m	Nys78 Kuk70
21980.5453( 1)	HNCO	1(0,1)–0(0,0) $F=0-1$	0.025	TMC-1	NRAO	43m	Bro81 Kuk71
21981.4706( 1)	HNCO	1(0,1)–0(0,0) $F=2-1$	0.107	TMC-1	NRAO	43m	Bro81 Kuk71
21982.0854( 1)	HNCO	1(0,1)–0(0,0) $F=1-1$	0.040	TMC-1	NRAO	43m	Bro81 Kuk71
22235.044 ( 5)	H <sub>2</sub> O	6(1,6)–5(2,3) $F=7-6$	b	W49	NRAO	43m	Mor73 Kuk69
22235.077 ( 5)	H <sub>2</sub> O	6(1,6)–5(2,3) $F=6-5$	b	W49	NRAO	43m	Mor73 Kuk69
22235.120 ( 5)	H <sub>2</sub> O	6(1,6)–5(2,3) $F=5-4$	2000i	W49	NRAO	43m	Mor73 Kuk69
22235.253 ( 5)	H <sub>2</sub> O	6(1,6)–5(2,3) $F=6-6$	b	W49	NRAO	43m	Mor73 Kuk69
22235.298 ( 5)	H <sub>2</sub> O	6(1,6)–5(2,3) $F=5-5$	b	W49	NRAO	43m	Mor73 Kuk69
22624.8892( 2)	<sup>15</sup> NH <sub>3</sub>	1(1)–1(1) $F, F_1=1.5, 1-1.3, 1$	b	OriMC-1	MPI	100m	Her85 Kuk67
22624.9331( 2)	<sup>15</sup> NH <sub>3</sub>	1(1)–1(1) $F, F_1=1.5, 1-0.8, 1$	b	OriMC-1	MPI	100m	Her85 Kuk67
22624.9410( 2)	<sup>15</sup> NH <sub>3</sub>	1(1)–1(1) $F, F_1=0.5, 1-0.8, 1$	b	OriMC-1	MPI	100m	Her85 Kuk67
22624.9469( 2)	<sup>15</sup> NH <sub>3</sub>	1(1)–1(1) $F, F_1=1.5, 2-1.5, 2$	0.22b	OriMC-1	MPI	100m	Her85 Kuk67
22649.843 ( 1)	<sup>15</sup> NH <sub>3</sub>	2(2)–2(2)	0.36	OriMC-1	MPI	100m	Her85 Kuk68
22653.022 ( 5)	NH <sub>3</sub>	5(4)–5(4)	0.6	OMC-1	MPI	100m	Nys78 Poy75
22688.312 ( 5)	NH <sub>3</sub>	4(3)–4(3)	1.2	OMC-1	MPI	100m	Nys78 Poy75
22732.429 ( 5)	NH <sub>3</sub>	6(5)–6(5)	0.6	OMC-1	MPI	100m	Nys78 Poy75
22789.421 ( 1)	<sup>15</sup> NH <sub>3</sub>	3(3)–3(3)	0.53	OriMC-1	MPI	100m	Her85 Kuk67
22827.767 (20)	HCOOCH <sub>3</sub>	2(1,2)–1(1,1) E	0.15	OriMC-1	MPI	100m	Chu80
22828.143*( 9)	HCOOCH <sub>3</sub>	2(1,2)–1(1,1) A	0.15	OriMC-1	MPI	100m	Chu80
22834.1851( 1)	NH <sub>3</sub>	3(2)–3(2)	0.11	Sgr B2	NRAO	11m	Mor73a Kuk65
22878.949*(10)	DC <sub>3</sub> N	9–8	0.019	TMC-1	NRAO	43m	Sch81
22924.940 ( 5)	NH <sub>3</sub>	7(6)–7(6)	1.0	OMC-1	MPI	100m	Nys78 Poy75
23046.0158( 2)	<sup>15</sup> NH <sub>3</sub>	4(4)–4(4)	0.26	OriMC-1	MPI	100m	Her85 Kuk68
23098.8190( 1)	NH <sub>3</sub>	2(1)–2(1)	0.29	Sgr B2	NRAO	11m	Mor73a Kuk70
23121.20 (10)	CH <sub>3</sub> OH	9(2)–10(1) A+	9.5 e	W3(OH)	MPI	100m	Wil84 Lee68
23232.238 ( 5)	NH <sub>3</sub>	8(7)–8(7)	0.2	OMC-1	MPI	100m	Nys78 Poy75
23421.9823( 2)	<sup>15</sup> NH <sub>3</sub>	5(5)–5(5)	0.14	OriMC-1	MPI	100m	Her85 Kuk68
23444.82 (10)	CH <sub>3</sub> OH	10(1)–9(2) A-	-0.77	W3(OH)	MPI	100m	Men85 Lee68
23600.187 (50)	SiC <sub>2</sub>	1(0,1)–0(0,0)	0.11	IRC+10216	MPI	100m	Sny85 Sny85
23657.471 ( 5)	NH <sub>3</sub>	9(8)–9(8)	0.1	OMC-1	MPI	100m	Nys78 Poy75
23687.889*(10)	HC <sub>7</sub> N	21–20	0.21	TMC-1	NEROC	37m	Kro78
23692.9265( 2)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 1-1/2, 0$	0.16	L134N	OSO	20m	Ryd77 Ryd77
23692.9688( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 1-1/2, 0$	0.24	L134N	OSO	20m	Ryd77 Kuk67
23693.8722( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 1-3/2, 2$	0.17	L134N	OSO	20m	Ryd77 Kuk67
23693.9051( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 1-5/2, 2$	0.30b	L134N	OSO	20m	Ho 77 Kuk67
23693.9145( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 1-3/2, 2$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.4591( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 1-1/2, 1$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.4700( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 1-3/2, 1$	0.40b	L134N	OSO	20m	Ho 77 Kuk67
23694.4709( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 2-5/2, 2$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.4803( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 2-3/2, 2$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.5014( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 1-1/2, 1$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.5060( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=5/2, 2-5/2, 2$	0.50b	L134N	OSO	20m	Ho 77 Kuk67
23694.5123( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 1-3/2, 1$	b	L134N	OSO	20m	Ho 77 Kuk67
23694.5153( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=5/2, 2-3/2, 2$	b	L134N	OSO	20m	Ho 77 Kuk67
23695.0672( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 2-3/2, 1$	0.18b	L134N	OSO	20m	Ho 77 Kuk67
23695.0782( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=3/2, 2-3/2, 1$	b	L134N	OSO	20m	Ho 77 Kuk67
23695.1132( 1)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=5/2, 2-3/2, 1$	0.25	L134N	OSO	20m	Ho 77 Kuk67
23696.0297( 2)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 0-1/2, 1$	0.29b	L134N	OSO	20m	Ho 77 Kuk67
23696.0406( 2)	NH <sub>3</sub>	1(1)–1(1) $F, F_1=1/2, 0-3/2, 1$	b	L134N	OSO	20m	Ho 77 Kuk67
23697.9 ( 4)	HC <sub>11</sub> N	70–69	0.006	IRC+10216	NEROC	37m	Bel82 Bel82
23720.575 ( 5)	NH <sub>3</sub>	2(2)–2(2) $F_1=1-2$	b	OriMC-1	NEROC	37m	Bar77 Kuk67
23721.336 ( 5)	NH <sub>3</sub>	2(2)–2(2) $F_1=3-2$	b	OriMC-1	NEROC	37m	Bar77 Kuk67

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
23722.6323 (5)	NH <sub>3</sub>	2(2)-2(2) $F_1=2-2$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23722.6336 (1)	NH <sub>3</sub>	2(2)-2(2) $F_1=3-3$	0.43j	OriMC-1	NEROC	37m	Bar77	Kuk67
23722.6344 (5)	NH <sub>3</sub>	2(2)-2(2) $F_1=1-1$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23723.929 (5)	NH <sub>3</sub>	2(2)-2(2) $F_1=2-3$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23724.691 (5)	NH <sub>3</sub>	2(2)-2(2) $F_1=2-1$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23817.6153(20)	OH	<sup>2</sup> Π <sub>3/2</sub> $J=9/2 F=4-4$	-0.05	W3(OH)	MPI	100m	Win78	Mee75
23826.6211(30)	OH	<sup>2</sup> Π <sub>3/2</sub> $J=9/2 F=5-5$	-0.13	W3(OH)	MPI	100m	Win78	Mee75
23867.805 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=2-3$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23868.450 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=4-3$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23870.1279 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=3-3$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23870.1296 (1)	NH <sub>3</sub>	3(3)-3(3) $F_1=4-4$	0.53j	OriMC-1	NEROC	37m	Bar77	Kuk67
23870.1302 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=2-2$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23871.807 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=3-4$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23872.453 (5)	NH <sub>3</sub>	3(3)-3(3) $F_1=3-2$	b	OriMC-1	NEROC	37m	Bar77	Kuk67
23922.3132 (2)	<sup>15</sup> NH <sub>3</sub>	6(6)-6(6)	0.13	OriMC-1	MPI	100m	Her85	Kuk68
23963.901*(2)	HC <sub>3</sub> N	9-8	1.2	TMC-1	SRCAL	25m	Lit77	
24037.1 (1)	HC <sub>11</sub> N	71-70	0.006	IRC+10216	NEROC	37m	Bel82	Bel82
24139.4169 (1)	NH <sub>3</sub>	4(4)-4(4)	0.25j	OriMC-1	NEROC	37m	Bar77	Kuk70
24205.287 (5)	NH <sub>3</sub>	10(9)-10(9)	0.1	OriMC-1	MPI	100m	Nys78	Poy75
24296.523 (20)	HCOOCH <sub>3</sub>	2(0,2)-1(0,1) E	0.09	OriMC-1	NRAO	43m	Chu80	Bau79
24298.476 (20)	HCOOCH <sub>3</sub>	2(0,2)-1(0,1) A	0.12	OriMC-1	NRAO	43m	Chu80	Bau79
24325.927 (1)	OCS	2-1	0.30	Sgr B2	NEROC	37m	Gol81	Wan73
24375.2 (2)	HC <sub>11</sub> N	72-71	0.006	IRC+10216	NEROC	37m	Bel82	Bel82
24428.652 (3)	CH <sub>3</sub> C <sub>4</sub> H	6(1)-5(1)	0.107	TMC-1	MPI	100m	Wal84	Wal84
24428.886 (16)	CH <sub>3</sub> C <sub>4</sub> H	6(0)-5(0)	0.131	TMC-1	MPI	100m	Wal84	Wal84
24532.9887 (1)	NH <sub>3</sub>	5(5)-5(5)	0.09j	OriMC-1	NEROC	37m	Bar77	Kuk70
24788.539*(5)	CH <sub>3</sub> CCCN	6(1)-5(1)	0.048	TMC-1	NEROC	37m	Bro84	
24788.778*(5)	CH <sub>3</sub> CCCN	6(0)-5(0)	0.076	TMC-1	NEROC	37m	Bro84	
24815.869*(10)	HC <sub>7</sub> N	22-21	0.24	TMC-1	SRCAL	25m	Lit78	
24928.70 (10)	CH <sub>3</sub> OH	3(2)-3(1) E	1.2	OriMC-1	NEROC	37m	Bar75	Lee73
24933.468 (2)	CH <sub>3</sub> OH	4(2)-4(1) E	1.0i	OriMC-1	NEROC	37m	Bar71	Gai74
24934.382 (5)	CH <sub>3</sub> OH	2(2)-2(1) E	0.35	OriMC-1	NEROC	37m	Bar75	Gai74
24959.080 (2)	CH <sub>3</sub> OH	5(2)-5(1) E	1.1i	OriMC-1	NEROC	37m	Bar71	Gai74
25018.123 (2)	CH <sub>3</sub> OH	6(2)-6(1) E	1.7i	OriMC-1	NEROC	37m	Bar71	Gai74
25056.025 (5)	NH <sub>3</sub>	6(6)-6(6)	0.17j	OriMC-1	NEROC	37m	Bar77	Kak75
25124.873 (2)	CH <sub>3</sub> OH	7(2)-7(1) E	1.5i	OriMC-1	NEROC	37m	Bar71	Gai74
25294.411 (3)	CH <sub>3</sub> OH	8(2)-8(1) E	0.7i	OriMC-1	NEROC	37m	Bar71	Gai74
25421.036*(9)	DC <sub>3</sub> N	10-9	0.027	TMC-1	NEROC	37m	Mac81	
25715.182 (5)	NH <sub>3</sub>	7(7)-7(7)	3.	OriMC-1	MPI	100m	Mau85	Poy75
25878.18 (10)	CH <sub>3</sub> OH	10(2)-10(1) E	0.9	OriMC-1	NRL	26m	Mat80	Lee73
26518.981 (10)	NH <sub>3</sub>	8(8)-8(8)	0.70	OriMC-1	MPI	100m	Ziu81	Poy75
26626.534*(2)	HC <sub>3</sub> N	10-9	1.0	TMC-1	NRAO	43m	Jen82	
27294.078*(1)	HC <sub>3</sub> N	3-2 $F=2-1$	0.70	HCL2C	OSO	20m	Cer84	
27294.295*(1)	HC <sub>3</sub> N	3-2 $F=3-2$	0.96	HCL2C	OSO	20m	Cer84	
27294.347*(1)	HC <sub>3</sub> N	3-2 $F=4-3$	3.400	TMC-1	OSO	20m	Irv83a	
27477.943 (10)	NH <sub>3</sub>	9(9)-9(9)	0.76	OriMC-1	MPI	100m	Ziu81	Poy75
28532.31 (1)	C <sub>4</sub> H	3-2 $J=7/2-5/2 F=3-2$	0.42	TMC-1	OSO	20m	Irv81	Gue82a
28532.46 (1)	C <sub>4</sub> H	3-2 $J=7/2-5/2 F=4-3$	0.49	TMC-1	OSO	20m	Irv81	Gue82a
28571.37 (1)	C <sub>4</sub> H	3-2 $J=5/2-3/2 F=3-2$	0.39	TMC-1	OSO	20m	Irv81	Gue82a
28571.53 (2)	C <sub>4</sub> H	3-2 $J=5/2-3/2 F=2-1$	0.23	TMC-1	OSO	20m	Irv81	Gue82a
28919.929*(6)	CH <sub>3</sub> CCCN	7(1)-6(1)	0.049	TMC-1	OSO	20m	Bro84	
28920.207*(6)	CH <sub>3</sub> CCCN	7(0)-6(0)	0.053	TMC-1	OSO	20m	Bro84	
28974.781 (3)	H <sub>2</sub> CO	3(1,2)-3(1,3) $F=2-2$	b	Sgr B2	n.r.		Wel70	Tak59
28974.804 (2)	H <sub>2</sub> CO	3(1,2)-3(1,3) $F=4-4$	n.r.b	Sgr B2	n.r.		Wel70	Tak59
28974.814 (3)	H <sub>2</sub> CO	3(1,2)-3(1,3) $F=3-3$	b	Sgr B2	n.r.		Wel70	Tak59
29676.14 (2)	C <sub>3</sub> N	3-2 $J=7/2-5/2 F=7/2-5/2$	0.11	TMC-1	OSO	20m	Fri80	Gue82a
29676.28 (2)	C <sub>3</sub> N	3-2 $J=7/2-5/2 F=9/2-7/2$	0.11	TMC-1	OSO	20m	Fri80	Gue82a
29678.877*(18)	<sup>34</sup> SO	1(0)-0(1)	0.25	L134N	OSO	20m	Ryd80	
29694.99 (2)	C <sub>3</sub> N	3-2 $J=5/2-3/2 F=3/2-1/2$	0.04	TMC-1	OSO	20m	Fri80	Gue82a
29695.14 (2)	C <sub>3</sub> N	3-2 $J=5/2-3/2 F=7/2-5/2$	0.15	TMC-1	OSO	20m	Fri80	Gue82a
30001.539*(18)	SO	1(0)-0(1)	0.44	Sgr B2	NRAO	11m	Got78	
31105.26 (10)	CH <sub>3</sub> OCH <sub>3</sub>	2(1,1)-2(0,2) AE+EA	b	OriMC-1	NRL	26m	Sny74	Sny74
31106.20 (5)	CH <sub>3</sub> OCH <sub>3</sub>	2(1,1)-2(0,2) EE	0.2b	OriMC-1	NRL	26m	Sny74	Sny74
31107.12 (10)	CH <sub>3</sub> OCH <sub>3</sub>	2(1,1)-2(0,2) AA	b	OriMC-1	NRL	26m	Sny74	Sny74
31583.706*(6)	HC <sub>7</sub> N	28-27	0.30	TMC-1	OSO	20m	Sne81	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
31951.777*(2)	HC <sub>3</sub> N	12-11	1.77	TMC-1	OSO	20m	Sne81	
32627.221*(60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=3/2-1/2, F=2-1b	0.28	TMC-1	OSO	20m	Tha85	Tha85
32634.336*(60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=3/2-1/2, F=1-0b	0.13	TMC-1	OSO	20m	Tha85	Tha85
32660.614*(60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=3/2-1/2, F=2-1a	0.35	TMC-1	OSO	20m	Tha85	Tha85
32663.312 (60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=3/2-1/2, F=1-0a	0.17	TMC-1	OSO	20m	Tha85	Tha85
33051.302*(6)	CH <sub>3</sub> CCCN	8(1)-7(1)	0.043	TMC-1	OSO	20m	Bro84	
33051.621*(6)	CH <sub>3</sub> CCCN	8(0)-7(0)	0.057	TMC-1	OSO	20m	Bro84	
34182.761*(1)	CH <sub>3</sub> CCH	2(1)-1(1)	0.20	TMC-1	OSO	20m	Irv81	
34183.414*(1)	CH <sub>3</sub> CCH	2(0)-1(0)	0.25	TMC-1	OSO	20m	Irv81	
34614.386*(2)	HC <sub>3</sub> N	13-12	1.50	TMC-1	OSO	20m	Sne81	
36169.24 (10)	CH <sub>3</sub> OH	4(-1)-3(0) E	12.5	Sgr B2	NRAO	11m	Lov76	Lee73
36202.040*(32)	SO	2(3)-2(2)	0.4	OriMC-1	Parkes	64m	Bro80	
36309.629 (3)	SiS	2-1	0.5	IRC+10216	MPI	100m	Gra81	
36392.238*(1)	HC <sub>3</sub> N	4-3 F=3-2	b	Sgr B2	Parkes	64m	McG77	
36392.332*(1)	HC <sub>3</sub> N	4-3 F=4-3	1.25b	Sgr B2	Parkes	64m	McG77	
36392.365*(1)	HC <sub>3</sub> N	4-3 F=5-4	b	Sgr B2	Parkes	64m	McG77	
36793.739*(1)	CH <sub>3</sub> CN	2(1)-1(1) F=2-1	b	Sgr B2	Parkes	64m	Bla77	
36794.204*(1)	CH <sub>3</sub> CN	2(0)-1(0) F=2-2	b	Sgr B2	Parkes	64m	Bla77	
36794.340*(1)	CH <sub>3</sub> CN	2(1)-1(1) F=2-2	b	Sgr B2	Parkes	64m	Bla77	
36794.417*(1)	CH <sub>3</sub> CN	2(0)-1(0) F=1-0	b	Sgr B2	Parkes	64m	Bla77	
36795.024*(1)	CH <sub>3</sub> CN	2(1)-1(1) F=3-2	0.98b	Sgr B2	Parkes	64m	Bla77	
36795.475*(1)	CH <sub>3</sub> CN	2(0)-1(0) F=2-1	b	Sgr B2	Parkes	64m	Bla77	
36795.568*(1)	CH <sub>3</sub> CN	2(0)-1(0) F=3-2	b	Sgr B2	Parkes	64m	Bla77	
36796.348*(1)	CH <sub>3</sub> CN	2(1)-1(1) F=1-0	b	Sgr B2	Parkes	64m	Bla77	
36797.584*(1)	CH <sub>3</sub> CN	2(0)-1(0) F=1-1	b	Sgr B2	Parkes	64m	Bla77	
37276.985*(3)	HC <sub>3</sub> N	14-13	2.09	TMC-1	NRO	45m	Suz84a	
U 40880.0	unidentified		0.07	Sgr B2	NRAO	11m	Kut80	
42215.539*(5)	DC <sub>3</sub> N	5-4 F=4-3	b	TMC-1	FCRAO	14m	Lan80	
42215.590*(5)	DC <sub>3</sub> N	5-4 F=5-4	0.14b	TMC-1	FCRAO	14m	Lan80	
42215.613*(5)	DC <sub>3</sub> N	5-4 F=6-5	b	TMC-1	FCRAO	14m	Lan80	
42519.379*(17)	SiO	1-0 ν=3	2.0	VX Sgr	IRT	13.7m	Sca78	
42602.153*(3)	HC <sub>3</sub> N	16-15	0.40	TMC-1	NEROC	37m	Irv83	
42674.205*(21)	HCS <sup>+</sup>	1-0	0.085	TMC-1	NEROC	37m	Irv83	
42820.587*(15)	SiO	1-0 ν=2	15i	VY CMa	NRAO	11m	Buh74	
43122.080*(12)	SiO	1-0 ν=1	29i	OriMC-1	NRAO	11m	Sny75	
43423.858*(10)	SiO	1-0 ν=0	0.50	OriMC-1	NEROC	37m	Sny78	
43962.998*(2)	HNCO	2(0,2)-1(0,1) F=3-2	~1b	Sgr B2	NRAO	11m	Sny72	Win76
43963.042*(2)	HNCO	2(0,2)-1(0,1) F=2-1	b	Sgr B2	NRAO	11m	Sny72	Win76
44069.49 (10)	CH <sub>3</sub> OH	7(0)-6(1) A+	3.9	SgrB2	NRO	45m	Mor85	Sas84
45264.721*(3)	HC <sub>3</sub> N	17-16	0.83	TMC-1	NRAO	11m	Buj81	
U 45379.00 (2)	unidentified		2.06	TMC-1	NRO	45m	Suz84	
45490.264*(1)	HC <sub>3</sub> N	5-4 F=4-3	b	Sgr B2	NRAO	11m	Mor76	
45490.316*(1)	HC <sub>3</sub> N	5-4 F=5-4	2.05j	Sgr B2	NRAO	11m	Mor76	
45490.340*(1)	HC <sub>3</sub> N	5-4 F=6-5	b	Sgr B2	NRAO	11m	Mor76	
46247.578*(8)	<sup>13</sup> CS	1-0	0.148	Sgr B2	NRAO	11m	Tur73	
46755.62 *(2)	C <sub>3</sub> H <sub>2</sub>	2(1,1)-2(0,2)	1.00	TMC-1	NRO	45m	Suz85	Tha85a
47927.275*(3)	HC <sub>3</sub> N	18-17	1.50	TMC-1	NRO	45m	Suz84a	
48108.504 (20)	C <sub>3</sub> O	5-4	0.158	TMC-1	NRO	45m	Suz84a	Bro83
48206.956*(7)	C <sup>34</sup> S	1-0	0.380	DR21 (OH)	NRAO	11m	Tur73	
48284.521*(8)	H <sub>2</sub> CO	4(1,3)-4(1,4)	0.63	OriMC-1	NRAO	11m	Hol77	
48372.4670(2)	CH <sub>3</sub> OH	1(0)-0(0) A+	0.44	OriMC-1	NRAO	11m	Hol77	Heu73
48377.09 (50)	CH <sub>3</sub> OH	1(0)-0(0) E	0.29	OriMC-1	NRAO	11m	Hol77	Lee73
48583.264 (10)	C <sup>33</sup> S	1-0 F=1/2-3/2	b	Sgr B2	NRAO	11m	Tur73	Moc55
48585.906 (10)	C <sup>33</sup> S	1-0 F=5/2-3/2	~0.12b	Sgr B2	NRAO	11m	Tur73	Moc55
48589.068 (10)	C <sup>33</sup> S	1-0 F=3/2-3/2	b	Sgr B2	NRAO	11m	Tur73	Moc55
48651.6043(10)	OCS	4-3	0.45	Sgr B2	NRAO	11m	Hol77	Dub80
48990.964*(9)	CS	1-0	3.53	OriMC-1	NRAO	11m	Tur73	
68972.154*(4)	SO <sub>2</sub>	6(1,5)-6(0,6)	0.8	OriMC-1	NRAO	11m	Joh76	
69464.094*(9)	SO <sub>2</sub>	14(4,10)-15(3,13)	0.70	OriMC-1	OSO	20m	Sch83	
69534.310*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	8(1,8)-7(1,7)	0.20	OriMC-1	OSO	20m	Joh84	
69575.927*(3)	SO <sub>2</sub>	1(1,1)-0(0,0)	0.6	OriMC-1	NRAO	11m	Joh76	
69607.15 (10)	CH <sub>3</sub> OH ν <sub>r</sub> =1?	9(1)-10(2) A+	0.30	OriMC-1	OSO	20m	Joh84	
69653.586*(5)	SO <sub>2</sub>	3(2,2)-4(1,3)	0.60	OriMC-1	OSO	20m	Sch83	
70733.213*(52)	D <sup>13</sup> CO <sup>+</sup>	1-0	0.079	TMC-1	BTL	7m	Gue82b	
71024.781*(4)	H <sub>2</sub> <sup>13</sup> CO	1(0,1)-0(0,0)	0.06	OriMC-1	BTL	7m	Kah84	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
71971.61 *(14)	CH <sub>3</sub> CH <sub>2</sub> OH	10(1,9)–10(0,10)	0.05	Sgr B2	BTL	7m	Cum85
72039.331*(13)	DCO <sup>+</sup>	1–0	0.87	L134	NRAO	11m	Hol76
72108.609*(11)	CH <sub>3</sub> CH <sub>2</sub> CN	8(2,6)–7(2,5)	0.07	Sgr B2	BTL	7m	Cum85
72409.092*(12)	H <sub>2</sub> CO	5(1,4)–5(1,5)	0.1	OriMC-1	NRAO	11m	Wil73
72413.4843(10)	DCN	1–0 $F_1=1-1$ $F=1-0,1,2$	b	OriMC-1	NRAO	11m	Wil73 DeL69
72413.5143(10)	DCN	1–0 $F_1=1-1$ $F=2-1,2$	0.2b	OriMC-1	NRAO	11m	Wil73 DeL69
72413.5584(10)	DCN	1–0 $F_1=1-1$ $F=0-0,1$	b	OriMC-1	NRAO	11m	Wil73 DeL69
72414.9054(10)	DCN	1–0 $F_1=2-1$ $F=1-0,1,2$	b	OriMC-1	NRAO	11m	Wil73 DeL69
72414.9270(10)	DCN	1–0 $F_1=2-1$ $F=2-1,2$	0.25b	OriMC-1	NRAO	11m	Wil73 DeL69
72414.9732(10)	DCN	1–0 $F_1=2-1$ $F=3-2$	b	OriMC-1	NRAO	11m	Wil73 DeL69
72417.0297(10)	DCN	1–0 $F_1=0-1$ $F=1-0,1,2$	0.2	OriMC-1	NRAO	11m	Wil73 DeL69
72475.074*(11)	HC <sup>13</sup> CCN	8–7	0.08	IRC+10216	OSO	20m	Joh84
72482.056*( 5)	HCC <sup>13</sup> CN	8–7	0.08	IRC+10216	OSO	20m	Joh84
72618.102*(10)	SiS	4–3	0.77	IRC+10216	OSO	20m	Joh84
72668.123*(24)	SO <sub>2</sub>	26(4,22)–25(5,21)	0.30	OriMC-1	OSO	20m	Sch83
72680.848*(88)	HCOOCH <sub>3</sub>	6(2,5)–5(2,4) E	0.18	OriMC-1	OSO	20m	Joh84
72685.581*(20)	HCOOCH <sub>3</sub>	6(2,5)–5(2,4) A	0.18	OriMC-1	OSO	20m	Joh84
U 72721.	unidentified		0.15	OriMC-1	OSO	20m	Joh84
72758.242*( 2)	SO <sub>2</sub>	6(0,6)–5(1,5)	0.8	OriMC-1	NRAO	11m	Joh76
72758.242*( 2)	SO <sub>2</sub>	6(0,6)–5(1,5)	3.40	OriMC-1	OSO	20m	Sch83
72783.824*( 2)	HC <sub>3</sub> N	8–7	2.29	Sgr B2	NRAO	11m	Mor76
72837.950*( 5)	H <sub>2</sub> CO	1(0,1)–0(0,0)	0.5	OriMC-1	TAO	6m	Aka74
72962.731*(23)	HC <sub>3</sub> N $\nu_7=1$	8–7 1e	0.15	OriMC-1	OSO	20m	Joh84
72976.7794(10)	OCS	6–5	0.25	Sgr B2	TAO	6m	Aka74 Dub80
73044.01 (10)	CH <sub>3</sub> NH <sub>2</sub>	5(1,5)–5(0,5) $F=4-4$	b	Sgr B2	TAO	6m	Kai74 Kai74
73044.20 (10)	CH <sub>3</sub> NH <sub>2</sub>	5(1,5)–5(0,5) $F=6-6$	0.5b	Sgr B2	TAO	6m	Kai74 Kai74
73045.15 (10)	CH <sub>3</sub> NH <sub>2</sub>	5(1,5)–5(0,5) $F=5-5$	b	Sgr B2	TAO	6m	Kai74 Kai74
73081.190*( 8)	CH <sub>3</sub> CH <sub>2</sub> OH?	4(2,2)–4(1,3)	0.10	Sgr B2	BTL	7m	Cum85
73466.93 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	10(2,8)–10(1,9) EA + AE	b	OriMC-1	OSO	20m	Joh84
73468.71 *( 5)	CH <sub>3</sub> OCH <sub>3</sub>	10(2,8)–10(1,9) EE	0.20b	OriMC-1	OSO	20m	Joh84
73470.49 *( 5)	CH <sub>3</sub> OCH <sub>3</sub>	10(2,8)–10(1,9) AA	b	OriMC-1	OSO	20m	Joh84
73577.453*( 2)	CH <sub>3</sub> CN	4(3)–3(3)	0.83	OriMC-1	OSO	20m	Joh84
73584.545*( 2)	CH <sub>3</sub> CN	4(2)–3(2)	1.00	OriMC-1	OSO	20m	Joh84
73588.801*( 2)	CH <sub>3</sub> CN	4(1)–3(1)	2.20b	OriMC-1	OSO	20m	Joh84
73590.220*( 2)	CH <sub>3</sub> CN	4(0)–3(0)	b	OriMC-1	OSO	20m	Joh84
73664.38 *(12)	HCOOCH <sub>3</sub>	6(5,2)–5(5,1) E	b	OriMC-1	OSO	20m	Joh84
73665.596*(25)	HCOOCH <sub>3</sub>	6(5,2)–5(5,1) A	0.15b	OriMC-1	OSO	20m	Joh84
73665.736*(25)	HCOOCH <sub>3</sub>	6(5,1)–5(5,0) A	b	OriMC-1	OSO	20m	Joh84
73720.51 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	9(2,7)–9(1,8) AE + EA	b	OriMC-1	OSO	20m	Joh84
73722.40 *( 5)	CH <sub>3</sub> OCH <sub>3</sub>	9(2,7)–9(1,8) EE	0.25b	OriMC-1	OSO	20m	Joh84
73724.28 *( 4)	CH <sub>3</sub> OCH <sub>3</sub>	9(2,7)–9(1,8) AA	b	OriMC-1	OSO	20m	Joh84
73782.91 *(10)	HCOOCH <sub>3</sub>	6(4,2)–5(4,1) E	b	OriMC-1	OSO	20m	Joh84
73784.523*(20)	HCOOCH <sub>3</sub>	6(4,3)–5(4,2) A	0.15b	OriMC-1	OSO	20m	Joh84
73787.88 *(10)	HCOOCH <sub>3</sub>	6(4,3)–5(4,2) E	b	OriMC-1	OSO	20m	Joh84
73796.793*(20)	HCOOCH <sub>3</sub>	6(4,2)–5(4,1) A	0.10	OriMC-1	OSO	20m	Joh84
73842. ( 1)	CH <sub>3</sub> OH $\nu_1=1?$	9(1)–10(2) A–	0.30	OriMC-1	OSO	20m	Joh84
74149.26 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	11(2,9)–11(1,10) EA + AE	b	OriMC-1	OSO	20m	Joh84
74150.95 *( 9)	CH <sub>3</sub> OCH <sub>3</sub>	11(2,9)–11(1,10) EE	0.30b	OriMC-1	OSO	20m	Joh84
74152.64 *( 5)	CH <sub>3</sub> OCH <sub>3</sub>	11(2,9)–11(1,10) AA	b	OriMC-1	OSO	20m	Joh84
74263.58 *(13)	HCOOCH <sub>3</sub>	6(3,3)–5(3,2) E	0.15	OriMC-1	OSO	20m	Joh84
74296.755*(19)	HCOOCH <sub>3</sub>	6(3,3)–5(3,2) A	0.20	OriMC-1	OSO	20m	Joh84
74404.579*(39)	34SO <sub>2</sub>	6(0,6)–5(1,5)	0.30	OriMC-1	OSO	20m	Sch83
74551.989*( 4)	HC <sub>3</sub> N	28–27	0.30	IRC+10216	OSO	20m	Joh84
74747.51 *(16)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,6)–8(1,7) AE + EA	b	OriMC-1	OSO	20m	Joh84
74749.50 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,6)–8(1,7) EE	0.20b	OriMC-1	OSO	20m	Joh84
74751.49 *( 4)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,6)–8(1,7) AA	b	OriMC-1	OSO	20m	Joh84
74866.514*(16)	SO <sub>2</sub>	24(6,18)–25(5,21)	0.20	OriMC-1	OSO	20m	Sch83
74891.643*(34)	CH <sub>3</sub> CHO?	4(1,4)–3(1,3) A	0.13	Sgr B2	BTL	7m	Cum85
74926.336*(57)	CH <sub>3</sub> CHO?	4(1,4)–3(1,3) E	0.07	Sgr B2	BTL	7m	Cum85
74976.040*( 8)	CH <sub>3</sub> CH <sub>2</sub> OH	3(1,3)–2(0,2)	0.23	Sgr B2	BTL	7m	Cum85
75399.248*( 6)	NaOH	3–2	0.04	Sgr B2	NRAO	11m	Wil81
75515.35 (10)	CH <sub>3</sub> OH	13(–5)–14(–4) E	0.37	OriMC-1	OSO	20m	Joh84 Sas84
75585.695*(17)	HC <sub>2</sub> CHCN	8(0,8)–7(0,7)	0.10	Sgr B2	BTL	7m	Cum85
U 75656.	unidentified		0.12	OriMC-1	OSO	20m	Joh84
75816.45 ( 5)	CH <sub>3</sub> SH	3(–1)–2(–1) E	~0.05	Sgr B2	BTL	7m	Lin79 Lee80

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_a$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
75838.866*(16)	HC <sub>2</sub> CHCN?	8(2,7)–7(2,6)	0.06	Sgr B2	BTL	7m	Cum85	
75862.87 ( 5)	CH <sub>3</sub> SH	3(0)–2(0) A	0.19b	Sgr B2	BTL	7m	Lin79	Lee80
75864.43 ( 5)	CH <sub>3</sub> SH	3(0)–2(0) E	b	Sgr B2	BTL	7m	Lin79	Lee80
75906.42 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	12(2,10)–12(1,11) AE+EA	b	OriMC-1	OSO	20m	Joh84	
75908.03 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	12(2,10)–12(1,11) EE	0.30b	OriMC-1	OSO	20m	Joh84	
75909.65 *( 7)	CH <sub>3</sub> OCH <sub>3</sub>	12(2,10)–12(1,11) AA	b	OriMC-1	OSO	20m	Joh84	
75921.978*(13)	HC <sub>2</sub> CHCN?	8(4,5)–7(4,4)	0.06b	Sgr B2	BTL	7m	Cum85	
75922.000*(13)	HC <sub>2</sub> CHCN?	8(4,4)–7(4,3)	b	Sgr B2	BTL	7m	Cum85	
75926.795*(13)	HC <sub>2</sub> CHCN?	8(5)–7(5)	b	Sgr B2	BTL	7m	Cum85	
75927.705*(14)	HC <sub>2</sub> CHCN?	8(3,6)–7(3,5)	b	Sgr B2	BTL	7m	Cum85	
75931.857*(14)	HC <sub>2</sub> CHCN?	8(3,5)–7(3,4)	b	Sgr B2	BTL	7m	Cum85	
75937.822*(13)	HC <sub>2</sub> CHCN?	8(6)–7(6)	0.13	Sgr B2	BTL	7m	Cum85	
75987.149*( 4)	DC <sub>3</sub> N	9–8	0.11	TMC-1	FCRAO	14m	Sch81	
U 76090.	unidentified		0.10	OriMC-1	OSO	20m	Joh84	
76117.43 *( 1)	C <sub>4</sub> H	8–7 $J=17/2-15/2$	0.17	IRC+10216	OSO	20m	Joh84	Got83
76128.895*(16)	HC <sub>2</sub> CHCN	8(2,6)–7(2,5)	0.10	OriMC-1	OSO	20m	Joh84	
U 76152.	unidentified		0.10	OriMC-1	OSO	20m	Joh84	
76156.02 *( 1)	C <sub>4</sub> H	8–7 $J=15/2-13/2$	0.17	IRC+10216	OSO	20m	Joh84	Got83
U 76168.	unidentified		0.12	OriMC-1	OSO	20m	Joh84	
76199.199 (60)	C <sub>3</sub> H	$^2\Pi_{1/2} J=7/2-5/2b$	0.12	IRC+10216	OSO	20m	Tha85	Tha85
76204.501 (60)	C <sub>3</sub> H	$^2\Pi_{1/2} J=7/2-5/2a$	0.12	IRC+10216	OSO	20m	Tha85	Tha85
76247.27 (19)	CH <sub>3</sub> OH	11(1)–10(2) A–	0.6	OriMC-1	NRAO	11m	Jen79	Sas84
76305.727 (50)	DNC	1–0	0.34	NGC 2264	NRAO	11m	God77	Cre76
76362.17 *(16)	CH <sub>3</sub> OCH <sub>3</sub>	7(2,5)–7(1,6) AE+EA	b	OriMC-1	OSO	20m	Joh84	
76364.26 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	7(2,5)–7(1,6) EE	0.30b	OriMC-1	OSO	20m	Joh84	
76366.35 *( 4)	CH <sub>3</sub> OCH <sub>3</sub>	7(2,5)–7(1,6) AA	b	OriMC-1	OSO	20m	Joh84	
76412.170*( 5)	SO <sub>2</sub>	10(1,9)–9(2,8)	2.5	OriMC-1	OSO	20m	Sch83	
76509.67 (10)	CH <sub>3</sub> OH	5(0)–4(1) E	0.6	OriMC-1	NRAO	11m	Jen79	Sas84
U 76648.6 (15)	unidentified		0.09	Sgr B2	BTL	7m	Cum85	
76701.834*(87)	HCOOCH <sub>3</sub>	6(2,4)–5(2,3) E	0.25	OriMC-1	OSO	20m	Ell80	
76711.160*(20)	HCOOCH <sub>3</sub>	6(2,4)–5(2,3) A	0.22	OriMC-1	OSO	20m	Ell80	
76796.094*(88)	HCOOCH <sub>3</sub>	6(1,5)–5(1,4) E	0.22	OriMC-1	OSO	20m	Joh84	
76804.010*(21)	HCOOCH <sub>3</sub>	6(1,5)–5(1,4) A	0.23	OriMC-1	OSO	20m	Joh84	
76866.1 *(10)	CH <sub>3</sub> CHO?	4(0,4)–3(0,3) E	0.13	Sgr B2	BTL	7m	Cum85	
76878.91 *( 6)	CH <sub>3</sub> CHO?	4(0,4)–3(0,3) A	0.10	Sgr B2	BTL	7m	Cum85	
76972.62 *(14)	C <sub>3</sub> O	8–7	0.059	TMC-1	NRAO	12m	Bro85	
77107.86 ( 9)	N <sub>2</sub> D <sup>+</sup>	1–0 $F_1=1-1$	0.25	L134N	NRAO	11m	Sny77	And77
77109.61 ( 8)	N <sub>2</sub> D <sup>+</sup>	1–0 $F_1=2-1$	0.30	L134N	NRAO	11m	Sny77	And77
77112.2 ( 1)	N <sub>2</sub> D <sup>+</sup>	1–0 $F_1=0-1$	0.15	L134N	NRAO	11m	Sny77	And77
77214.361*( 4)	HC <sub>3</sub> N	29–28	0.25	IRC+10216	OSO	20m	Joh84	
77633.827*(16)	HC <sub>2</sub> CHCN?	8(1,7)–7(1,6)	0.12	Sgr B2	BTL	7m	Cum85	
U 77978.5 (13)	unidentified		0.13	Sgr B2	BTL	7m	Cum85	
U 77983.	unidentified		0.20	OriMC-1	OSO	20m	Joh84	
78183.631*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(1,9)–8(1,8)	0.25	OriMC-1	OSO	20m	Joh84	
78361.41 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	6(2,4)–6(1,5) AE+EA	b	OriMC-1	OSO	20m	Joh84	
78363.59 *( 9)	CH <sub>3</sub> OCH <sub>3</sub>	6(2,4)–6(1,5) EE	0.25b	OriMC-1	OSO	20m	Joh84	
78365.77 *( 4)	CH <sub>3</sub> OCH <sub>3</sub>	6(2,4)–6(1,5) AA	b	OriMC-1	OSO	20m	Joh84	
78479.41 *(16)	HCOOCH <sub>3</sub>	7(1,7)–6(1,6) E	0.75b	OriMC-1	OSO	20m	Joh84	
78481.394*(28)	HCOOCH <sub>3</sub>	7(1,7)–6(1,6) A	0.65b	OriMC-1	OSO	20m	Joh84	
78856.40 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,11)–13(1,12) AE+EA	b	OriMC-1	OSO	20m	Joh84	
78857.91 *( 8)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,11)–13(1,12) EE	0.38b	OriMC-1	OSO	20m	Joh84	
78859.43 *( 6)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,11)–13(1,12) AA	b	OriMC-1	OSO	20m	Joh84	
79098.65 *(96)	CH <sub>3</sub> CHO	4(1,3)–3(1,2) E	0.15	Sgr B2	BTL	7m	Cum85	
79150.131*(34)	CH <sub>3</sub> CHO	4(1,3)–3(1,2) A	0.3	Sgr B2	NRAO	11m	Lis78	
79151.01 *( 2)	C <sub>3</sub> N	8–7 $J=17/2-15/2$	0.27	IRC+10216	OSO	20m	Joh84	Got83
79169.77 *( 2)	C <sub>3</sub> N	8–7 $J=15/2-13/2$	0.27	IRC+10216	OSO	20m	Joh84	Got83
U 79220.	unidentified		0.043	Sgr B2	BTL	7m	Wan78	
U 79221.9 (50)	unidentified		0.05	Sgr B2	BTL	7m	Cum85	
79350.476*( 8)	H <sup>13</sup> CCCN	9–8	0.56	Sgr B2	BTL	7m	Wan78	
79449.73 ( 9)	NH <sub>2</sub> CN	4(1,4)–3(1,3)	0.27	Sgr B2	BTL	7m	Wan78	Joh76a
79581.3 *( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(–1)–4(0) E	0.15	OriMC-1	OSO	20m	Joh84	
79677.507*( 7)	CH <sub>3</sub> CH <sub>2</sub> CN	9(0,9)–8(0,8)	0.25	OriMC-1	OSO	20m	Joh84	
79753.49 *( 7)	CH <sub>3</sub> OCH <sub>3</sub>	15(3,13)–14(4,10) AA	b	OriMC-1	OSO	20m	Joh84	
79756.55 *(20)	CH <sub>3</sub> OCH <sub>3</sub>	15(3,13)–14(4,10) EE	0.06b	OriMC-1	OSO	20m	Joh84	
79759.52 *(34)	CH <sub>3</sub> OCH <sub>3</sub>	15(3,13)–14(4,10) EA	b	OriMC-1	OSO	20m	Joh84	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
79759.68 *(34)	CH <sub>3</sub> OCH <sub>3</sub>	15(3,13)–14(4,10) AE	b	OriMC-1	OSO	20m	Joh84	
79781.71 *(16)	HCOOCH <sub>3</sub>	7(0,7)–6(0,6) E	0.30b	OriMC-1	OSO	20m	Joh84	
79783.893*(29)	HCOOCH <sub>3</sub>	7(0,7)–6(0,6) A	b	OriMC-1	OSO	20m	Joh84	
79876.712*( 5)	HC <sub>3</sub> N	30–29	0.25	IRC+10216	OSO	20m	Joh84	
79979.596 (90)	NH <sub>2</sub> CN	4(0,4)–3(0,3)	0.07	Sgr B2	NRAO	11m	Tur77	Joh76a
80076.606*(48)	CH <sub>2</sub> CO	4(1,4)–3(1,3)	0.1	Sgr B2	NRAO	11m	Tur77	
80404.898*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(2,8)–8(2,7)	0.25	OriMC-1	OSO	20m	Joh84	
U 80484.	unidentified		~0.2	Sgr B2	NRAO	11m	Tur75a	
80504.60 (10)	NH <sub>2</sub> CN	4(1,3)–3(1,2)	0.36g	Sgr B2	NRAO	11M	Tur75a	Joh76a
80536.24 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,3)–5(1,4) AE+EA	b	Sgr B2	NRAO	11m	Tur75a	Lov79
80538.54 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,3)–5(1,4) EE	0.2bg	Sgr B2	NRAO	11m	Tur75a	Lov79
80540.88 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,3)–5(1,4) AA	b	Sgr B2	NRAO	11m	Tur75a	Lov79
80578.283*(53)	HDO	1(1,0)–1(1,1)	~0.4g	OriMC-1	NRAO	11m	Tur75b	
80602.135*(11)	CH <sub>3</sub> CH <sub>2</sub> CN	9(6,4)–8(6,2)	b	OriMC-1	OSO	20m	Olo84	
80602.135*(11)	CH <sub>3</sub> CH <sub>2</sub> CN	9(6,3)–8(6,2)	0.3b	OriMC-1	OSO	20m	Olo84	
80604.58 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	9(5,4)–8(5,3)	b	OriMC-1	OSO	20m	Olo84	
80604.58 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	9(5,5)–8(5,4)	0.4b	OriMC-1	OSO	20m	Olo84	
80606.211*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(7,2)–8(7,1)	b	OriMC-1	OSO	20m	Olo84	
80606.211*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(7,3)–8(7,2)	0.2b	OriMC-1	OSO	20m	Olo84	
80619.233*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(4,6)–8(4,5)	0.12b	OriMC-1	NRAO	11m	Hol80	
80619.689*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(4,5)–8(4,4)	b	OriMC-1	NRAO	11m	Hol80	
80649.873*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(3,7)–8(3,6)	0.04	OriMC-1	NRAO	11m	Hol80	
80682.813*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(3,6)–8(3,5)	0.05	OriMC-1	NRAO	11m	Hol80	
U 80733. ( 1)	unidentified		0.04	Sgr B2	NRAO	11m	Hol80	
80832.075*(51)	CH <sub>2</sub> CO	4(0,4)–3(0,3)	0.1	Sgr B2	NRAO	11m	Tur77	
80993.16 (10)	CH <sub>3</sub> OH	7(2)–8(1) A–	1.50	OriMC-1	OSO	20m	Joh84	Sas84
81261.441*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(2,7)–8(2,6)	0.40	OriMC-1	OSO	20m	Joh84	
81477.49 (10)	HNO	1(0,1)–0(0,0)	0.033	Sgr B2	NRAO	11m	Uli77	Sai72
U 81478.	unidentified		0.10	IRC+10216	OSO	20m	Joh84	
U 81506.1 ( 6)	unidentified		0.19	Sgr B2	BTL	7m	Cum85	
U 81507.	unidentified		0.10	IRC+10216	OSO	20m	Joh84	
81534.125*(11)	HC <sup>13</sup> CCN	9–8	0.050	Sgr B2	BTL	7m	Wan78	
81541.981*( 5)	HCC <sup>13</sup> CN	9–8	0.052	Sgr B2	BTL	7m	Wan78	
81586.188*(48)	CH <sub>2</sub> CO	4(1,3)–3(1,2)	0.15	Sgr B2	NRAO	11m	Tur77	
81653.08 (10)	CH <sub>3</sub> OH	18(4)–19(3) E	0.35	OriMC-1	OSO	20m	Joh84	Sas84
81693.447*( 4)	NH <sub>2</sub> CHO	4(1,4)–3(1,3)	0.18	SgrB2	BTL	7m	Cum85	
81881.468*( 1)	HC <sub>3</sub> N	9–8	2.51	Sgr B2	BTL	7m	Wan78	
82082.730*(26)	HC <sub>3</sub> N $\nu_7=1$	9–8 1e	0.30	OriMC-1	OSO	20m	Joh84	
82093.55 *( 2)	C <sub>3</sub> H <sub>2</sub>	2(0,2)–1(1,1)	0.12	Sgr B2	BTL	7m	Tha85a	Tha85a
82101.67 *( 5)	HNCS	7(0,7)–6(0,6)	0.05	Sgr B2	NRAO	11m	Fre79	
82124.322*(51)	34SO <sub>2</sub>	10(1,9)–9(2,8)	0.10	OriMC-1	OSO	20m	Joh84	
82200.372*(26)	HC <sub>3</sub> N $\nu_7=1$	9–8 1f	0.23	OriMC-1	OSO	20m	Joh84	
82458.616*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	9(1,8)–8(1,7)	0.45	OriMC-1	OSO	20m	Joh84	
82539.041*( 5)	HC <sub>3</sub> N	31–30	0.13	OriMC-1	NRAO	11m	Buj81	
82649.30 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(1,3)–2(0,2) AE+EA	b	OriMC-1	NRAO	11m	Cla79	Cla79
82650.18 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(1,3)–2(0,2) EE	0.2b	OriMC-1	NRAO	11m	Cla79	Cla79
82651.08 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(1,3)–2(0,2) AA	b	OriMC-1	NRAO	11m	Cla79	Cla79
82686.50 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,2)–4(1,3) AE+EA	0.10	OriMC-1	NRAO	11m	Cla79	Cla79
82688.77 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,2)–4(1,3) EE	0.12	OriMC-1	NRAO	11m	Cla79	Cla79
82691.14 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,2)–4(1,3) AA	0.08	OriMC-1	NRAO	11m	Cla79	Cla79
82951.970*(10)	SO <sub>2</sub>	13(4,10)–14(3,11)	1.10	OriMC-1	OSO	20m	Sch83	
82966.20 ( 2)	C <sub>3</sub> H <sub>2</sub>	3(1,2)–3(0,3)	0.16	Sgr B2	BTL	7m	Cum85	Tha85a
83043.782*(45)	<sup>34</sup> SO <sub>2</sub>	8(1,7)–8(0,8)	0.50	OriMC-1	OSO	20m	Sch83	
83057.99 *(48)	OC <sup>34</sup> S	7–6	0.040	Sgr B2	BTL	7m	Gol81	
83097.53 *(11)	CH <sub>3</sub> OCH <sub>3</sub>	14(2,12)–14(1,13) AE+EA	b	OriMC-1	OSO	20m	Joh84	
83099.00 *( 9)	CH <sub>3</sub> OCH <sub>3</sub>	14(2,12)–14(1,13) EE	0.35b	OriMC-1	OSO	20m	Joh84	
83100.47 *( 7)	CH <sub>3</sub> OCH <sub>3</sub>	14(2,12)–14(1,13) AA	b	OriMC-1	OSO	20m	Joh84	
U 83163.	unidentified		0.12	IRC+10216	OSO	20m	Joh84	
83207.509*(17)	HC <sub>2</sub> CHCN	9(1,9)–8(1,8)	0.20	OriMC-1	OSO	20m	Joh84	
83319.56 *( 5)	CH <sub>3</sub> OCH <sub>3</sub>	8(1,7)–7(2,6) AA	b	OriMC-1	OSO	20m	Joh84	
83321.43 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	8(1,7)–7(2,6) EE	0.17b	OriMC-1	OSO	20m	Joh84	
83323.30 *(23)	CH <sub>3</sub> OCH <sub>3</sub>	8(1,7)–7(2,6) AE+EA	b	OriMC-1	OSO	20m	Joh84	
83688.086*( 7)	SO <sub>2</sub>	8(1,7)–8(0,8)	~2	OriMC-1	NRAO	11m	Sny75a	
83978.60 (10)	CH <sub>3</sub> NH <sub>2</sub>	5(1,5)–5(0,5) As F=6–6	0.05b	Sgr B2	BTL	7m	Cum85	Tak73
83979.57 (10)	CH <sub>3</sub> NH <sub>2</sub>	5(1,5)–5(0,5) As F=5–5	b	Sgr B2	BTL	7m	Cum85	Tak73

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

	Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_a$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
U	84219.75 *(5)	CH <sub>3</sub> CHO	2(1,2)-1(0,1) A	0.05	Sgr B2	BTL	7m	Cum85
	84308.	unidentified		0.10	OriMC-1	OSO	20m	Joh84
	84320.936*(32)	SO <sub>2</sub>	32(5,27)-31(6,26)	0.10	OriMC-1	OSO	20m	Joh84
	84410.68 *(12)	34SO?	2(2)-1(1)	0.03	Sgr B2	BTL	7m	Cum85
	84423.81 (10)	CH <sub>3</sub> OH	13(-3)-14(-2) E	0.80	OriMC-1	OSO	20m	Joh84
	84449.19 *(16)	HCOOCH <sub>3</sub>	7(2,6)-6(2,5) E	0.45	OriMC-1	OSO	20m	Joh84
	84454.758*(28)	HCOOCH <sub>3</sub>	7(2,6)-6(2,5) A	0.45	OriMC-1	OSO	20m	Joh84
U	84505.35	unidentified		0.08	OriMC-1	NRAO	11m	Kui77
	84521.21 (8)	CH <sub>3</sub> OH	5(-1)-4(0) E	2.8	Sgr B2	NRAO	11m	Zuc72
	84542.331*(3)	NH <sub>2</sub> CHO	4(0,4)-3(0,3)	0.21	Sgr B2	BTL	7m	Cum85
	84595.760*(7)	CH <sub>3</sub> CH <sub>2</sub> OH	4(2,3)-4(1,4)	0.06b	Sgr B2	BTL	7m	Cum85
	84597.64 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(1)-2(0) Ea $F=2-2$	b	Sgr B2	BTL	7m	Cum85
	84598.54 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(1)-2(0) Ea $F=3-3$	b	Sgr B2	BTL	7m	Cum85
	84632.02 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(2,1)-3(1,2) AE+EA	0.14	OriMC-1	NRAO	11m	Cla79
	84634.40 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(2,1)-3(1,2) EE	~0.09b	OriMC-1	NRAO	11m	Cla79
	84636.80 (10)	CH <sub>3</sub> OCH <sub>3</sub>	3(2,1)-3(1,2) AA	b	OriMC-1	NRAO	11m	Cla79
	84727.70 *(2)	C <sub>3</sub> H <sub>2</sub>	3(2,2)-3(1,3)	0.04	Sgr B2	BTL	7m	Cum85
	84744.17 (10)	CH <sub>3</sub> OH	19(4)-18(5) E	0.46b	OriMC-1	OSO	20m	Joh84
	84746.036*(20)	<sup>30</sup> SiO	2-1 $\nu=0$	0.08b	OriMC-1	NRAO	11m	Cla77
	84807.797*(10)	NH <sub>2</sub> CHO	4(2,3)-3(2,2) n,t	0.18	Sgr B2	NRAO	11m	Wil81
	84865.166*(9)	O <sup>13</sup> CS	7-6	0.032	Sgr B2	BTL	7m	Gol81
	84888.996*(18)	NH <sub>2</sub> CHO	4(3,2)-3(3,1) n,t	0.08b	Sgr B2	NRAO	11m	Wil81
	84890.989*(18)	NH <sub>2</sub> CHO	4(3,1)-3(3,0) n,t	b	Sgr B2	NRAO	11m	Wil81
	84946.004*(17)	HC <sub>2</sub> CHCN	9(0,9)-8(0,8)	0.10	OriMC-1	OSO	20m	Joh84
U	84970.	unidentified		0.20	OriMC-1	OSO	20m	Joh84
	85093.274*(10)	NH <sub>2</sub> CHO	4(2,2)-3(2,1)	0.12	Sgr B2	BTL	7m	Cum85
	85139.108*(2)	OCS	7-6	0.7	Sgr B2	NRAO	11m	Sol73
	85162.256 (40)	HC <sup>18</sup> O <sup>+</sup>	1-0	0.1	L134N	BTL	7m	Lan78
	85201.348*(5)	HC <sub>3</sub> N	32-31	0.030	IRC+10216	BTL	7m	Gol81
U	85230.6 (6)	unidentified		0.07	Sgr B2	BTL	7m	Cum85
	85265.470*(7)	CH <sub>3</sub> CH <sub>2</sub> OH	6(0,6)-5(1,5)	0.25	Sgr B2	NRAO	11m	Zuc75
	85302.654*(16)	HC <sub>2</sub> CHCN	9(2,8)-8(2,7)	0.12	Sgr B2	BTL	7m	Cum85
	85338.89 (2)	C <sub>3</sub> H <sub>2</sub>	2(1,2)-1(0,1)	3.1	TMC-1	NRAO	11m	Tha81
	85347.90 (30)	HCS <sup>+</sup>	2-1	0.4	OriMC-1	NRAO	11m	Tha81
	85416.762*(14)	HC <sub>2</sub> CHCN	9(4,6)-8(4,5)	0.12b	OriMC-1	OSO	20m	Joh84
	85416.813*(14)	HC <sub>2</sub> CHCN	9(4,5)-8(4,4)	b	OriMC-1	OSO	20m	Joh84
	85426.932*(15)	HC <sub>2</sub> CHCN	9(3,7)-8(3,6)	0.10	OriMC-1	OSO	20m	Joh84
U	85435.	unidentified		0.2h	Sgr B2	NRAO	11m	Sny73
	85442.601*(1)	CH <sub>3</sub> CCH	5(3)-4(3)	0.11	OriMC-1	NRAO	11m	Chu83
	85450.7660*(7)	CH <sub>3</sub> CCH	5(2)-4(2)	0.14	OriMC-1	NRAO	11m	Chu83
	85455.6665*(6)	CH <sub>3</sub> CCH	5(1)-4(1)	0.23	OriMC-1	NRAO	11m	Chu83
	85457.3002*(7)	CH <sub>3</sub> CCH	5(0)-4(0)	0.28	OriMC-1	NRAO	11m	Chu83
U	85506.	unidentified		0.10	OriMC-1	OSO	20m	Joh84
	85530.68 (15)	HOCO <sup>+</sup>	4(0,4)-3(0,3)	0.5	Sgr B2	NRAO	11m	Tha81
U	85565.	unidentified		0.05	IRC+10216	OSO	20m	Joh84
	85567.97 (10)	CH <sub>3</sub> OH	6(-2)-7(-1) E	0.3	OriMC-1	NRAO	11m	Lov76a
	85634.00 *(1)	C <sub>4</sub> H	9-8 $J=19/2-17/2$	0.08	IRC+10216	NRAO	11m	Gue78
	85640.456*(30)	SiO	2-1 $\nu=2$	0.11	R Cas	NRAO	11m	Cla81
	85672.57 *(1)	C <sub>4</sub> H	9-8 $J=17/2-15/2$	0.07	IRC+10216	NRAO	11m	Gue78
	85715.433*(16)	HC <sub>2</sub> CHCN	9(2,7)-8(2,6)	0.06	Sgr B2	BTL	7m	Cum85
	85759.132*(20)	<sup>29</sup> SiO	2-1 $\nu=0$	0.13	OriMC-1	NRAO	11m	Lov76a
	85919.12 *(22)	HCOOCH <sub>3</sub>	7(6,1)-6(6,0) E	0.12	OriMC-1	OSO	20m	Ell80
	85924.747 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=0-1$	0.40	L183	OSO	20m	Olb85
	85925.684 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=2-1$	0.40	L183	OSO	20m	Olb85
	85926.263 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup>	0.14	OriMC-1	NRAO	11m	Tur78
	85926.263 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=1-1$	b	L183	OSO	20m	Olb85
	85926.263 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=2-2$	0.99b	L183	OSO	20m	Olb85
	85926.858 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=1-2$	0.40	L183	OSO	20m	Olb85
	85927.204*(39)	HCOOCH <sub>3</sub>	7(6,2)-6(6,1) A+E	0.3b	OriMC-1	OSO	20m	Ell80
	85927.210*(39)	HCOOCH <sub>3</sub>	7(6,1)-6(6,0) A	b	OriMC-1	OSO	20m	Ell80
	85927.721 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>+</sup> -1(0,1)0 <sup>-</sup> $F=1-0$	0.40	L183	OSO	20m	Olb85
	85973.13 *(9)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,12)-12(3,9) AA	b	OriMC-1	OSO	20m	Joh84
	85976.04 *(17)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,12)-12(3,9) EE	0.06b	OriMC-1	OSO	20m	Joh84
	85978.92 *(25)	CH <sub>3</sub> OCH <sub>3</sub>	13(2,12)-12(3,9) EA+AE	b	OriMC-1	OSO	20m	Joh84
	86021.00 *(19)	HCOOCH <sub>3</sub>	7(5,2)-6(5,1) E	0.12	OriMC-1	OSO	20m	Ell80

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^a$ (K) $T_s^b$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
86028.24 *(19)	HCOOCH <sub>3</sub>	7(5,3)-6(5,2) A	0.20b	OriMC-1	OSO	20m	Ell80
86029.422*(32)	HCOOCH <sub>3</sub>	7(5,3)-6(5,2) E	b	OriMC-1	OSO	20m	Ell80
86030.189*(32)	HCOOCH <sub>3</sub>	7(5,2)-6(5,1) A	0.32	OriMC-1	OSO	20m	Ell80
86054.961 (25)	HC <sup>15</sup> N	1-0	0.80g	OriMC-1	NRAO	11m	Lin77 Pea76
86074.20 (10)	CH <sub>3</sub> NH <sub>2</sub>	4(1,4)-4(0,4) F=3-3	b	Sgr B2	NRAO	11m	Kai74 Tak73
86074.44 (10)	CH <sub>3</sub> NH <sub>2</sub>	4(1,4)-4(0,4) F=5-5	0.2b	Sgr B2	NRAO	11m	Kai74 Tak73
86075.43 (10)	CH <sub>3</sub> NH <sub>2</sub>	4(1,4)-4(0,4) F=4-4	b	Sgr B2	NRAO	11m	Kai74 Tak73
86093.55 *(24)	SO	2(2)-1(1)	~1.7	OriMC-1	NRAO	11m	Cla74
86153.709*(25)	SO <sub>2</sub>	39(9,31)-40(8,32)	0.07	OriMC-1	OSO	20m	Joh84
86210.053*(28)	HCOOCH <sub>3</sub>	7(4,4)-6(4,3) A	0.18	OriMC-1	OSO	20m	Joh84
86223.53 *(17)	HCOOCH <sub>3</sub>	7(4,3)-6(4,2) E	0.35b	OriMC-1	OSO	20m	Joh84
86223.76 (10)	CH <sub>3</sub> OCH <sub>3</sub>	2(2,0)-2(1,1) AE	b	OriMC-1	NRAO	11m	Cla79 Cla79
86224.53 *(17)	HCOOCH <sub>3</sub>	7(4,4)-6(4,3) E	b	OriMC-1	OSO	20m	Joh84
86225.67 (12)	CH <sub>3</sub> OCH <sub>3</sub>	2(2,0)-2(1,1) EA	b	OriMC-1	NRAO	11m	Cla79 Cla79
86226.728 (96)	CH <sub>3</sub> OCH <sub>3</sub>	2(2,0)-2(1,1) EE	0.28b	OriMC-1	NRAO	11m	Cla79 Cla79
86228.72 ( 2)	CH <sub>3</sub> OCH <sub>3</sub>	2(2,0)-2(1,1) AA	b	OriMC-1	NRAO	11m	Cla79 Cla79
86243.442*(24)	SiO	2-1 $\nu=1$	17.4i	OriMC-1	NRAO	11m	Sny74a
86265.798*(27)	HCOOCH <sub>3</sub>	7(3,5)-6(3,4) A	0.15	OriMC-1	OSO	20m	Joh84
86268.74 *(17)	HCOOCH <sub>3</sub>	7(3,5)-6(3,4) E	0.20	OriMC-1	OSO	20m	Joh84
86338.767 (30)	H <sup>13</sup> CN	1-0 F=1-1	b	OriMC-1	NRAO	11m	Sny71 Pea76
86340.184 (30)	H <sup>13</sup> CN	1-0 F=2-1	~2b	OriMC-1	NRAO	11m	Sny71 Pea76
86342.274 (30)	H <sup>13</sup> CN	1-0 F=0-1	b	OriMC-1	NRAO	11m	Sny71 Pea76
U 86360.	unidentified		0.10	IRC+10216	OSO	20m	Joh84
U 86395.8 (15)	unidentified		0.06	Sgr B2	BTL	7m	Cum85
U 86413.	unidentified		0.15	OriMC-1	OSO	20m	Joh84
U 86416.9 (13)	unidentified		0.05	Sgr B2	BTL	7m	Cum85
U 86418.	unidentified		0.20	OriMC-1	OSO	20m	Joh84
86546.18 *( 1)	HCOOH	4(1,4)-3(1,3)	0.07	Sgr B2	BTL	7m	Cum85
86593.74 *(22)	C <sub>3</sub> O	9-8	0.028	TMC-1	FCRAO	14m	Bro85
86615.76 (10)	CH <sub>3</sub> OH	7(2)-6(3) A-	0.6	OriMC-1	NRAO	11m	Lov76a Sas84
86639.108*( 7)	SO <sub>2</sub>	8(3,5)-9(2,8)	~0.6	OriMC-1	NRAO	11m	Sny75a
86670.82 ( 4)	HCO	1(0,1)-0(0,0) 3/2-1/2 F=2-1	0.15	OriMC-2	NRAO	11m	Sny76 Pic78
86708.35 ( 4)	HCO	1(0,1)-0(0,0) 3/2-1/2 F=1-0	0.04	Sgr B2	BTL	7m	Cum85 Pic78
86754.294 (30)	H <sup>13</sup> CO <sup>+</sup>	1-0	0.6	OriMC-1	NRAO	11m	Sny76a Gue82b
86777.43 ( 4)	HCO	1(0,1)-0(0,0) 1/2-1/2 F=1-1	0.02	DR21	OSO	20m	Sch85a Pic78
86805.75 ( 4)	HCO	1(0,1)-0(0,0) 1/2-1/2 F=0-1	0.02	DR21	OSO	20m	Sch85a Pic78
86819.851*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(1,10)-9(1,9)	0.20	OriMC-1	OSO	20m	Dow82
86819.851*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(1,10)-9(1,9)	0.50	OriMC-1	OSO	20m	Joh84
86846.998*(20)	SiO	2-1 $\nu=0$	0.9	OriMC-1	NRAO	11m	Dic72
U 86864.	unidentified		0.08	OriMC-1	OSO	20m	Dow82
U 86866.	unidentified		0.05	IRC+10216	OSO	20m	Joh84
86903.06 (10)	CH <sub>3</sub> OH	7(2)-6(3) A +	0.2	OriMC-1	NRAO	11m	Lov76a Sas84
U 86980.	unidentified		0.10	OriMC-1	OSO	20m	Joh84
87057.5 ( 5)	HC <sup>17</sup> O <sup>+</sup>	1-0	0.05	Sgr B2	BTL	7m	Gue82 Gue82
87090.735 (46)	HN <sup>13</sup> C	1-0 F=0-1	0.08	L134N	BTL	7m	Fre79a Fre79a
87090.859 (46)	HN <sup>13</sup> C	1-0 F=2-1	0.42	L134N	BTL	7m	Fre79a Fre79a
87090.942 (46)	HN <sup>13</sup> C	1-0 F=1-1	0.25	L134N	BTL	7m	Fre79a Fre79a
87143.40 *(17)	HCOOCH <sub>3</sub>	7(3,4)-6(3,3) E	0.37	OriMC-1	OSO	20m	Joh84
87161.285*(27)	HCOOCH <sub>3</sub>	7(3,4)-6(3,3) A	0.25	OriMC-1	OSO	20m	Joh84
87284.156 (30)	HC <sub>2</sub>	1-0 3/2-1/2 F=1-1	0.53	OriMC-1	NRAO	11m	Got83a Got83a
87316.925 ( 4)	HC <sub>2</sub>	1-0 3/2-1/2 F=2-1	4.00	OriMC-1	NRAO	11m	Got83a Got83a
87328.624 ( 6)	HC <sub>2</sub>	1-0 3/2-1/2 F=1-0	2.27	OriMC-1	NRAO	11m	Got83a Got83a
87402.004 ( 5)	HC <sub>2</sub>	1-0 1/2-1/2 F=1-1	2.25	OriMC-1	NRAO	11m	Got83a Got83a
87407.165 (11)	HC <sub>2</sub>	1-0 1/2-1/2 F=0-1	1.02	OriMC-1	NRAO	11m	Got83a Got83a
87446.512 (23)	HC <sub>2</sub>	1-0 1/2-1/2 F=1-0	0.56	OriMC-1	NRAO	11m	Tuc78 Got83a
U 87479.	unidentified		0.05	IRC+10216	OSO	20m	Joh84
87550.545*(28)	<sup>30</sup> SiS	5-4	0.027	IRC+10216	FCRAO	14m	Ziu84
87597.333*( 3)	HNCO	4(1,4)-3(1,3)	0.13	OriMC-1	OSO	20m	Joh84
87715.980*( 9)	CH <sub>3</sub> CH <sub>2</sub> OH	5(2,4)-5(1,5)	0.06	Sgr B2	BTL	7m	Cum85
87766.42 *(26)	HCOOCH <sub>3</sub> ?	8(0,8)-7(1,7) E	0.03b	Sgr B2	BTL	7m	Cum85
87769.03 *( 2)	HCOOCH <sub>3</sub> ?	8(0,8)-7(1,7) A	b	Sgr B2	BTL	7m	Cum85 Plu84
87782.23 (10)	CH <sub>3</sub> NH <sub>2</sub>	3(1,3)-3(0,3) As F=4-4	0.03b	Sgr B2	BTL	7m	Cum85 Tak73
87783.09 (10)	CH <sub>3</sub> NH <sub>2</sub>	3(1,3)-3(0,3) As F=3-3	b	Sgr B2	BTL	7m	Cum85 Tak73
87848.875*( 4)	NH <sub>2</sub> CHO	4(1,3)-3(1,2)	0.31	Sgr B2	BTL	7m	Cum85
87863.632*( 5)	HC <sub>3</sub> N	33-32	0.23	IRC+10216	OSO	20m	Joh84

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_s^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
87898.416*(4)	HNCO	4(2,3)-3(2,2)	0.06b	Sgr B2	BTL	7m	Cum85	
87898.620*(4)	HNCO	4(2,2)-3(2,1)	b	Sgr B2	BTL	7m	Cum85	
87925.238*(4)	HNCO	4(0,4)-3(0,3)	~2.4	Sgr B2	NRAO	11m	Sny71	
88166.808*(8)	H <sup>13</sup> CCCN	10-9	0.15	IRC+10216	OSO	20m	Joh84	
88239.027*(3)	HNCO	4(1,3)-3(1,2)	~0.3	Sgr B2	NRAO	11m	Sny73	
88285.809*(27)	Si <sup>34</sup> S	5-4	0.10	IRC+10216	OSO	20m	Joh84	
88323.757*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(0,10)-9(0,9)	0.12	OriMC-1	NRAO	11m	Joh77	
88594.96 (10)	CH <sub>3</sub> OH	15(3)-14(4) A+	0.73	OriMC-1	OSO	20m	Joh84	Sas84
88630.4157(10)	HCN	1-0 F=1-1	9.6	OriMC-1	NRAO	11m	Uli76	DeL69
88631.8473(10)	HCN	1-0 F=2-1	17.2	OriMC-1	NRAO	11m	Uli76	DeL69
88633.9360(10)	HCN	1-0 F=0-1	6.8	OriMC-1	NRAO	11m	Uli76	DeL69
88668.06 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(0,2)-1(0,1) Aa	b	Sgr B2	NRAO	11m	Kai75	Kai75
88668.62 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(0,2)-1(0,1) Es	0.15b	Sgr B2	NRAO	11m	Kai75	Kai75
88668.63 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(0,2)-1(0,1) A+E	0.04	Sgr B2	NRAO	11m	Kut80	Joh72
88669.61 (10)	CH <sub>3</sub> NH <sub>2</sub>	2(0,2)-1(0,1) As,Ea	b	Sgr B2	NRAO	11m	Kai75	Kai75
88706.38 *(16)	CH <sub>3</sub> OCH <sub>3</sub>	15(2,13)-15(1,14) EA+AE	b	OriMC-1	OSO	20m	Joh84	
88707.64 (10)	CH <sub>3</sub> OCH <sub>3</sub>	15(2,13)-15(1,14) EE	0.05	OriMC-1	NRAO	11m	Kut80	
88707.78 *(12)	CH <sub>3</sub> OCH <sub>3</sub>	15(2,13)-15(1,14) EE	0.27b	OriMC-1	OSO	20m	Joh84	
88709.07 (10)	CH <sub>3</sub> OCH <sub>3</sub>	15(2,13)-15(1,14) AA	0.06	OriMC-1	NRAO	11m	Kut80	
88709.19 *(8)	CH <sub>3</sub> OCH <sub>3</sub>	15(2,13)-15(1,14) AA	b	OriMC-1	OSO	20m	Joh84	
88720.604*(56)	<sup>34</sup> SO <sub>2</sub>	7(3,5)-8(2,6)	0.10	OriMC-1	OSO	20m	Sch83	
U 88741.8	unidentified		0.03	OriMC-1	NRAO	11m	Kut80	
U 88749.8	unidentified		0.03	OriMC-1	NRAO	11m	Kut80	
U 88770.8	unidentified		0.03	OriMC-1	NRAO	11m	Kut80	
88843.24 *(16)	HCOOCH <sub>3</sub>	7(1,6)-6(1,5) E	0.09	OriMC-1	NRAO	11m	Kut80	
88851.61 *(3)	HCOOCH <sub>3</sub>	7(1,6)-6(1,5) A	0.07	OriMC-1	NRAO	11m	Kut80	
U 88861.	unidentified		0.15	OriMC-1	OSO	20m	Go181b	
88865.692 (26)	H <sup>15</sup> NC	1-0	0.15	DR21 (OH)	NRAO	11m	Bro77	Say76
88940.09 (10)	CH <sub>3</sub> OH	15(3)-14(4) A-	1.30	OriMC-1	OSO	20m	Joh84	Sas84
89045.59 *(2)	C <sub>3</sub> N	9-8 J=19/2-17/2	0.131	IRC+10216	NRAO	11m	Gue77	Got83
89064.36 *(2)	C <sub>3</sub> N	9-8 J=17/2-15/2	0.141	IRC+10216	NRAO	11m	Gue77	Got83
U 89087.	unidentified		0.07	IRC+10216	OSO	20m	Joh84	
89103.730*(26)	<sup>29</sup> SiS	5-4	0.07	IRC+10216	OSO	20m	Joh84	
89188.518*(9)	HCO <sup>+</sup>	1-0	10.8	OriMC-1	NRAO	11m	Uli76	
89297.651*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(2,9)-9(2,8)	0.32	OriMC-1	OSO	20m	Joh84	
89314.68 *(26)	HCOOCH <sub>3</sub>	8(1,8)-7(1,7) E	0.35b	OriMC-1	OSO	20m	Joh84	
89316.632*(44)	HCOOCH <sub>3</sub>	8(1,8)-7(1,7) A	b	OriMC-1	OSO	20m	Joh84	
89331.302*(33)	<sup>13</sup> CH <sub>3</sub> CN	5(0)-4(0)	0.22	Sgr B2	BTL	7m	Cum85	
89487.415 (15)	HOC <sup>+</sup>	1-0	0.08	Sgr B2	FCRAO	14m	Woo83	Gud82
89505.86 (4)	CH <sub>3</sub> OH	8(-4)-9(-3) E	0.3	OriMC-1	NRAO	11m	Lov76a	Lov78
89562.317*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	10(6)-9(6)	0.08b	OriMC-1	NRAO	11m	Joh77	
89565.031*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	10(7)-9(7)	0.05b	OriMC-1	NRAO	11m	Joh77	
89568.105*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	10(5)-9(5)	0.11b	OriMC-1	NRAO	11m	Joh77	
89573.052*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(8)-9(8)	0.03b	OriMC-1	NRAO	11m	Joh77	
89579.17* (1)	HCOOH	4(0,4)-3(0,3)	0.05	Sgr B2	FCRAO	14m	Woo83	Wil80
89590.035*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	10(4,7)-9(4,6)	0.05b	OriMC-1	NRAO	11m	Joh77	
89591.019*(12)	CH <sub>3</sub> CH <sub>2</sub> CN	10(4,6)-9(4,5)	0.05b	OriMC-1	NRAO	11m	Joh77	
89628.451*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(3,8)-9(3,7)	0.13	OriMC-1	NRAO	11m	Joh77	
89684.718*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(3,7)-9(3,6)	0.22	OriMC-1	OSO	20m	Joh84	
U 89726.	unidentified		0.07	IRC+10216	OSO	20m	Joh84	
89861.48 *(1)	HCOOH	4(2,3)-3(2,2)	0.13	Sgr B2	BTL	7m	Cum85	
U 89936.	unidentified		0.20	OriMC-1	OSO	20m	Joh84	
U 89960.	unidentified		0.20	OriMC-1	OSO	20m	Joh84	
90117.600*(9)	CH <sub>3</sub> CH <sub>2</sub> OH	4(1,4)-3(0,3)	0.25g	Sgr B2	NRAO	11m	Zuc75	
90145.74 *(16)	HCOOCH <sub>3</sub>	7(2,5)-6(2,4) E	0.32	OriMC-1	OSO	20m	Joh83	
90156.476*(29)	HCOOCH <sub>3</sub>	7(2,5)-6(2,4) A	0.25	OriMC-1	OSO	20m	Joh83	
U 90212. (1)	unidentified		0.04	Sgr B2	NRAO	11m	Hol80	
90227.68 *(27)	HCOOCH <sub>3</sub>	8(0,8)-7(0,7) E	0.15	OriMC-1	NRAO	11m	Hol80	
90229.61 *(4)	HCOOCH <sub>3</sub>	8(0,8)-7(0,7) A	0.15	OriMC-1	NRAO	11m	Hol80	
90263.833 (30)	<sup>15</sup> NNH <sup>+</sup>	1-0	0.035	DR21(OH)	BTL	7m	Lin83	Gud82a
90453.358*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(2,8)-9(2,7)	0.35	OriMC-1	OSO	20m	Joh84	
90525.892*(5)	HC <sub>3</sub> N	34-33	0.20	IRC+10216	OSO	20m	Joh84	
90548.251*(28)	SO <sub>2</sub>	25(3,23)-24(4,20)	0.6	OriMC-1	OSO	20m	Sch83	
90593.059*(11)	HC <sup>13</sup> CCN	10-9	0.35	Sgr B2	NRAO	11m	Uli78	
90601.791*(5)	HCC <sup>13</sup> CCN	10-9	0.18	Sgr B2	NRAO	11m	Uli78	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
90663.450	HNC	1-0 $F=0-1$	n.r.	L134N	BTL	7m	Fre79a	Fre79a
90663.543 (40)	HNC	1-0	1.6	L134	NRAO	11m	Sny77a	Pea76
90663.574	HNC	1-0 $F=2-1$	n.r.	L134N	BTL	7m	Fre79a	Fre79a
90663.656	HNC	1-0 $F=1-1$	n.r.	L134N	BTL	7m	Fre79a	Fre79a
U 90684.2	unidentified		0.2	SgrB2	NRAO	11m	Sch85	
90703.78 (5)	CH <sub>3</sub> OD	2(-1)-1(-1) E	0.14b	Sgr B2	NRAO	11m	Got79	Lov78
90705.77 (5)	CH <sub>3</sub> OD	2(0)-1(0) A	b	Sgr B2	NRAO	11m	Got79	Lov78
U 90763.	unidentified		0.20	OriMC-1	OSO	20m	Joh84	
90771.546*(26)	SiS	5-4	0.35	IRC+10216	NRAO	11m	Mor75	
U 90841. (3)	unidentified		0.08	Sgr B2	NRAO	11m	Cla79	
U 90908. (3)	unidentified		0.05	Sgr B2	NRAO	11m	Cla79	
U 90928. (1)	unidentified		0.07	Sgr B2	NRAO	11m	Cla79	
90937.539 (40)	CH <sub>3</sub> OCH <sub>3</sub>	6(0,6)-5(1,5) AA	b	OriMC-1	NRAO	11m	Sny74	Cla79
90938.099 (30)	CH <sub>3</sub> OCH <sub>3</sub>	6(0,6)-5(1,5) EE	0.17b	OriMC-1	NRAO	11m	Sny74	Cla79
90938.674 (50)	CH <sub>3</sub> OCH <sub>3</sub>	6(0,6)-5(1,5) AE+EA	b	OriMC-1	NRAO	11m	Sny74	Cla79
90978.993*(2)	HC <sub>3</sub> N	10-9	1.77	OriMC-1	NRAO	11m	Mor76	
91202.607*(27)	HC <sub>3</sub> N $\nu_7=1$	10-9 $\ell=1e$	0.2	OriMC-1	NRAO	11m	Cla76	
91204.328 (30)	N <sup>15</sup> NH <sup>+</sup>	1-0 $F=1-1$	0.02	DR21(OH)	BTL	7m	Lin83	Gud82a
91205.999 (30)	N <sup>15</sup> NH <sup>+</sup>	1-0 $F=2-1$	0.025	DR21(OH)	BTL	7m	Lin83	Gud82a
91208.663 (70)	N <sup>15</sup> NH <sup>+</sup>	1-0 $F=0-1$	0.01	DR21(OH)	BTL	7m	Lin83	Gud82a
91333.308*(27)	HC <sub>3</sub> N $\nu_7=1$	10-9 $\ell=1f$	0.2	OriMC-1	NRAO	11m	Cla76	
91549.122*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	10(1,9)-9(1,8)	0.2	Sgr B2	NRAO	11m	Joh77	
91959.024*(2)	CH <sub>3</sub> CN	5(4)-4(4) $F=6-5$	0.08b	OriMC-1	NRAO	11m	Lov76a	
91959.359*(2)	CH <sub>3</sub> CN	5(4)-4(4) $F=4-3$	b	OriMC-1	NRAO	11m	Lov76a	
91971.310*(1)	CH <sub>3</sub> CN	5(3)-4(3) $F=6-5$	0.20b	OriMC-1	NRAO	11m	Lov76a	
91971.465*(1)	CH <sub>3</sub> CN	5(3)-4(3) $F=4-3$	b	OriMC-1	NRAO	11m	Lov76a	
91980.089*(1)	CH <sub>3</sub> CN	5(2)-4(2) $F=6-5$	0.16	OriMC-1	NRAO	11m	Lov76a	
91985.317*(1)	CH <sub>3</sub> CN	5(1)-4(1)	0.28b	OriMC-1	NRAO	11m	Lov76a	
91987.090*(1)	CH <sub>3</sub> CN	5(0)-4(0)	b	OriMC-1	NRAO	11m	Lov76a	
U 92352.7	unidentified		~0.1	OriMC-1	NRAO	11m	Cla76	
92494.299*(17)	<sup>13</sup> CS	2-1	0.215	OriMC-1	NRAO	11m	Tur73	
93065. (1)	SiC <sub>2</sub>	4(0,4)-3(0,3)	0.11	IRC+10216	NRAO	11m	Sny83	Tha84
93171.67	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=1-1$ $F=0-1$	0.5	L134N	NRAO	11m	Sny79	Sny79
93171.91	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=1-1$ $F=2-2$	0.7	L134N	NRAO	11m	Sny77	Sny79
93172.09	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=1-1$ $F=1-1$	0.8	L134N	NRAO	11m	Sny77	Sny79
93173.50	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=2-1$ $F=2-1$	0.9	L134N	NRAO	11m	Sny77	Sny79
93173.83	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=2-1$ $F=3-2$	0.9	L134N	NRAO	11m	Sny77	Sny79
93174.01	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=2-1$ $F=1-0$	0.6	L134N	NRAO	11m	Sny77	Sny79
93176.32	N <sub>2</sub> H <sup>+</sup>	1-0 $F_1=0-1$ $F=1-2$	0.7	L134N	NRAO	11m	Sny77	Sny79
93188.127*(5)	HC <sub>3</sub> N	35-34	0.09	OriMC-1	NRAO	11m	Lov82	
93196.62 (1)	CH <sub>3</sub> OH $\nu_1=1$	1(0)-2(1) E	0.18	OriMC-1	NRAO	11m	Lov82	Lov82
93580.84 *(5)	CH <sub>3</sub> CHO	5(1,5)-4(1,4) A	0.17	Sgr B2	BTL	7m	Cum85	
93595.28 (10)	CH <sub>3</sub> CHO	5(1,5)-4(1,4) E	0.17	Sgr B2	BTL	7m	Cum85	Bau76
93666.65 *(12)	CH <sub>3</sub> OCH <sub>3</sub>	12(1,11)-12(0,12) EE	0.10	OriMC-1	NRAO	11m	Hol80	
U 93780. (3)	unidentified		0.14p	OriMC-1	NRAO	11m	Cla79	
93830.050 (20)	HNCS	8(0,8)-7(0,7)	0.05	OriMC-1	BTL	7m	Fre79	Yam79
U 93844. (2)	unidentified		0.06	Sgr B2	NRAO	11m	Cla79	
93854.44 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,3)-4(1,4) AE+EA	0.14	OriMC-1	NRAO	11m	Cla79	Cla79
93857.11 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,3)-4(1,4) EE	0.20	OriMC-1	NRAO	11m	Cla79	Cla79
93859.64 (10)	CH <sub>3</sub> OCH <sub>3</sub>	4(2,3)-4(1,4) AA	0.03	OriMC-1	NRAO	11m	Cla79	Cla79
U 93870.5	unidentified		0.2s	Sgr B2	NRAO	11m	Cla79	
94245. (1)	SiC <sub>2</sub>	4(2,3)-3(2,2)	0.10	IRC+10216	NRAO	11m	Tha84	
94276.638*(18)	HC <sub>2</sub> CHCN	10(0,10)-9(0,9)	0.08	Sgr B2	NRAO	11m	Joh77	
94405.17 (15)	<sup>13</sup> CH <sub>3</sub> OH	2(-1)-1(-1) E	b	Sgr B2	NRAO	11m	Got79	Lee73
94407.02 (10)	<sup>13</sup> CH <sub>3</sub> OH	2(0)-1(0) A +	0.8b	Sgr B2	NRAO	11m	Got79	Lee73
94410.76 (10)	<sup>13</sup> CH <sub>3</sub> OH	2(0)-1(0) E	b	Sgr B2	NRAO	11m	Got79	Lee73
94541.81 (10)	CH <sub>3</sub> OH	8(3)-9(2) E	0.43	OriMC-1	NRAO	11m	Hol83	Sas84
95150.32 *(2)	C <sub>4</sub> H	10-9 $J=21/2-19/2$	0.08	IRC+10216	NRAO	11m	Got78	Got83
95169.44 (10)	CH <sub>3</sub> OH	8(0)-7(1) A +	0.85	OriMC-1	NRAO	11m	Lov76a	Lee68
95188.94 *(2)	C <sub>4</sub> H	10-9 $J=19/2-17/2$	0.08	IRC+10216	NRAO	11m	Gue78	Got83
95442.482*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(1,11)-10(1,10)	0.20	OriMC-1	NRAO	11m	Joh77	
95579. (1)	SiC <sub>2</sub>	4(2,2)-3(2,1)	0.10	IRC+10216	NRAO	11m	Cum80	Tha84
96368.05 (25)	CH <sub>3</sub> CHO	5(3,2)-4(3,1) E	b	Sgr B2	NRAO	11m	Got78a	Bau76
96368.05 (25)	CH <sub>3</sub> CHO	5(3,3)-4(3,2) A	0.07b	Sgr B2	NRAO	11m	Got78a	Bau76
96371.60 (13)	CH <sub>3</sub> CHO	5(3,2)-4(3,1) A	b	Sgr B2	NRAO	11m	Got78a	Bau76

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

	Frequency unc.	Formula	Quantum numbers	$T_r^*$ (K) $T_a^*$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
	96384.30 (13)	CH <sub>3</sub> CHO	5(3,3)-4(3,2) E	0.1	Sgr B2	NRAO	11m	Got78a	Bau76
	96412.982*(13)	C <sup>34</sup> S	2-1	0.62	OriMC-1	NRAO	11m	Tur73	
	96475.50 (13)	CH <sub>3</sub> CHO	5(2,3)-4(2,2) E	0.08	Sgr B2	NRAO	11m	Got78a	Bau76
	96492.13 (1)	CH <sub>3</sub> OH $\nu_1=1$	2(1)-1(1) E	0.13	OriMC-1	NRAO	11m	Hol83	Lov82
	96493.58 (1)	CH <sub>3</sub> OH $\nu_1=1$	2(0)-1(0) E	0.12	OriMC-1	NRAO	11m	Hol83	Lov82
	96506.66 (1)	CH <sub>3</sub> OH $\nu_1=1$	2(-1)-1(-1) E	0.06	OriMC-1	NRAO	11m	Hol83	Lov82
	96513.70 (1)	CH <sub>3</sub> OH $\nu_1=1$	2(0)-1(0) A+	0.08	OriMC-1	NRAO	11m	Hol83	Lov82
U	96536.	unidentified		0.1	OriMC-1	NRAO	11m	Sny83	
	96739.39 (10)	CH <sub>3</sub> OH	2(-1)-1(-1) E	0.96	OriMC-1	NRAO	11m	Hol83	Lee68
	96741.42 (10)	CH <sub>3</sub> OH	2(0)-1(0) A+	1.13	OriMC-1	NRAO	11m	Hol83	Lee68
	96744.58 (10)	CH <sub>3</sub> OH	2(0)-1(0) E	0.88	OriMC-1	NRAO	11m	Hol83	Lee68
	96755.51 (10)	CH <sub>3</sub> OH	2(1)-1(1) E	0.54	OriMC-1	NRAO	11m	Hol83	Lee68
U	96797. (3)	unidentified		0.05	Sgr B2	NRAO	11m	Cla79	
	96847.25 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,4)-5(1,5) AE+EA	0.11	OriMC-1	NRAO	11m	Cla79	Cla79
	96849.85 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,4)-5(1,5) EE	0.14	OriMC-1	NRAO	11m	Cla79	Cla79
	96852.46 (10)	CH <sub>3</sub> OCH <sub>3</sub>	5(2,4)-5(1,5) AA	0.13	OriMC-1	NRAO	11m	Cla79	Cla79
	96919.757*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(0,11)-10(0,10)	0.08	OriMC-1	NRAO	11m	Joh77	
	96988.139*(9)	O <sup>13</sup> CS	8-7	0.069	Sgr B2	BTL	7m	Gol81	
	97172.086*(13)	C <sup>33</sup> S	2-1	0.17	Sgr B2	BTL	7m	Cum85	
	97301.2085(2)	OCS	8-7	0.85	Sgr B2	NRAO	11m	Sol73	Dij71
	97582.83 (1)	CH <sub>3</sub> OH	2(1)-1(1) A-	~2.5	OriMC-1	OSO	20m	Fri84	Lee68
	97632.218*(21)	H <sub>2</sub> <sup>13</sup> CS	3(1,3)-2(1,2)	0.04	Sgr B2	BTL	7m	Cum85	
	97702.359*(8)	SO <sub>2</sub>	7(3,5)-8(2,6)	~0.3	OriMC-1	NRAO	11m	Sny75a	
	97715.388*(38)	<sup>34</sup> SO	3(2)-2(1)	0.14	OriMC-1	NRAO	11m	Got78	
	97980.968*(17)	CS	2-1	6.94	OriMC-1	NRAO	11m	Tur73	
	97995.450 (60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=9/2-7/2b	0.116	IRC+10216	OSO	20m	Tha85	Tha85
	98012.064 (60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=9/2-7/2a	0.089	IRC+10216	OSO	20m	Tha85	Tha85
	98177.581*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(2,10)-10(2,9)	0.15	OriMC-1	NRAO	11m	Joh77	
U	98230.2	unidentified		0.02	OriMC-1	NRAO	11m	Kut80	
U	98239.7	unidentified		0.03	OriMC-1	NRAO	11m	Kut80	
U	98257.7	unidentified		0.03	OriMC-1	NRAO	11m	Kut80	
U	98265.9 (9)	unidentified		0.04	Sgr B2	BTL	7m	Cum85	
	98270.41 *(31)	HCOOCH <sub>3</sub>	8(6,2)-7(6,1) E	0.06	OriMC-1	NRAO	11m	Kut80	
	98279.70 *(5)	HCOOCH <sub>3</sub>	8(6,3)-7(6,2) E+A	0.12b	OriMC-1	NRAO	11m	Kut80	
	98279.74 *(5)	HCOOCH <sub>3</sub>	8(6,2)-7(6,1) A	b	OriMC-1	NRAO	11m	Kut80	
U	98333.9	unidentified		0.02	OriMC-1	NRAO	11m	Kut80	
U	98351.9	unidentified		0.02	OriMC-1	NRAO	11m	Kut80	
	98432.37 *(29)	HCOOCH <sub>3</sub>	8(5,4)-7(5,3) E	0.04b	Sgr B2	BTL	7m	Cum85	
	98432.73 *(5)	HCOOCH <sub>3</sub>	8(5,4)-7(5,3) A	b	Sgr B2	BTL	7m	Cum85	
	98435.78 *(5)	HCOOCH <sub>3</sub>	8(5,3)-7(5,2) A	b	Sgr B2	BTL	7m	Cum85	
	98512.522*(5)	HC <sub>3</sub> N	37-36	0.08	OriMC-1	NRAO	11m	Buj81	
	98523.880*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(6)-10(6)	0.13	OriMC-1	NRAO	11m	Joh77	
	98524.661*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(7)-10(7)	0.10	OriMC-1	NRAO	11m	Joh77	
	98532.070*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(8)-10(8)	0.06	OriMC-1	NRAO	11m	Joh77	
	98533.985*(26)	CH <sub>3</sub> CH <sub>2</sub> CN	11(5)-10(5)	0.17	OriMC-1	NRAO	11m	Joh77	
	98564.834*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(4,8)-10(4,7)	0.09	OriMC-1	NRAO	11m	Joh77	
	98566.799*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(4,7)-10(4,6)	0.09	OriMC-1	NRAO	11m	Joh77	
	98606.87 *(27)	HCOOCH <sub>3</sub>	8(3,6)-7(3,5) E	0.08b	Sgr B2	BTL	7m	Cum85	
	98610.108*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(3,9)-10(3,8)	0.14	OriMC-1	NRAO	11m	Joh77	
	98611.14 *(4)	HCOOCH <sub>3</sub>	8(3,6)-7(3,5) A	b	Sgr B2	BTL	7m	Cum85	
	98682.59 *(4)	HCOOCH <sub>3</sub>	8(4,5)-7(4,4) A	0.02	Sgr B2	BTL	7m	Cum85	
	98701.109*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	11(3,8)-10(3,7)	0.12	OriMC-1	NRAO	11m	Joh77	
	98712.28 *(28)	HCOOCH <sub>3</sub>	8(4,5)-7(4,4) E	0.04	Sgr B2	BTL	7m	Cum85	
	98747.88 *(28)	HCOOCH <sub>3</sub> ?	8(4,4)-7(4,3) E	0.04	Sgr B2	BTL	7m	Cum85	
	98792.27 *(4)	HCOOCH <sub>3</sub> ?	8(4,4)-7(4,3) A	0.05	Sgr B2	BTL	7m	Cum85	
	98862.65 *(98)	CH <sub>3</sub> CHO	5(1,4)-4(1,3) E	0.23	Sgr B2	BTL	7m	Cum85	
	98900.87 *(5)	CH <sub>3</sub> CHO	5(1,4)-4(1,3) A	0.18	Sgr B2	BTL	7m	Cum85	
	98940.02 *(2)	C <sub>3</sub> N	10-9 J=21/2-19/2	0.18	IRC+10216	NRAO	11m	Gue77	Got83
	98958.78 *(2)	C <sub>3</sub> N	10-9 J=19/2-17/2	0.13	IRC+10216	NRAO	11m	Gue77	Got83
	99118.6 (1)	NH <sub>2</sub> D?	5(2,4)-4(1,4)	0.04	Sgr B2	BTL	7m	Cum85	DeL75
U	99120.	unidentified		0.15	OriMC-1	OSO	20m	Fri84	
	99299.879*(38)	SO	3(2)-2(1)	1.59m	OriMC-1	NRAO	11m	Got78	
	99311.195 (75)	NH <sub>2</sub> CN	5(1,5)-4(1,4)	0.40	Sgr B2	BTL	7m	Cum85	Joh76a
	99325.25 (20)	CH <sub>3</sub> OCH <sub>3</sub>	4(1,4)-3(0,3) EE	0.2	OriMC-1	NRAO	11m	Cla79	Lov79
	99392.645*(27)	SO <sub>2</sub>	29(4,26)-28(5,23)	~0.50	OriMC-1	OSO	20m	Fri84	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_s^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
99651.863*(11)	HC <sup>13</sup> CCN	11-10	0.13	Sgr B2	BTL	7m	Cum85	
99661.471*( 6)	HCC <sup>13</sup> CN	11-10	0.14	Sgr B2	BTL	7m	Cum85	
99681.516*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(2,9)-10(2,8)	0.05	Sgr B2	BTL	7m	Cum85	
U 99727.0 (16)	unidentified		0.04	Sgr B2	BTL	7m	Cum85	
99730.92 ( 1)	CH <sub>3</sub> OH $\nu_1=1$	6(1)-5(0)	0.20	OriMC-1	NRAO	11m	Chu80	Lov82
99774.15 ( 5)	H <sub>2</sub> C <sup>34</sup> S	3(1,3)-2(1,2)	~ 0.2	OriMC-1	OSO	20m	Gar85	Lov84
U 99867.0 ( 6)	unidentified		0.08	Sgr B2	BTL	7m	Cum85	
99953.27 ( 6)	NH <sub>2</sub> CN	5(2,4)-4(2,3)	0.08b	Sgr B2	BTL	7m	Cum85	Joh76a
99956.60 ( 4)	NH <sub>2</sub> CN	5(2,3)-4(2,2)	b	Sgr B2	BTL	7m	Cum85	Joh76a
99972.66 ( 8)	NH <sub>2</sub> CN	5(0,5)-4(0,4)	0.12	Sgr B2	BTL	7m	Cum85	Joh76a
100029.569*(60)	SO	4(5)-4(4)	0.38m	OriMC-1	NRAO	11m	Got78	
100076.389*( 2)	HC <sub>3</sub> N	11-10	1.28	OriMC-1	NRAO	11m	Mor76	
100094.461*(51)	CH <sub>2</sub> CO	5(1,5)-4(1,4)	0.17	Sgr B2	NRAO	11m	Tur77	
100110.27 (10)	CH <sub>3</sub> SH	4(1)-3(1) A +	0.06	Sgr B2	BTL	7m	Lin79	Lee80
U 100157.0	unidentified		0.07	Sgr B2	NRAO	11m	Tur77	
U 100197.2 ( 8)	unidentified		0.09	Sgr B2	BTL	7m	Cum85	
U 100200.4	unidentified		0.09	Sgr B2	NRAO	11m	Tur77	
100294.69 *(27)	HCOOCH <sub>3</sub> ?	8(3,5)-7(3,4) E	0.03	Sgr B2	BTL	7m	Cum85	
100308.158*(43)	HCOOCH <sub>3</sub>	8(3,5)-7(3,4) A	0.08	OriMC-1	BTL	7m	Got82	
100322.349*(29)	HC <sub>3</sub> N $\nu_7=1$	11-10 1e	0.07	OriMC-1	BTL	7m	Got82	
U 100435.	unidentified		0.04	OriMC-1	NRAO	11m	Wil81	
100463.11 ( 3)	CH <sub>3</sub> OCH <sub>3</sub>	6(2,5)-6(1,6) EE	0.12	OriMC-1	NRAO	11m	Wil81	
100466.106*(29)	HC <sub>3</sub> N $\nu_7=1$	11-10 1f	~0.2	OriMC-1	NRAO	11m	Wil76	
100482.27 *(27)	HCOOCH <sub>3</sub>	8(1,7)-7(1,6) E	0.08	OriMC-1	BTL	7m	Got82	
100490.661*(45)	HCOOCH <sub>3</sub>	8(1,7)-7(1,6) A	0.08	OriMC-1	BTL	7m	Got82	
U 100498.5	unidentified		0.05	OriMC-1	NRAO	11m	Wil81	
100529.127*(52)	NaOH	4-3	0.05	Sgr B2(OH)	NRAO	11m	Hol82	
U 100601.6 ( 3)	unidentified		0.19	Sgr B2	BTL	7m	Cum85	
100614.295*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	11(1,10)-10(1,9)	0.10	OriMC-1	NRAO	11m	Joh77	
100629.50 (12)	NH <sub>2</sub> CN	5(1,4)-4(1,3)	0.17	Sgr B2	NRAO	11m	Tur75a	Joh76a
100681.58 *(40)	HCOOCH <sub>3</sub>	9(0,9)-8(0,8) E	0.07b	Sgr B2	NRAO	11m	Chu80	
100683.331*(67)	HCOOCH <sub>3</sub>	9(0,9)-8(0,8) A	b	Sgr B2	NRAO	11m	Chu80	
100708.837*(44)	HC <sub>3</sub> N $\nu_7=2$	11-10 0	0.05b	Sgr B2	BTL	7m	Cum85	
100710.972*(52)	HC <sub>3</sub> N $\nu_7=2$	11-10 2e	b	Sgr B2	BTL	7m	Cum85	
100714.306*(46)	HC <sub>3</sub> N $\nu_7=2$	11-10 2f	b	Sgr B2	BTL	7m	Cum85	
100878.113*( 6)	SO <sub>2</sub>	2(2,0)-3(1,3)	0.08	Sgr B2	BTL	7m	Cum85	
100989.940*(16)	CH <sub>2</sub> CH <sub>2</sub> OH	8(2,7)-8(1,8)	0.05	Sgr B2	BTL	7m	Lin79	
U 101000.	unidentified		0.05	Sgr B2	BTL	7m	Lin79	
101002.34 *( 5)	CH <sub>2</sub> CO?	5(3,3)-4(3,2)	0.06b	Sgr B2	BTL	7m	Cum85	
101002.35 *( 5)	CH <sub>2</sub> CO?	5(3,2)-4(3,1)	b	Sgr B2	BTL	7m	Cum85	
101029.75 ( 5)	CH <sub>3</sub> SH	4(-1)-3(-1) E	~0.1	Sgr B2	BTL	7m	Lin79	Lin79
101036.56 *( 6)	CH <sub>2</sub> CO	5(0,5)-4(0,4)	0.1	Sgr B2	NRAO	11m	Tur77	
101139.16 ( 5)	CH <sub>3</sub> SH	4(0)-3(0) A	0.27b	Sgr B2	BTL	7m	Lin79	Lin79
101139.65 ( 4)	CH <sub>3</sub> SH	4(0)-3(0) E	b	Sgr B2	BTL	7m	Lin79	Lin79
101159.46 (10)	CH <sub>3</sub> SH	4(2)-3(2) A-	0.03	Sgr B2	BTL	7m	Cum85	Lee80
101167.15 ( 4)	CH <sub>3</sub> SH	4(-2)-3(-2) E	0.13b	Sgr B2	BTL	7m	Cum85	Lin79
101168.34 ( 4)	CH <sub>3</sub> SH	4(2)-3(2) E	b	Sgr B2	BTL	7m	Cum85	Lin79
101174.679*( 5)	HC <sub>3</sub> N	38-37	0.09	Sgr B2	BTL	7m	Lin79	
101284.36 ( 4)	CH <sub>3</sub> SH	4(1)-3(1) E	0.09	Sgr B2	BTL	7m	Lin79	Lin79
101332.984*(17)	H <sub>2</sub> CO	6(1,5)-6(1,6)	~0.1	Sgr B2	BTL	7m	Lin79	
101341.0 *(15)	CH <sub>3</sub> CHO	3(1,3)-2(0,2) E	0.08	Sgr B2	BTL	7m	Cum85	
101477.753*(55)	H <sub>2</sub> CS	3(1,3)-2(1,2)	0.49	OriMC-1	BTL	7m	Van84	
101981.383*(51)	CH <sub>2</sub> CO	5(1,4)-4(1,3)	0.22	Sgr B2	NRAO	11m	Tur77	
102064.268*( 8)	NH <sub>2</sub> CHO	5(1,5)-4(1,4)	0.2	Sgr B2	NRAO	11m	Tur78a	
102202.49 ( 4)	CH <sub>3</sub> SH	4(1)-3(1) A-	0.08	Sgr B2	BTL	7m	Lin79	Lin79
U 102217.	unidentified		~0.08	Sgr B2	BTL	7m	Lin79	
102530.346*( 1)	CH <sub>3</sub> CCH	6(3)-5(3)	0.14	OriMC-1	NRAO	11m	Chu83	
102540.144*( 1)	CH <sub>3</sub> CCH	6(2)-5(2)	0.23	OriMC-1	NRAO	11m	Chu83	
102546.024*( 1)	CH <sub>3</sub> CCH	6(1)-5(1)	0.29	OriMC-1	NRAO	11m	Chu83	
102547.984*( 1)	CH <sub>3</sub> CCH	6(0)-5(0)	0.33	OriMC-1	NRAO	11m	Chu83	
102658.04 (10)	CH <sub>3</sub> OH	11(-2)-11(1) E	0.15	OriMC-1	NRAO	11m	Lov82	Sas84
U 102812.0 (16)	unidentified		0.04	Sgr B2	BTL	7m	Cum85	
103040.399*(53)	H <sub>2</sub> CS	3(0,3)-2(0,2)	0.2	Sgr B2	NRAO	11m	Got78a	
103051.785*(58)	H <sub>2</sub> CS	3(2,1)-2(2,0)	0.13	Sgr B2	BTL	7m	Van84	
U 103216.6 (12)	unidentified		0.04	Sgr B2	BTL	7m	Cum85	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

	Frequency unc.	Formula	Quantum numbers	$T_a^*$ (K) $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
	103319.611 (60)	C <sub>2</sub> H	<sup>2</sup> Π <sub>3/2</sub> J=9/2-7/2a	0.054	IRC+10216	FCRAO	14m	Tha85
	103372.658 (60)	C <sub>2</sub> H	<sup>2</sup> Π <sub>3/2</sub> J=9/2-7/2b	0.078	IRC+10216	FCRAO	14m	Tha85
	103466.60 *(27)	HCOOCH <sub>3</sub>	8(2,6)-7(2,5) E	0.07	Sgr B2	BTL	7m	Cum85
	103478.64 *(4)	HCOOCH <sub>3</sub>	8(2,6)-7(2,5) A	0.04	Sgr B2	BTL	7m	Cum85
U	103549.0 (19)	unidentified		0.04	Sgr B2	BTL	7m	Cum85
	103575.400*(18)	HC <sub>2</sub> CHCN	11(0,11)-10(0,10)	0.07	Sgr B2	BTL	7m	Cum85
U	103641.8 (11)	unidentified		0.05	Sgr B2	BTL	7m	Cum85
	103702.810*(10)	CH <sub>3</sub> CH <sub>2</sub> OH?	9(1,8)-8(2,7)	0.04	Sgr B2	BTL	7m	Cum85
	103836.809*(5)	HC <sub>3</sub> N	39-38	0.05	Sgr B2	BTL	7m	Cum85
U	103915.	unidentified	(H56γ?)	0.1	OriMC-1	NRAO	11m	Kui77
	104029.416*(5)	SO <sub>2</sub>	3(1,3)-2(0,2)	3.0	OriMC-1	NRAO	11m	Hol76a
	104051.281*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(1,12)-11(1,11)	0.08	OriMC-1	NRAO	11m	Joh77
	104060.76 (10)	CH <sub>3</sub> OH	13(-4)-12(-3)	0.2	OriMC-1	NRAO	11m	Kui77
U	104200.1 (8)	unidentified		0.07	Sgr B2	BTL	7m	Cum85
	104212.654*(16)	HC <sub>2</sub> CHCN	11(2,10)-10(2,9)	0.06	Sgr B2	BTL	7m	Cum85
	104239.293*(10)	SO <sub>2</sub>	10(1,9)-10(0,10)	0.29	Sgr B2	BTL	7m	Cum85
	104300.46 (10)	CH <sub>3</sub> OH	11(-1)-10(-2) E	0.12	Sgr B2	BTL	7m	Cum85
	104336.54 (5)	CH <sub>3</sub> OH	13(-2)-13(1) E	0.03	Sgr B2	BTL	7m	Cum85
	104354.85 (10)	CH <sub>3</sub> OH	10(4)-11(3) A-	0.06	Sgr B2	BTL	7m	Cum85
	104391.65 *(6)	<sup>34</sup> SO <sub>2</sub>	10(1,9)-10(0,10)	0.04	Sgr B2	BTL	7m	Cum85
	104408.903*(13)	HC <sub>2</sub> CHCN	11(5)-10(5)	0.08b	Sgr B2	BTL	7m	Cum85
	104410.48 (10)	CH <sub>3</sub> OH	10(4)-11(3) A+	b	Sgr B2	BTL	7m	Cum85
	104411.262*(13)	HC <sub>2</sub> CHCN	11(4,8)-10(4,7)	b	Sgr B2	BTL	7m	Cum85
	104411.485*(13)	HC <sub>2</sub> CHCN	11(4,7)-10(4,6)	b	Sgr B2	BTL	7m	Cum85
	104419.308*(15)	HC <sub>2</sub> CHCN	11(6)-10(6)	b	Sgr B2	BTL	7m	Cum85
	104432.793*(15)	HC <sub>2</sub> CHCN	11(3,9)-10(3,8)	0.04b	Sgr B2	BTL	7m	Cum85
	104437.516*(17)	HC <sub>2</sub> CHCN	11(7)-10(7)	b	Sgr B2	BTL	7m	Cum85
	104453.927*(15)	HC <sub>2</sub> CHCN	11(3,8)-10(3,7)	0.06	Sgr B2	BTL	7m	Cum85
	104487.220*(9)	CH <sub>3</sub> CH <sub>2</sub> OH	7(0,7)-6(1,6)	0.20	Sgr B2	BTL	7m	Cum85
U	104589.	unidentified		0.15x	Sgr B2	NRAO	11m	Lis78
	104616.975*(55)	H <sub>2</sub> CS	3(1,2)-2(1,1)	0.77	Sgr B2	NRAO	11m	Lis78
	104666.56 *(2)	C <sub>2</sub> H	11-10 J=23/2-21/2	0.10	IRC+10216	NRAO	11m	Gue78
	104705.10 *(2)	C <sub>2</sub> H	11-10 J=21/2-19/2	0.10	IRC+10216	NRAO	11m	Gue78
	104711.385*(20)	<sup>13</sup> C <sup>18</sup> O	1-0	n.r.	OriMC-2	NRAO	11m	Wan76
	104808.620*(11)	CH <sub>3</sub> CH <sub>2</sub> OH	5(1,5)-4(0,4)	0.18	Sgr B2	NRAO	11m	Zuc75
U	104874.8 (10)	unidentified		0.12	Sgr B2	BTL	7m	Cum85
	104960.550*(16)	HC <sub>2</sub> CHCN?	11(2,9)-10(2,8)	0.06	Sgr B2	BTL	7m	Cum85
	105063.70 (10)	CH <sub>3</sub> OH	13(1)-12(2)	0.55	OriMC-1	FCRAO	14m	Gol83
	105464.221 (6)	NH <sub>2</sub> CHO	5(0,5)-4(0,4)	0.31	Sgr B2	BTL	7m	Cum85
	105469.303*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(0,12)-11(0,11)	0.2	OriMC-1	NRAO	11m	Kui77
U	105540.	unidentified		0.05	OriMC-1	OSO	20m	Joh84
	105558.077*(4)	HNCS	9(0,9)-8(0,8)	0.05	Sgr B2	BTL	7m	Fre79
	105576.35 (10)	CH <sub>3</sub> OH	14(-2)-14(1) E	0.2n	OriMC-1	NRAO	11m	Kui77
U	105590.	unidentified		0.15	OriMC-1	OSO	20m	Joh84
	105768.60 *(43)	CH <sub>3</sub> OCH <sub>3</sub>	13(1,12)-13(0,13) EA+AE	b	OriMC-1	OSO	20m	Joh84
	105770.50 *(26)	CH <sub>3</sub> OCH <sub>3</sub>	13(1,12)-13(0,13) EE	0.20b	OriMC-1	OSO	20m	Joh84
	105772.41 *(12)	CH <sub>3</sub> OCH <sub>3</sub>	13(1,12)-13(0,13) AA	b	OriMC-1	OSO	20m	Joh84
	105794.057*(58)	CH <sub>2</sub> NH	4(0,4)-3(1,3)	0.27b	Sgr B2	BTL	7m	Cum85
	105799.093*(10)	H <sup>13</sup> CCCN	12-11	b	Sgr B2	BTL	7m	Cum85
	105799.093*(10)	H <sup>13</sup> CCCN	12-11	0.10	OriMC-1	OSO	20m	Joh84
	105972.601*(14)	NH <sub>2</sub> CHO	5(2,4)-4(2,3)	0.1o	Sgr B2	NRAO	11m	Got78a
	106134.430*(25)	NH <sub>2</sub> CHO	5(3,3)-4(3,2)	0.10b	Sgr B2	BTL	7m	Cum85
	106141.403*(25)	NH <sub>2</sub> CHO	5(3,2)-4(3,1)	b	Sgr B2	BTL	7m	Cum85
U	106348.0 (5)	unidentified		0.19	Sgr B2	BTL	7m	Cum85
	106498.911*(5)	HC <sub>3</sub> N	40-39	0.04	Sgr B2	BTL	7m	Cum85
	106541.683*(14)	NH <sub>2</sub> CHO	5(2,3)-4(2,2)	0.15	Sgr B2	BTL	7m	Cum85
	106641.394*(17)	HC <sub>2</sub> CHCN	11(1,10)-10(1,9)	0.05	Sgr B2	BTL	7m	Cum85
	106723.410*(18)	CH <sub>3</sub> CH <sub>2</sub> OH?	9(2,8)-9(1,9)	0.06	Sgr B2	BTL	7m	Cum85
	106743.365*(36)	<sup>34</sup> SO	2(3)-1(2)	0.16d	OriMC-1	NRAO	11m	Got78
	106777.52 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	9(1,8)-8(2,7) EE	0.05	Sgr B2	BTL	7m	Cum85
	106787.38 *(4)	OC <sup>34</sup> S	9-8	0.089	Sgr B2	BTL	7m	Gol81
	106913.36 (19)	HOCO <sup>+</sup>	5(0,5)-4(0,4)	0.4	Sgr B2	BTL	7m	Tha81
	106922.945*(49)	<sup>29</sup> SiS	6-5	0.012	IRC+10216	BTL	7m	Hen85
	107013.85 (10)	CH <sub>3</sub> OH	3(1)-4(0) A+	4.5	OriMC-1	FCRAO	14m	Gol83
	107043.524*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(2,11)-11(2,10)	0.05	Sgr B2	BTL	7m	Cum85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
107060.323*(35)	SO <sub>2</sub>	27(3,25)-26(4,22)	0.07	Sgr B2	BTL	7m	Cum85
107178.486*(31)	<sup>13</sup> CH <sub>3</sub> CN	6(3)-5(3)	0.04b	Sgr B2	BTL	7m	Cum85
107188.545*(31)	<sup>13</sup> CH <sub>3</sub> CN	6(2)-5(2)	b	Sgr B2	BTL	7m	Cum85
107194.580*(32)	<sup>13</sup> CH <sub>3</sub> CN	6(1)-5(1)	b	Sgr B2	BTL	7m	Cum85
107196.592*(32)	<sup>13</sup> CH <sub>3</sub> CN	6(0)-5(0)	0.07b	Sgr B2	BTL	7m	Cum85
107316.46 *(10)	CH <sub>3</sub> SH	3(-1)-3(0) A	0.04	Sgr B2	BTL	7m	Cum85
107485.178*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(7,5)-11(7,4)	b	Sgr B2	BTL	7m	Cum85
107485.178*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(7,6)-11(7,5)	0.05b	Sgr B2	BTL	7m	Cum85
107486.961*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(6,6)-11(6,5)	b	Sgr B2	BTL	7m	Cum85
107486.961*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(6,7)-11(6,6)	b	Sgr B2	BTL	7m	Cum85
107491.573*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(8,4)-11(8,3)	b	Sgr B2	BTL	7m	Cum85
107491.573*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(8,5)-11(8,4)	b	Sgr B2	BTL	7m	Cum85
107502.426*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(5,8)-11(5,7)	0.05b	Sgr B2	BTL	7m	Cum85
107502.474*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(5,7)-11(5,6)	b	Sgr B2	BTL	7m	Cum85
107519.934*(17)	CH <sub>3</sub> CH <sub>2</sub> CN?	12(10,2)-11(10,1)	0.03b	Sgr B2	BTL	7m	Cum85
107519.934*(17)	CH <sub>3</sub> CH <sub>2</sub> CN?	12(10,3)-11(10,2)	b	Sgr B2	BTL	7m	Cum85
107537.27 *(40)	HCOOCH <sub>3</sub>	9(2,8)-8(2,7) E	0.07b	Sgr B2	BTL	7m	Cum85
107543.66 *(7)	HCOOCH <sub>3</sub>	9(2,8)-8(2,7) A	b	Sgr B2	BTL	7m	Cum85
107543.926*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(4,9)-11(4,8)	b	Sgr B2	BTL	7m	Cum85
107547.601*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	12(4,8)-11(4,7)	b	Sgr B2	BTL	7m	Cum85
107594.049*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(3,10)-11(3,9)	0.06	Sgr B2	BTL	7m	Cum85
107734.741*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(3,9)-11(3,8)	0.04	Sgr B2	BTL	7m	Cum85
107843.508*(11)	SO <sub>2</sub>	12(4,8)-13(3,11)	0.06	Sgr B2	BTL	7m	Cum85
108126.71 *(1)	HCOOH	5(1,5)-4(1,4)	0.06	Sgr B2	BTL	7m	Cum85
108651.297 (50)	<sup>13</sup> CN	1/2-1/2 $F=2-1, F_1=0, F_2=1-0$	0.07	Sgr B2	BTL	7m	Ger84
108657.646 (50)	<sup>13</sup> CN	1/2-1/2 $F=2-2, F_1=1, F_2=1-1$	0.07b	Sgr B2	BTL	7m	Ger84
108658.948 (50)	<sup>13</sup> CN	1/2-1/2 $F=1-2, F_1=1, F_2=1-1$	b	Sgr B2	BTL	7m	Ger84
108710.523*(11)	HC <sup>13</sup> CCN	12-11	0.15	Sgr B2	BTL	7m	Cum85
108721.008*(7)	HCC <sup>13</sup> CN	12-11	0.15	Sgr B2	BTL	7m	Cum85
108780.201 (50)	<sup>13</sup> CN	3/2-1/2 $F=3-2, F_1=1, F_2=2-1$	0.13b	Sgr B2	BTL	7m	Ger84
108782.374 (50)	<sup>13</sup> CN	3/2-1/2 $F=2-1, F_1=1, F_2=2-1$	b	Sgr B2	BTL	7m	Ger84
108786.982 (50)	<sup>13</sup> CN	3/2-1/2 $F=1-0, F_1=1, F_2=2-1$	b	Sgr B2	BTL	7m	Ger84
108834.27 *(3)	C <sub>3</sub> N	11-10 $J=23/2-21/2$	0.45	IRC+10216	OSO	20m	Joh84
108853.02 *(3)	C <sub>3</sub> N	11-10 $J=21/2-19/2$	0.45	IRC+10216	OSO	20m	Joh84
108893.94 (10)	CH <sub>3</sub> OH	0(0)-1(-1) E	0.98	Sgr B2	BTL	7m	Cum85
108924.267*(48)	SiS	6-5	0.28	IRC+10216	NRAO	11m	Mor75
109110.844*(4)	O <sup>13</sup> CS	9-8	0.08	Sgr B2	BTL	7m	Cum85
109136.81 (10)	CH <sub>3</sub> OH	unassigned or 14(5)-15(4) E	0.3	OriMC-1	FCRAO	14m	Gol82
109153.19 (10)	CH <sub>3</sub> OH	16(-2)-16(1) E	0.3	OriMC-1	FCRAO	14m	Gol82
109160.984*(5)	HC <sub>3</sub> N	41-40	0.018	IRC+10216	NRAO	11m	Jew84
109173.634 (4)	HC <sub>3</sub> N	12-11	2.57	Sgr B2	NRAO	11m	Mor76
109252.184*(36)	SO	2(3)-1(2)	2.42m	OriMC-1	MMWO	4.9m	Gol78
109352.726*(38)	HC <sub>3</sub> N $\nu_7=1$	12-11 1e	0.02	OriMC-1	FCRAO	14m	Gol84
109441.944*(30)	HC <sub>3</sub> N $\nu_7=1$	12-11 1e	0.13	OriMC-1	FCRAO	14m	Gol82
109463.063*(1)	OCS	9-8	0.70	Sgr B2	NRAO	11m	Jef71
109496.007*(4)	HNCO	5(1,5)-4(1,4)	0.16	OriMC-1	FCRAO	14m	Gol82
109598.751*(30)	HC <sub>3</sub> N $\nu_7=1$	12-11 1f	0.19	OriMC-1	FCRAO	14m	Gol84
109650.305*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	12(1,11)-11(1,10)	0.07	OriMC-1	NRAO	11m	Joh77
U 109738.5	unidentified		0.02	OriMC-1	FCRAO	14m	Gol83
109753.504*(8)	NH <sub>2</sub> CHO	5(1,4)-4(1,3)	0.3	Sgr B2	BTL	7m	Lin81
109757.633*(15)	SO <sub>2</sub>	17(5,13)-18(4,14)	0.30	OriMC-1	FCRAO	14m	Gol82
U 109770.5	unidentified		0.03	OriMC-1	FCRAO	14m	Gol83
109782.160*(20)	C <sup>18</sup> O	1-0	2.1	OriMC-1	NRAO	11m	Uli76
109833.489*(6)	HNCO	5(3,3)-4(3,2)	b	OriMC-1	FCRAO	14m	Gol82
109833.489*(6)	HNCO	5(3,2)-4(3,1)	0.03b	OriMC-1	FCRAO	14m	Gol82
109862.828*(46)	HC <sub>3</sub> N $\nu_7=2$	12-11 0	0.02b	OriMC-1	FCRAO	14m	Gol83
109865.854*(55)	HC <sub>3</sub> N $\nu_7=2$	12-11 2e	b	OriMC-1	FCRAO	14m	Gol83
109872.366*(5)	HNCO	5(2,4)-4(2,3)	0.09b	OriMC-1	FCRAO	14m	Gol82
109872.773*(5)	HNCO	5(2,3)-4(2,2)	b	OriMC-1	FCRAO	14m	Gol82
109905.753*(5)	HNCO	5(0,5)-4(0,4)	1.1	Sgr B2	NRAO	11m	Sol73
110152.084 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=0-1$	b	DR21(OH)	OSO	20m	Olb85
110152.995 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=2-1$	b	DR21(OH)	OSO	20m	Olb85
110153.599 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup>	0.14	OriMC-1	NRAO	11m	Kui78
110153.599 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=2-2$	0.11b	DR21(OH)	OSO	20m	Olb85
110153.599 (10)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=1-1$	b	DR21(OH)	OSO	20m	Olb85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
110154.222 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=1-2$	b	DR21(OH)	OSO	20m	Olb85	Bes83
110155.053 (20)	NH <sub>2</sub> D	1(1,1)0 <sup>-</sup> -1(0,1)0 <sup>+</sup> $F=1-0$	b	DR21(OH)	OSO	20m	Olb85	Bes83
110201.353*(9)	<sup>13</sup> CO	1-0	9.3	OriMC-1	NRAO	11m	Uli76	
110298.098*(4)	HNCO	5(1,4)-4(1,3)	0.23	Sgr B2	BTL	7m	Cum85	
110326.78 *(3)	CH <sub>3</sub> <sup>13</sup> CN	6(1)-5(1)	b	Sgr B2	BTL	7m	Cum85	
110328.89 *(3)	CH <sub>3</sub> <sup>13</sup> CN	6(0)-5(0)	b	Sgr B2	BTL	7m	Cum85	
110330.627*(3)	CH <sub>3</sub> CN	6(5)-5(5) $F=7-6$	0.2bk	Sgr B2	NRAO	11m	Sol71	
110330.872*(2)	CH <sub>3</sub> CN	6(5)-5(5) $F=5-4$	b	Sgr B2	NRAO	11m	Sol71	
110349.659*(2)	CH <sub>3</sub> CN	6(4)-5(4) $F=7-6$	0.45b	Sgr B2	NRAO	11m	Sol73	
110349.797*(2)	CH <sub>3</sub> CN	6(4)-5(4) $F=5-4$	b	Sgr B2	NRAO	11m	Sol73	
110364.469*(1)	CH <sub>3</sub> CN	6(3)-5(3) $F=7-6$	0.31b	Sgr B2	NRAO	11m	Sol73	
110364.524*(1)	CH <sub>3</sub> CN	6(3)-5(3) $F=5-4$	b	Sgr B2	NRAO	11m	Sol73	
110375.052*(1)	CH <sub>3</sub> CN	6(2)-5(2) $F=7-6$	0.81	Sgr B2	NRAO	11m	Sol73	
110381.404*(1)	CH <sub>3</sub> CN	6(1)-5(1) $F=7-6$	1.09b	Sgr B2	NRAO	11m	Sol73	
110383.522*(1)	CH <sub>3</sub> CN	6(0)-5(0) $F=7-6$	b	Sgr B2	NRAO	11m	Sol73	
110535.11 *(8)	HCOOCH <sub>3</sub>	9(7,2)-8(7,1) A	b	Sgr B2	BTL	7m	Cum85	
110535.11 *(8)	HCOOCH <sub>3</sub>	9(7,3)-8(7,2) A	0.03b	Sgr B2	BTL	7m	Cum85	
110536.99 *(48)	HCOOCH <sub>3</sub>	9(7,3)-8(7,2) E	b	Sgr B2	BTL	7m	Cum85	
110609.554*(60)	CH <sub>3</sub> CN $\nu_8=1$	6(1)-5(1) $\ell=1$	0.06	OriMC-1	FCRAO	14m	Gol83	
110652.72 *(45)	HCOOCH <sub>3</sub>	9(6,3)-8(6,2) E	0.10	OriMC-1	FCRAO	14m	Gol83	
110663.09 *(45)	HCOOCH <sub>3</sub>	9(6,4)-8(6,3) E	b	OriMC-1	FCRAO	14m	Gol83	
127428.307*(35)	SO <sub>2</sub> ?	28(4,24)-27(5,23)	0.04	Sgr B2	BTL	7m	Cum85	
128020.53 (5)	HCS <sup>+</sup>	3-2	0.2	OriMC-1	BTL	7m	Tha81	Bog84
128102.791*(20)	NH <sub>2</sub> CHO	6(2,4)-5(2,3)	0.16	Sgr B2	BTL	7m	Cum85	
128294.89 (41)	HOCO <sup>+</sup>	6(0,6)-5(0,5)	0.4	Sgr B2	BTL	7m	Tha81	Tha81
128458.888*(44)	SiO	3-2 $\nu=2$	83e	OriMC-1	NRAO	11m	Sch82	
128605.091*(18)	SO <sub>2</sub>	12(2,10)-12(1,11)	0.58	OriMC-1	MMWO	4.9m	Lor84	
128622.14*(3)	C <sub>3</sub> N	13-12 $J=27/2-25/2$	0.097	IRC+10216	BTL	7m	Hen85	Got83
128636.948*(30)	<sup>29</sup> SiO	3-2	0.11	OriMC-1	MMWO	4.9m	Lor84	
128640.90*(3)	C <sub>3</sub> N	13-12 $J=25/2-23/2$	0.093	IRC+10216	BTL	7m	Hen85	Got83
128668.824*(59)	<sup>34</sup> SO <sub>2</sub>	8(2,6)-8(1,7)	0.06	OriMC-1	MMWO	4.9m	Lor84	
128689.620*(15)	CH <sub>3</sub> CH <sub>2</sub> OH	6(3,3)-6(2,4)	0.09b	Sgr B2	BTL	7m	Cum85	
128690.11 *(10)	CH <sub>3</sub> CN	7(6)-6(6)	0.07	OriMC-1	MMWO	4.9m	Lor84	
128690.112*(3)	CH <sub>3</sub> CN	7(6)-6(6)	b	Sgr B2	BTL	7m	Cum85	
U 128706.	unidentified		0.06y	OriMC-1	MMWO	4.9m	Lor84	
128713.183*(30)	CH <sub>3</sub> <sup>13</sup> CN	7(1)-6(1)	0.11b	Sgr B2	BTL	7m	Cum85	
128715.649*(32)	CH <sub>3</sub> <sup>13</sup> CN	7(0)-6(0)	b	Sgr B2	BTL	7m	Cum85	
128717.36 *(10)	CH <sub>3</sub> CN	7(5)-6(5)	0.09	OriMC-1	MMWO	4.9m	Lor84	
128739.67 *(10)	CH <sub>3</sub> CN	7(4)-6(4)	0.18	OriMC-1	MMWO	4.9m	Lor84	
128757.03 *(10)	CH <sub>3</sub> CN	7(3)-6(3)	0.39	OriMC-1	MMWO	4.9m	Lor84	
128769.440*(60)	CH <sub>3</sub> CN	7(2)-6(2)	0.38	OriMC-1	MMWO	4.9m	Lor84	
128776.886*(40)	CH <sub>3</sub> CN	7(1)-6(1)	0.52	OriMC-1	MMWO	4.9m	Lor84	
128779.369*(40)	CH <sub>3</sub> CN	7(0)-6(0)	0.62	OriMC-1	MMWO	4.9m	Lor84	
128812.86 (10)	HDCO	2(0,2)-1(0,1)	0.3	L134N	BTL	7m	Lan79	Dan78
129013.260*(4)	HNCS	11(0,11)-10(0,10)	0.06	Sgr B2	BTL	7m	Fre79	Yam79
129077.570*(12)	CH <sub>3</sub> CH <sub>2</sub> OH	3(2,2)-2(1,1)	0.13	Sgr B2	BTL	7m	Cum85	
129105.799*(9)	SO <sub>2</sub>	12(1,11)-11(2,10)	0.20	Sgr B2	BTL	7m	Cum85	
129138.898*(32)	SO	3(3)-2(2)	1.5	$\rho$ Oph A	MMWO	4.9m	Lor84b	
129219.221*(16)	HC <sub>2</sub> CHCN	14(1,14)-13(1,13)	0.05	Sgr B2	BTL	7m	Cum85	
129296.41 *(58)	HCOOCH <sub>3</sub>	10(2,8)-9(2,7) E	0.03	Sgr B2	BTL	7m	Cum85	
129310.08 *(10)	HCOOCH <sub>3</sub>	10(2,8)-9(2,7) A	0.05	Sgr B2	BTL	7m	Cum85	
129363.368*(35)	SiO	3-2 $\nu=1$	0.9	OriMC-1	MMWO	4.9m	Dav74	
129433.41 (10)	CH <sub>3</sub> OH	12(1)-11(2) A-	0.07	Sgr B2	BTL	7m	Cum85	Lee68
130010.11 *(80)	HCOOCH <sub>3</sub>	11(2,10)-10(2,9) E	0.04b	Sgr B2	BTL	7m	Cum85	
130016.66 *(14)	HCOOCH <sub>3</sub>	11(2,10)-10(2,9) A	b	Sgr B2	BTL	7m	Cum85	
130171.466*(32)	H <sub>2</sub> <sup>13</sup> CS	4(1,4)-3(1,3)	0.04	Sgr B2	BTL	7m	Cum85	
130268.702*(30)	SiO	3-2 $\nu=0$	1.34	OriMC-1	MMWO	4.9m	Dic76	
131014.837*(15)	SO <sub>2</sub>	12(1,11)-12(0,12)	0.25	Sgr B2	BTL	7m	Cum85	
131102.971*(12)	CH <sub>3</sub> CH <sub>2</sub> OH	5(3,3)-5(2,4)	0.04	Sgr B2	BTL	7m	Cum85	
U 131134.0 (7)	unidentified		0.06	Sgr B2	BTL	7m	Cum85	
131267.478*(17)	HC <sub>2</sub> CHCN	14(0,14)-13(0,13)	0.09b	Sgr B2	BTL	7m	Cum85	
131274.915*(17)	SO <sub>2</sub>	16(5,11)-17(4,14)	b	Sgr B2	BTL	7m	Cum85	
131394.241*(5)	HNCO	6(1,6)-5(1,5)	0.18	OriMC-1	MMWO	4.9m	Lor84	
131405.84 *(2)	CH <sub>3</sub> OCH <sub>3</sub>	6(1,6)-5(0,5) EE	0.17	OriMC-1	MMWO	4.9m	Lor84	
131502.670*(15)	CH <sub>3</sub> CH <sub>2</sub> OH	6(3,4)-6(2,5)	0.05	Sgr B2	BTL	7m	Cum85	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_s$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
U 131552.3 (14)	unidentified		0.09	Sgr B2	BTL	7m	Cum85
131617.905*(13)	NH <sub>2</sub> CHO	6(1,5)-5(1,4)	0.23	Sgr B2	BTL	7m	Cum85
131799.292*(7)	HNCO	6(3,4)-5(3,3)	0.05b	Sgr B2	BTL	7m	Cum85
131799.292*(7)	HNCO	6(3,3)-5(3,2)	b	Sgr B2	BTL	7m	Cum85
131845.880*(5)	HNCO	6(2,5)-5(2,4)	0.06b	Sgr B2	BTL	7m	Cum85
131846.590*(6)	HNCO	6(2,4)-5(2,3)	b	Sgr B2	BTL	7m	Cum85
131885.740*(6)	HNCO	6(0,6)-5(0,5)	3.41	Sgr B2	BTL	7m	Cum85
132089.902*(80)	H <sub>2</sub> <sup>13</sup> CS	4(0,4)-3(0,3)	0.08	Sgr B2	BTL	7m	Cum85
132105.6 *(11)	HCOOCH <sub>3</sub>	12(1,12)-11(1,11) E	0.10b	Sgr B2	BTL	7m	Cum85
132107.03 *(19)	HCOOCH <sub>3</sub>	12(1,12)-11(1,11) A	b	Sgr B2	BTL	7m	Cum85
132113.983*(74)	<sup>34</sup> SO <sub>2</sub> ?	12(1,11)-12(0,12)	b	Sgr B2	BTL	7m	Cum85
132245.2 *(11)	HCOOCH <sub>3</sub>	12(0,12)-11(0,11) E	0.18b	Sgr B2	BTL	7m	Cum85
132246.385*(13)	H <sup>13</sup> CCCN	15-14	b	Sgr B2	BTL	7m	Cum85
132246.56 *(19)	HCOOCH <sub>3</sub>	12(0,12)-11(0,11) A	b	Sgr B2	BTL	7m	Cum85
132356.711*(5)	HNCO	6(1,5)-5(1,4)	0.19	Sgr B2	BTL	7m	Cum85
132524.590*(15)	HC <sub>2</sub> CHCN	14(2,13)-13(2,12)	0.15b	Sgr B2	BTL	7m	Cum85
132525.39 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	8(0,8)-7(1,7) EE	b	Sgr B2	BTL	7m	Cum85
132621.94 (10)	CH <sub>3</sub> OH	6(2)-7(1) A-	0.12	Sgr B2	BTL	7m	Cum85
132744.808*(22)	SO <sub>2</sub>	14(2,12)-14(1,13)	0.57	OriMC-1	NRAO	11m	Pic79
132890.79 (10)	CH <sub>3</sub> OH	6(-1)-5(0) E	2.07	Sgr B2	BTL	7m	Cum85
132917.762*(12)	HC <sub>2</sub> CHCN	14(4,11)-13(4,10)	0.11b	Sgr B2	BTL	7m	Cum85
132919.017*(12)	HC <sub>2</sub> CHCN	14(4,10)-13(4,9)	b	Sgr B2	BTL	7m	Cum85
132921.92 *(80)	HCOOCH <sub>3</sub>	11(1,10)-10(1,9) E	b	Sgr B2	BTL	7m	Cum85
132928.60 *(14)	HCOOCH <sub>3</sub>	11(1,10)-10(1,9) A	b	Sgr B2	BTL	7m	Cum85
132935.070*(12)	CH <sub>3</sub> CH <sub>2</sub> OH	3(2,1)-2(1,2)	b	Sgr B2	BTL	7m	Cum85
133605.50 (10)	CH <sub>3</sub> OH	5(-2)-6(-1) E	0.19	Sgr B2	BTL	7m	Cum85
133785.897*(1)	OCS	11-10	1.49	OriMC-1	BTL	7m	Gol81
133829.5 *(11)	CH <sub>3</sub> CHO	7(0,7)-6(0,6) E	0.16	Sgr B2	BTL	7m	Cum85
133853.87 *(15)	CH <sub>3</sub> CHO	7(0,7)-6(0,6) A	0.15	Sgr B2	BTL	7m	Cum85
134004.804*(11)	SO <sub>2</sub>	8(2,6)-8(1,7)	0.65	OriMC-1	MMWO	4.9m	Pic79
134231.12 (10)	CH <sub>3</sub> OH	12(-3)-13(-2) E	0.24	OriMC-1	MMWO	4.9m	Lor84a
134284.91 *(17)	HDCO	2(1,1)-1(1,0)	0.19	OriMC-1	MMWO	4.9m	Lor84a
135298.134*(75)	H <sub>2</sub> CS	4(1,4)-3(1,3)	0.64	OriMC-1	MMWO	4.9m	Van84
135696.011*(8)	SO <sub>2</sub>	5(1,5)-4(0,4)	1.5	$\rho$ Oph	MMWO	4.9m	Got78
135775.633*(42)	<sup>34</sup> SO	4(3)-3(2)	0.62	$\rho$ Oph A	MMWO	4.9m	Lor85
135775.633*(42)	<sup>34</sup> SO	4(3)-3(2)	0.6	$\rho$ Oph A	MMWO	4.9m	Lor84b
U 136250.7 (11)	unidentified		0.04	Sgr B2	BTL	7m	Cum85
136280.0 *(8)	HCOOCH <sub>3</sub>	11(4,8)-10(4,7) E	0.12b	Sgr B2	BTL	7m	Cum85
136282.47 *(13)	HCOOCH <sub>3</sub>	11(4,8)-10(4,7) A	b	Sgr B2	BTL	7m	Cum85
U 136387.8 (15)	unidentified		0.05	Sgr B2	BTL	7m	Cum85
136464.400*(2)	HC <sub>3</sub> N	15-14	1.5	Sgr B2	MMWO	4.9m	Mor77
136541.301*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	15(1,14)-14(1,13)	0.10	Sgr B2	BTL	7m	Cum85
136634.682*(68)	SO	5(6)-5(5)	0.4	OriMC-1	MMWO	4.9m	Mun84
136704.502*(1)	CH <sub>3</sub> CCH	8(3)-7(3)	0.17	OriMC-1	MMWO	4.9m	Mun84
136717.560*(1)	CH <sub>3</sub> CCH	8(2)-7(2)	0.20	OriMC-1	MMWO	4.9m	Mun84
136725.397*(1)	CH <sub>3</sub> CCH	8(1)-7(1)	0.41	OriMC-1	MMWO	4.9m	Mun84
136728.010*(1)	CH <sub>3</sub> CCH	8(0)-7(0)	0.42	OriMC-1	MMWO	4.9m	Mun84
136799.703*(30)	HC <sub>3</sub> N $\nu_7=1$	15-14 1e	0.09	Sgr B2	BTL	7m	Cum85
137180. (1)	SiC <sub>2</sub>	6(0,6)-5(0,5)	0.138	IRC+10216	BTL	7m	Tha84
137369.315*(98)	H <sub>2</sub> CS	4(3,2)-3(3,1)	0.12b	OriMC-1	MMWO	4.9m	Van84
137369.346*(98)	H <sub>2</sub> CS	4(3,1)-3(3,0)	b	OriMC-1	MMWO	4.9m	Van84
137371.043*(84)	H <sub>2</sub> CS	4(0,4)-3(0,3)	0.37	OriMC-1	MMWO	4.9m	Van84
137381.956*(64)	H <sub>2</sub> CS	4(2,3)-3(2,2)	0.10	OriMC-1	MMWO	4.9m	Van84
137411.803*(64)	H <sub>2</sub> CS	4(2,2)-3(2,1)	0.09	OriMC-1	MMWO	4.9m	Van84
137449.959*(6)	H <sub>2</sub> <sup>13</sup> CO	2(1,2)-1(1,1)	0.2	OriMC-1	MMWO	4.9m	Kut76
137449.959*(6)	H <sub>2</sub> <sup>13</sup> CO	2(1,2)-1(1,1)	0.31	OriMC-1	BTL	7m	Kah84
137903.06 (10)	CH <sub>3</sub> OH	7(-4)-8(-3) E	0.8	OriMC-1	BTL	7m	Woo84
138178.648*(42)	SO	4(3)-3(2)	2.0	OriMC-1	MMWO	4.9m	Got73b
138284.2 *(11)	CH <sub>3</sub> CHO	7(1,6)-6(1,5) E	0.15	Sgr B2	BTL	7m	Cum85
138319.43 *(16)	CH <sub>3</sub> CHO	7(1,6)-6(1,5) A	0.14	Sgr B2	BTL	7m	Cum85
138351.055*(14)	CH <sub>3</sub> CH <sub>2</sub> CN?	16(1,16)-15(1,15)	0.15	Sgr B2	BTL	7m	Cum85
138739.309*(29)	<sup>13</sup> CS	3-2	0.5	OriMC-1	MMWO	4.9m	Wil71
139483.466*(75)	H <sub>2</sub> CS	4(1,3)-3(1,2)	0.17	$\rho$ Oph B1	MMWO	4.9m	Lor84a
139953.62 *(72)	NH <sub>2</sub> CN	7(0,7)-6(0,6)	0.08	Sgr B2	BTL	7m	Cum85
140033.50 (10)	CH <sub>3</sub> OH?	unassigned	0.03	Sgr B2	BTL	7m	Cum85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*$ (K) $T_a^*$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
140127.473*(48)	CH <sub>2</sub> CO	7(1,7)–6(1,6)	0.15	Sgr B2	BTL	7m	Cum85	
140151.08 (10)	CH <sub>3</sub> OH	18(0)–18(-1) E	0.05	Sgr B2	BTL	7m	Cum85	Lee68
140306.164*(9)	SO <sub>2</sub>	6(2,4)–6(1,5)	0.75	OriMC-1	MMWO	4.9m	Pic79	
140423.83 (4)	<sup>13</sup> CH <sub>3</sub> OH?	3(1)–2(1) A+	0.05b	Sgr B2	BTL	7m	Cum85	Haq74
140429.438*(17)	HC <sub>2</sub> CHCN	15(0,15)–14(0,14)	b	Sgr B2	BTL	7m	Cum85	
U 140687.3 (16)	unidentified		0.07	Sgr B2	BTL	7m	Cum85	
140740.379*(4)	HNCS	12(0,12)–11(0,11)	0.05	Sgr B2	BTL	7m	Fre79	Yam79
140839.518*(7)	H <sub>2</sub> CO	2(1,2)–1(1,1)	4.5	OriMC-1	MMWO	4.9m	Kut76	
140877.42 *(70)	NH <sub>2</sub> CN	7(1,6)–6(1,5)	0.05	Sgr B2	BTL	7m	Cum85	
U 140902.2 (14)	unidentified		0.07	Sgr B2	BTL	7m	Cum85	
140918. (1)	SiC <sub>2</sub>	6(2,5)–5(2,4)	0.123	IRC+10216	BTL	7m	Tha84	
141061.797*(15)	H <sup>13</sup> CCCN	16–15	0.07	Sgr B2	BTL	7m	Cum85	
141244.04 *(80)	HCOOCH <sub>3</sub>	11(3,8)–10(3,7) E	0.5	OriMC-1	NRAO	11m	Wil81	
141260.28 *(14)	HCOOCH <sub>3</sub>	11(3,8)–10(3,7) A	0.4	OriMC-1	NRAO	11m	Wil81	
141595.48 (5)	<sup>13</sup> CH <sub>3</sub> OH	3(0)–2(0) E	0.44b	Sgr B2	BTL	7m	Cum85	Haq74
141597.06 (5)	<sup>13</sup> CH <sub>3</sub> OH	3(-1)–2(-1) E	b	Sgr B2	BTL	7m	Cum85	Haq74
141602.53 (4)	<sup>13</sup> CH <sub>3</sub> OH	3(0)–2(0) A+	b	Sgr B2	BTL	7m	Cum85	Haq74
141636.055 (60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=13/2–11/2	0.042	IRC+10216	BTL	7m	Tha85	Tha85
141709.128 (60)	C <sub>3</sub> H	<sup>2</sup> Π <sub>1/2</sub> J=13/2–11/2	0.062	IRC+10216	BTL	7m	Tha85	Tha85
141751. (1)	SiC <sub>2</sub>	6(4,3)–5(4,2)	0.064	IRC+10216	BTL	7m	Tha84	
141755. (1)	SiC <sub>2</sub>	6(4,2)–5(4,1)	0.064	IRC+10216	BTL	7m	Tha84	
141983.748*(6)	H <sub>2</sub> <sup>13</sup> CO	2(0,2)–1(0,1)	0.21	OriMC-1	BTL	7m	Kah84	
142285.061*(17)	CH <sub>3</sub> CH <sub>2</sub> OH	9(0,9)–8(1,8)	0.14	Sgr B2	BTL	7m	Cum85	
142346.314*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	16(2,15)–15(2,14)	0.07	Sgr B2	BTL	7m	Cum85	
142379.431*(3)	OC <sup>34</sup> S	12–11	0.08	Sgr B2	BTL	7m	Cum85	
142399.489*(14)	HC <sub>2</sub> CHCN	15(5,11)–14(5,10)	0.07b	Sgr B2	BTL	7m	Cum85	
142399.510*(14)	HC <sub>2</sub> CHCN	15(5,10)–14(5,9)	b	Sgr B2	BTL	7m	Cum85	
142401.867*(16)	HC <sub>2</sub> CHCN	15(6)–14(6)	b	Sgr B2	BTL	7m	Cum85	
142419.704*(19)	HC <sub>2</sub> CHCN	15(7)–14(7)	0.06b	Sgr B2	BTL	7m	Cum85	
142424.454*(13)	HC <sub>2</sub> CHCN	15(4,12)–14(4,11)	b	Sgr B2	BTL	7m	Cum85	
142426.506*(13)	HC <sub>2</sub> CHCN	15(4,11)–14(4,10)	b	Sgr B2	BTL	7m	Cum85	
142447.936*(21)	HC <sub>2</sub> CHCN?	15(8)–14(8)	0.07	Sgr B2	BTL	7m	Cum85	
142701.329*(18)	NH <sub>2</sub> CHO	7(1,7)–6(1,6)	0.11	Sgr B2	BTL	7m	Cum85	
142733.7 *(10)	HCOOCH <sub>3</sub>	13(1,13)–12(1,12) E	0.05b	Sgr B2	BTL	7m	Cum85	Cum85
142735.13 *(10)	HCOOCH <sub>3</sub>	13(1,13)–12(1,12) A	b	Sgr B2	BTL	7m	Cum85	Plu84
142768.884*(48)	CH <sub>2</sub> CO	7(1,6)–6(1,5)	0.11	Sgr B2	BTL	7m	Cum85	
142807.66 (4)	<sup>13</sup> CH <sub>3</sub> OH?	3(1)–2(1) A-	b	Sgr B2	BTL	7m	Cum85	Haq74
142815.6 *(10)	HCOOCH <sub>3</sub>	13(0,13)–12(0,12) E	0.04b	Sgr B2	BTL	7m	Cum85	Cum85
142817.02 *(10)	HCOOCH <sub>3</sub>	13(0,13)–12(0,12) A	b	Sgr B2	BTL	7m	Cum85	Plu84
143057.058*(28)	SO <sub>2</sub>	16(2,14)–16(1,15)	0.57	OriMC-1	MMWO	4.9m	Pic79	
U 143603.06 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	7(3,4)–7(2,5) EE	0.08	Sgr B2	BTL	7m	Cum85	
U 143768.4 (15)	unidentified		0.07z	Sgr B2	BTL	7m	Cum85	
143865.79 (10)	CH <sub>3</sub> OH	3(1)–2(1) A+	1.27	Sgr B2	BTL	7m	Cum85	Lee68
144077.321*(23)	DCO <sup>+</sup>	2–1	0.3	OriMC-1	MMWO	4.9m	Gue77a	
144241.96 (3)	DC <sub>2</sub>	2–1 J=5/2–3/2 F=7/2–5/2	0.13b	OriMC-1	BTL	7m	Vrt85	Vrt85
144243.05 (3)	DC <sub>2</sub>	2–1 J=5/2–3/2 F=5/2–3/2	b	OriMC-1	BTL	7m	Vrt85	Vrt85
144243.05 (3)	DC <sub>2</sub>	2–1 J=5/2–3/2 F=3/2–1/2	b	OriMC-1	BTL	7m	Vrt85	Vrt85
U 144244.5	unidentified		0.15	OriMC-1	BTL	7m	Vrt85	Vrt85
U 144244.8	unidentified		0.13	Sgr B2	NRAO	11m	Hol81	
144296.72 (8)	DC <sub>2</sub>	2–1 J=3/2–1/2 F=5/2–3/2	0.09	OriMC-1	BTL	7m	Vrt85	Vrt85
144617.147*(19)	C <sup>34</sup> S	3–2	1.2	OriMC-1	MMWO	4.9m	Wil76a	
144826.573*(2)	DCN	2–1 F <sub>1</sub> =2–2	b	OriMC-1	MMWO	4.9m	Pen77	DeL69
144826.8097(10)	DCN	2–1 F <sub>1</sub> =1–0 F=2–1	b	OriMC-1	MMWO	4.9m	Pen77	DeL69
144826.8414(10)	DCN	2–1 F <sub>1</sub> =1–0 F=1–1	b	OriMC-1	MMWO	4.9m	Pen77	DeL69
144828.000*(2)	DCN	2–1 F <sub>1</sub> =2–1	0.9b	OriMC-1	MMWO	4.9m	Pen77	DeL69
144828.109*(2)	DCN	2–1 F <sub>1</sub> =3–2	b	OriMC-1	MMWO	4.9m	Pen77	DeL69
144830.336*(2)	DCN	2–1 F <sub>1</sub> =1–1	b	OriMC-1	MMWO	4.9m	Pen77	DeL69
U 145075.9 (5)	unidentified		0.25	OriMC-1	NRAO	11m	Hol81	
145093.75 (10)	CH <sub>3</sub> OH	3(0)–2(0) E	1.25	OriMC-1	NRAO	11m	Kut73	Lee68
145097.47 (10)	CH <sub>3</sub> OH	3(-1)–2(-1) E	1.45	OriMC-1	NRAO	11m	Kut73	Lee68
145103.23 (10)	CH <sub>3</sub> OH	3(0)–2(0) A+	1.35	OriMC-1	NRAO	11m	Kut73	Lee68
145124.41 (10)	CH <sub>3</sub> OH	3(2)–2(2) A-	1.45b	OriMC-1	NRAO	11m	Kut73	Lee68
145126.37 (10)	CH <sub>3</sub> OH	3(2)–2(2) E, 3(-2)–3(-2) E	b	OriMC-1	NRAO	11m	Kut73	Lee68
145131.88 (10)	CH <sub>3</sub> OH	3(1)–2(1) E	1.25b	OriMC-1	NRAO	11m	Kut73	Lee68
145133.46 (10)	CH <sub>3</sub> OH	3(2)–2(2) A+	b	OriMC-1	NRAO	11m	Kut73	Lee68

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
145226.96*(13)	SiS	8-7	0.25	IRC+10216	BTL	7m	Hen85
145418.035*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	16(1,15)-15(1,14)	0.1	OriMC-1	BTL	7m	Woo84
145560.946*(2)	HC <sub>3</sub> N	16-15	0.8	Sgr B2	MMWO	4.9m	Mor77
145602.953*(10)	H <sub>2</sub> CO	2(0,2)-1(0,1)	1.9	OriMC-1	NRAO	11m	Tha71
145680.54*(14)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,2)-5(2,3) EE	0.1	OriMC-1	BTL	7m	Woo84
145755.620*(50)	C <sup>33</sup> S	3-2 $F=9/2-7/2$	0.2b	OriMC-1	MMWO	4.9m	Wil76a Bog81
145755.620*(50)	C <sup>33</sup> S	3-2 $F=7/2-5/2$	b	OriMC-1	MMWO	4.9m	Wil76a Bog81
145756.500*(50)	C <sup>33</sup> S	3-2 $F=5/2-3/2$	b	OriMC-1	MMWO	4.9m	Wil76a Bog81
145756.500*(50)	C <sup>33</sup> S	3-2 $F=3/2-1/2$	b	OriMC-1	MMWO	4.9m	Wil76a Bog81
145766.14 (10)	CH <sub>3</sub> OH	16(0)-16(-1) E	0.4	OriMC-1	BTL	7m	Woo84
145946.812 (2)	OCS	12-11	0.45	Sgr B2	NRAO	11m	Sol73 Dub80
146635.675*(6)	H <sub>2</sub> <sup>13</sup> CO	2(1,1)-1(1,0)	n.r.	OriMC-1	MMWO	4.9m	Wan76
U 146932.5 (10)	unidentified		0.6	OriMC-1	NRAO	11m	Hol81
146969.049*(23)	CS	3-2	8.1	OriMC-1	MMWO	4.9m	Lis75
146977.7*(11)	HCOOCH <sub>3</sub>	12(3,10)-11(3,9) E	~0.08	OriMC-1	MMWO	4.9m	Lor84
146987.85*(18)	HCOOCH <sub>3</sub>	12(3,10)-11(3,9) A	0.11	OriMC-1	MMWO	4.9m	Lor84
147024.94*(2)	CH <sub>3</sub> OCH <sub>3</sub>	7(1,6)-6(0,6) EE	0.20	OriMC-1	MMWO	4.9m	Lor84
147072.868 (64)	CH <sub>3</sub> CN	8(6)-7(6) $F=9-8$ , 7-6	0.08	OriMC-1	MMWO	4.9m	Lor84
147103.873*(62)	CH <sub>3</sub> CN	8(5)-7(5) $F=9-8$	0.12	OriMC-1	MMWO	4.9m	Lor84
147129.323*(62)	CH <sub>3</sub> CN	8(4)-7(4) $F=9-8$	0.16	OriMC-1	MMWO	4.9m	Lor84
147149.128*(62)	CH <sub>3</sub> CN	8(3)-7(3) $F=9-8$	0.32	OriMC-1	MMWO	4.9m	Lor84
147163.249*(60)	CH <sub>3</sub> CN	8(2)-7(2)	0.34	OriMC-1	MMWO	4.9m	Lor84
147171.757*(30)	CH <sub>3</sub> CN	8(1)-7(1)	0.50	OriMC-1	MMWO	4.9m	Lor84
147174.594*(30)	CH <sub>3</sub> CN	8(0)-7(0)	0.54	OriMC-1	MMWO	4.9m	Lor84
U 147243.	unidentified		0.12	OriMC-1	MMWO	4.9m	Lor84
150176.48 (4)	NO	<sup>2</sup> $\Pi_{1/2}$ $J=3/2-1/2$ $F=5/2-3/2(-+)$	0.25	Sgr B2	NRAO	11m	Lis78a Poy80
U 150328.0 (10)	unidentified		0.14	Sgr B2	NRAO	11m	Hol81
150381.139*(20)	SO <sub>2</sub>	15(5,11)-16(4,12)	0.25	Sgr B2	NRAO	11m	Hol80a
150439.12 (4)	NO	<sup>2</sup> $\Pi_{1/2}$ $J=3/2-1/2$ $F=3/2-3/2(+ -)$	0.15	OriMC-1	NRAO	11m	Hol80a Poy80
150498.339*(7)	H <sub>2</sub> CO	2(1,1)-1(1,0)	2.7	OriMC-1	NRAO	11m	Tha71
150546.52 (4)	NO	<sup>2</sup> $\Pi_{1/2}$ $J=3/2-1/2$ $F=5/2-3/2(+ -)$	0.25	Sgr B2	NRAO	11m	Lis78a Poy80
150601.0*(11)	HCOOCH <sub>3</sub>	12(4,8)-11(4,7) E	0.2	OriMC-1	BTL	7m	Woo84
150618.10*(18)	HCOOCH <sub>3</sub>	12(4,8)-11(4,7) A	0.2	OriMC-1	BTL	7m	Woo84
150820.66 (3)	C <sub>3</sub> H <sub>2</sub>	4(0,4)-3(1,3)	0.3	Sgr B2	NRAO	11m	Hol83a Tha85a
150851.91 (2)	C <sub>3</sub> H <sub>2</sub>	4(1,4)-3(0,3)	0.3	Sgr B2	NRAO	11m	Hol83a Tha85a
150884.58 (10)	CH <sub>3</sub> OH	12(-1)-11(-2) E n,t	1.5	Sgr B2	NRAO	11m	Sny80 Lee68
151378.667*(8)	SO <sub>2</sub>	2(2,0)-2(1,1)	0.32	$\rho$ Oph A	MMWO	4.9m	Lor85
152609.774 (50)	DNC	2-1	0.5	L134	MMWO	4.9m	Sne77 Cre76
153054.97*(3)	CH <sub>3</sub> OCH <sub>3</sub>	9(0,9)-8(1,8) EE	0.39	Sgr B2	NRAO	11m	Mer82
153432.18*(2)	NH <sub>2</sub> CHO	7(1,6)-6(1,5)	0.15	Sgr B2	NRAO	11m	Hol83a
U 153487.5 (5)	unidentified		0.13	Sgr B2	NRAO	11m	Hol81
153512.0 (10)	HCOOCH <sub>3</sub>	13(1,12)-12(1,11) E	0.1	OriMC-1	NRAO	11m	Hol83a
153518.689*(46)	HCOOCH <sub>3</sub>	13(1,12)-12(1,11) A	0.13	OriMC-1	NRAO	11m	Hol83a
153553.2*(11)	HCOOCH <sub>3</sub>	12(2,10)-11(2,9) E	0.13	OriMC-1	NRAO	11m	Hol83a
153566.72*(11)	HCOOCH <sub>3</sub>	12(2,10)-11(2,9) A	0.11	OriMC-1	NRAO	11m	Hol83a
U 153668.3 (10)	unidentified		0.08	Sgr B2	NRAO	11m	Hol81
153790.770*(2)	CH <sub>3</sub> CCH	9(3)-8(3)	0.23	Sgr B2	NRAO	11m	Hol81
153805.458*(1)	CH <sub>3</sub> CCH	9(2)-8(2)	0.18	Sgr B2	NRAO	11m	Hol81
153814.273*(1)	CH <sub>3</sub> CCH	9(1)-8(1)	b	Sgr B2	NRAO	11m	Hol81
153817.212*(1)	CH <sub>3</sub> CCH	9(0)-8(0)	0.59b	Sgr B2	NRAO	11m	Hol81
154217.20 (15)	N <sub>2</sub> D <sup>+</sup>	2-1	0.25	$\rho$ Oph B2	MMWO	4.9m	Lor84b Sas81
154425.78 (10)	CH <sub>3</sub> OH	11(0)-11(-1) E	1.42	OriMC-1	NRAO	11m	Hol81 Lee68
154657.283*(1)	HC <sub>3</sub> N	17-16	1.54	OriMC-1	NRAO	11m	Hol81
156488.95 (10)	CH <sub>3</sub> OH	8(0)-8(-1) E	1.1	OriMC-1	NRAO	11m	Hol81 Lee68
156602.42 (10)	CH <sub>3</sub> OH	2(1)-3(0) A +	1.5	OriMC-1	NRAO	11m	Hol81 Lee68
158971.814*(42)	SO	3(4)-2(3)	3.5	OriMC-1	NRAO	11m	Hol81
159888.873*(13)	CH <sub>3</sub> CH <sub>2</sub> CN	18(2,17)-17(2,16)	0.15	Sgr B2	NRAO	11m	Hol81
U 159915.6 (10)	unidentified		0.07	Sgr B2	NRAO	11m	Hol81
160827.843*(9)	SO <sub>2</sub>	10(0,10)-9(1,9)	2.4	OriMC-1	NRAO	11m	Hol81
163119.437*(21)	SO <sub>2</sub>	18(2,16)-17(3,15)	0.20	Sgr B2	NRAO	11m	Hol83a
163160.825*(53)	CH <sub>2</sub> CO	8(1,7)-7(1,6)	0.20	Sgr B2	NRAO	11m	Hol83a
163829.69*(50)	HCOOCH <sub>3</sub>	14(1,13)-13(1,12) E	0.35	OriMC-1	NRAO	11m	Sny85a
163835.48*(4)	HCOOCH <sub>3</sub>	14(1,13)-13(1,12) A	0.40	OriMC-1	NRAO	11m	Sny85a
U 163873. (1)	unidentified		0.15	OriMC-1	NRAO	11m	Sny85a
U 163902. (1)	unidentified		0.10	OriMC-1	NRAO	11m	Sny85a

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
163927.31 *( 5)	HCOOCH <sub>3</sub>	15(0,15)–14(1,14) A	0.15	OriMC-1	NRAO	11m	Sny85a	
168762.76237(2)	H <sub>2</sub> S	1(1,0)–1(0,1)	2.3	OriMC-1	NRAO	11m	Tha72	Cup68
168815.101*(36)	<sup>34</sup> SO	4(3)–3(3)	0.9	OriMC-1	NRAO	11m	Hol81	
169335.34 (10)	CH <sub>3</sub> OH	10(1)–10(0) E	0.7	OriMC-1	NRAO	11m	Wil72	Lee68
170742. ( 1)	SiC <sub>2</sub>	7(2,5)–6(2,4)	0.16	IRC + 10216	NRAO	11m	Tha84	
170876.405*( 2)	CH <sub>3</sub> CCH	10(3)–9(3)	0.2	OriMC-1	MMWO	4.9m	Mun84	
170892.722*( 2)	CH <sub>3</sub> CCH	10(2)–9(2)	0.31	OriMC-1	MMWO	4.9m	Mun84	
170902.514*( 1)	CH <sub>3</sub> CCH	10(1)–9(1)	0.51	OriMC-1	MMWO	4.9m	Mun84	
170905.779*( 1)	CH <sub>3</sub> CCH	10(0)–9(0)	0.58	OriMC-1	MMWO	4.9m	Mun84	
171275.166*(57)	SiO	4–3 $\nu=2$	87e	$\chi$ -Cyg	NRAO	11m	Sch82	
172107.956 (45)	HC <sup>15</sup> N	2–1	0.45	OriMC-1	NRAO	11m	Wil72	Pea76
172481.140*(45)	SiO	4–3 $\nu=1$	50e	$\chi$ -Cyg	NRAO	11m	Sch82	
172676.573 (50)	H <sup>13</sup> CN	2–1 $F=1-0,2-2$	b	OriMC-1	NRAO	11m	Wil72	Pea76
172677.959 (50)	H <sup>13</sup> CN	2–1 $F=2-1,3-2$	0.91b	OriMC-1	NRAO	11m	Wil72	Pea76
172680.209 (50)	H <sup>13</sup> CN	2–1 $F=1-1$	b	OriMC-1	NRAO	11m	Wil72	Pea76
173377.38 *(10)	HCO	2(0,2)–1(0,1) 5/2–3/2 $F=3-2$	0.12	OriMC-2	NRAO	11m	Sny85a	Sny85a
173391.211*(16)	CH <sub>3</sub> CH <sub>2</sub> OH	5(2,3)–4(1,4)	0.05	OriMC-2	NRAO	11m	Sny85a	
173406.08 *(10)	HCO	2(0,2)–1(0,1) 5/2–3/2 $F=2-1$	0.05	OriMC-2	NRAO	11m	Sny85a	Sny85a
173443.06 *(10)	HCO	2(0,2)–1(0,1) 3/2–1/2 $F=2-1$	0.06	OriMC-2	NRAO	11m	Sny85a	Sny85a
173688.254*(41)	SiO	4–3 $\nu=0$	65e	OriMC-1	NRAO	11m	Sch82	
183310.0906(15)	H <sub>2</sub> O	3(1,3)–2(2,0)	10	OriMC-1	KAO	1m	Wat77	Hui71
195954.249*(29)	CS	4–3	3.3	NGC2024	MMWO	4.9m	Mun84a	
U 202688.	unidentified		0.65	OriMC-1	NRAO	12m	Tur84a	
202763.47 *( 5)	H <sup>13</sup> CCCN	23–22	0.1	OriMC-1	NRAO	12m	Tur84a	
U 202815.	unidentified		0.15	OriMC-1	NRAO	12m	Tur84a	
203391.488*(15)	SO <sub>2</sub>	12(0,12)–11(1,11)	2.0	OriMC-1	MMWO	4.9m	Eri84	
U 205757.	unidentified		0.17	OriMC-1	NRAO	12m	Tur84a	
206131.627*( 6)	H <sub>2</sub> <sup>13</sup> CO	3(1,2)–2(1,2)	3.00	OriMC-1	FCRAO	14m	Eri84c	
206176.015*(40)	SO	4(5)–3(4)	9.00	OriMC-1	FCRAO	14m	Eri84c	
208700.338*(11)	SO <sub>2</sub>	3(2,2)–2(1,1)	0.5	$\rho$ Oph A	MMWO	4.9m	Lor84a	
209230.221*(26)	HC <sub>3</sub> N	23–22	0.7	OriMC-1	MMWO	4.9m	Lor81	
211013.011*(36)	<sup>34</sup> SO	5(5)–4(4)	0.45	OriMC-1	MMWO	4.9m	Tha84a	
211211.452*( 9)	H <sub>2</sub> CO	3(1,3)–2(1,2)	1.9	$\rho$ Oph B	MMWO	4.9m	Lor83	
213293.594*(29)	H <sub>2</sub> <sup>13</sup> CO	3(2,1)–2(2,0)	~0.5	OriMC-1	BTL	7m	Tha81	
213360.55 ( 8)	HCS <sup>+</sup>	5–4	0.6	OriMC-1	BTL	7m	Tha81	Bog84
U 213376.	unidentified	H <sub>2</sub> <sup>34</sup> S?	0.7	OriMC-1	BTL	7m	Tha81	
214088.570*(69)	SiO	5–4 $\nu=2$	110e	VX Sgr	MMWO	4.9m	Cle83	
215039.723*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	24(9,16)–23(9,15)	1.1b	OriMC-1	OVRO	10.4m	Sut85	
215039.723*(14)	CH <sub>3</sub> CH <sub>2</sub> CN	24(9,15)–23(9,14)	b	OriMC-1	OVRO	10.4m	Sut85	
215041.89 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(10,14)–23(10,13)	b	OriMC-1	OVRO	10.4m	Sut85	
215041.89 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(10,15)–23(10,14)	b	OriMC-1	OVRO	10.4m	Sut85	
215058.02 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(3,22)–23(3,21)	1.4b	OriMC-1	OVRO	10.4m	Sut85	
215058.58 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(8,16)–23(8,15)	b	OriMC-1	OVRO	10.4m	Sut85	
215058.58 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(8,17)–23(8,16)	b	OriMC-1	OVRO	10.4m	Sut85	
215059.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(11,14)–23(11,13)	b	OriMC-1	OVRO	10.4m	Sut85	
215059.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(11,13)–23(11,12)	b	OriMC-1	OVRO	10.4m	Sut85	
215088.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(12,12)–23(12,11)	b	OriMC-1	OVRO	10.4m	Sut85	
215088.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(12,13)–23(12,12)	0.6b	OriMC-1	OVRO	10.4m	Sut85	
215109.05 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(7,17)–23(7,16)	b	OriMC-1	OVRO	10.4m	Sut85	
215109.05 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(7,18)–23(7,17)	1.2b	OriMC-1	OVRO	10.4m	Sut85	
215119.22 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(0,25)–24(0,24)	1.1	OriMC-1	OVRO	10.4m	Sut85	
215126.72 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(13,12)–23(13,11)	0.5b	OriMC-1	OVRO	10.4m	Sut85	
215126.72 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(13,11)–23(13,10)	b	OriMC-1	OVRO	10.4m	Sut85	
215173.25 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(14,11)–23(14,10)	0.3b	OriMC-1	OVRO	10.4m	Sut85	
215173.25 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(14,10)–23(14,9)	b	OriMC-1	OVRO	10.4m	Sut85	
215211.53 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(6,19)–23(6,18)	b	OriMC-1	OVRO	10.4m	Sut85	
215212.47 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(6,18)–23(6,17)	b	OriMC-1	OVRO	10.4m	Sut85	
215220.649*(36)	SO	5(5)–4(4)	3.0	OriMC-1	MMWO	4.9m	Cle84	
215302.23 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	6(1)–7(2) A +	1.3	OriMC-1	OVRO	10.4m	Sut85	Sas84
215400.81 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(5,20)–23(5,19)	0.8	OriMC-1	OVRO	10.4m	Sut85	
215427.98 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(5,19)–23(5,18)	1.0	OriMC-1	OVRO	10.4m	Sut85	
215596.040*(55)	SiO	5–4 $\nu=1$	150e	VX Sgr	MMWO	4.9m	Cle83	
215620.19 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(4,21)–23(4,20)	0.6	OriMC-1	OVRO	10.4m	Sut85	
215839.903*(38)	<sup>34</sup> SO	6(5)–5(4)	0.50	OriMC-1	MMWO	4.9m	Sne84a	
U 215886.	unidentified		0.9	OriMC-1	OVRO	10.4m	Sut85	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
215965.59 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(1,25)–24(0,24)	0.3	OriMC-1	OVRO	10.4m	Sut85 •
215999.78 *(12)	<sup>34</sup> SO <sub>2</sub>	14(3,11)–14(2,12)	0.7	OriMC-1	OVRO	10.4m	Sut85
216077.20 *( 1)	CH <sub>3</sub> CH <sub>2</sub> CN	24(4,20)–23(4,19)	0.7	OriMC-1	OVRO	10.4m	Sut85
216109.7 *( 1)	HCOOCH <sub>3</sub>	19(2,18)–18(2,17) E	0.9	OriMC-1	OVRO	10.4m	Sut85
216112.623*(29)	DCO <sup>+</sup>	3–2	2.5	$\rho$ -Oph	MMWO	4.9m	Lor82
216115.48 *(10)	HCOOCH <sub>3</sub>	19(2,18)–18(2,17) A	1.1	OriMC-1	OVRO	10.4m	Sut85
216210.9 *( 1)	HCOOCH <sub>3</sub>	19(1,16)–18(1,17) E	0.8	OriMC-1	OVRO	10.4m	Sut85
216216.45 *(10)	HCOOCH <sub>3</sub>	19(1,16)–18(1,17) A	0.9	OriMC-1	OVRO	10.4m	Sut85
216372.90 *( 3)	DC <sub>2</sub>	1–0 $F=9/2-7/2$	0.27b	OriMC-1	MMWO	4.9m	Com85
216373.40 *( 4)	DC <sub>2</sub>	1–0 $F=7/2-5/2,5/2-3/2$	b	OriMC-1	MMWO	4.9m	Com85
216568.618*(43)	H <sub>2</sub> CO	9(1,8)–9(1,9)	1.3	OriMC-1	OVRO	10.4m	Sut85
216643.329*(46)	SO <sub>2</sub>	22(2,20)–22(1,21)	0.3	OriMC-1	MMWO	4.9m	Lor84a
216710.437*( 2)	H <sub>2</sub> S	2(2,0)–2(1,1)	0.32	OriMC-1	MMWO	4.9m	Lor84a
216752.552*(20)	CH <sub>3</sub> CH <sub>2</sub> CN	26(1,25)–25(2,24)	0.17	OriMC-1	MMWO	4.9m	Lor84a
216830.1 *( 1)	HCOOCH <sub>3</sub>	18(2,16)–17(2,15) E	1.2	OriMC-1	OVRO	10.4m	Sut85
216838.81 *(10)	HCOOCH <sub>3</sub>	18(2,16)–17(2,15) A	1.1	OriMC-1	OVRO	10.4m	Sut85
216936.68 *( 4)	HC <sub>2</sub> CHCN	23(2,22)–22(2,21)	0.6	OriMC-1	OVRO	10.4m	Sut85
216945.60 ( 5)	CH <sub>3</sub> OH	4(2)–5(1) E	3.1	OriMC-1	OVRO	10.4m	Sut85
216964.8 *( 1)	HCOOCH <sub>3</sub>	20(1,20)–19(1,19) E	2.0b	OriMC-1	OVRO	10.4m	Sut85
216965.99 ( 5)	HCOOCH <sub>3</sub>	20(1,20)–19(1,19) A	b	OriMC-1	OVRO	10.4m	Sut85
216966.2 *( 1)	HCOOCH <sub>3</sub>	20(0,20)–19(0,19) E	b	OriMC-1	OVRO	10.4m	Sut85
216967.33 ( 5)	HCOOCH <sub>3</sub>	20(0,20)–19(0,19) A	b	OriMC-1	OVRO	10.4m	Sut85
217104.935*(53)	SiO	5–4 $\nu=0$	1.6	OriMC-1	MMWO	4.9m	Lor84a
217238.531*(10)	DCN	3–2	0.7	OriMC-1	NRAO	11m	Phi74
217817.32 *(46)	SiS	12–11	0.66	IRC+10216	MMWO	4.9m	Sah84
217822.06 *( 8)	C <sub>3</sub> H <sub>2</sub>	6(0,6)–5(1,5)	0.23	OriMC-1	MMWO	4.9m	Lor84
217822.18 *( 8)	C <sub>3</sub> H <sub>2</sub>	6(1,6)–5(0,5)	0.23	OriMC-1	MMWO	4.9m	Lor84
217827.14 *(11)	<sup>33</sup> SO	6(5)–5(4) $F=9/2-7/2$	b	OriMC-1	MMWO	4.9m	Lor84
217829.806*(54)	<sup>33</sup> SO	6(5)–5(4) $F=11/2-9/2$	b	OriMC-1	MMWO	4.9m	Lor84
217831.762*(54)	<sup>33</sup> SO	6(5)–5(4) $F=13/2-11/2$	0.15b	OriMC-1	MMWO	4.9m	Lor84
217832.67 *(11)	<sup>33</sup> SO	6(5)–5(4) $F=15/2-13/2$	b	OriMC-1	MMWO	4.9m	Lor84
217887.	CH <sub>3</sub> OH	unassigned	0.9	OriMC-1	OVRO	10.4m	Sut85
218198.998 (30)	O <sup>13</sup> CS	18–17	0.5	OriMC-1	OVRO	10.4m	Sut85
218222.191*(13)	H <sub>2</sub> CO	3(0,3)–2(0,2)	4.0	OriMC-1	MMWO	4.9m	Lor84b
218281.0 *( 1)	HCOOCH <sub>3</sub>	17(3,14)–16(3,13) E	1.0	OriMC-1	OVRO	10.4m	Sut85
218297.81 *(10)	HCOOCH <sub>3</sub>	17(3,14)–16(3,13) A	1.2	OriMC-1	OVRO	10.4m	Sut85
218324.744*(35)	HC <sub>3</sub> N	24–23	0.9	OriMC-1	MMWO	4.9m	Lor81
218390.01 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(3,21)–23(3,20)	0.8	OriMC-1	OVRO	10.4m	Sut85
218398.50 *( 9)	HC <sub>2</sub> CHCN	23(7,17)–22(7,16)	b	OriMC-1	OVRO	10.4m	Sut85
218398.50 *( 9)	HC <sub>2</sub> CHCN	23(7,16)–22(7,15)	b	OriMC-1	OVRO	10.4m	Sut85
218402.39 *( 7)	HC <sub>2</sub> CHCN	23(6,18)–22(6,17)	b	OriMC-1	OVRO	10.4m	Sut85
218402.40 *( 7)	HC <sub>2</sub> CHCN	23(6,17)–22(6,16)	0.4b	OriMC-1	OVRO	10.4m	Sut85
218421.73 *(11)	HC <sub>2</sub> CHCN	23(8,16)–22(8,15)	0.3b	OriMC-1	OVRO	10.4m	Sut85
218421.73 *(11)	HC <sub>2</sub> CHCN	23(8,15)–22(8,14)	b	OriMC-1	OVRO	10.4m	Sut85
218440.05 ( 5)	CH <sub>3</sub> OH	4(2)–3(1) E	1.7	OriMC-1	MMWO	4.9m	Lor84b
218451.25 *( 6)	HC <sub>2</sub> CHCN	23(5,19)–22(5,18)	0.2b	OriMC-1	OVRO	10.4m	Sut85
218452.31 *( 6)	HC <sub>2</sub> CHCN	23(5,18)–22(5,17)	b	OriMC-1	OVRO	10.4m	Sut85
218475.639*(13)	H <sub>2</sub> CO	3(2,2)–2(2,1)	1.8	OriMC-1	MMWO	4.9m	Lor84b
218573.60 *( 5)	HC <sub>2</sub> CHCN	23(4,20)–22(4,19)	0.3	OriMC-1	OVRO	10.4m	Sut85
218585.03 *( 5)	HC <sub>2</sub> CHCN	23(3,21)–22(3,20)	0.3	OriMC-1	OVRO	10.4m	Sut85
218615.05 *( 5)	HC <sub>2</sub> CHCN	23(4,19)–22(4,18)	0.2	OriMC-1	OVRO	10.4m	Sut85
218760.068*(13)	H <sub>2</sub> CO	3(2,1)–2(2,0)	1.5	OriMC-1	MMWO	4.9m	Lor84a
218837.00 *( 6)	C <sub>4</sub> H	23–22 $J=47/2-45/2$	0.06	IRC+10216	MMWO	4.9m	Lor84a
218860.629*(58)	HC <sub>3</sub> N $\nu_7=1$	24–23 1e	0.6	OriMC-1	OVRO	10.4m	Sut85
218875.36 *( 6)	C <sub>4</sub> H	23–22 $J=45/2-43/2$	0.06	IRC+10216	MMWO	4.9m	Lor84a
218903.357 ( 3)	OCS	18–17	2.8	OriMC-1	BTL	7m	Gol81
218981.019*(12)	HNCO	10(1,10)–9(1,9)	0.24	OriMC-1	MMWO	4.9m	Arm84a
U 219002.	unidentified		0.1u	OriMC-1	MMWO	4.9m	Arm84a
219173.582*(58)	HC <sub>3</sub> N $\nu_7=1$	24–23 1f	0.6	OriMC-1	OVRO	10.4m	Sut85
219276.00 *( 5)	SO <sub>2</sub>	22(7,15)–23(6,16)	0.3	OriMC-1	OVRO	10.4m	Sut85
219335.07 *(10)	<sup>34</sup> SO <sub>2</sub>	11(1,11)–10(0,10)	1.3	OriMC-1	OVRO	10.4m	Sut85
219400.54 *( 5)	HC <sub>2</sub> CHCN	23(3,20)–22(3,19)	0.3	OriMC-1	OVRO	10.4m	Sut85
219463.63 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	22(2,21)–21(1,20)	0.3	OriMC-1	OVRO	10.4m	Sut85
219505.59 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(2,22)–23(2,21)	0.9	OriMC-1	OVRO	10.4m	Sut85
219547.105*(11)	HNCO	10(4,7)–9(4,6)	0.4b	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
219547.105*(11)	HNCO	10(4,6)-9(4,5)	b	OriMC-1	OVRO	10.4m	Sut85
219560.319*(46)	C <sup>18</sup> O	2-1	3.5	DR 21	NRAO	11m	Phi77
219656.805*(11)	HNCO	10(3,7)-9(3,6)	b	OriMC-1	OVRO	10.4m	Sut85
219656.805*(11)	HNCO	10(3,8)-9(3,7)	0.4b	OriMC-1	OVRO	10.4m	Sut85
219733.824*(11)	HNCO	10(2,9)-9(2,8)	0.6	OriMC-1	OVRO	10.4m	Sut85
219737.175*(13)	HNCO	10(2,8)-9(2,7)	0.8	OriMC-1	OVRO	10.4m	Sut85
219798.282*( 8)	HNCO	10(0,10)-9(0,9)	0.3	OriMC-1	MMWO	4.9m	Arm84
219908.489*( 6)	H <sub>2</sub> <sup>13</sup> CO	3(1,2)-2(1,1)	0.5	OriMC-1	MMWO	4.9m	Arm84a
219949.391*(38)	SO	6(5)-5(4)	4.3	OriMC-1	MMWO	4.9m	Lor84a
220037.96 *( 1)	HCOOH	10(0,10)-9(0,9)	0.3	OriMC-1	OVRO	10.4m	Sut85
220078.6 ( 1)	CH <sub>3</sub> OH	7(1)-8(0) E	6.1	OriMC-1	OVRO	10.4m	Sut85
220166.6 *( 1)	HCOOCH <sub>3</sub>	17(4,13)-16(4,12) E	1.3	OriMC-1	OVRO	10.4m	Sut85
220177.52 *(18)	CH <sub>2</sub> CO	11(1,11)-10(1,10)	1.0	OriMC-1	OVRO	10.4m	Sut85
220190.20 *(10)	HCOOCH <sub>3</sub>	17(4,13)-16(4,12) A	1.3	OriMC-1	OVRO	10.4m	Sut85
220398.686*(23)	<sup>13</sup> CO	2-1	17	OriMC-1	NRAO	11m	Phi77
220475.815*( 3)	CH <sub>3</sub> CN	12(8)-11(8)	0.5	OriMC-1	OVRO	10.4m	Sut85
220539.330*(30)	CH <sub>3</sub> CN	12(7)-11(7)	0.10	OriMC-1	MMWO	4.9m	Lor84
220561.33 *( 7)	HC <sub>2</sub> CHCN	24(1,24)-23(1,23)	0.4	OriMC-1	OVRO	10.4m	Sut85
220584.762*(12)	HNCO	10(1,9)-9(1,8)	0.13	OriMC-1	MMWO	4.9m	Lor84
220594.43 *(10)	CH <sub>3</sub> CN	12(6)-11(6)	0.23	OriMC-1	MMWO	4.9m	Lor84
220599.94 *(14)	CH <sub>3</sub> <sup>13</sup> CN	12(3)-11(3)	b	OriMC-1	OVRO	10.4m	Sut85
220621.08 *(15)	CH <sub>3</sub> <sup>13</sup> CN	12(2)-11(2)	0.5	OriMC-1	OVRO	10.4m	Sut85
220633.77 *(16)	CH <sub>3</sub> <sup>13</sup> CN	12(1)-11(1)	0.5b	OriMC-1	OVRO	10.4m	Sut85
220641.09 *(10)	CH <sub>3</sub> CN	12(5)-11(5)	0.29	OriMC-1	MMWO	4.9m	Lor84
220660.91 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(2,24)-24(2,23)	0.7	OriMC-1	OVRO	10.4m	Sut85
U 220664.5	unidentified		0.14	OriMC-1	MMWO	4.9m	Lor84
220679.291*(70)	CH <sub>3</sub> CN	12(4)-11(4)	0.37	OriMC-1	MMWO	4.9m	Lor84
220709.020*(50)	CH <sub>3</sub> CN	12(3)-11(3)	0.80	OriMC-1	MMWO	4.9m	Lor84
220730.263*(20)	CH <sub>3</sub> CN	12(2)-11(2)	0.67	OriMC-1	MMWO	4.9m	Lor84
220743.013*(20)	CH <sub>3</sub> CN	12(1)-11(1)	0.84	OriMC-1	MMWO	4.9m	Lor84
220747.263*(20)	CH <sub>3</sub> CN	12(0)-11(0)	0.99	OriMC-1	MMWO	4.9m	Lor84
U 220792.5	unidentified		0.17 <sub>u</sub>	OriMC-1	MMWO	4.9m	Lor84
220811.6 *( 1)	HCOOCH <sub>3</sub>	18(3,16)-17(2,15) E	0.4	OriMC-1	OVRO	10.4m	Sut85
220815.19 *(10)	HCOOCH <sub>3</sub>	18(3,16)-17(2,15) A	0.4	OriMC-1	OVRO	10.4m	Bla84
220889.02 *(10)	HCOOCH <sub>3</sub>	18(17,1)-17(17,0) A	b	OriMC-1	OVRO	10.4m	Sut85
220889.02 *(10)	HCOOCH <sub>3</sub>	18(17,2)-17(17,1) A	0.4b	OriMC-1	OVRO	10.4m	Bla84
220926.20 *(10)	HCOOCH <sub>3</sub>	18(16,2)-17(16,1) A	b	OriMC-1	OVRO	10.4m	Sut85
220926.20 *(10)	HCOOCH <sub>3</sub>	18(16,3)-17(16,2) A	0.5b	OriMC-1	OVRO	10.4m	Bla84
220977.84 *(10)	HCOOCH <sub>3</sub>	18(15,4)-17(15,3) A	b	OriMC-1	OVRO	10.4m	Sut85
220977.84 *(10)	HCOOCH <sub>3</sub>	18(15,3)-17(15,2) A	0.5b	OriMC-1	OVRO	10.4m	Bla84
221047.67 *(10)	HCOOCH <sub>3</sub>	18(14,5)-17(14,4) A	b	OriMC-1	OVRO	10.4m	Sut85
221047.67 *(10)	HCOOCH <sub>3</sub>	18(14,4)-17(14,3) A	0.5b	OriMC-1	OVRO	10.4m	Bla84
221050.0 *( 1)	HCOOCH <sub>3</sub>	18(14,4)-17(14,3) E	b	OriMC-1	OVRO	10.4m	Sut85
221066.3 *( 1)	HCOOCH <sub>3</sub>	18(14,5)-17(14,4) E	0.3	OriMC-1	OVRO	10.4m	Sut85
221123.82 *( 4)	HC <sub>2</sub> CHCN	23(1,22)-22(1,21)	0.4	OriMC-1	OVRO	10.4m	Sut85
221141.02 *(30)	HCOOCH <sub>3</sub>	18(13,5)-17(13,4) E	b	OriMC-1	OVRO	10.4m	Sut85
221141.02 *(10)	HCOOCH <sub>3</sub>	18(13,5)-17(13,4) A	0.7b	OriMC-1	OVRO	10.4m	Bla84
221141.02 *(10)	HCOOCH <sub>3</sub>	18(13,6)-17(13,5) A	b	OriMC-1	OVRO	10.4m	Sut85
221158.4 *( 1)	HCOOCH <sub>3</sub>	18(13,6)-17(13,5) E	0.2	OriMC-1	OVRO	10.4m	Sut85
221198.962*(90)	CH <sub>3</sub> CN $\nu_8=1$	12(1)-11(1) $\ell=1$	0.7	OriMC-1	OVRO	10.4m	Sut85
221252.388*(83)	CH <sub>3</sub> CN $\nu_8=1$	12(5)-11(5) $\ell=-1$	0.3	OriMC-1	OVRO	10.4m	Sut85
221260.9 *( 1)	HCOOCH <sub>3</sub>	18(12,6)-17(12,5) E	0.4	OriMC-1	OVRO	10.4m	Sut85
221265.59 *(10)	HCOOCH <sub>3</sub>	18(12,6)-17(12,5) A	0.6b	OriMC-1	OVRO	10.4m	Bla84
221265.59 *(10)	HCOOCH <sub>3</sub>	18(12,7)-17(12,6) A	b	OriMC-1	OVRO	10.4m	Bla84
221280.8 *( 1)	HCOOCH <sub>3</sub>	18(12,7)-17(12,6) E	0.4	OriMC-1	OVRO	10.4m	Sut85
221299.576*(80)	CH <sub>3</sub> CN $\nu_8=1$	12(4)-11(4) $\ell=-1$	0.2	OriMC-1	OVRO	10.4m	Sut85
221311.925*(78)	CH <sub>3</sub> CN $\nu_8=1$	12(6)-11(6) $\ell=1$	0.2	OriMC-1	OVRO	10.4m	Sut85
221338.038*(90)	CH <sub>3</sub> CN $\nu_8=1$	12(3)-11(3) $\ell=-1$	0.3	OriMC-1	OVRO	10.4m	Sut85
221350.329*(81)	CH <sub>3</sub> CN $\nu_8=1$	12(5)-11(5) $\ell=1$	0.2	OriMC-1	OVRO	10.4m	Sut85
221367.512*(90)	CH <sub>3</sub> CN $\nu_8=1$	12(2)-11(2) $\ell=-1$	0.6	OriMC-1	OVRO	10.4m	Sut85
221380.61 *(10)	CH <sub>3</sub> CN $\nu_8=1$	12(4)-11(4) $\ell=1$	0.6	OriMC-1	OVRO	10.4m	Sut85
221387.33 *(10)	CH <sub>3</sub> CN $\nu_8=1$	12(1)-11(1) $\ell=-1$	0.4	OriMC-1	OVRO	10.4m	Sut85
221394.13 *(15)	CH <sub>3</sub> CN $\nu_8=1$	12(0)-11(0) $\ell=1$	0.5	OriMC-1	OVRO	10.4m	Sut85
221403.51 *(11)	CH <sub>3</sub> CN $\nu_8=1$	12(3)-11(3) $\ell=1$	0.3	OriMC-1	OVRO	10.4m	Sut85
221422.34 *(16)	CH <sub>3</sub> CN $\nu_8=1$	12(2)-11(2) $\ell=1$	0.3b	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r'$ (K) $T_a'$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
221424.7 *(1)	HCOOCH <sub>3</sub>	18(11,7)–17(11,6) E	0.8	OriMC-1	OVRO	10.4m	Sut85
221432.95 *(10)	HCOOCH <sub>3</sub>	18(11,7)–17(11,6) A	0.9b	OriMC-1	OVRO	10.4m	Sut85
221432.95 *(10)	HCOOCH <sub>3</sub>	18(11,8)–17(11,7) A	b	OriMC-1	OVRO	10.4m	Sut85
221445.5 *(1)	HCOOCH <sub>3</sub>	18(11,8)–17(11,7) E	0.6	OriMC-1	OVRO	10.4m	Sut85
221626.04 *(9)	CH <sub>3</sub> CN $\nu_3=1$	12(1)–11(1) $\ell=1$	0.4	OriMC-1	OVRO	10.4m	Sut85
221649.7 *(1)	HCOOCH <sub>3</sub>	18(10,8)–17(10,7) E	0.5	OriMC-1	OVRO	10.4m	Sut85
221660.4 *(1)	HCOOCH <sub>3</sub>	18(4,15)–17(4,14) E	1.5b	OriMC-1	OVRO	10.4m	Sut85
221661.06 *(10)	HCOOCH <sub>3</sub>	18(10,9)–17(10,8) A	b	OriMC-1	OVRO	10.4m	Sut85
221661.06 *(10)	HCOOCH <sub>3</sub>	18(10,8)–17(10,7) A	b	OriMC-1	OVRO	10.4m	Sut85
221670.5 *(1)	HCOOCH <sub>3</sub>	18(10,9)–17(10,8) E	0.4	OriMC-1	OVRO	10.4m	Sut85
221674.62 *(10)	HCOOCH <sub>3</sub>	18(4,15)–17(4,14) A	0.8	OriMC-1	OVRO	10.4m	Sut85
221735.67 *(12)	34SO <sub>2</sub>	13(2,12)–13(1,13)	1.0	OriMC-1	OVRO	10.4m	Sut85
221765.98 *(6)	HC <sub>2</sub> CHCN	24(0,24)–23(0,23)	0.4	OriMC-1	OVRO	10.4m	Sut85
221965.21 *(2)	SO <sub>2</sub>	11(1,11)–10(0,10)	13.9	OriMC-1	OVRO	10.4m	Sut85
222099.152*(10)	CH <sub>3</sub> CCH	13(4)–12(4)	0.2	OriMC-1	OVRO	10.4m	Sut85
222128.814*(6)	CH <sub>3</sub> CCH	13(3)–12(3)	0.13	OriMC-1	MMWO	4.9m	Lor84d
222150.009*(3)	CH <sub>3</sub> CCH	13(2)–12(2)	0.30	OriMC-1	MMWO	4.9m	Lor84d
222153.45 *(5)	HC <sub>2</sub> CHCN	23(2,21)–22(2,20)	0.4	OriMC-1	OVRO	10.4m	Sut85
222162.729*(2)	CH <sub>3</sub> CCH	13(1)–12(1)	0.27	OriMC-1	MMWO	4.9m	Lor84d
222166.970*(2)	CH <sub>3</sub> CCH	13(0)–12(0)	0.41	OriMC-1	MMWO	4.9m	Lor84d
U 222177.	unidentified		0.4	OriMC-1	OVRO	10.4m	Sut85
222197.65 *(28)	CH <sub>2</sub> CO	11(0,11)–10(0,10)	0.6	OriMC-1	OVRO	10.4m	Sut85
222228.61 *(20)	CH <sub>2</sub> CO	11(2,10)–10(2,9)	0.2	OriMC-1	OVRO	10.4m	Sut85
222238.67 *(35)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,2)–3(2,1) EA	0.02	OriMC-1	OVRO	10.4m	Sut85
222247.48 *(19)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,2)–3(2,1) AE	1.3b	OriMC-1	OVRO	10.4m	Sut85
222247.60 *(21)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,2)–3(2,1) EE	b	OriMC-1	OVRO	10.4m	Sut85
222254.74 *(9)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,2)–3(2,1) AA	1.0	OriMC-1	OVRO	10.4m	Sut85
U 222259.	unidentified		0.6	OriMC-1	OVRO	10.4m	Sut85
222314.40 *(20)	CH <sub>2</sub> CO	11(2,9)–10(2,8)	0.2	OriMC-1	OVRO	10.4m	Sut85
222421.6 *(1)	HCOOCH <sub>3</sub>	18(8,10)–17(8,9) E	1.0	OriMC-1	OVRO	10.4m	Sut85
222426.82 *(19)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,1)–3(2,2) AE	0.3	OriMC-1	OVRO	10.4m	Sut85
222433.96 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,1)–3(2,2) EE	1.5b	OriMC-1	OVRO	10.4m	Sut85
222434.08 *(9)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,1)–3(2,2) AA	b	OriMC-1	OVRO	10.4m	Sut85
222435.63 *(13)	CH <sub>3</sub> OCH <sub>3</sub>	4(3,1)–3(2,2) EA	b	OriMC-1	OVRO	10.4m	Sut85
222438.23 *(10)	HCOOCH <sub>3</sub>	18(8,10)–17(8,9) A	1.2b	OriMC-1	OVRO	10.4m	Sut85
222440.34 *(10)	HCOOCH <sub>3</sub>	18(8,11)–17(8,10) A	b	OriMC-1	OVRO	10.4m	Sut85
222441.9 *(1)	HCOOCH <sub>3</sub>	18(8,10)–17(8,9) E	b	OriMC-1	OVRO	10.4m	Sut85
222707.22 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(0,26)–25(1,25)	0.3	OriMC-1	OVRO	10.4m	Sut85
222723.	CH <sub>3</sub> OH	unassigned	0.6	OriMC-1	OVRO	10.4m	Sut85
222918.17 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(1,24)–24(1,23)	0.9	OriMC-1	OVRO	10.4m	Sut85
223038.3 *(1)	HCOOCH <sub>3</sub>	19(2,17)–18(3,16) E	0.3	OriMC-1	OVRO	10.4m	Sut85
223119.20 *(10)	HCOOCH <sub>3</sub>	18(7,12)–17(7,11) A	1.1	OriMC-1	OVRO	10.4m	Sut85
223125.1 *(1)	HCOOCH <sub>3</sub>	18(7,12)–17(7,11) E	1.0	OriMC-1	OVRO	10.4m	Sut85
223134.9 *(1)	HCOOCH <sub>3</sub>	18(7,11)–17(7,10) E	1.0	OriMC-1	OVRO	10.4m	Sut85
223163.69 *(10)	HCOOCH <sub>3</sub>	18(7,11)–17(7,10) A	0.8	OriMC-1	OVRO	10.4m	Sut85
223200.13 *(24)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,7)–7(1,6) AE	b	OriMC-1	OVRO	10.4m	Sut85
223200.13 *(24)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,7)–7(1,6) EA	b	OriMC-1	OVRO	10.4m	Sut85
223202.32 *(17)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,7)–7(1,6) EA	1.1b	OriMC-1	OVRO	10.4m	Sut85
223204.51 *(11)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,7)–7(1,6) EA	b	OriMC-1	OVRO	10.4m	Sut85
223385.32 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(1,26)–25(1,25)	0.9	OriMC-1	OVRO	10.4m	Sut85
223434.43 *(6)	SO <sub>2</sub>	27(6,20)–28(7,21)	0.3	OriMC-1	OVRO	10.4m	Sut85
223553.58 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(0,26)–25(0,25)	0.6	OriMC-1	OVRO	10.4m	Sut85
223650.3 (1)	CH <sub>3</sub> CHO	12(1,12)–11(1,11) E	0.2	OriMC-1	OVRO	10.4m	Sut85
223660.8 (1)	CH <sub>3</sub> CHO	12(1,12)–11(1,11) A	0.3	OriMC-1	OVRO	10.4m	Sut85
223883.64 *(2)	SO <sub>2</sub>	6(4,2)–7(3,5)	1.4	OriMC-1	OVRO	10.4m	Sut85
223915.56 *(1)	HCOOH	10(2,9)–9(2,8)	0.3	OriMC-1	OVRO	10.4m	Sut85
223933.73 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(3,23)–24(3,22)	0.6	OriMC-1	OVRO	10.4m	Sut85
224002.12 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(10,15)–24(10,14)	b	OriMC-1	OVRO	10.4m	Sut85
224002.12 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(10,16)–24(10,15)	b	OriMC-1	OVRO	10.4m	Sut85
224003.44 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(9,17)–24(9,16)	b	OriMC-1	OVRO	10.4m	Sut85
224003.44 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(9,16)–24(9,15)	0.9b	OriMC-1	OVRO	10.4m	Sut85
224017.54 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(11,15)–24(11,14)	0.6b	OriMC-1	OVRO	10.4m	Sut85
224017.54 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(11,14)–24(11,13)	b	OriMC-1	OVRO	10.4m	Sut85
224021.4 *(1)	HCOOCH <sub>3</sub>	18(6,13)–17(6,12) E	1.0b	OriMC-1	OVRO	10.4m	Sut85
224024.05 *(10)	HCOOCH <sub>3</sub>	18(6,13)–17(6,12) A	b	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*$ (K) $T_a^*$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
224028.14 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(6,18)–24(6,17)	0.8b	OriMC-1	OVRO	10.4m	Sut85
224028.14 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(6,17)–24(6,16)	b	OriMC-1	OVRO	10.4m	Sut85
224045.75 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(12,13)–24(12,12)	0.3b	OriMC-1	OVRO	10.4m	Sut85
224045.75 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(12,14)–24(12,13)	b	OriMC-1	OVRO	10.4m	Sut85
224084.28 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(13,12)–24(13,11)	b	OriMC-1	OVRO	10.4m	Sut85
224084.28 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(13,13)–24(13,12)	b	OriMC-1	OVRO	10.4m	Sut85
224088.19 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(7,19)–24(7,18)	b	OriMC-1	OVRO	10.4m	Sut85
224088.23 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(7,18)–24(7,17)	0.8b	OriMC-1	OVRO	10.4m	Sut85
224131.51 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(14,12)–24(14,11)	0.2b	OriMC-1	OVRO	10.4m	Sut85
224131.51 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(14,11)–24(14,10)	b	OriMC-1	OVRO	10.4m	Sut85
224186.35 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(15,11)–24(15,10)	0.2b	OriMC-1	OVRO	10.4m	Sut85
224186.35 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(15,10)–24(15,9)	b	OriMC-1	OVRO	10.4m	Sut85
224206.60 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(6,20)–24(6,19)	0.7b	OriMC-1	OVRO	10.4m	Sut85
224208.08 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(6,19)–24(6,18)	b	OriMC-1	OVRO	10.4m	Sut85
224264.90 *(3)	SO <sub>2</sub>	20(2,16)–19(3,17)	2.6	OriMC-1	OVRO	10.4m	Sut85
224312.9 *(1)	HCOOCH <sub>3</sub>	18(5,14)–17(5,13) E	0.8	OriMC-1	OVRO	10.4m	Sut85
224327.21 *(18)	CH <sub>2</sub> CO	11(1,10)–10(1,9)	b	OriMC-1	OVRO	10.4m	Sut85
224328.25 *(10)	HCOOCH <sub>3</sub>	18(5,14)–17(5,13) A	0.8b	OriMC-1	OVRO	10.4m	Sut85
224419.82 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(5,21)–24(5,20)	0.4	OriMC-1	OVRO	10.4m	Sut85
224458.85 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(5,20)–24(5,19)	0.7	OriMC-1	OVRO	10.4m	Sut85
224469.02 *(3)	CH <sub>3</sub> CH <sub>2</sub> CN	25(19,7)–24(19,6)	0.3b	OriMC-1	OVRO	10.4m	Sut85
224469.02 *(3)	CH <sub>3</sub> CH <sub>2</sub> CN	25(19,6)–24(19,5)	b	OriMC-1	OVRO	10.4m	Sut85
U 224493.	unidentified		0.5	OriMC-1	OVRO	10.4m	Sut85
224583.0 *(1)	HCOOCH <sub>3</sub>	18(6,12)–17(6,11) E	0.8	OriMC-1	OVRO	10.4m	Sut85
224609.31 *(10)	HCOOCH <sub>3</sub>	18(6,12)–17(6,11) A	0.8	OriMC-1	OVRO	10.4m	Sut85
224638.70 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(4,22)–24(4,21)	0.6b	OriMC-1	OVRO	10.4m	Sut85
224643.26 *(5)	CH <sub>3</sub> CH <sub>2</sub> CN	25(21,5)–24(21,4)	b	OriMC-1	OVRO	10.4m	Sut85
224643.26 *(5)	CH <sub>3</sub> CH <sub>2</sub> CN	25(21,4)–24(21,3)	b	OriMC-1	OVRO	10.4m	Sut85
224699.	CH <sub>3</sub> OH	unassigned	0.7	OriMC-1	OVRO	10.4m	Sut85
224714.368*(30)	C <sup>17</sup> O	2–1	1.5	OriMC-1	OVRO	10.4m	Sut85
U 224895.	unidentified		0.7	OriMC-1	OVRO	10.4m	Sut85
225153.69 *(2)	SO <sub>2</sub>	13(2,12)–13(1,13)	6.3	OriMC-1	OVRO	10.4m	Sut85
225236.11 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(4,21)–24(4,20)	0.8	OriMC-1	OVRO	10.4m	Sut85
225413.638 (30)	OC <sup>34</sup> S	19–18	0.7	OriMC-1	OVRO	10.4m	Sut85
225512.54 *(1)	HCOOH	10(3,7)–9(3,6)	0.4	OriMC-1	OVRO	10.4m	Sut85
225599.14 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	12(1,12)–11(0,11) EE	0.7	OriMC-1	MMWO	4.9m	Woo84
225608.7 *(1)	HCOOCH <sub>3</sub>	19(3,17)–18(3,16) E	1.1	OriMC-1	OVRO	10.4m	Sut85
225618.66 *(10)	HCOOCH <sub>3</sub>	19(3,17)–18(3,16) A	1.3	OriMC-1	OVRO	10.4m	Sut85
U 225625.	unidentified		1.0	OriMC-1	OVRO	10.4m	Sut85
225697.772*(9)	H <sub>2</sub> CO	3(1,2)–2(1,1)	5.0	OriMC-1	MMWO	4.9m	Eva79
225896.720 (38)	HDO	3(1,2)–2(2,1)	2.3	OriMC-1	OVRO	10.4m	Sut85
225928.56 *(10)	HCOOCH <sub>3</sub>	6(6,0)–5(5,1) A	b	OriMC-1	OVRO	10.4m	Sut85
225928.56 *(10)	HCOOCH <sub>3</sub>	6(6,1)–5(5,0) A	0.4b	OriMC-1	OVRO	10.4m	Sut85
226256.83 *(5)	HC <sub>2</sub> CHCN	24(2,23)–23(2,22)	0.2	OriMC-1	OVRO	10.4m	Sut85
226300.00 *(4)	SO <sub>2</sub>	14(3,11)–14(2,12)	5.8	OriMC-1	OVRO	10.4m	Sut85
226332.519*(20)	CN	2–1 $J=3/2-3/2$ $F=3/2-5/2$	0.3	OriMC-1	OVRO	10.4m	Sut85
226341.919*(20)	CN	2–1 $J=3/2-3/2$ $F=5/2-3/2$	0.3	OriMC-1	OVRO	10.4m	Sut85
226346.00 *(13)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,13)–13(2,12) AA	b	OriMC-1	OVRO	10.4m	Sut85
226346.89 *(25)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,13)–13(2,12) EE	1.6b	OriMC-1	OVRO	10.4m	Sut85
226347.78 *(37)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,13)–13(2,12) EA	b	OriMC-1	OVRO	10.4m	Sut85
226347.78 *(37)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,13)–13(2,12) AE	b	OriMC-1	OVRO	10.4m	Sut85
226359.987*(20)	CN	2–1 $J=3/2-3/2$ $F=5/2-5/2$	1.2	OriMC-1	OVRO	10.4m	Sut85
U 226384.	unidentified		0.5	OriMC-1	OVRO	10.4m	Sut85
U 226436.	unidentified		0.4	OriMC-1	OVRO	10.4m	Sut85
226551.5 (1)	CH <sub>3</sub> CHO	12(0,12)–11(0,11) E	0.3	OriMC-1	OVRO	10.4m	Sut85
226592.8 (1)	CH <sub>3</sub> CHO	12(0,12)–11(0,11) A	0.2	OriMC-1	OVRO	10.4m	Sut85
226616.520*(20)	CN	2–1 $J=3/2-1/2$ $F=1/2-3/2$	0.2	OriMC-1	OVRO	10.4m	Sut85
226632.176*(20)	CN	2–1 $J=3/2-1/2$ $F=3/2-3/2$	1.4	OriMC-1	OVRO	10.4m	Sut85
226659.543*(20)	CN	2–1 $J=3/2-1/2$ $F=5/2-3/2$	4.3	OriMC-1	OVRO	10.4m	Sut85
226663.685*(20)	CN	2–1 $J=3/2-1/2$ $F=1/2-1/2$	1.5	OriMC-1	OVRO	10.4m	Sut85
226679.341*(20)	CN	2–1 $J=3/2-1/2$ $F=3/2-1/2$	1.9	OriMC-1	OVRO	10.4m	Sut85
226713.1 *(1)	HCOOCH <sub>3</sub>	20(2,19)–19(2,18) E	0.9	OriMC-1	OVRO	10.4m	Sut85
226718.69 (5)	HCOOCH <sub>3</sub>	20(2,19)–19(2,18) A	0.5	OriMC-1	OVRO	10.4m	Sut85
226773.2 *(1)	HCOOCH <sub>3</sub>	20(1,19)–19(1,18) E	0.9	OriMC-1	OVRO	10.4m	Sut85
226778.75 (5)	HCOOCH <sub>3</sub>	20(1,19)–19(1,18) A	1.0	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_a$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
226856.5 *(1)	HCOOCH <sub>3</sub>	20(2,19)–19(1,18) E	0.5	OriMC-1	OVRO	10.4m	Sut85
226862.19 *(10)	HCOOCH <sub>3</sub>	20(2,19)–19(1,18) A	0.6	OriMC-1	OVRO	10.4m	Sut85
226874.183*(20)	CN	2–1 $J=5/2-3/2$ $F=5/2-3/2$	b	OriMC-1	OVRO	10.4m	Woo82
226874.764*(20)	CN	2–1 $J=5/2-3/2$ $F=7/2-5/2$	8.0b	OriMC-1	OVRO	10.4m	Woo82
226875.896*(20)	CN	2–1 $J=5/2-3/2$ $F=3/2-1/2$	b	OriMC-1	OVRO	10.4m	Woo82
226887.399*(20)	CN	2–1 $J=5/2-3/2$ $F=3/2-3/2$	1.0b	OriMC-1	OVRO	10.4m	Woo82
226892.151*(20)	CN	2–1 $J=5/2-3/2$ $F=5/2-5/2$	b	OriMC-1	OVRO	10.4m	Woo82
227019.6 *(1)	HCOOCH <sub>3</sub>	19(2,17)–18(2,16) E	1.0	OriMC-1	OVRO	10.4m	Sut85
227028.06 *(10)	HCOOCH <sub>3</sub>	19(2,17)–18(2,16) A	1.2	OriMC-1	OVRO	10.4m	Sut85
227031.94 *(11)	<sup>34</sup> SO <sub>2</sub>	12(3,9)–12(2,10)	0.7	OriMC-1	OVRO	10.4m	Sut85
227095.	CH <sub>3</sub> OH	unassigned	0.9	OriMC-1	OVRO	10.4m	Sut85
227418.957*(46)	HC <sub>3</sub> N	25–24	3.5	OriMC-1	OVRO	10.4m	Sut85
227561.1 *(1)	HCOOCH <sub>3</sub>	21(0,21)–20(0,20) E	b	OriMC-1	OVRO	10.4m	Sut85
227561.9 *(1)	HCOOCH <sub>3</sub>	21(1,21)–20(1,20) E	b	OriMC-1	OVRO	10.4m	Sut85
227561.95 *(10)	HCOOCH <sub>3</sub>	21(1,21)–20(1,20) A	b	OriMC-1	OVRO	10.4m	Sut85
227562.77 *(10)	HCOOCH <sub>3</sub>	21(0,21)–20(0,20) A	2.1b	OriMC-1	OVRO	10.4m	Sut85
227780.97 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(3,22)–24(3,21)	0.5	OriMC-1	OVRO	10.4m	Sut85
227815.	CH <sub>3</sub> OH	unassigned	1.4	OriMC-1	OVRO	10.4m	Sut85
227897.52 *(11)	HC <sub>2</sub> CHCN	24(7,17)–23(7,16)	b	OriMC-1	OVRO	10.4m	Sut85
227897.52 *(11)	HC <sub>2</sub> CHCN	24(7,18)–23(7,17)	0.5b	OriMC-1	OVRO	10.4m	Sut85
227906.61 *(9)	HC <sub>2</sub> CHCN	24(6,19)–23(6,18)	0.5b	OriMC-1	OVRO	10.4m	Sut85
227906.64 *(9)	HC <sub>2</sub> CHCN	24(6,18)–23(6,17)	b	OriMC-1	OVRO	10.4m	Sut85
227918.54 *(13)	HC <sub>2</sub> CHCN	24(8,17)–23(8,16)	b	OriMC-1	OVRO	10.4m	Sut85
227918.54 *(13)	HC <sub>2</sub> CHCN	24(8,16)–23(8,15)	0.5b	OriMC-1	OVRO	10.4m	Sut85
227960.07 *(15)	HC <sub>2</sub> CHCN	24(9,15)–23(9,14)	b	OriMC-1	OVRO	10.4m	Sut85
227960.07 *(15)	HC <sub>2</sub> CHCN	24(9,16)–23(9,15)	b	OriMC-1	OVRO	10.4m	Sut85
227965.97 *(7)	HC <sub>2</sub> CHCN	24(5,20)–23(5,19)	b	OriMC-1	OVRO	10.4m	Sut85
227967.52 *(7)	HC <sub>2</sub> CHCN	24(5,19)–23(5,18)	0.5b	OriMC-1	OVRO	10.4m	Sut85
227977.074*(68)	HC <sub>3</sub> N $\nu_7=1$	25–24 1e	0.7	OriMC-1	OVRO	10.4m	Sut85
228090.48 *(5)	HC <sub>2</sub> CHCN	24(3,22)–23(3,21)	0.4	OriMC-1	OVRO	10.4m	Sut85
228104.55 *(6)	HC <sub>2</sub> CHCN	24(4,21)–23(4,20)	0.5	OriMC-1	OVRO	10.4m	Sut85
228302.988*(68)	HC <sub>3</sub> N $\nu_7=1$	25–24 1f	0.8	OriMC-1	OVRO	10.4m	Sut85
228483.14 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	25(2,23)–24(2,22)	0.9	OriMC-1	OVRO	10.4m	Sut85
228544.07 *(1)	HCOOH	10(2,8)–9(2,7)	0.4	OriMC-1	OVRO	10.4m	Sut85
228629.1 *(1)	HCOOCH <sub>3</sub>	18(5,13)–17(5,12) E	1.2	OriMC-1	OVRO	10.4m	Sut85
228651.34 *(10)	HCOOCH <sub>3</sub>	18(5,13)–17(5,12) A	1.2	OriMC-1	OVRO	10.4m	Sut85
228797.47 *(4)	CH <sub>3</sub> CH <sub>2</sub> CN	14(2,12)–13(1,13)	0.3	OriMC-1	OVRO	10.4m	Sut85
228910.46 *(10)	DNC	3–2	0.23	OriMC-1	MMWO	4.9m	Lor84b
228978.76 *(58)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,1)–8(6,2) EA	0.2	OriMC-1	OVRO	10.4m	Sut85
228983.24 *(48)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,1)–8(6,2) EE	0.2b	OriMC-1	OVRO	10.4m	Sut85
228984.83 *(48)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,1)–8(6,2) AE	b	OriMC-1	OVRO	10.4m	Sut85
228984.83 *(48)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,0)–8(6,3) AE	b	OriMC-1	OVRO	10.4m	Sut85
228987.74 *(37)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,1)–8(6,2) AA	b	OriMC-1	OVRO	10.4m	Sut85
228987.74 *(37)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,0)–8(6,3) AA	b	OriMC-1	OVRO	10.4m	Sut85
228989.33 *(40)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,0)–8(6,3) EE	b	OriMC-1	OVRO	10.4m	Sut85
228990.91 *(44)	CH <sub>3</sub> OCH <sub>3</sub>	7(7,0)–8(6,3) EA	b	OriMC-1	OVRO	10.4m	Sut85
229086.99 *(5)	HC <sub>2</sub> CHCN	24(3,21)–23(3,20)	0.3	OriMC-1	OVRO	10.4m	Sut85
229265.16 *(2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(2,25)–25(2,24)	0.7	OriMC-1	OVRO	10.4m	Sut85
229347.73 *(3)	SO <sub>2</sub>	11(5,7)–12(4,8)	1.9	OriMC-1	OVRO	10.4m	Sut85
229404.9 *(1)	HCOOCH <sub>3</sub>	18(3,15)–17(3,14) E	1.2	OriMC-1	OVRO	10.4m	Sut85
229420.30 *(10)	HCOOCH <sub>3</sub>	18(3,15)–17(3,14) A	1.3	OriMC-1	OVRO	10.4m	Sut85
229474.6 *(1)	HCOOCH <sub>3</sub>	20(3,17)–19(4,16) E	0.3	OriMC-1	OVRO	10.4m	Sut85
229504.59 *(10)	HCOOCH <sub>3</sub>	20(3,17)–19(4,16) A	0.3	OriMC-1	OVRO	10.4m	Sut85
229590.	CH <sub>3</sub> OH	unassigned	1.3	OriMC-1	OVRO	10.4m	Sut85
229647.75 *(9)	HC <sub>2</sub> CHCN	25(1,25)–24(1,24)	0.2	OriMC-1	OVRO	10.4m	Sut85
229758.76 (5)	CH <sub>3</sub> OH	8(–1)–7(0) E	10.6	OriMC-1	OVRO	10.4m	Sut85
229857.66 *(11)	<sup>34</sup> SO <sub>2</sub>	4(2,2)–3(1,3)	1.1	OriMC-1	OVRO	10.4m	Sut85
229864.19 (5)	CH <sub>3</sub> OH	19(5)–20(4) A +	0.4	OriMC-1	OVRO	10.4m	Sut85
229939.18 (5)	CH <sub>3</sub> OH	19(5)–20(4) A–	0.5	OriMC-1	OVRO	10.4m	Sut85
230027.06 (5)	CH <sub>3</sub> OH	3(–2)–4(–1) E	5.1	OriMC-1	OVRO	10.4m	Sut85
U 230233.	unidentified		0.6	OriMC-1	OVRO	10.4m	Sut85
230317.527 (30)	O <sup>13</sup> CS	19–18	0.5	OriMC-1	OVRO	10.4m	Sut85
230368.69 (5)	CH <sub>3</sub> OH	22(4)–21(5) E	0.2	OriMC-1	OVRO	10.4m	Sut85
230465.75 *(71)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,3)–11(7,4) EA	b	OriMC-1	OVRO	10.4m	Sut85
230467.78 *(64)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,3)–11(7,4) EE	0.4b	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_c^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
230469.81 *(59)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,2)–11(7,5) AA	b	OriMC-1	OVRO	10.4m	Sut85
230469.81 *(59)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,3)–11(7,4) AA	b	OriMC-1	OVRO	10.4m	Sut85
230470.19 *(70)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,2)–11(7,5) AE	b	OriMC-1	OVRO	10.4m	Sut85
230470.19 *(70)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,3)–11(7,4) AE	b	OriMC-1	OVRO	10.4m	Sut85
230472.22 *(69)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,2)–11(7,5) EE	b	OriMC-1	OVRO	10.4m	Sut85
230474.62 *(80)	CH <sub>3</sub> OCH <sub>3</sub>	10(8,2)–11(7,5) EA	b	OriMC-1	OVRO	10.4m	Sut85
230537.990*(17)	CO	2–1	70	OriMC-1	NRAO	11m	Phi77
230738.48 *( 8)	HC <sub>2</sub> CHCN	25(0,25)–24(0,24)	0.4	OriMC-1	OVRO	10.4m	Sut85
231060.991*( 2)	OCS	19–18	0.80	OriMC-1	FCRAO	14m	Sch84
231199.27 *(10)	HCOOCH <sub>3</sub>	21(9,12)–21(8,13) A	0.3	OriMC-1	OVRO	10.4m	Sut85
231220.768*(40)	<sup>13</sup> CS	5–4	0.7	OriMC-1	MMWO	4.9m	Mun84a
231239.05 *(10)	HCOOCH <sub>3</sub>	21(9,13)–21(8,14) A	0.4	OriMC-1	OVRO	10.4m	Sut85
231281.10 ( 5)	CH <sub>3</sub> OH	10(2)–9(3) A–	0.4	OriMC-1	MMWO	4.9m	Mun84a
231310.43 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(1,25)–25(1,24)	b	OriMC-1	OVRO	10.4m	Sut85
231312.30 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(0,27)–26(1,26)	0.9b	OriMC-1	OVRO	10.4m	Sut85
231313.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	24(2,23)–23(1,22)	b	OriMC-1	OVRO	10.4m	Sut85
231321.635 (50)	N <sub>2</sub> D <sup>+</sup>	3–2	0.17	$\rho$ Oph B2	MMWO	4.9m	Lor85
231505.59 *( 1)	HCOOH	10(1,9)–9(1,8)	0.8	OriMC-1	OVRO	10.4m	Sut85
231854.21 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(1,27)–26(1,26)	1.1	OriMC-1	OVRO	10.4m	Sut85
231952.27 *( 5)	HC <sub>2</sub> CHCN	24(2,22)–23(2,21)	0.3	OriMC-1	OVRO	10.4m	Sut85
231966.91 *(10)	HCOOCH <sub>3</sub>	20(9,11)–20(8,12) A	0.4	OriMC-1	OVRO	10.4m	Sut85
231987.79 *(13)	CH <sub>3</sub> OCH <sub>3</sub>	13(0,13)–12(1,12) AA	b	OriMC-1	OVRO	10.4m	Sut85
231987.87 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	13(0,13)–12(1,12) EE	3.2b	OriMC-1	OVRO	10.4m	Sut85
231987.95 *(18)	CH <sub>3</sub> OCH <sub>3</sub>	13(0,13)–12(1,12) AE	b	OriMC-1	OVRO	10.4m	Sut85
231987.95 *(18)	CH <sub>3</sub> OCH <sub>3</sub>	13(0,13)–12(1,12) EA	b	OriMC-1	OVRO	10.4m	Sut85
231990.41 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(0,27)–26(0,26)	1.1	OriMC-1	OVRO	10.4m	Sut85
U 232163.	unidentified		0.8	OriMC-1	OVRO	10.4m	Sut85
232194.64 *(18)	<sup>13</sup> CH <sub>3</sub> CN	13(3)–12(3)	0.7	OriMC-1	OVRO	10.4m	Sut85
232216.43 *(18)	<sup>13</sup> CH <sub>3</sub> CN	13(2)–12(2)	0.5	OriMC-1	OVRO	10.4m	Sut85
232229.51 *(18)	<sup>13</sup> CH <sub>3</sub> CN	13(1)–12(1)	0.5	OriMC-1	OVRO	10.4m	Sut85
232233.87 *(18)	<sup>13</sup> CH <sub>3</sub> CN	13(0)–12(0)	0.6	OriMC-1	OVRO	10.4m	Sut85
232265.878*(58)	S <sup>18</sup> O	5(6)–4(5)	0.3	OriMC-1	OVRO	10.4m	Sut85
232418.59 ( 5)	CH <sub>3</sub> OH	10(2)–9(3) A +	3.9	OriMC-1	OVRO	10.4m	Sut85
232783.50 ( 5)	CH <sub>3</sub> OH	18(3)–17(4) A +	1.4	OriMC-1	OVRO	10.4m	Sut85
232790.03 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(3,24)–25(3,23)	1.1	OriMC-1	OVRO	10.4m	Sut85
232945.	CH <sub>3</sub> OH	unassigned	3.0	OriMC-1	OVRO	10.4m	Sut85
232962.34 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(10,16)–25(10,15)	b	OriMC-1	OVRO	10.4m	Sut85
232962.34 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(10,17)–25(10,16)	b	OriMC-1	OVRO	10.4m	Sut85
232967.58 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(9,18)–25(9,17)	b	OriMC-1	OVRO	10.4m	Sut85
232967.58 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(9,17)–25(9,16)	1.2b	OriMC-1	OVRO	10.4m	Sut85
232975.52 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(11,16)–25(11,15)	b	OriMC-1	OVRO	10.4m	Sut85
232975.52 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(11,15)–25(11,14)	0.8b	OriMC-1	OVRO	10.4m	Sut85
232998.74 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(8,19)–25(8,18)	1.1b	OriMC-1	OVRO	10.4m	Sut85
232998.74 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(8,18)–25(8,17)	b	OriMC-1	OVRO	10.4m	Sut85
233002.70 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(12,15)–25(12,14)	b	OriMC-1	OVRO	10.4m	Sut85
233002.70 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(12,14)–25(12,13)	b	OriMC-1	OVRO	10.4m	Sut85
233041.09 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(13,13)–25(13,12)	b	OriMC-1	OVRO	10.4m	Sut85
233041.09 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(13,14)–25(13,13)	0.4b	OriMC-1	OVRO	10.4m	Sut85
233069.31 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(7,20)–25(7,19)	1.0b	OriMC-1	OVRO	10.4m	Sut85
233069.31 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(7,19)–25(7,18)	b	OriMC-1	OVRO	10.4m	Sut85
233088.07 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(14,13)–25(14,12)	b	OriMC-1	OVRO	10.4m	Sut85
233088.07 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(14,12)–25(14,11)	0.5b	OriMC-1	OVRO	10.4m	Sut85
233144.82 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(15,12)–25(15,11)	b	OriMC-1	OVRO	10.4m	Sut85
233144.82 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(15,11)–25(15,10)	0.4b	OriMC-1	OVRO	10.4m	Sut85
233205.05 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(6,21)–25(6,20)	1.5b	OriMC-1	OVRO	10.4m	Sut85
233207.32 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(6,20)–25(6,19)	b	OriMC-1	OVRO	10.4m	Sut85
233208.07 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(16,11)–25(16,10)	b	OriMC-1	OVRO	10.4m	Sut85
233208.07 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(16,10)–25(16,9)	b	OriMC-1	OVRO	10.4m	Sut85
U 233213.	unidentified		0.2	OriMC-1	MMWO	4.9m	Eri81
233226.73 *(10)	HCOOCH <sub>3</sub>	19(4,16)–18(4,15) A	1.1	OriMC-1	OVRO	10.4m	Sut85
233310.00 *(10)	HCOOCH <sub>3</sub>	19(15,4)–18(15,3) A	0.4b	OriMC-1	OVRO	10.4m	Sut85
233310.00 *(10)	HCOOCH <sub>3</sub>	19(15,5)–18(15,4) A	b	OriMC-1	OVRO	10.4m	Sut85
233394.55 *(10)	HCOOCH <sub>3</sub>	19(14,5)–18(14,4) A	0.4b	OriMC-1	OVRO	10.4m	Sut85
233394.55 *(10)	HCOOCH <sub>3</sub>	19(14,6)–18(14,5) A	b	OriMC-1	OVRO	10.4m	Sut85
233443.09 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(5,22)–25(5,21)	0.7	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
233498.29 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(5,21)–25(5,20)	0.8	OriMC-1	OVRO	10.4m	Sut85	
233506.59 *(10)	HCOOCH <sub>3</sub>	19(13,6)–18(13,5) A	0.8b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233506.59 *(10)	HCOOCH <sub>3</sub>	19(13,7)–18(13,6) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233523.54 *( 4)	CH <sub>3</sub> CH <sub>2</sub> CN	26(20,6)–25(20,5)	b	OriMC-1	OVRO	10.4m	Sut85	
233523.54 *( 4)	CH <sub>3</sub> CH <sub>2</sub> CN	26(20,7)–25(20,6)	0.5b	OriMC-1	OVRO	10.4m	Sut85	
233524.6 *( 1)	HCOOCH <sub>3</sub>	19(13,6)–18(13,5) E	0.4	OriMC-1	OVRO	10.4m	Sut85	Sut85
233627.06 *(10)	HCOOCH <sub>3</sub>	17(9,8)–17(8,9) A	0.4b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233628.39 *(10)	HCOOCH <sub>3</sub>	17(9,9)–17(8,10) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233649.9 *( 1)	HCOOCH <sub>3</sub>	19(12,7)–18(12,6) E	0.5	OriMC-1	OVRO	10.4m	Sut85	Sut85
233654.07 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(4,23)–25(4,22)	1.1	OriMC-1	OVRO	10.4m	Sut85	
233655.27 *(10)	HCOOCH <sub>3</sub>	19(12,8)–18(12,7) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233655.27 *(10)	HCOOCH <sub>3</sub>	19(12,7)–18(12,6) A	1.1b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233671.0 *( 1)	HCOOCH <sub>3</sub>	19(12,6)–18(12,7) E	0.3	OriMC-1	OVRO	10.4m	Sut85	Sut85
233754.1 *( 1)	HCOOCH <sub>3</sub>	18(4,14)–17(4,13) E	0.8	OriMC-1	OVRO	10.4m	Sut85	Sut85
233777.45 *(10)	HCOOCH <sub>3</sub>	18(4,14)–17(4,13) A	0.8	OriMC-1	OVRO	10.4m	Sut85	Bla84
233795.75 ( 5)	CH <sub>3</sub> OH	18(3)–17(4) A–	1.0	OriMC-1	OVRO	10.4m	Sut85	Sas84
233845.3 *( 1)	HCOOCH <sub>3</sub>	19(11,8)–18(11,7) E	0.5	OriMC-1	OVRO	10.4m	Sut85	Sut85
233854.23 *(10)	HCOOCH <sub>3</sub>	19(11,8)–18(11,7) A	0.7b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233854.23 *(10)	HCOOCH <sub>3</sub>	19(11,9)–18(11,8) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
233867.1 *( 1)	HCOOCH <sub>3</sub>	19(11,9)–18(11,8) E	0.4	OriMC-1	OVRO	10.4m	Sut85	Sut85
234011.34 *(10)	HCOOCH <sub>3</sub>	16(9,7)–16(8,8) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
234011.58 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(1)–4(1) A+	0.76b	OriMC-1	OVRO	10.4m	Bla84	Bla84
234011.81 *(10)	HCOOCH <sub>3</sub>	16(9,8)–16(8,9) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
23412.3 *( 1)	HCOOCH <sub>3</sub>	19(10,9)–18(10,8) E	0.3	OriMC-1	OVRO	10.4m	Sut85	Sut85
234124.84 *(10)	HCOOCH <sub>3</sub>	19(10,9)–18(10,8) A	0.6b	OriMC-1	OVRO	10.4m	Sut85	Bla84
234124.84 *(10)	HCOOCH <sub>3</sub>	19(10,10)–18(10,9) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
234134.6 *( 1)	HCOOCH <sub>3</sub>	19(10,10)–18(10,9) E	0.6	OriMC-1	OVRO	10.4m	Sut85	Sut85
234187.12 *( 7)	SO <sub>2</sub>	28(3,25)–28(2,26)	1.6	OriMC-1	OVRO	10.4m	Sut85	
U 234291.	unidentified		0.6	OriMC-1	OVRO	10.4m	Sut85	
234421.67 *( 4)	SO <sub>2</sub>	16(6,10)–17(5,13)	1.5	OriMC-1	OVRO	10.4m	Sut85	
234423.95 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	26(4,22)–25(4,21)	b	OriMC-1	OVRO	10.4m	Sut85	
234486.4 *( 1)	HCOOCH <sub>3</sub>	19(9,10)–18(9,9) E	0.6	OriMC-1	OVRO	10.4m	Sut85	Sut85
234502.20 *(10)	HCOOCH <sub>3</sub>	19(9,11)–18(9,10) A	1.1b	OriMC-1	OVRO	10.4m	Sut85	Bla84
234502.42 *(10)	HCOOCH <sub>3</sub>	19(9,10)–18(9,9) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
234508.5 *( 1)	HCOOCH <sub>3</sub>	19(9,11)–18(9,10) E	0.6	OriMC-1	OVRO	10.4m	Sut85	Sut85
234683.39 ( 5)	CH <sub>3</sub> OH	4(2)–5(1) A–	2.6	OriMC-1	OVRO	10.4m	Sut85	Sas84
234698.45 ( 5)	CH <sub>3</sub> OH	5(–4)–6(–3) E	1.2	OriMC-1	OVRO	10.4m	Sut85	Sas84
234739.03 *(10)	HCOOCH <sub>3</sub>	20(2,18)–19(3,17) A	0.5	OriMC-1	OVRO	10.4m	Sut85	Bla84
U 234936.	unidentified		0.4	OriMC-1	OVRO	10.4m	Sut85	
235029.9 *( 1)	HCOOCH <sub>3</sub>	19(8,11)–18(8,10) E	1.2	OriMC-1	OVRO	10.4m	Sut85	Sut85
235043.2 *( 1)	HCOOCH <sub>3</sub>	19(8,12)–18(8,11) E	0.6b	OriMC-1	OVRO	10.4m	Sut85	Sut85
235046.48 *(10)	HCOOCH <sub>3</sub>	19(8,12)–18(8,11) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
235051.37 *(10)	HCOOCH <sub>3</sub>	19(8,11)–18(8,10) A	1.2	OriMC-1	OVRO	10.4m	Sut85	Bla84
235151.719*(12)	SO <sub>2</sub>	4(2,2)–3(1,3)	1.0	OriMC-1	MMWO	4.9m	Lor84a	
U 235261.	unidentified		0.7	OriMC-1	OVRO	10.4m	Sut85	
235563.82 *( 6)	HC <sub>2</sub> CHCN	25(2,24)–24(2,23)	0.3	OriMC-1	OVRO	10.4m	Sut85	
235844.50 ( 5)	HCOOCH <sub>3</sub>	19(7,13)–18(7,12) A	0.54	OriMC-1	OVRO	10.4m	Bla84	Plu84
235865.87 (10)	HCOOCH <sub>3</sub>	19(7,13)–18(7,12) E	0.48	OriMC-1	OVRO	10.4m	Bla84	Plu84
235881.17 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(0)–4(0) E	0.60	OriMC-1	OVRO	10.4m	Bla84	Bla84
235887.18 (10)	HCOOCH <sub>3</sub>	19(7,12)–18(7,11) E	0.54	OriMC-1	OVRO	10.4m	Bla84	Plu84
235927.55 *(11)	<sup>34</sup> SO <sub>2</sub>	5(2,4)–4(1,3)	0.59	OriMC-1	OVRO	10.4m	Bla84	
235932.34 ( 5)	HCOOCH <sub>3</sub>	19(7,12)–18(7,11) A	0.47	OriMC-1	OVRO	10.4m	Bla84	Plu84
235938.22 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(–1)–4(–1) E	0.68	OriMC-1	OVRO	10.4m	Bla84	Bla84
235951.98 *(10)	<sup>34</sup> SO <sub>2</sub>	10(3,7)–10(2,8)	0.71	OriMC-1	OVRO	10.4m	Bla84	Bla84
235960.37 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(0)–4(0) A+	0.71	OriMC-1	OVRO	10.4m	Bla84	Bla84
235960.94 *(59)	SiS	13–12	0.39	IRC+10216	MMWO	4.9m	Sah84	
235971.07 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(4)–4(4) A+–	0.25	OriMC-1	OVRO	10.4m	Bla84	Bla84
235978.62 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(–4)–4(–4) E	0.12	OriMC-1	OVRO	10.4m	Bla84	Bla84
235994.42 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(4)–4(4) E	b	OriMC-1	OVRO	10.4m	Bla84	Bla84
235997.23 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(3)–4(3) A+–	0.72b	OriMC-1	OVRO	10.4m	Bla84	Bla84
236006.10 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(3)–4(3) E	0.35	OriMC-1	OVRO	10.4m	Bla84	Bla84
236008.39 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(2)–4(2) A–	0.65	OriMC-1	OVRO	10.4m	Bla84	Bla84
236016.55 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(–3)–4(–3) E	0.36	OriMC-1	OVRO	10.4m	Bla84	Bla84
236041.40 ( 5)	<sup>13</sup> CH <sub>3</sub> OH	5(1)–4(1) E	0.56	OriMC-1	OVRO	10.4m	Bla84	Bla84
236042.2 *(10)	<sup>13</sup> CH <sub>3</sub> OH	5(1)–4(1) E	0.3	OriMC-1	MMWO	4.9m	Eri81	Lee84

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope		Astr. Ref.	Lab. Ref.
236049.52 (5)	$^{13}\text{CH}_3\text{OH}$	5(2)-4(2) A +	0.41	OriMC-1	OVRO	10.4m	Bla84	Bla84
236062.00 (5)	$^{13}\text{CH}_3\text{OH}$	5(-2)-4(-2) E	b	OriMC-1	OVRO	10.4m	Bla84	Bla84
236062.85 (5)	$^{13}\text{CH}_3\text{OH}$	5(2)-4(2) E	0.92b	OriMC-1	OVRO	10.4m	Bla84	Bla84
236216.724*(24)	$\text{SO}_2$	16(1,15)-15(2,14)	1.1	OriMC-1	MMWO	4.9m	Lor81a	
236355.9 *(1)	$\text{HCOOCH}_3$	20(3,18)-19(3,17) E	0.9	OriMC-1	OVRO	10.4m	Sut85	Sut85
236365.52 *(10)	$\text{HCOOCH}_3$	20(3,18)-19(3,17) A	0.7	OriMC-1	OVRO	10.4m	Sut85	Bla84
236452.304*(58)	$\text{SO}$	1(2)-2(1)	0.4	OriMC-1	OVRO	10.4m	Sut85	
236512.850*(61)	$\text{HC}_3\text{N}$	26-25	0.8	OriMC-1	MMWO	4.9m	Lor81	
236717.20 *(1)	$\text{HCOOH}$	11(1,11)-10(1,10)	0.4	OriMC-1	OVRO	10.4m	Sut85	
236726.27 *(38)	$\text{H}_2\text{CS}$	7(1,7)-6(1,6)	1.1	OriMC-1	MMWO	4.9m	Lor84a	
236743.72 *(1)	$\text{HCOOCH}_3$	19(5,15)-18(5,14) E	0.6	OriMC-1	OVRO	10.4m	Sut85	Sut85
236759.63 *(10)	$\text{HCOOCH}_3$	19(5,15)-18(5,14) A	0.6	OriMC-1	OVRO	10.4m	Sut85	Bla84
236800.5 *(1)	$\text{HCOOCH}_3$	19(6,14)-18(6,13) E	0.6	OriMC-1	OVRO	10.4m	Sut85	Sut85
236810.28 *(10)	$\text{HCOOCH}_3$	19(6,14)-18(6,13) A	0.8	OriMC-1	OVRO	10.4m	Sut85	Bla84
236936.13 (5)	$\text{CH}_3\text{OH}$	14(1)-13(2) A-	2.3	OriMC-1	OVRO	10.4m	Sut85	Sas84
U 236977.	unidentified		0.9	OriMC-1	OVRO	10.4m	Sut85	
237046.34 *(21)	$\text{CH}_3\text{OCH}_3$	7(2,5)-6(1,6) AE	b	OriMC-1	OVRO	10.4m	Sut85	
237046.34 *(21)	$\text{CH}_3\text{OCH}_3$	7(2,5)-6(1,6) EA	b	OriMC-1	OVRO	10.4m	Sut85	
237049.03 *(15)	$\text{CH}_3\text{OCH}_3$	7(2,5)-6(1,6) EE	1.5b	OriMC-1	OVRO	10.4m	Sut85	
237051.72 *(9)	$\text{CH}_3\text{OCH}_3$	7(2,5)-6(1,6) AA	b	OriMC-1	OVRO	10.4m	Sut85	
237068.826*(28)	$\text{SO}_2$	12(3,9)-12(2,10)	0.9	OriMC-1	MMWO	4.9m	Lei84a	
237093.183*(79)	$\text{HC}_3\text{N } \nu_7=1$	26-25 1e	0.8	OriMC-1	OVRO	10.4m	Sut85	
237131.	$\text{CH}_3\text{OH}$	unassigned	0.7	OriMC-1	OVRO	10.4m	Sut85	Bla85a
237170.44 *(2)	$\text{CH}_3\text{CH}_2\text{CN}$	26(3,23)-25(3,22)	0.9	OriMC-1	OVRO	10.4m	Sut85	
237266.91 *(10)	$\text{HCOOCH}_3$	21(1,20)-20(2,19) A	0.4	OriMC-1	OVRO	10.4m	Sut85	Bla84
237273.635 (30)	$\text{OC}^{34}\text{S}$	20-19	0.5	OriMC-1	OVRO	10.4m	Sut85	Dub80
237297.5 *(1)	$\text{HCOOCH}_3$	20(2,18)-19(2,17) E	0.8	OriMC-1	OVRO	10.4m	Sut85	Sut85
237305.97 (5)	$\text{HCOOCH}_3$	20(2,18)-19(2,17) A	1.1b	OriMC-1	OVRO	10.4m	Sut85	Bla84
237309.5 *(1)	$\text{HCOOCH}_3$	21(2,20)-20(2,19) E	b	OriMC-1	OVRO	10.4m	Sut85	Sut85
237315.08 (5)	$\text{HCOOCH}_3$	21(2,20)-20(2,19) A	1.1	OriMC-1	OVRO	10.4m	Sut85	Bla84
237344.8 *(1)	$\text{HCOOCH}_3$	21(1,20)-20(1,19) E	0.8	OriMC-1	OVRO	10.4m	Sut85	Sut85
237350.39 (5)	$\text{HCOOCH}_3$	21(1,20)-20(1,19) A	0.7	OriMC-1	OVRO	10.4m	Sut85	Bla84
237405.18 *(2)	$\text{CH}_3\text{CH}_2\text{CN}$	26(2,24)-25(2,23)	0.7	OriMC-1	OVRO	10.4m	Sut85	
237432.049*(79)	$\text{HC}_3\text{N } \nu_7=1$	26-25 1f	0.7	OriMC-1	OVRO	10.4m	Sut85	
237456.25 *(19)	$\text{HC}_2\text{CHCN}$	25(9,16)-24(9,15)	b	OriMC-1	OVRO	10.4m	Sut85	
237456.25 *(19)	$\text{HC}_2\text{CHCN}$	25(9,17)-24(9,16)	0.2b	OriMC-1	OVRO	10.4m	Sut85	
237482.77 *(9)	$\text{HC}_2\text{CHCN}$	25(5,21)-24(5,20)	0.3b	OriMC-1	OVRO	10.4m	Sut85	
237485.01 *(9)	$\text{HC}_2\text{CHCN}$	25(5,20)-24(5,19)	b	OriMC-1	OVRO	10.4m	Sut85	
237591.40 *(6)	$\text{HC}_2\text{CHCN}$	25(3,23)-24(3,22)	0.4	OriMC-1	OVRO	10.4m	Sut85	
237618.87 *(27)	$\text{CH}_3\text{OCH}_3$	9(2,8)-8(1,7) AE	b	OriMC-1	OVRO	10.4m	Sut85	
237618.87 *(27)	$\text{CH}_3\text{OCH}_3$	9(2,8)-8(1,7) EA	b	OriMC-1	OVRO	10.4m	Sut85	
237620.96 *(20)	$\text{CH}_3\text{OCH}_3$	9(2,8)-8(1,7) EE	0.9b	OriMC-1	OVRO	10.4m	Sut85	
237623.05 *(13)	$\text{CH}_3\text{OCH}_3$	9(2,8)-8(1,7) AA	b	OriMC-1	OVRO	10.4m	Sut85	
237711.89 *(7)	$\text{HC}_2\text{CHCN}$	25(4,21)-24(4,20)	0.3	OriMC-1	OVRO	10.4m	Sut85	
237807.6 *(1)	$\text{HCOOCH}_3$	19(6,13)-18(6,12) E	0.5	OriMC-1	OVRO	10.4m	Sut85	Sut85
237829.78 *(10)	$\text{HCOOCH}_3$	19(6,13)-18(6,12) A	0.6	OriMC-1	OVRO	10.4m	Sut85	Bla84
237851.85 *(2)	$\text{CH}_3\text{CH}_2\text{CN}$	27(2,26)-26(2,25)	0.4	OriMC-1	OVRO	10.4m	Sut85	
237859.71 *(7)	$\text{C}_4\text{H}$	25-24 $J=51/2-49/2$	0.053	IRC+10216	MMWO	4.9m	Lor84a	
237898.03 *(7)	$\text{C}_4\text{H}$	25-24 $J=49/2-47/2$	0.055	IRC+10216	MMWO	4.9m	Lor84a	
237983.38 (5)	$^{13}\text{CH}_3\text{OH}$	5(1)-4(1) A-	0.84	OriMC-1	OVRO	10.4m	Bla84	Bla84
U 238017.	unidentified		0.4	OriMC-1	OVRO	10.4m	Sut85	
238156.2 *(1)	$\text{HCOOCH}_3$	22(1,22)-21(1,21) E	b	OriMC-1	OVRO	10.4m	Sut85	Sut85
238156.6 *(1)	$\text{HCOOCH}_3$	22(0,22)-21(0,21) E	2.7b	OriMC-1	OVRO	10.4m	Sut85	Sut85
238156.84 *(10)	$\text{HCOOCH}_3$	22(1,22)-21(1,21) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
238157.27 *(10)	$\text{HCOOCH}_3$	22(0,22)-21(0,21) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
238190.06 *(10)	$\text{HCOOCH}_3$	7(6,2)-6(5,1) A	0.2b	OriMC-1	OVRO	10.4m	Sut85	Bla84
238190.23 *(10)	$\text{HCOOCH}_3$	7(6,1)-6(5,2) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
238726.70 *(12)	$\text{HC}_2\text{CHCN}$	26(1,26)-25(1,25)	0.2	OriMC-1	OVRO	10.4m	Sut85	
238766.166*(4)	$\text{CH}_3\text{CN}$	13(9)-12(9)	0.4	OriMC-1	OVRO	10.4m	Sut85	
238796.22 *(7)	$\text{HC}_2\text{CHCN}$	25(3,22)-24(3,21)	0.2	OriMC-1	OVRO	10.4m	Sut85	
238844.019*(4)	$\text{CH}_3\text{CN}$	13(8)-12(8)	0.6	OriMC-1	OVRO	10.4m	Sut85	
238912.787*(4)	$\text{CH}_3\text{CN}$	13(7)-12(7)	0.7	OriMC-1	OVRO	10.4m	Sut85	
238926.8 *(1)	$\text{HCOOCH}_3$	20(3,18)-19(2,17) E	0.3	OriMC-1	OVRO	10.4m	Sut85	Sut85
238972.44 *(10)	$\text{CH}_3\text{CN}$	13(6)-12(6)	0.31	OriMC-1	MMWO	4.9m	Lor84	
238992.562*(54)	$\text{SO}_2$	21(7,15)-22(6,16)	~0.12	OriMC-1	MMWO	4.9m	Lor84	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ '(K) $T_a$ '(K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
239001.21 *(21)	CH <sub>3</sub> <sup>13</sup> CN	12(2)-11(2)	0.3	OriMC-1	OVRO	10.4m	Sut85	
239014.95 *(21)	CH <sub>3</sub> <sup>13</sup> CN	12(1)-11(1)	0.5b	OriMC-1	OVRO	10.4m	Sut85	
239019.53 *(21)	CH <sub>3</sub> <sup>13</sup> CN	12(0)-11(0)	b	OriMC-1	OVRO	10.4m	Sut85	
239022.93 *(10)	CH <sub>3</sub> CN	13(5)-12(5)	0.33	OriMC-1	MMWO	4.9m	Lor84	
239064.299*(70)	CH <sub>3</sub> CN	13(4)-12(4)	0.39	OriMC-1	MMWO	4.9m	Lor84	
239096.496*(50)	CH <sub>3</sub> CN	13(3)-12(3)	0.68	OriMC-1	MMWO	4.9m	Lor84	
239119.503*(20)	CH <sub>3</sub> CN	13(2)-12(2)	0.54	OriMC-1	MMWO	4.9m	Lor84	
239133.311*(20)	CH <sub>3</sub> CN	13(1)-12(1)	0.73	OriMC-1	MMWO	4.9m	Lor84	
239137.914*(20)	CH <sub>3</sub> CN	13(0)-12(0)	0.83	OriMC-1	MMWO	4.9m	Lor84	
239179.284*(15)	CH <sub>3</sub> CCH	14(4)-13(4)	0.16	OriMC-1	MMWO	4.9m	Lor84a	
239211.218*( 4)	CH <sub>3</sub> CCH	14(3)-13(3)	0.24	OriMC-1	MMWO	4.9m	Lor84a	
239234.036*( 4)	CH <sub>3</sub> CCH	14(2)-13(2)	0.19	OriMC-1	MMWO	4.9m	Lor84a	
239247.731*( 4)	CH <sub>3</sub> CCH	14(1)-13(1)	0.36	OriMC-1	MMWO	4.9m	Lor84a	
239252.296*( 4)	CH <sub>3</sub> CCH	14(0)-13(0)	0.37	OriMC-1	MMWO	4.9m	Lor84a	
239627.16 *(12)	CH <sub>3</sub> CN $\nu_8=1$	13(1)-12(1) $\ell=1$	0.4	OriMC-1	OVRO	10.4m	Sut85	
239682.80 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(1,26)-26(1,25)	0.7	OriMC-1	OVRO	10.4m	Sut85	
239708.28 *(11)	HC <sub>2</sub> CHCN	26(0,26)-25(0,25)	0.1	OriMC-1	OVRO	10.4m	Sut85	
239732.	CH <sub>3</sub> OH	unassigned	0.6	OriMC-1	OVRO	10.4m	Sut85	Bla85a
239746.253 (12)	CH <sub>3</sub> OH	4(1)-4(1) A +	7.4	OriMC-1	OVRO	10.4m	Sut85	Pic81
239777.19 *(11)	CH <sub>3</sub> CN $\nu_8=1$	13(3)-12(3) $\ell=-1$	0.3	OriMC-1	OVRO	10.4m	Sut85	
239791.76 *(11)	CH <sub>3</sub> CN $\nu_8=1$	13(5)-12(5) $\ell=1$	0.2	OriMC-1	OVRO	10.4m	Sut85	
239808.91 *(12)	CH <sub>3</sub> CN $\nu_8=1$	13(2)-12(2) $\ell=-1$	0.6	OriMC-1	OVRO	10.4m	Sut85	
239816.08 *( 5)	HC <sub>2</sub> CHCN	25(1,24)-24(1,23)	0.5	OriMC-1	OVRO	10.4m	Sut85	
239824.78 *(12)	CH <sub>3</sub> CN $\nu_8=1$	13(4)-12(4) $\ell=1$	0.8	OriMC-1	OVRO	10.4m	Sut85	
239829.96 *(13)	CH <sub>3</sub> CN $\nu_8=1$	13(1)-12(1) $\ell=-1$	0.5	OriMC-1	OVRO	10.4m	Sut85	
239836.06 *(18)	CH <sub>3</sub> CN $\nu_8=1$	13(0)-12(0) $\ell=1$	0.5	OriMC-1	OVRO	10.4m	Sut85	
239850.01 *(14)	CH <sub>3</sub> CN $\nu_8=1$	13(3)-12(3) $\ell=1$	0.7	OriMC-1	OVRO	10.4m	Sut85	
239871.67 *(29)	CH <sub>3</sub> CN $\nu_8=1$	13(2)-12(2) $\ell=1$	0.4	OriMC-1	OVRO	10.4m	Sut85	
240020.4 *( 5)	HCOOCH <sub>3</sub>	19(3,16)-18(3,5) E	0.16	OriMC-1	NRAO	12m	Tur84a	
240021.4 *( 1)	HCOOCH <sub>3</sub>	19(3,16)-18(3,15) E	1.0	OriMC-1	OVRO	10.4m	Sut85	Sut85
240034.61 *( 6)	HCOOCH <sub>3</sub>	19(3,16)-18(3,5) A	0.10	OriMC-1	NRAO	12m	Tur84a	
240089.83 *(12)	CH <sub>3</sub> CN $\nu_8=1$	13(1)-12(1) $\ell=1$	0.6	OriMC-1	OVRO	10.4m	Sut85	
U 240097.	unidentified		0.1	OriMC-1	NRAO	12m	Tur84a	
240185.77 *(26)	CH <sub>2</sub> CO	12(1,12)-11(1,11)	0.5	OriMC-1	OVRO	10.4m	Sut85	
240241.50 ( 5)	CH <sub>3</sub> OH	5(3)-6(2) E	0.55	OriMC-1	MMWO	4.9m	Lor84a	Sas84
240266.16 *(40)	H <sub>2</sub> CS	7(0,7)-6(0,6)	0.55	OriMC-1	MMWO	4.9m	Lor84a	
240319.338*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	28(1,28)-27(1,27)	0.16	OriMC-1	MMWO	4.9m	Lor84a	
240331.44 *(26)	H <sub>2</sub> CS	7(4,3)-6(4,2)	b	OriMC-1	MMWO	4.9m	Lor84a	
240331.44 *(26)	H <sub>2</sub> CS	7(4,4)-6(4,3)	0.07b	OriMC-1	MMWO	4.9m	Lor84a	
240381.27 *(33)	H <sub>2</sub> CS	7(2,6)-6(2,5)	0.16	OriMC-1	MMWO	4.9m	Lor84a	
240392.29 *(26)	H <sub>2</sub> CS	7(3,5)-6(3,4)	0.38b	OriMC-1	MMWO	4.9m	Lor84a	
240392.96 *(26)	H <sub>2</sub> CS	7(3,4)-6(3,3)	b	OriMC-1	MMWO	4.9m	Lor84a	
240429.183*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	28(0,28)-27(0,27)	0.12	OriMC-1	MMWO	4.9m	Lor84a	
U 240473.4	unidentified		0.11	OriMC-1	MMWO	4.9m	Lor84a	
240548.29 *(33)	H <sub>2</sub> CS	7(2,5)-6(2,4)	0.16	OriMC-1	MMWO	4.9m	Lor84a	
240875.735*(16)	HNCO	11(1,11)-10(1,10)	1.0	OriMC-1	OVRO	10.4m	Sut85	
240942.793*(37)	SO <sub>2</sub>	18(1,17)-18(0,18)	0.8	OriMC-1	MMWO	4.9m	Lei84	
240960.56 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(1)-4(2) A +	0.9	OriMC-1	OVRO	10.4m	Sut85	Sas84
240978.15 *(33)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,3)-4(2,2) EA	0.2	OriMC-1	OVRO	10.4m	Sut85	
240982.94 *(21)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,3)-4(2,2) AE	b	OriMC-1	OVRO	10.4m	Sut85	
240985.15 *(19)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,3)-4(2,2) EE	1.0b	OriMC-1	OVRO	10.4m	Sut85	
240990.14 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,3)-4(2,2) AA	0.7	OriMC-1	OVRO	10.4m	Sut85	
241016.176*(29)	C <sup>34</sup> S	5-4	0.83	OriMC-2	MMWO	4.9m	Sne84	
241146.20 *( 1)	HCOOH	11(0,11)-10(0,10)	0.2	OriMC-1	OVRO	10.4m	Sut85	
241159.13 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(4)-4(4) E	0.7	OriMC-1	OVRO	10.4m	Sut85	Sas84
241166.53 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(3)-4(3) E	0.8	OriMC-1	OVRO	10.4m	Sut85	Sas84
241178.42 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(4)-4(4) A +-	1.3b	OriMC-1	OVRO	10.4m	Sut85	Sas84
241179.90 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(-3)-4(-3) E	b	OriMC-1	OVRO	10.4m	Sut85	Sas84
241184.08 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(-4)-4(-4) E	1.1	OriMC-1	OVRO	10.4m	Sut85	Sas84
241187.40 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(-2)-4(-2) E	1.4	OriMC-1	OVRO	10.4m	Sut85	Sas84
241192.81 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(2)-4(2) A +	1.9	OriMC-1	OVRO	10.4m	Sut85	Sas84
241196.35 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(2)-4(2) A -	2.1b	OriMC-1	OVRO	10.4m	Sut85	Sas84
241198.29 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(3)-4(3) A +-	b	OriMC-1	OVRO	10.4m	Sut85	Sas84
241203.69 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(1)-4(1) E	b	OriMC-1	OVRO	10.4m	Sut85	Sas84
241205.99 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(0)-4(0) E	2.8	OriMC-1	OVRO	10.4m	Sut85	Sas84

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_s$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.
241210.68 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(2)-4(2) E	1.2b	OriMC-1	OVRO	10.4m	Sut85 Sas84
241238.16 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(-1)-4(-1) E	0.7	OriMC-1	OVRO	10.4m	Sut85 Sas84
241267.88 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(0)-4(0) A	0.4	OriMC-1	OVRO	10.4m	Sut85 Sas84
241441.24 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	5(1)-4(1) A-	1.5	OriMC-1	OVRO	10.4m	Sut85 Sas84
241509.05 *(10)	<sup>34</sup> SO <sub>2</sub>	16(1,15)-15(2,14)	0.9	OriMC-1	OVRO	10.4m	Sut85
241523.98 *(20)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,2)-4(2,3) AE	0.9	OriMC-1	OVRO	10.4m	Sut85
241528.76 *(11)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,2)-4(2,3) EA	b	OriMC-1	OVRO	10.4m	Sut85
241528.97 *(11)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,2)-4(2,3) EE	1.7b	OriMC-1	OVRO	10.4m	Sut85
241531.18 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	5(3,2)-4(2,3) AA	b	OriMC-1	OVRO	10.4m	Sut85
U 241534.	unidentified		0.4	OriMC-1	MMWO	4.9m	Eri84b
241561.550 (37)	HDO	2(1,1)-2(1,2)	1.0	OriMC-1	MMWO	4.9m	Bec82 DeL71
241561.550 (37)	HDO	2(1,1)-2(1,2)	1.9	OriMC-1	OVRO	10.4m	Sut85 DeL71
241615.795*(13)	SO <sub>2</sub>	5(2,4)-4(1,3)	1.4	OriMC-1	MMWO	4.9m	Lor84e
241700.219 (12)	CH <sub>3</sub> OH	5(0)-4(0) E	1.7	OriMC-1	MMWO	4.9m	Lor84 Pic81
241767.224 (12)	CH <sub>3</sub> OH	5(-1)-4(-1) E	1.8	OriMC-1	MMWO	4.9m	Lor84 Pic81
241774.037*(10)	HNCO	11(0,11)-10(0,10)	3.1	OriMC-1	OVRO	10.4m	Sut85
241791.431 (12)	CH <sub>3</sub> OH	5(0)-4(0) A +	1.8	OriMC-1	MMWO	4.9m	Lor84 Pic81
241806.507 (12)	CH <sub>3</sub> OH	5(4)-4(4) A +	0.8b	OriMC-1	MMWO	4.9m	Lor84 Pic81
241806.508 (12)	CH <sub>3</sub> OH	5(4)-4(4) A-	b	OriMC-1	MMWO	4.9m	Lor84 Pic81
241813.257 (12)	CH <sub>3</sub> OH	5(-4)-4(-4) E	0.7	OriMC-1	MMWO	4.9m	Lor84 Pic81
241829.646 (12)	CH <sub>3</sub> OH	5(4)-4(4) E	~0.7	OriMC-1	MMWO	4.9m	Lor84 Pic81
241832.951 (12)	CH <sub>3</sub> OH	5(3)-4(3) A +, A-	1.6	OriMC-1	MMWO	4.9m	Lor84 Pic81
241842.23 (12)	CH <sub>3</sub> OH	5(2)-4(2) A-	b	OriMC-1	MMWO	4.9m	Lor84 Pic81
241843.646 (12)	CH <sub>3</sub> OH	5(3)-4(3) E	1.7b	OriMC-1	MMWO	4.9m	Lor84 Pic81
241852.352 (12)	CH <sub>3</sub> OH	5(-3)-4(-3) E	0.9	OriMC-1	MMWO	4.9m	Lor84 Pic81
241879.073 (12)	CH <sub>3</sub> OH	5(1)-4(1) E	1.4	OriMC-1	MMWO	4.9m	Lor84 Pic81
241887.704 (12)	CH <sub>3</sub> OH	5(2)-4(2) A +	1.2	OriMC-1	MMWO	4.9m	Lor84 Pic81
241904.119 (50)	CH <sub>3</sub> OH	5(2)-4(2) E	1.2b	OriMC-1	MMWO	4.9m	Lor81a Pic81
241904.407 (50)	CH <sub>3</sub> OH	5(-2)-4(-2) E	b	OriMC-1	MMWO	4.9m	Lor81a Pic81
241922.55 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(10,17)-26(10,16)	b	OriMC-1	OVRO	10.4m	Sut85
241922.55 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(10,18)-26(10,17)	0.9b	OriMC-1	OVRO	10.4m	Sut85
241932.18 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(9,18)-26(9,17)	b	OriMC-1	OVRO	10.4m	Sut85
241932.18 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(9,19)-26(9,18)	1.3b	OriMC-1	OVRO	10.4m	Sut85
241933.16 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(11,17)-26(11,16)	b	OriMC-1	OVRO	10.4m	Sut85
241933.16 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(11,16)-26(11,15)	b	OriMC-1	OVRO	10.4m	Sut85
241946.86 *(15)	CH <sub>3</sub> OCH <sub>3</sub>	13(1,13)-12(0,12) EE	0.5	OriMC-1	MMWO	4.9m	Lor81a
241959.06 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(12,15)-26(12,14)	0.7b	OriMC-1	OVRO	10.4m	Sut85
241959.06 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(12,16)-26(12,15)	b	OriMC-1	OVRO	10.4m	Sut85
241970.44 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(6,19)-26(6,18)	b	OriMC-1	OVRO	10.4m	Sut85
241970.44 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(6,20)-26(6,19)	0.8b	OriMC-1	OVRO	10.4m	Sut85
241985.51 *(10)	<sup>34</sup> SO <sub>2</sub>	8(3,5)-8(2,5)	1.4	OriMC-1	OVRO	10.4m	Sut85
241997.11 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(13,14)-26(13,13)	b	OriMC-1	OVRO	10.4m	Sut85
241997.11 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(13,15)-26(13,14)	0.5b	OriMC-1	OVRO	10.4m	Sut85
242045.30 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(14,13)-26(14,12)	b	OriMC-1	OVRO	10.4m	Sut85
242045.30 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(14,14)-26(14,13)	b	OriMC-1	OVRO	10.4m	Sut85
242052.48 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(7,21)-26(7,20)	b	OriMC-1	OVRO	10.4m	Sut85
242052.58 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(7,20)-26(7,19)	0.8b	OriMC-1	OVRO	10.4m	Sut85
242102.24 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(15,13)-26(15,12)	0.8b	OriMC-1	OVRO	10.4m	Sut85
242102.24 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(15,12)-26(15,11)	b	OriMC-1	OVRO	10.4m	Sut85
242166.96 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(16,12)-26(16,11)	0.2b	OriMC-1	OVRO	10.4m	Sut85
242166.96 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(16,11)-26(16,10)	b	OriMC-1	OVRO	10.4m	Sut85
242206.97 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(6,22)-26(6,21)	1.3b	OriMC-1	OVRO	10.4m	Sut85
242210.41 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(6,21)-26(6,20)	b	OriMC-1	OVRO	10.4m	Sut85
242375.82 *(38)	CH <sub>2</sub> CO	12(0,12)-11(0,11)	0.5	OriMC-1	OVRO	10.4m	Sut85
242398.66 *(23)	CH <sub>2</sub> CO	12(3,10)-11(3,9)	0.6b	OriMC-1	OVRO	10.4m	Sut85
242399.16 *(23)	CH <sub>2</sub> CO	12(3,9)-11(3,8)	b	OriMC-1	OVRO	10.4m	Sut85
242424.66 *(28)	CH <sub>2</sub> CO	12(2,11)-11(2,10)	0.2	OriMC-1	OVRO	10.4m	Sut85
242446.21 ( 5)	CH <sub>3</sub> OH	13(-2)-14(-1) E	3.3	OriMC-1	OVRO	10.4m	Sut85 Sas84
242470.39 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(5,23)-26(5,22)	0.9	OriMC-1	OVRO	10.4m	Sut85
242490.3 ( 1)	CH <sub>3</sub> OH	24(-3)-24(2) A	0.7	OriMC-1	OVRO	10.4m	Sut85
242536.16 *(28)	CH <sub>2</sub> CO	12(2,10)-11(2,9)	0.4	OriMC-1	OVRO	10.4m	Sut85
242547.32 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(5,22)-26(5,21)	0.7	OriMC-1	OVRO	10.4m	Sut85
242639.717*(16)	HNCO	11(1,10)-10(1,9)	1.1	OriMC-1	OVRO	10.4m	Sut85
242664.68 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(4,24)-26(4,23)	1.0	OriMC-1	OVRO	10.4m	Sut85
242872.2 *( 1)	HCOOCH <sub>3</sub>	19(5,14)-18(5,13) E	1.1	OriMC-1	OVRO	10.4m	Sut85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
242895.95 *(10)	HCOOCH <sub>3</sub>	19(5,14)–18(5,13) A	1.1	OriMC-1	OVRO	10.4m	Sut85	Bla84
242913.680*(26)	C <sup>33</sup> S	5–4	1.5	OriMC-1	OVRO	10.4m	Sut85	
243039.344*(54)	S <sup>18</sup> O	7(5)–6(5)	0.4	OriMC-1	OVRO	10.4m	Sut85	
243087.72 *( 3)	SO <sub>2</sub>	5(4,2)–6(3,3)	1.4	OriMC-1	OVRO	10.4m	Sut85	
243218.034*( 2)	OCS	20–19	0.67	OriMC-1	MMWO	4.9m	Lor84a	
243397.53 ( 5)	CH <sub>3</sub> OH	18(6)–19(5) A +	1.6	OriMC-1	OVRO	10.4m	Sut85	Sas84
243412.6 ( 1)	CH <sub>3</sub> OH	23(–3)–23(2) A	0.9	OriMC-1	OVRO	10.4m	Sut85	Sut85
243522.64 *( 9)	SO <sub>2</sub> $\nu_2=1$	14(0,14)–13(1,13)	0.6	OriMC-1	OVRO	10.4m	Sut85	
243643.23 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(4,23)–26(4,22)	0.9	OriMC-1	OVRO	10.4m	Sut85	
U U 243740.	unidentified		0.8	OriMC-1	OVRO	10.4m	Sut85	
243747.	unidentified		1.1	OriMC-1	OVRO	10.4m	Sut85	
243915.826 (12)	CH <sub>3</sub> OH	5(1)–4(1) A–	8.1	OriMC-1	OVRO	10.4m	Sut85	Pic81
243935.88 *(21)	<sup>34</sup> SO <sub>2</sub>	18(1,17)–18(0,18)	0.4	OriMC-1	OVRO	10.4m	Sut85	
244047.75 *(48)	H <sub>2</sub> CS	7(1,6)–6(1,5)	0.91	OriMC-1	MMWO	4.9m	Lor84a	
244254.228*(24)	SO <sub>2</sub>	14(0,14)–13(1,13)	1.5	OriMC-1	MMWO	4.9m	Lor84b	
244330.5 ( 1)	CH <sub>3</sub> OH	22(–3)–22(2) A	1.1	OriMC-1	OVRO	10.4m	Sut85	Sut85
244338.02 ( 5)	CH <sub>3</sub> OH $\nu_1=1$	9(1)–8(0) E	1.2	OriMC-1	OVRO	10.4m	Sut85	Sas84
244481.54 *(11)	<sup>34</sup> SO <sub>2</sub>	14(0,14)–13(1,13)	1.4	OriMC-1	OVRO	10.4m	Sut85	
244580.7 *( 1)	HCOOCH <sub>3</sub>	20(4,17)–19(4,16) E	1.3	OriMC-1	OVRO	10.4m	Sut85	Sut85
244593.98 *(10)	HCOOCH <sub>3</sub>	20(4,17)–19(4,16) A	1.1	OriMC-1	OVRO	10.4m	Sut85	Bla84
244712.24 *(26)	CH <sub>2</sub> CO	12(1,11)–11(1,10)	0.8	OriMC-1	OVRO	10.4m	Sut85	
244857.39 *( 7)	HC <sub>2</sub> CHCN	26(2,25)–25(2,24)	0.5	OriMC-1	OVRO	10.4m	Sut85	
244935.606*(33)	CS	5–4	5.5	OriMC-2	MMWO	4.9m	Sne84	
245178.68 *(16)	<sup>34</sup> SO <sub>2</sub>	15(2,14)–15(1,15)	0.8	OriMC-1	OVRO	10.4m	Sut85	
245223.0 ( 1)	CH <sub>3</sub> OH	21(–3)–21(2) A	1.3	OriMC-1	OVRO	10.4m	Sut85	Sut85
245302.30 *(11)	<sup>34</sup> SO <sub>2</sub>	6(3,3)–6(2,4)	0.9	OriMC-1	OVRO	10.4m	Sut85	
245339.40 *( 5)	SO <sub>2</sub>	26(3,23)–25(4,22)	1.7	OriMC-1	OVRO	10.4m	Sut85	
245563.43 *( 2)	SO <sub>2</sub>	10(3,7)–10(2,8)	7.8	OriMC-1	OVRO	10.4m	Sut85	
245606.406*(78)	HC <sub>3</sub> N	27–26	0.7	OriMC-1	MMWO	4.9m	Lor81	
245651.09 *(10)	HCOOCH <sub>3</sub>	20(15,6)–19(15,5) A	0.6b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245651.09 *(10)	HCOOCH <sub>3</sub>	20(15,5)–19(15,4) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245752.17 *(10)	HCOOCH <sub>3</sub>	20(14,6)–19(14,5) A	0.7b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245752.17 *(10)	HCOOCH <sub>3</sub>	20(14,7)–19(14,6) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245754.3 *( 1)	HCOOCH <sub>3</sub>	20(14,6)–19(14,5) E	b	OriMC-1	OVRO	10.4m	Sut85	Sut85
245772.1 *( 1)	HCOOCH <sub>3</sub>	20(14,7)–19(14,6) E	0.5	OriMC-1	OVRO	10.4m	Sut85	Sut85
245883.2 *( 1)	HCOOCH <sub>3</sub>	20(13,8)–19(13,7) E	0.2	OriMC-1	OVRO	10.4m	Sut85	Sut85
245885.14 *(10)	HCOOCH <sub>3</sub>	20(13,7)–19(13,6) A	0.8b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245885.14 *(10)	HCOOCH <sub>3</sub>	20(13,8)–19(13,7) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
245903.5 *( 1)	HCOOCH <sub>3</sub>	20(13,7)–19(13,6) E	0.2	OriMC-1	OVRO	10.4m	Sut85	Sut85
246055.1 *( 1)	HCOOCH <sub>3</sub>	20(12,9)–19(12,8) E	0.5	OriMC-1	OVRO	10.4m	Sut85	Sut85
246060.75 *(10)	HCOOCH <sub>3</sub>	20(12,9)–19(12,8) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246060.75 *(10)	HCOOCH <sub>3</sub>	20(12,8)–19(12,7) A	0.8b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246074.65 ( 5)	CH <sub>3</sub> OH	20(–3)–20(2) A	1.6	OriMC-1	OVRO	10.4m	Sut85	Sas84
246268.73 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(2,25)–26(2,24)	0.9	OriMC-1	OVRO	10.4m	Sut85	
246285.4 *( 1)	HCOOCH <sub>3</sub>	20(11,9)–19(11,8) E	0.4	OriMC-1	OVRO	10.4m	Sut85	Sut85
246295.06 *(10)	HCOOCH <sub>3</sub>	20(11,10)–19(11,9) A	1.3b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246295.06 *(10)	HCOOCH <sub>3</sub>	20(11,9)–19(11,8) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246308.6 *( 1)	HCOOCH <sub>3</sub>	20(11,10)–19(11,9) E	0.4	OriMC-1	OVRO	10.4m	Sut85	Sut85
246421.91 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	28(2,27)–27(2,26)	0.6	OriMC-1	OVRO	10.4m	Sut85	
246548.69 *( 2)	CH <sub>3</sub> CH <sub>2</sub> CN	27(3,24)–26(3,23)	0.6	OriMC-1	OVRO	10.4m	Sut85	
246560.749*(91)	HC <sub>3</sub> N $\nu_7=1$	27–26 1f	1.1	OriMC-1	OVRO	10.4m	Sut85	
246600.2 *( 1)	HCOOCH <sub>3</sub>	20(10,11)–19(10,10) E	0.7	OriMC-1	OVRO	10.4m	Sut85	Sut85
246613.34 *(10)	HCOOCH <sub>3</sub>	20(10,11)–19(10,10) A	1.1b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246613.38 *(10)	HCOOCH <sub>3</sub>	20(10,10)–19(10,9) A	b	OriMC-1	OVRO	10.4m	Sut85	Bla84
246623.1 *( 1)	HCOOCH <sub>3</sub>	20(10,10)–19(10,9) E	0.8	OriMC-1	OVRO	10.4m	Sut85	Sut85
246663.390*(38)	<sup>34</sup> SO	5(6)–4(5)	2.9	OriMC-1	OVRO	10.4m	Sut85	
246686.18 *(13)	<sup>34</sup> SO <sub>2</sub>	4(3,1)–4(2,2)	0.3	OriMC-1	OVRO	10.4m	Sut85	
246873.34 ( 5)	CH <sub>3</sub> OH	19(3)–19(2) A–+	0.30	OriMC-1	MMWO	4.9m	Lor84b	Sas84
246891.1 *( 1)	HCOOCH <sub>3</sub>	19(4,15)–18(4,14) E	1.2	OriMC-1	OVRO	10.4m	Sut85	Sut85
246896.87 *(16)	HC <sub>2</sub> CHCN	26(7,20)–25(7,19)	0.5b	OriMC-1	OVRO	10.4m	Sut85	
246896.87 *(16)	HC <sub>2</sub> CHCN	26(7,19)–25(7,18)	b	OriMC-1	OVRO	10.4m	Sut85	
246914.59 *(10)	HCOOCH <sub>3</sub>	19(4,15)–18(4,14) A	1.2	OriMC-1	OVRO	10.4m	Sut85	Bla84
246924.65 *(31)	HDCCO	4(1,4)–3(1,3)	0.40	OriMC-1	MMWO	4.9m	Lor84b	
246945.87 *(93)	HCOOCH <sub>3</sub>	10(5,6)–9(4,6) E	0.16	OriMC-1	MMWO	4.9m	Lor84b	
246952.14 *(23)	HC <sub>2</sub> CHCN	26(9,17)–25(9,16)	b	OriMC-1	OVRO	10.4m	Sut85	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_1^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
246952.14 *(23)	HC <sub>2</sub> CHCN	26(9,18)–25(9,17)	0.6b	OriMC–1	OVRO	10.4m	Sut85
247001.71 *(11)	HC <sub>2</sub> CHCN	26(5,22)–25(5,21)	0.2b	OriMC–1	OVRO	10.4m	Bla85
247004.92 *(11)	HC <sub>2</sub> CHCN	26(5,21)–25(5,20)	b	OriMC–1	OVRO	10.4m	Bla85
247040.8 *(1)	HCOOCH <sub>3</sub>	20(9,11)–19(9,10) E	0.6	OriMC–1	OVRO	10.4m	Bla85
247044.1 *(1)	HCOOCH <sub>3</sub>	20(3,19)–19(3,18) E	1.1	OriMC–1	OVRO	10.4m	Bla85
247044.1	HCOOCH <sub>3</sub>	21(5,17)–20(5,16)	0.27	OriMC–1	MMWO	4.9m	Lor84b
247053.45 (5)	HCOOCH <sub>3</sub>	20(3,19)–19(3,18) A	1.2	OriMC–1	OVRO	10.4m	Bla85
247057.25 *(10)	HCOOCH <sub>3</sub>	20(9,12)–19(9,11) A	1.2b	OriMC–1	OVRO	10.4m	Bla85
247057.70 *(10)	HCOOCH <sub>3</sub>	20(9,11)–19(9,10) A	b	OriMC–1	OVRO	10.4m	Bla85
247063.5 *(5)	HCOOCH <sub>3</sub>	20(9,12)–19(9,11) E	0.5	OriMC–1	OVRO	10.4m	Bla85
247086.93 *(8)	HC <sub>2</sub> CHCN	26(3,24)–25(3,23)	0.2	OriMC–1	OVRO	10.4m	Bla85
247162.1 (1)	CH <sub>3</sub> OH	unassigned	1.6	OriMC–1	OVRO	10.4m	Bla85
247228.693 (24)	CH <sub>3</sub> OH	4(2)–5(1) A+	3.9	OriMC–1	OVRO	10.4m	Bla85
247270.64 *(9)	HC <sub>2</sub> CHCN	26(4,22)–25(4,21)	0.3	OriMC–1	OVRO	10.4m	Bla85
247440.36 *(12)	<sup>34</sup> SO <sub>2</sub>	5(3,3)–5(2,4)	0.7	OriMC–1	OVRO	10.4m	Bla85
U 247469.	unidentified		0.6	OriMC–1	OVRO	10.4m	Bla85
247610.96 (5)	CH <sub>3</sub> OH	18(3)–18(2) A–+	1.1	OriMC–1	OVRO	10.4m	Bla85
U 247630.	unidentified		0.4	OriMC–1	OVRO	10.4m	Bla85
U 247636.	unidentified		0.4	OriMC–1	OVRO	10.4m	Bla85
247656.8 *(5)	HCOOCH <sub>3</sub>	20(2,19)–19(2,18) E	1.4	OriMC–1	OVRO	10.4m	Bla85
247665.34 *(10)	HCOOCH <sub>3</sub>	20(2,19)–19(2,18) A	1.2	OriMC–1	OVRO	10.4m	Bla85
247682.7 *(1)	HCOOCH <sub>3</sub>	20(8,12)–19(8,11) E	0.2	OriMC–1	OVRO	10.4m	Bla85
247697.19 *(10)	HCOOCH <sub>3</sub>	20(8,13)–19(8,12) A	0.7	OriMC–1	OVRO	10.4m	Bla85
247704.3 *(1)	HCOOCH <sub>3</sub>	20(8,13)–19(8,12) E	0.8	OriMC–1	OVRO	10.4m	Bla85
247707.95 *(10)	HCOOCH <sub>3</sub>	20(8,12)–19(8,11) A	1.1	OriMC–1	OVRO	10.4m	Bla85
247798.55 *(15)	HC <sub>2</sub> CHCN	27(1,27)–26(1,26)	0.3	OriMC–1	OVRO	10.4m	Bla85
247840.2 (1)	CH <sub>3</sub> OH	unassigned	1.0	OriMC–1	OVRO	10.4m	Bla85
U 247875.	unidentified		0.7	OriMC–1	OVRO	10.4m	Bla85
247901.6 *(1)	HCOOCH <sub>3</sub>	22(8,21)–21(8,20) E	0.7	OriMC–1	OVRO	10.4m	Bla85
247907.12 *(10)	HCOOCH <sub>3</sub>	22(2,21)–21(2,20) A	0.6	OriMC–1	OVRO	10.4m	Bla85
U 247911.	unidentified		0.5	OriMC–1	OVRO	10.4m	Bla85
247922.2 *(1)	HCOOCH <sub>3</sub>	22(1,21)–21(1,20) E	0.6	OriMC–1	OVRO	10.4m	Bla85
247927.69 *(10)	HCOOCH <sub>3</sub>	22(1,21)–21(1,20) A	0.5	OriMC–1	OVRO	10.4m	Bla85
248057.385*(31)	SO <sub>2</sub>	15(2,14)–15(1,15)	6.1	OriMC–1	OVRO	10.4m	Bla85
248242.5 (1)	CH <sub>3</sub> OH	17(3)–17(2) A–+	2.2	OriMC–1	OVRO	10.4m	Bla85
248364.82 *(11)	<sup>34</sup> SO <sub>2</sub>	7(3,5)–7(2,6)	0.9	OriMC–1	OVRO	10.4m	Bla85
248436.900*(33)	SO <sub>2</sub>	13(3,11)–14(0,14)	0.6	OriMC–1	OVRO	10.4m	Bla85
248528.95 *(78)	HC <sub>2</sub> CHCN	26(3,23)–25(3,22)	0.4	OriMC–1	OVRO	10.4m	Bla85
248617.41 *(10)	HCOOCH <sub>3</sub>	20(7,14)–19(7,13) A	1.0	OriMC–1	OVRO	10.4m	Bla85
248633.8 *(1)	HCOOCH <sub>3</sub>	20(7,14)–19(7,13) E	1.0	OriMC–1	OVRO	10.4m	Bla85
249887.47 (5)	CH <sub>3</sub> OH	14(3)–14(2) A–+	3.6	OriMC–1	OVRO	10.4m	Bla85
249924.31 *(28)	CH <sub>3</sub> OCH <sub>3</sub>	15(1,14)–14(2,13) EE	1.1	OriMC–1	OVRO	10.4m	Bla85
250050.21 *(24)	<sup>13</sup> CH <sub>3</sub> CN	14(3)–13(3)	0.6	OriMC–1	OVRO	10.4m	Bla85
250073.68 *(24)	<sup>13</sup> CH <sub>3</sub> CN	14(2)–13(2)	0.5	OriMC–1	OVRO	10.4m	Bla85
250087.76 *(25)	<sup>13</sup> CH <sub>3</sub> CN	14(1)–13(1)	0.3	OriMC–1	OVRO	10.4m	Bla85
250092.46 *(25)	<sup>13</sup> CH <sub>3</sub> CN	14(0)–13(0)	0.4	OriMC–1	OVRO	10.4m	Bla85
250246.5 *(1)	HCOOCH <sub>3</sub>	20(3,17)–19(3,16) E	1.0	OriMC–1	OVRO	10.4m	Bla85
250258.34 *(10)	HCOOCH <sub>3</sub>	20(3,17)–19(3,16) A	0.9	OriMC–1	OVRO	10.4m	Bla85
250291.18 (5)	CH <sub>3</sub> OH	13(3)–13(2) A–+	4.2	OriMC–1	OVRO	10.4m	Bla85
250358.42 *(10)	<sup>34</sup> SO <sub>2</sub>	9(3,7)–9(2,8)	0.9	OriMC–1	OVRO	10.4m	Bla85
250440.328*(20)	CH <sub>3</sub> CH <sub>2</sub> CN	28(3,26)–27(3,25)	1.7w	OriMC–1	OVRO	10.4m	Bla85
250482.94 (2)	NO	<sup>2</sup> Π <sub>1/2</sub> J,F = 5/2,5/2–3/2,3/2 e	0.3	OriMC–1	OVRO	10.4m	Bla85
250506.98 (5)	CH <sub>3</sub> OH	11(0)–10(1) A+	5.8	OriMC–1	OVRO	10.4m	Bla85
250635.207 (12)	CH <sub>3</sub> OH	12(3)–12(2) A–+	5.9	OriMC–1	OVRO	10.4m	Bla85
251738.520 (12)	CH <sub>3</sub> OH	6(3)–6(2) A–+	2.0	OriMC–1	MMWO	4.9m	Cle84
251811.882 (12)	CH <sub>3</sub> OH	5(3)–5(2) A–+	1.2	OriMC–1	MMWO	4.9m	Cle84
251825.762*(39)	SO	5(6)–4(5)	3.3	OriMC–1	MMWO	4.9m	Cle84
251866.579 (12)	CH <sub>3</sub> OH	4(3)–4(2) A–+	1.5	OriMC–1	MMWO	4.9m	Cle84
251890.901 (12)	CH <sub>3</sub> OH	5(3)–5(2) A–+	1.8	OriMC–1	MMWO	4.9m	Cle84
251895.728 (12)	CH <sub>3</sub> OH	6(3)–6(2) A–+	2.1	OriMC–1	MMWO	4.9m	Cle84
251900.495 (12)	CH <sub>3</sub> OH	4(3)–4(2) A–+	1.7	OriMC–1	MMWO	4.9m	Cle84
251905.812 (12)	CH <sub>3</sub> OH	3(3)–3(2) A–+	1.0	OriMC–1	MMWO	4.9m	Cle84
251917.042 (12)	CH <sub>3</sub> OH	3(3)–3(2) A–+	1.1	OriMC–1	MMWO	4.9m	Cle84
251923.631 (12)	CH <sub>3</sub> OH	7(3)–7(2) A–+	1.8	OriMC–1	MMWO	4.9m	Cle84
U 251953.	unidentified		1.2	OriMC–1	MMWO	4.9m	Cle84

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r$ (K) $T_a$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
252803.377 (24)	CH <sub>3</sub> OH	12(3)-12(2) A+-	4.1	OriMC-1	OVRO	10.4m	Bla85	Pic81
252896.045*(20)	CH <sub>3</sub> CH <sub>2</sub> CN	28(4,24)-27(4,23)	0.7	OriMC-1	OVRO	10.4m	Bla85	
253207.011*(32)	<sup>34</sup> SO	6(6)-5(5)	3.0	OriMC-1	OVRO	10.4m	Bla85	
253221.39 ( 5)	CH <sub>3</sub> OH	13(3)-13(2) A+-	3.1	OriMC-1	OVRO	10.4m	Bla85	Sas84
253755.85 ( 5)	CH <sub>3</sub> OH	14(3)-14(-2) A+-	0.73	OriMC-1	MMWO	4.9m	Lor84b	Sas84
254015.34 ( 5)	CH <sub>3</sub> OH	2(0)-1(-1) E	0.95	OriMC-1	MMWO	4.9m	Lor84	Sas84
254102.68 *(74)	SiS	14-13	0.85	IRC+10216	MMWO	4.9m	Sah84	
254216.241*(67)	<sup>30</sup> SiO	6-5 $\nu=0$	0.6	OriMC-1	MMWO	4.9m	Lor84b	
254423.58 ( 5)	CH <sub>3</sub> OH	15(3)-15(2) A+-	3.0b	OriMC-1	OVRO	10.4m	Bla85	Sas84
254423.58 ( 5)	CH <sub>3</sub> OH	11(5)-11(4) E	b	OriMC-1	OVRO	10.4m	Bla85	Sas84
254573.657*(10)	SO	8(9)-8(8)	0.39	OriMC-1	MMWO	4.9m	Lor84	
254699.62 *(10)	HC <sub>3</sub> N	28-27	5.0	OriMC-1	OVRO	10.4m	Bla85	
254959.5 ( 1)	CH <sub>3</sub> OH	unassigned	1.2	OriMC-1	OVRO	10.4m	Bla85	Bla85
254976.344*(20)	CH <sub>3</sub> CH <sub>2</sub> CN	29(2,28)-28(2,27)	1.5	OriMC-1	OVRO	10.4m	Bla85	
255050.260 (59)	HDO	5(2,3)-4(3,2)	2.1	OriMC-1	OVRO	10.4m	Bla85	Del71
255121.0 ( 1)	CH <sub>3</sub> OH	unassigned	1.7	OriMC-1	OVRO	10.4m	Bla85	Bla85
255173.0 ( 1)	CH <sub>3</sub> OH	unassigned	1.2	OriMC-1	OVRO	10.4m	Bla85	Bla85
255192.5 ( 1)	CH <sub>3</sub> OH	unassigned	1.8b	OriMC-1	OVRO	10.4m	Bla85	Bla85
255193.5 ( 1)	CH <sub>3</sub> OH	unassigned	b	OriMC-1	OVRO	10.4m	Bla85	Bla85
255203.8 ( 1)	CH <sub>3</sub> OH	unassigned	1.3	OriMC-1	OVRO	10.4m	Bla85	Bla85
255214.9 ( 1)	CH <sub>3</sub> OH	unassigned	1.1	OriMC-1	OVRO	10.4m	Bla85	Bla85
255220.9 ( 1)	CH <sub>3</sub> OH	unassigned	0.9	OriMC-1	OVRO	10.4m	Bla85	Bla85
255241.97 ( 5)	CH <sub>3</sub> OH	16(3)-16(2) A+-	3.8	OriMC-1	OVRO	10.4m	Bla85	Sas84
255265.7 ( 1)	CH <sub>3</sub> OH	unassigned	1.4	OriMC-1	OVRO	10.4m	Bla85	Bla85
255324.34 *(11)	HC <sub>3</sub> N $\nu_7=1$	28-27 1e	1.0	OriMC-1	OVRO	10.4m	Bla85	
255374.453*( 2)	OCS	21-20	6.5	OriMC-1	OVRO	10.4m	Bla85	
255479.39 *( 8)	HC <sup>18</sup> O <sup>+</sup>	3-2	1.0	OriMC-1	OVRO	10.4m	Bla85	
255553.328*(14)	SO <sub>2</sub>	4(3,1)-4(2,2)	7.4	OriMC-1	OVRO	10.4m	Bla85	
255595.35 *(13)	SO <sub>2</sub> ?	51(7,45)-50(8,42)	0.4v	OriMC-1	OVRO	10.4m	Bla85	
U 255651.	unidentified		1.2	OriMC-1	OVRO	10.4m	Bla85	
255689.08 *(11)	HC <sub>3</sub> N $\nu_7=1$	28-27 1f	1.1	OriMC-1	OVRO	10.4m	Bla85	
255776.1 *( 1)	HCOOCH <sub>3</sub>	21(4,18)-20(4,17) E	1.0	OriMC-1	OVRO	10.4m	Bla85	Bla85
255789.41 *(10)	HCOOCH <sub>3</sub>	21(4,18)-20(4,17) A	1.0	OriMC-1	OVRO	10.4m	Bla85	Plu84
255906.469*(20)	CH <sub>3</sub> CH <sub>2</sub> CN	28(3,25)-27(3,24)	0.9	OriMC-1	OVRO	10.4m	Bla85	
255958.073*(15)	SO <sub>2</sub>	3(3,1)-3(2,2)	>3.	OriMC-1	BTL	7m	Tha81	
256027.12 ( 8)	HCS <sup>+</sup>	6-5	~1.	OriMC-1	BTL	7m	Tha81	Bog84
256228.80 ( 5)	CH <sub>3</sub> OH	17(3)-17(2) A+-	1.7	OriMC-1	OVRO	10.4m	Bla85	Sas84
256246.969*(14)	SO <sub>2</sub>	5(3,3)-5(2,4)	1.2	OriMC-1	MMWO	4.9m	Lor84b	
256292.639*(13)	CH <sub>3</sub> CCH	15(3)-14(3)	0.3	OriMC-1	MMWO	4.9m	Lor84b	
256317.079*( 8)	CH <sub>3</sub> CCH	15(2)-14(2)	0.3	OriMC-1	MMWO	4.9m	Lor84b	
256331.746*( 6)	CH <sub>3</sub> CCH	15(1)-14(1)	0.4	OriMC-1	MMWO	4.9m	Lor84b	
256336.637*( 6)	CH <sub>3</sub> CCH	15(0)-14(0)	0.4	OriMC-1	MMWO	4.9m	Lor84b	
256395.926*(22)	CH <sub>3</sub> CH <sub>2</sub> CN	29(1,28)-28(1,27)	1.0	OriMC-1	OVRO	10.4m	Bla85	
256409.07 *(29)	HC <sub>2</sub> CHCN	27(8,20)-26(8,19)	0.7b	OriMC-1	OVRO	10.4m	Bla85	
256409.07 *(29)	HC <sub>2</sub> CHCN	27(8,19)-26(8,18)	b	OriMC-1	OVRO	10.4m	Bla85	
256425.85 *(16)	HC <sub>2</sub> CHCN	27(6,22)-26(6,21)	0.7b	OriMC-1	OVRO	10.4m	Bla85	
256425.95 *(16)	HC <sub>2</sub> CHCN	27(6,21)-26(6,20)	b	OriMC-1	OVRO	10.4m	Bla85	
256447.75 *(28)	HC <sub>2</sub> CHCN	27(9,19)-26(9,18)	0.4b	OriMC-1	OVRO	10.4m	Bla85	
256447.75 *(28)	HC <sub>2</sub> CHCN	27(9,18)-26(9,17)	b	OriMC-1	OVRO	10.4m	Bla85	
256522.86 *(13)	HC <sub>2</sub> CHCN	27(5,23)-26(5,22)	0.8	OriMC-1	OVRO	10.4m	Bla85	
256527.36 *(13)	HC <sub>2</sub> CHCN	27(5,22)-26(5,21)	0.5	OriMC-1	OVRO	10.4m	Bla85	
256585.34 *(33)	HDCO	4(0,4)-3(0,3)	0.54	OriMC-1	MMWO	4.9m	Lor84b	
256711.75 *(11)	HC <sub>2</sub> CHCN	27(4,24)-26(4,23)	0.3	OriMC-1	OVRO	10.4m	Bla85	
256837.22 *(11)	HC <sub>2</sub> CHCN	27(4,23)-26(4,22)	0.3	OriMC-1	OVRO	10.4m	Bla85	
256877.802*(32)	<sup>34</sup> SO	7(6)-6(5)	0.79	OriMC-1	MMWO	4.9m	Lor84	
256966.885*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	30(0,30)-29(1,29)	0.2	OriMC-1	OVRO	10.4m	Bla85	
257033.46 *( 2)	CH <sub>3</sub> CN	14(10)-13(10)	0.3	OriMC-1	OVRO	10.4m	Bla85	Bau80
257099.982*(14)	SO <sub>2</sub>	7(3,5)-7(2,6)	7.9	OriMC-1	OVRO	10.4m	Bla85	
257127.05 *( 2)	CH <sub>3</sub> CN	14(9)-13(9)	0.6	OriMC-1	OVRO	10.4m	Bla85	Bau80
257210.08 *( 2)	CH <sub>3</sub> CN	14(8)-13(8)	0.6	OriMC-1	OVRO	10.4m	Bla85	Bau80
257226.5 *( 1)	HCOOCH <sub>3</sub>	20(5,15)-19(5,14) E	0.8	OriMC-1	OVRO	10.4m	Bla85	Bla85
257239.855*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	30(1,30)-29(1,29)	0.4	OriMC-1	OVRO	10.4m	Bla85	
257252.59 *(10)	HCOOCH <sub>3</sub>	20(5,15)-19(5,14) A	0.9	OriMC-1	OVRO	10.4m	Bla85	Plu84
257255.002*(67)	<sup>29</sup> SiO	6-5	1.6	OriMC-1	OVRO	10.4m	Bla85	
257284.04 *( 2)	CH <sub>3</sub> CN	14(7)-13(7)	1.0	OriMC-1	OVRO	10.4m	Bla85	Bau80

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.	
257310.641*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	30(0,30)–29(0,29)	0.8	OriMC-1	OVRO	10.4m	Bla85	
257349.18 *( 2)	CH <sub>3</sub> CN	14(6)–13(6)	1.8	OriMC-1	OVRO	10.4m	Bla85	Bau80
257380.15 *(27)	CH <sub>3</sub> <sup>13</sup> CN	14(2)–13(2)	0.3	OriMC-1	OVRO	10.4m	Bla85	Bau80
257402.19 ( 5)	CH <sub>3</sub> OH	18(3)–18(2) A +–	2.8b	OriMC-1	OVRO	10.4m	Bla85	Sas84
257403.58 *(10)	CH <sub>3</sub> CN	14(5)–13(5)	0.5	OriMC-1	MMWO	4.9m	Lor84	
257420.24 *(14)	SO <sub>2</sub> $\nu_2=1$	24(2,22)–24(1,23)	0.4	OriMC-1	OVRO	10.4m	Bla85	
257448.122*(80)	CH <sub>3</sub> CN	14(4)–13(4)	0.5	OriMC-1	MMWO	4.9m	Lor84	
257482.784*(50)	CH <sub>3</sub> CN	14(3)–13(3)	1.1	OriMC-1	MMWO	4.9m	Lor84	
257507.553*(50)	CH <sub>3</sub> CN	14(2)–13(2)	0.85	OriMC-1	MMWO	4.9m	Lor84	
257522.418*(20)	CH <sub>3</sub> CN	14(1)–13(1)	1.15	OriMC-1	MMWO	4.9m	Lor84	
257527.374*(20)	CH <sub>3</sub> CN	14(0)–13(0)	1.2	OriMC-1	MMWO	4.9m	Lor84	
257583.611*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	30(1,30)–29(0,29)	0.3	OriMC-1	OVRO	10.4m	Bla85	
257646.01 *(19)	HC <sub>2</sub> CHCN	28(0,28)–27(0,27)	0.5	OriMC-1	OVRO	10.4m	Bla85	
257690.3 *( 1)	HCOOCH <sub>3</sub>	22(3,20)–21(3,19) E	1.4	OriMC-1	OVRO	10.4m	Bla85	Bla85
257699.44 *(10)	HCOOCH <sub>3</sub>	22(3,20)–21(3,19) A	0.9	OriMC-1	OVRO	10.4m	Bla85	Plu84
257747.05 ( 3)	HDCO	4(2,3)–3(2,2)	0.6	OriMC-1	OVRO	10.4m	Bla85	Dan78
U 257912.	unidentified		1.0	OriMC-1	OVRO	10.4m	Bla85	
257975.01 *( 1)	HCOOH	12(1,12)–11(1,11)	0.3	OriMC-1	OVRO	10.4m	Bla85	
258054.14 *(15)	CH <sub>3</sub> CN $\nu_8=1$	14(1)–13(1) $\ell=1$	1.1	OriMC-1	OVRO	10.4m	Bla85	Bau80
258070.96 ( 6)	HDCO	4(3,2)–3(3,1)	0.3	OriMC-1	OVRO	10.4m	Bla85	Dan78
258081.0 *( 1)	HCOOCH <sub>3</sub>	22(2,20)–21(2,19) E	1.2	OriMC-1	OVRO	10.4m	Bla85	Bla85
258089.50 *(10)	HCOOCH <sub>3</sub>	22(2,20)–21(2,19) A	1.1	OriMC-1	OVRO	10.4m	Bla85	Plu84
258121.06 *(10)	HCOOCH <sub>3</sub>	21(14,8)–20(14,7) A	1.0b	OriMC-1	OVRO	10.4m	Bla85	Plu84
258121.06 *(10)	HCOOCH <sub>3</sub>	21(14,7)–20(14,6) A	b	OriMC-1	OVRO	10.4m	Bla85	Plu84
258123.0 *( 1)	HCOOCH <sub>3</sub>	21(14,7)–20(14,6) E	b	OriMC-1	OVRO	10.4m	Bla85	Bla85
258157.02 *(47)	HC <sup>15</sup> N	3–2	5.2	OriMC-1	OVRO	10.4m	Bla85	
258186.99 *(13)	CH <sub>3</sub> CN $\nu_8=1$	14(6)–13(5) $\ell=1$	0.3	OriMC-1	OVRO	10.4m	Bla85	Bau80
258255.828*(32)	SO	6(6)–5(5)	4.0	OriMC-1	MMWO	4.9m	Cle84	
258295.60 *(18)	CH <sub>3</sub> CN $\nu_8=1$	14(3)–13(3) $\ell=1$	1.1	OriMC-1	OVRO	10.4m	Bla85	Bau80
258320.39 *(25)	CH <sub>3</sub> CN $\nu_8=1$	14(2)–13(2) $\ell=1$	0.7	OriMC-1	OVRO	10.4m	Bla85	Bau80
258360.05 *( 7)	HC <sub>2</sub> CHCN	27(1,26)–26(1,25)	0.6	OriMC-1	OVRO	10.4m	Bla85	
258388.81 *(12)	SO <sub>2</sub>	32(4,28)–32(3,29)	1.5	OriMC-1	OVRO	10.4m	Bla85	
258476.6 *( 1)	HCOOCH <sub>3</sub>	21(12,9)–20(12,8) E	0.9	OriMC-1	OVRO	10.4m	Bla85	Bla85
258482.92 *(10)	HCOOCH <sub>3</sub>	21(12,10)–20(12,9) A	1.0	OriMC-1	OVRO	10.4m	Bla85	Plu84
258490.8 *( 1)	HCOOCH <sub>3</sub>	23(2,22)–22(2,21) E	1.0	OriMC-1	OVRO	10.4m	Bla85	Bla85
258496.27 *(10)	HCOOCH <sub>3</sub>	23(2,23)–22(2,21) A	1.1	OriMC-1	OVRO	10.4m	Bla85	PLU84
258499.0 *( 1)	HCOOCH <sub>3</sub>	21(12,10)–20(12,9) E	0.8	OriMC-1	OVRO	10.4m	Bla85	BLA85
258502.7 *( 1)	HCOOCH <sub>3</sub>	23(1,22)–22(1,21) E	1.0	OriMC-1	OVRO	10.4m	Bla85	BLA85
258508.14 *(10)	HCOOCH <sub>3</sub>	23(1,22)–22(1,21) A	1.0	OriMC-1	OVRO	10.4m	Bla85	Plu84
258549.04 *(20)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,14)–13(0,13) EE	3.2b	OriMC-1	OVRO	10.4m	Bla85	
258549.30 *(19)	CH <sub>3</sub> OCH <sub>3</sub>	14(1,14)–13(0,13) AA	b	OriMC-1	OVRO	10.4m	Bla85	
258552.40 *(15)	CH <sub>3</sub> CN $\nu_8=1$	14(1)–13(1) $\ell=1$	0.6b	OriMC-1	OVRO	10.4m	Bla85	Bau80
258667.002*(61)	SO <sub>2</sub>	20(7,13)–21(6,16)	0.7	OriMC-1	OVRO	10.4m	Bla85	
258746.4 *( 1)	HCOOCH <sub>3</sub>	21(11,10)–20(11,9) E	0.5	OriMC-1	OVRO	10.4m	Bla85	Bla85
258756.63 *(10)	HCOOCH <sub>3</sub>	21(11,11)–20(11,10) A	b	OriMC-1	OVRO	10.4m	Bla85	Plu84
258756.63 *(10)	HCOOCH <sub>3</sub>	21(11,10)–20(11,9) A	0.7b	OriMC-1	OVRO	10.4m	Bla85	Plu84
258769.7 *( 1)	HCOOCH <sub>3</sub>	21(11,11)–20(11,10) E	0.4	OriMC-1	OVRO	10.4m	Bla85	Bla85
258780.38 ( 5)	CH <sub>3</sub> OH	19(3)–19(2) A +–	1.8	OriMC-1	OVRO	10.4m	Bla85	Sas84
258942.207*(18)	SO <sub>2</sub>	9(3,7)–9(2,8)	0.9	OriMC-1	MMWO	4.9m	Lor84b	
259011.79 *(55)	H <sup>13</sup> CN	3–2	2.3	OriMC-1	MMWO	4.9m	Lor84b	
259035.13 *(33)	HDCO	4(2,2)–3(2,1)	0.18	OriMC-1	MMWO	4.9m	Lor84b	
259114.2 *( 1)	HCOOCH <sub>3</sub>	21(10,11)–20(10,10) E	0.6	OriMC-1	OVRO	10.4m	Bla85	Bla85
259128.13 *(10)	HCOOCH <sub>3</sub>	21(10,12)–20(10,11) A	b	OriMC-1	OVRO	10.4m	Bla85	Plu84
259128.17 *(10)	HCOOCH <sub>3</sub>	21(10,11)–20(10,10) A	1.1b	OriMC-1	OVRO	10.4m	Bla85	Plu84
259137.7 *( 1)	HCOOCH <sub>3</sub>	21(10,12)–20(10,11) E	0.3	OriMC-1	OVRO	10.4m	Bla85	Bla85
259232.721*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(3,27)–28(3,26)	0.7	OriMC-1	OVRO	10.4m	Bla85	
259273.7 ( 1)	CH <sub>3</sub> OH	unassigned	1.0	OriMC-1	OVRO	10.4m	Bla85	Bla85
U 259285.	unidentified		0.8	OriMC-1	OVRO	10.4m	Bla85	
U 259311.	unidentified		0.6	OriMC-1	OVRO	10.4m	Bla85	
259341.9 *( 1)	HCOOCH <sub>3</sub>	24(1,24)–23(1,23) E	2.0b	OriMC-1	OVRO	10.4m	Bla85	Bla85
259342.0 *( 1)	HCOOCH <sub>3</sub>	24(0,24)–23(0,23) E	b	OriMC-1	OVRO	10.4m	Bla85	Bla85
259342.84 *(10)	HCOOCH <sub>3</sub>	24(1,24)–23(1,23) A	b	OriMC-1	OVRO	10.4m	Bla85	Plu84
259342.95 *(10)	HCOOCH <sub>3</sub>	24(0,24)–23(0,23) A	b	OriMC-1	OVRO	10.4m	Bla85	Plu84
259484.90 *(28)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,4)–5(2,3) EA	0.7b	OriMC-1	OVRO	10.4m	Bla85	
259486.79 *(22)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,4)–5(2,3) AE	b	OriMC-1	OVRO	10.4m	Bla85	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
259488.87 *(17)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,4)–5(2,3) EE	1.3	OriMC-1	OVRO	10.4m	Bla85
259493.92 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,4)–5(2,3) AA	0.6	OriMC-1	OVRO	10.4m	Bla85
259499.9 *(1)	HCOOCH <sub>3</sub>	20(4,16)–19(4,15) E	0.8	OriMC-1	OVRO	10.4m	Bla85
259521.70 *(10)	HCOOCH <sub>3</sub>	20(4,16)–19(4,15) A	1.0	OriMC-1	OVRO	10.4m	Bla85
259599.48 *(11)	SO <sub>2</sub>	30(4,26)–30(3,27)	1.5	OriMC-1	OVRO	10.4m	Bla85
259617.23 *(10)	<sup>34</sup> SO <sub>2</sub>	13(3,11)–13(2,12)	1.0	OriMC-1	OVRO	10.4m	Bla85
259629.4 *(1)	HCOOCH <sub>3</sub>	21(9,12)–20(9,11) E	0.6	OriMC-1	OVRO	10.4m	Bla85
259646.55 *(10)	HCOOCH <sub>3</sub>	21(9,13)–20(9,12) A	0.8b	OriMC-1	OVRO	10.4m	Bla85
259646.67 *(10)	HCOOCH <sub>3</sub>	21(9,12)–20(9,11) A	b	OriMC-1	OVRO	10.4m	Bla85
259652.9 *(1)	HCOOCH <sub>3</sub>	21(9,13)–20(9,12) E	0.5	OriMC-1	OVRO	10.4m	Bla85
U 259690.	unidentified		0.5	OriMC-1	OVRO	10.4m	Bla85
U 259733.	unidentified		0.7	OriMC-1	OVRO	10.4m	Bla85
259842.936*(23)	CH <sub>3</sub> CH <sub>2</sub> CN	29(10,19)–28(10,18)	1.0b	OriMC-1	OVRO	10.4m	Bla85
259842.936*(23)	CH <sub>3</sub> CH <sub>2</sub> CN	29(10,20)–28(10,19)	b	OriMC-1	OVRO	10.4m	Bla85
259847.373*(24)	CH <sub>3</sub> CH <sub>2</sub> CN	29(11,19)–28(11,18)	0.9b	OriMC-1	OVRO	10.4m	Bla85
259847.373*(24)	CH <sub>3</sub> CH <sub>2</sub> CN	29(11,18)–28(11,17)	b	OriMC-1	OVRO	10.4m	Bla85
259862.754*(22)	CH <sub>3</sub> CH <sub>2</sub> CN	29(9,21)–28(9,20)	0.9b	OriMC-1	OVRO	10.4m	Bla85
259862.754*(22)	CH <sub>3</sub> CH <sub>2</sub> CN	29(9,20)–28(9,19)	b	OriMC-1	OVRO	10.4m	Bla85
259869.904*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	29(12,18)–28(12,17)	0.6b	OriMC-1	OVRO	10.4m	Bla85
259869.904*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	29(12,17)–28(12,16)	b	OriMC-1	OVRO	10.4m	Bla85
259906.678*(27)	CH <sub>3</sub> CH <sub>2</sub> CN	29(13,17)–28(13,16)	0.5b	OriMC-1	OVRO	10.4m	Bla85
259906.678*(27)	CH <sub>3</sub> CH <sub>2</sub> CN	29(13,16)–28(13,15)	b	OriMC-1	OVRO	10.4m	Bla85
259917.265*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	29(8,22)–28(8,21)	1.0b	OriMC-1	OVRO	10.4m	Bla85
259917.265*(25)	CH <sub>3</sub> CH <sub>2</sub> CN	29(8,21)–28(8,20)	b	OriMC-1	OVRO	10.4m	Bla85
259955.178*(28)	CH <sub>3</sub> CH <sub>2</sub> CN	29(14,16)–28(14,15)	0.4b	OriMC-1	OVRO	10.4m	Bla85
259955.178*(28)	CH <sub>3</sub> CH <sub>2</sub> CN	29(14,15)–28(14,14)	b	OriMC-1	OVRO	10.4m	Bla85
U 259986.	unidentified		0.8	OriMC-1	OVRO	10.4m	Bla85
260013.701*(30)	CH <sub>3</sub> CH <sub>2</sub> CN	29(15,15)–28(15,14)	0.5b	OriMC-1	OVRO	10.4m	Bla85
260013.701*(30)	CH <sub>3</sub> CH <sub>2</sub> CN	29(15,14)–28(15,13)	b	OriMC-1	OVRO	10.4m	Bla85
260025.312*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(7,23)–28(7,22)	0.8b	OriMC-1	OVRO	10.4m	Bla85
260025.566*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(7,23)–28(7,22)	b	OriMC-1	OVRO	10.4m	Bla85
260060.33 (10)	HCO	3(0,3)–2(0,2) 7/2–5/2 F=4–3	0.09	OriMC-2	MMWO	4.9m	Sny85a
260081.055*(33)	CH <sub>3</sub> CH <sub>2</sub> CN	29(16,14)–28(16,13)	0.3b	OriMC-1	OVRO	10.4m	Bla85
260081.055*(33)	CH <sub>3</sub> CH <sub>2</sub> CN	29(16,13)–28(16,12)	b	OriMC-1	OVRO	10.4m	Bla85
260156.377*(37)	CH <sub>3</sub> CH <sub>2</sub> CN	29(17,13)–28(17,12)	0.4b	OriMC-1	OVRO	10.4m	Bla85
260156.377*(37)	CH <sub>3</sub> CH <sub>2</sub> CN	29(17,12)–28(17,11)	b	OriMC-1	OVRO	10.4m	Bla85
260191.99 *(36)	CH <sub>2</sub> CO	13(1,13)–12(1,12)	0.6	OriMC-1	OVRO	10.4m	Bla85
260221.648*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(6,24)–28(6,23)	0.9b	OriMC-1	OVRO	10.4m	Bla85
260229.152*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(6,23)–28(6,22)	b	OriMC-1	OVRO	10.4m	Bla85
260244.4 *(1)	HCOOCH <sub>3</sub>	21(3,18)–20(3,17) E	0.8	OriMC-1	OVRO	10.4m	Bla85
260255.06 (5)	HCOOCH <sub>3</sub>	21(3,18)–20(3,17) A	2.1b	OriMC-1	OVRO	10.4m	Bla85
260255.48 *(20)	H <sup>13</sup> CO <sup>+</sup>	3–2	0.95	OriMC-1	MMWO	4.9m	Woo84a
260327.00 *(22)	<sup>34</sup> SO <sub>2</sub>	24(2,22)–24(1,23)	1.0	OriMC-1	OVRO	10.4m	Bla85
260381.56 (5)	CH <sub>3</sub> OH	20(3)–20(2) A+-	1.8b	OriMC-1	OVRO	10.4m	Bla85
260384.2 *(1)	HCOOCH <sub>3</sub>	21(8,13)–20(8,12) E	1.6b	OriMC-1	OVRO	10.4m	Bla85
260392.73 *(10)	HCOOCH <sub>3</sub>	21(8,14)–20(8,13) A	1.0	OriMC-1	OVRO	10.4m	Bla85
260404.2 *(1)	HCOOCH <sub>3</sub>	21(8,14)–20(8,13) E	1.8	OriMC-1	OVRO	10.4m	Bla85
260415.31 *(10)	HCOOCH <sub>3</sub>	21(8,13)–20(8,12) A	0.7	OriMC-1	OVRO	10.4m	Bla85
U 260440.	unidentified		1.2	OriMC-1	OVRO	10.4m	Bla85
260518.027*(67)	SiO	6–5 v=0	2.9	OriMC-1	MMWO	4.9m	Lor84b
260664.770*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(4,26)–28(4,25)	0.9b	OriMC-1	OVRO	10.4m	Bla85
260667.111*(30)	CH <sub>3</sub> CH <sub>2</sub> CN	11(4,7)–10(3,6)	b	OriMC-1	OVRO	10.4m	Bla85
260679.039*(21)	CH <sub>3</sub> CH <sub>2</sub> CN	29(5,24)–28(5,23)	0.8	OriMC-1	OVRO	10.4m	Bla85
U 260726.	unidentified		1.2	OriMC-1	OVRO	10.4m	Bla85
260758.61 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,3)–5(2,4) EE	1.9	OriMC-1	OVRO	10.4m	Bla85
260761.70 *(10)	CH <sub>3</sub> OCH <sub>3</sub>	6(3,3)–5(2,4) AA	1.5	OriMC-1	OVRO	10.4m	Bla85
261061.36 (5)	CH <sub>3</sub> OH	21(–4)–20(–5) E	0.5	OriMC-1	OVRO	10.4m	Bla85
261148.8 *(1)	HCOOCH <sub>3</sub>	21(5,17)–20(5,16) E	1.4	OriMC-1	OVRO	10.4m	Bla85
261149.3	HCOOCH <sub>3</sub>	21(5,17)–20(5,16)	0.22	OriMC-1	MMWO	4.9m	Lor84b
261165.41 *(10)	HCOOCH <sub>3</sub>	21(5,17)–20(5,16) A	1.2	OriMC-1	OVRO	10.4m	Bla85
261247.64 *(56)	CH <sub>3</sub> OCH <sub>3</sub>	15(5,10)–15(4,11) EE	1.5	OriMC-1	OVRO	10.4m	Bla85
261250.17 *(46)	CH <sub>3</sub> OCH <sub>3</sub>	15(5,10)–15(4,11) AA	0.8	OriMC-1	OVRO	10.4m	Bla85
261263.39 *(10)	HN <sup>13</sup> C	3–2	0.2	OriMC-1	MMWO	4.9m	Lor84b
261433.75 *(10)	HCOOCH <sub>3</sub>	21(7,15)–20(7,14) A	0.9	OriMC-1	OVRO	10.4m	Bla85
261436.8 *(1)	HCOOCH <sub>3</sub>	21(7,15)–20(7,14) E	1.3	OriMC-1	OVRO	10.4m	Bla85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*$ (K) $T_a^*$ (K)	Source	Telescope	Astr. Ref.	Lab. Ref.	
U 261564.	unidentified		1.1	OriMC-1	OVRO	10.4m	Bla85	
261704.44 (5)	CH <sub>3</sub> OH	12(6)-11(5) E	0.9	OriMC-1	OVRO	10.4m	Bla85	Sas84
261715.4 *(1)	HCOOCH <sub>3</sub>	21(7,14)-20(7,13) E	1.1	OriMC-1	OVRO	10.4m	Bla85	Bla85
261746.56 *(10)	HCOOCH <sub>3</sub>	21(7,14)-20(7,13) A	1.1	OriMC-1	OVRO	10.4m	Bla85	Plu84
261805.71 (5)	CH <sub>3</sub> OH	2(1)-1(0) E	1.0	OriMC-1	MMWO	4.9m	Lor84b	Sas84
261843.715*(36)	SO	7(6)-6(5)	4.2	OriMC-1	MMWO	4.9m	Lor84b	
261897.33 *(6)	CH <sub>3</sub> OCH <sub>3</sub>	14(5,9)-14(4,10) EE	0.23	OriMC-1	MMWO	4.9m	Lor84b	
261955.99 *(14)	CH <sub>3</sub> OCH <sub>3</sub>	15(5,11)-15(4,12) EE	0.28	OriMC-1	MMWO	4.9m	Lor84b	
261959.30 *(45)	CH <sub>3</sub> OCH <sub>3</sub>	15(5,11)-15(4,12) AA	1.1	OriMC-1	OVRO	10.4m	Bla85	
262004.26 (5)	HC <sub>2</sub>	3-2 $J=7/2-5/2$ $F=4-3$	3.5	OriMC-1	MMWO	4.9m	Ziu82	Ziu82
262006.48 (5)	HC <sub>2</sub>	3-2 $J=7/2-5/2$ $F=3-2$	3.0	OriMC-1	MMWO	4.9m	Ziu82	Ziu82
262064.99 (5)	HC <sub>2</sub>	3-2 $J=5/2-3/2$ $F=3-2$	2.8	OriMC-1	MMWO	4.9m	Ziu82	Ziu82
262067.46 (5)	HC <sub>2</sub>	3-2 $J=5/2-3/2$ $F=2-1$	2.4	OriMC-1	MMWO	4.9m	Ziu82	Ziu82
262078.89 *(30)	HC <sub>2</sub>	3-2 $J=5/2-3/2$ $F=2-2$	0.8	OriMC-1	OVRO	10.4m	Bla85	
262103.48 *(1)	HCOOH	12(0,12)-11(0,11)	0.4	OriMC-1	OVRO	10.4m	Bla85	
262183.742*(22)	CH <sub>3</sub> CH <sub>2</sub> CN	29(4,25)-28(4,24)	0.7	OriMC-1	OVRO	10.4m	Bla85	
262208.61 *(30)	HC <sub>2</sub>	3-2 $J=5/2-3/2$ $F=3-3$	~0.8	OriMC-1	OVRO	10.4m	Bla85	
262224.2 (1)	CH <sub>3</sub> OH	21(3)-21(2) A +-	1.3	OriMC-1	OVRO	10.4m	Bla85	Bla85
262256.904*(25)	SO <sub>2</sub>	11(3,9)-11(2,10)	1.7	OriMC-1	MMWO	4.9m	Eri84a	
262307.30 *(81)	CH <sub>3</sub> OCH <sub>3</sub>	14(5,10)-14(4,11) EA	0.8b	OriMC-1	OVRO	10.4m	Bla85	
262310.27 *(63)	CH <sub>3</sub> OCH <sub>3</sub>	14(5,10)-14(4,11) AE	b	OriMC-1	OVRO	10.4m	Bla85	
262312.45 *(56)	CH <sub>3</sub> OCH <sub>3</sub>	14(5,10)-14(4,11) EE	1.0	OriMC-1	OVRO	10.4m	Bla85	
262316.39 *(39)	CH <sub>3</sub> OCH <sub>3</sub>	14(5,10)-14(4,11) AA	0.9	OriMC-1	OVRO	10.4m	Bla85	
262324.7 *(1)	HCOOCH <sub>3</sub>	21(6,16)-20(6,15) E	1.2	OriMC-1	OVRO	10.4m	Bla85	Bla85
262340.53 *(10)	HCOOCH <sub>3</sub>	21(6,16)-20(6,15) A	1.0	OriMC-1	OVRO	10.4m	Bla85	Plu84
262393.39 *(36)	CH <sub>3</sub> OCH <sub>3</sub>	13(5,8)-13(4,9) EE	1.3b	OriMC-1	OVRO	10.4m	Bla85	
262394.92 *(33)	CH <sub>3</sub> OCH <sub>3</sub>	13(5,8)-13(4,9) AA	b	OriMC-1	OVRO	10.4m	Bla85	
262548.36 *(51)	CH <sub>2</sub> CO	13(0,13)-12(0,12)	0.5	OriMC-1	OVRO	10.4m	Bla85	
262624.70 *(51)	CH <sub>3</sub> OCH <sub>3</sub>	13(5,9)-13(4,10) EE	1.6	OriMC-1	OVRO	10.4m	Bla85	
262629.54 *(33)	CH <sub>3</sub> OCH <sub>3</sub>	13(5,9)-13(4,10) AA	0.6	OriMC-1	OVRO	10.4m	Bla85	
262768.94 *(29)	CH <sub>3</sub> OCH <sub>3</sub>	12(5,7)-12(4,6) EE	1.3b	OriMC-1	OVRO	10.4m	Bla85	
262769.484*(20)	HNCO	12(1,12)-11(1,11)	1.3b	OriMC-1	OVRO	10.4m	Bla85	
262769.72 *(28)	CH <sub>3</sub> OCH <sub>3</sub>	12(5,7)-12(4,6) AA	b	OriMC-1	OVRO	10.4m	Bla85	
262774.25 *(18)	CH <sub>3</sub> OCH <sub>3</sub>	8(2,6)-7(1,7) EE	0.7	OriMC-1	OVRO	10.4m	Bla85	
262889.46 *(47)	CH <sub>3</sub> OCH <sub>3</sub>	12(5,8)-11(4,9) EE	0.5	OriMC-1	OVRO	10.4m	Bla85	
262895.29 *(28)	CH <sub>3</sub> OCH <sub>3</sub>	12(5,8)-11(4,9) AA	0.5	OriMC-1	OVRO	10.4m	Bla85	
263050.03 *(24)	CH <sub>3</sub> OCH <sub>3</sub>	11(5,6)-11(4,7) EE	1.1b	OriMC-1	OVRO	10.4m	Bla85	
263050.33 *(23)	CH <sub>3</sub> OCH <sub>3</sub>	11(5,6)-11(4,7) AA	b	OriMC-1	OVRO	10.4m	Bla85	
U 263065.	unidentified		0.9	OriMC-1	OVRO	10.4m	Bla85	
263107.25 *(39)	CH <sub>3</sub> OCH <sub>3</sub>	11(5,7)-11(4,8) EE	0.3	OriMC-1	OVRO	10.4m	Bla85	
263113.70 *(23)	CH <sub>3</sub> OCH <sub>3</sub>	11(5,7)-11(4,8) AA	1.2	OriMC-1	OVRO	10.4m	Bla85	
263748.630*(13)	HNCO	12(0,12)-11(0,11)	0.3	OriMC-1	MMWO	4.9m	Arm84	
263792.47 *(12)	HC <sub>3</sub> N	29-28	0.6	OriMC-1	MMWO	4.9m	Arm84	
U 265698.	unidentified		0.16	OriMC-1	MMWO	4.9m	Lor84a	
265759.48 *(4)	C <sub>3</sub> H <sub>2</sub>	4(4,1)-3(3,0)	0.21	OriMC-1	MMWO	4.9m	Lor84a	Tha85a
265852.68 (5)	HCN	3-2 $v_2=1$ , $\ell=1c$	1.5	OriMC-1	NRAO	12m	Ziu85a	DeL77
265886.432*(10)	HCN	3-2	2.0	OriMC-1	Hale	5m	Hug79	
266838.13 (5)	CH <sub>3</sub> OH	5(2)-4(1) E	1.7	OriMC-1	MMWO	4.9m	Joh84	Sas84
267199.37 (5)	HCN	3-2 $v_2=1$ , $\ell=1d$	1.5	OriMC-1	NRAO	12m	Ziu85a	DeL77
267403.44 (5)	CH <sub>3</sub> OH	9(0)-8(1) E	1.8	OriMC-1	UKIRT	3.8m	Den84	Sas84
267530.218 (20)	OCS	22-21	r	OriMC-1	MMWO	4.9m	Lor84b	Sch83a
267537.440*(33)	SO <sub>2</sub>	13(3,11)-13(2,12)	r	OriMC-1	MMWO	4.9m	Lor84b	
267557.625*(17)	HCO <sup>+</sup>	3-2	12	OriMC-1	Hale	5m	Hug79	
271981.067*(50)	HNC	3-2	10	OriMC-1	Hale	5m	Hug79	
272242.40 *(91)	SiS	15-14	0.48	IRC+10216	MMWO	4.9m	Sah84	
272884.95 *(15)	HC <sub>3</sub> N	30-29	0.8	OriMC-1	MMWO	4.9m	Lor81	
275240.166*(43)	SO <sub>2</sub>	15(3,13)-15(2,14)	1.7	OriMC-1	MMWO	4.9m	Lor84c	
275724.69 *(14)	CH <sub>3</sub> CN	15(6)-14(6)	0.47	OriMC-1	MMWO	4.9m	Lor84	
275782.96 *(10)	CH <sub>3</sub> CN	15(5)-14(5)	0.39	OriMC-1	MMWO	4.9m	Lor84	
275830.668*(80)	CH <sub>3</sub> CN	15(4)-14(4)	0.42	OriMC-1	MMWO	4.9m	Lor84	
275867.792*(50)	CH <sub>3</sub> CN	15(3)-14(3)	0.96	OriMC-1	MMWO	4.9m	Lor84	
275894.321*(50)	CH <sub>3</sub> CN	15(2)-14(2)	0.83	OriMC-1	MMWO	4.9m	Lor84	
275910.243*(50)	CH <sub>3</sub> CN	15(1)-14(1)	1.17	OriMC-1	MMWO	4.9m	Lor84	
275915.550*(50)	CH <sub>3</sub> CN	15(0)-14(0)	1.24	OriMC-1	MMWO	4.9m	Lor84	
U 278263.	unidentified		1.0	OriMC-1	MMWO	4.9m	Lor84c	

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
278304.51 ( 5)	CH <sub>3</sub> OH	9(-1)-8(0) E	1.5	OriMC-1	MMWO	4.9m	Sas84
278886.49 *(59)	H <sub>2</sub> CS	8(1,7)-7(1,6)	0.8	OriMC-1	MMWO	4.9m	Lor84f
279511.732*(77)	N <sub>2</sub> H <sup>+</sup>	3-2	0.9	OriMC-1	MMWO	4.9m	Lor84g
281526.922*(12)	H <sub>2</sub> CO	4(1,4)-3(1,3)	1.4	$\rho$ Oph B	MMWO	4.9m	Lor83
281762.598*(38)	SO <sub>2</sub>	15(1,15)-14(0,14)	1.0	OriMC-1	MMWO	4.9m	Lor84c
U 281958.	unidentified		0.8	OriMC-1	MMWO	4.9m	Lor81
281977.05 *(18)	HC <sub>3</sub> N	31-30	0.8	OriMC-1	MMWO	4.9m	Lor81
282036.560*(14)	SO <sub>2</sub>	6(2,4)-5(1,5)	1.6	OriMC-1	MMWO	4.9m	Lor81
282292.795*(51)	SO <sub>2</sub>	20(1,19)-20(0,20)	0.7	OriMC-1	MMWO	4.9m	Lor84f
U 286342.45	unidentified		0.36	OriMC-1	MMWO	4.9m	Lor85
286416.390*(45)	SO <sub>2</sub>	22(2,20)-21(3,19)	0.22	OriMC-1	MMWO	4.9m	Lor85
288143.912*(28)	DCO <sup>+</sup>	4-3	~1.3	$\rho$ -Oph	MMWO	4.9m	Lor82
289209.179*(39)	C <sup>34</sup> S	6-5	0.8	OriMC-1	MMWO	4.9m	Lor85
289644.897*(20)	DCN	4-3	0.77	OriMC-1	MMWO	4.9m	Woo85
289939.477 (14)	CH <sub>3</sub> OH	6(0)-5(0) E	2.1	OriMC-1	MMWO	4.9m	Pla82
290380.0 *(11)	SiS	16-15	0.22	IRC+10216	MMWO	4.9m	Sah84
290479.934*(17)	CH <sub>3</sub> CCH	17(2)-16(2)	0.14	OriMC-1	MMWO	4.9m	Lor84b
290496.545*(14)	CH <sub>3</sub> CCH	17(1)-16(1)	0.32	OriMC-1	MMWO	4.9m	Lor84b
290502.083*(14)	CH <sub>3</sub> CCH	17(0)-16(0)	0.3	OriMC-1	MMWO	4.9m	Lor84b
290562.242*(38)	<sup>34</sup> SO	6(7)-5(6)	0.4	OriMC-1	MMWO	4.9m	Lor84b
290623.416*(13)	H <sub>2</sub> CO	4(0,4)-3(0,3)	3.8	OriMC-1	MMWO	4.9m	Lor84b
291237.770*(22)	H <sub>2</sub> CO	4(2,3)-3(2,2)	2.2	OriMC-1	MMWO	4.9m	Lor84a
291380.452*(32)	H <sub>2</sub> CO	4(3,2)-3(3,1)	2.3b	OriMC-1	MMWO	4.9m	Lor84a
291384.371*(32)	H <sub>2</sub> CO	4(3,1)-3(3,0)	b	OriMC-1	MMWO	4.9m	Lor84a
291839.652*( 5)	OCS	24-23	0.53	OriMC-1	MMWO	4.9m	Lor84b
291948.072*(22)	H <sub>2</sub> CO	4(2,2)-3(2,1)	1.9	OriMC-1	MMWO	4.9m	Lor84a
U 292414.	unidentified		0.36	OriMC-1	MMWO	4.9m	Woo85
293463.99 ( 5)	CH <sub>3</sub> OH	3(2)-4(1) A +	0.95	OriMC-1	MMWO	4.9m	Lor84b
293912.160*(39)	CS	6-5	3.3	OriMC-2	MMWO	4.9m	Sne84
294098.85 *(10)	CH <sub>3</sub> CN	16(6)-15(6)	0.29	OriMC-1	MMWO	4.9m	Lor84a
294160.98 *(10)	CH <sub>3</sub> CN	16(5)-15(5)	0.16	OriMC-1	MMWO	4.9m	Lor84a
294211.84 *(10)	CH <sub>3</sub> CN	16(4)-15(4)	0.29	OriMC-1	MMWO	4.9m	Lor84a
298576.296*(24)	SO <sub>2</sub>	9(2,8)-8(1,7)	2.0	OriMC-1	MMWO	4.9m	Eri84
300836.635*(12)	H <sub>2</sub> CO	4(1,3)-3(1,2)	3.9	OriMC-1	MMWO	4.9m	Lor84b
301286.126*(32)	SO	7(7)-6(6)	2.7	OriMC-1	MMWO	4.9m	Lor84b
330587.957*(23)	<sup>13</sup> CO	3-2	27.	OriMC-1	UM/UCSD	1.5m	Hug81
335582.005 (15)	CH <sub>3</sub> OH	7(1)-6(1) A +	1.2	OriMC-1	MMWO	4.9m	Lor85
337396.602*(55)	C <sup>34</sup> S	7-6	0.8	OriMC-1	MMWO	4.9m	Lor85
338408.681 (15)	CH <sub>3</sub> OH	7(0)-6(0) A	1.3	OriMC-1	MMWO	4.9m	Lor85
338414.113*(69)	HCOOCH <sub>3</sub>	27(7,21)-26(7,20) A	1.2	OriMC-1	MMWO	4.9m	Lor85
338486.337 (14)	CH <sub>3</sub> OH	7(5)-6(5) A +	1.1b	OriMC-1	MMWO	4.9m	Lor85
338486.338 (14)	CH <sub>3</sub> OH	7(5)-6(5) A -	b	OriMC-1	MMWO	4.9m	Lor85
338512.762 (48)	CH <sub>3</sub> OH	7(4)-6(4) A +	b	OriMC-1	MMWO	4.9m	Lor85
338512.762 (48)	CH <sub>3</sub> OH	7(4)-6(4) A -	b	OriMC-1	MMWO	4.9m	Lor85
338512.762 (29)	CH <sub>3</sub> OH	7(2)-6(2) A -	1.7b	OriMC-1	MMWO	4.9m	Lor85
338540.795 (15)	CH <sub>3</sub> OH	7(3)-6(3) A +	1.0b	OriMC-1	MMWO	4.9m	Lor85
338543.204 (15)	CH <sub>3</sub> OH	7(3)-6(3) A -	b	OriMC-1	MMWO	4.9m	Lor85
338559.928 (24)	CH <sub>3</sub> OH	7(-3)-6(-3) E	1.2	OriMC-1	MMWO	4.9m	Lor85
338583.195 (17)	CH <sub>3</sub> OH	7(3)-6(3) E	1.3	OriMC-1	MMWO	4.9m	Lor85
338614.999 (17)	CH <sub>3</sub> OH	7(1)-6(1) E	1.7	OriMC-1	MMWO	4.9m	Lor85
340031.567*(40)	CN	3-2 $J=5/2-3/2$ $F=7/2-5/2$	1.6b	OriMC-1	MMWO	4.9m	Lor85
340035.281*(50)	CN	3-2 $J=5/2-3/2$ $F=3/2-1/2$	b	OriMC-1	MMWO	4.9m	Lor85
340035.525*(50)	CN	3-2 $J=5/2-3/2$ $F=5/2-3/2$	b	OriMC-1	MMWO	4.9m	Lor85
340247.625*(50)	CN	3-2 $J=7/2-5/2$ $F=7/2-5/2$	3.1b	OriMC-1	MMWO	4.9m	Lor85
340247.874*(50)	CN	3-2 $J=7/2-5/2$ $F=9/2-7/2$	b	OriMC-1	MMWO	4.9m	Lor85
340248.573*(50)	CN	3-2 $J=7/2-5/2$ $F=5/2-3/2$	b	OriMC-1	MMWO	4.9m	Lor85
340714.294*(48)	SO	7(8)-6(7)	2.7	OriMC-1	MMWO	4.9m	Lor85
342882.949*(50)	CS	7-6	5.5	OriMC-1	MMWO	4.9m	Lor85
342882.949*(50)	CS	7-6	3.00	M17	MMT		Eri84d
344310.728*(54)	SO	8(8)-7(7)	7.00	OriMC-1	MMT		Eri84d
345338.519*(44)	SO <sub>2</sub>	13(2,12)-12(1,11)	2.4b	OriMC-1	MMWO	4.9m	Lor85
345339.7 *(12)	H <sup>13</sup> CN	4-3	b	OriMC-1	MMWO	4.9m	Lor85
345795.975*(24)	CO	3-2	80	OriMC-1	Hale	5m	Phi77a
346528.562*(74)	SO	9(8)-8(7)	4.0	OriMC-1	MMWO	4.9m	Lor85
347330.58 *(11)	SiO	8-7	1.6	OriMC-1	MMWO	4.9m	Lor85

TABLE 2. Recommended rest frequencies for observed interstellar molecular lines — Continued

Frequency unc.	Formula	Quantum numbers	$T_r^*(K)$ $T_a^*(K)$	Source	Telescope	Astr. Ref.	Lab. Ref.
349338.10 (50)	HC <sub>2</sub>	4-3 $J=9/2-7/2 F=4-3$	b	M17	MMWO	4.9m Lor85	Sas81a
349338.10 (50)	HC <sub>2</sub>	4-3 $J=9/2-7/2 F=5-4$	1.2b	M17	MMWO	4.9m Lor85	Sas81a
349400.61 (50)	HC <sub>2</sub>	4-3 $J=7/2-5/2 F=3-2$	b	M17	MMWO	4.9m Lor85	Sas81a
349400.61 (50)	HC <sub>2</sub>	4-3 $J=7/2-5/2 F=4-3$	1.0b	M17	MMWO	4.9m Lor85	Sas81a
350905.119 (17)	CH <sub>3</sub> OH	1(1)-0(0) A+	2.0	OriMC-1	MMWO	4.9m Lor85	Pic81
351768.639*(18)	H <sub>2</sub> CO	5(1,5)-4(1,4)	4.5	OriMC-1	MMWO	4.9m Lor85	
351873.896*(43)	SO <sub>2</sub>	14(4,10)-14(3,11)	0.9	OriMC-1	MMWO	4.9m Lor85	
354505.47 *(2)	HCN	4-3	10.	OriMC-1	UKIRT	3.8m Pad80	
354505.472*(20)	HCN	4-3	9.4	OriMC-1	MMWO	4.9m Lor85	
356734.49 *(26)	HCO <sup>+</sup>	4-3	8.6	OriMC-1	UKIRT	3.8m Pad82	
372421.34 (20)	H <sub>2</sub> D <sup>+</sup>	1(1,0)-1(1,1)	0.23	NGC2264	KAO	1m Phi85	Bog84b
380197.372*(25)	H <sub>2</sub> O	4(1,4)-3(2,1)	12.	OriMC-1	KAO	1m Phi80	
461040.766*(60)	CO	4-3	60.	OriMC-1	KAO	1m Phi80	
572498.15 (10)	NH <sub>3</sub>	1(0)-0(0)	3.5	OriMC-1	KAO	1m Kee83	
691473.048*(42)	CO	6-5	100.	OriMC-1	IRTF	3m Gol81a	
806651.770*(46)	CO	7-6	110.	OriMC-1	IRTF	3m Sch85b	
1956018.18 *(23)	CO	17-16	0.7 q	OriMC-1	KAO	1m Sta82	
2413917.30 *(40)	CO	21-20	0.85q	OriMC-1	KAO	1m Wat80	
2509947.7 *(30)	OH	<sup>2</sup> Π <sub>3/2</sub> $J=5/2-3/2 F=3+-2-$	n.r.	Sgr B2	KAO	1m Sto81	Bro82
2514315.5 *(30)	OH	<sup>2</sup> Π <sub>3/2</sub> $J=5/2-3/2 F=3--2+$	n.r.	Sgr B2	KAO	1m Sto81	Bro82
2528172.31 *(45)	CO	22-21	1.4 q	OriMC-1	KAO	1m Wat80	
3097910.1 *(7)	CO	27-26	0.43q	OriMC-1	KAO	1m Sto81a	
3438365.8 *(8)	CO	30-29	0.16q	OriMC-1	KAO	1m Sto81a	

a) The asterisk (\*) following a rest frequency indicates that the frequency is a calculated value. A question mark (?) following the formula indicates that the identification was uncertain in the astronomical reference. The symbol n. r. in the intensity column means that the intensity was not reported.

b) Blended with adjacent transitions, see astronomical reference.

c) Line-to-continuum ratio ( $T_l/T_c$ ) = 0.0095.

d) Blended with a recombination line.

e) In flux units (fu). 1 fu =  $10^{-26} \text{ W m}^{-2} \text{ Hz}^{-1}$  = Jansky (Jy).

f) This observation has not been confirmed.

g) Beam brightness temperature.

h) See astronomical reference.

i) Intensity varies with time.

j) Astronomical reference shows partially resolved hyperfine structure.

k) Blended with CH<sub>3</sub><sup>13</sup>CN.

l) Peak line radiation temperature.

m) Only the strongest of several velocity components is listed.

n) Reported as unidentified in astronomical reference.

o) The acetaldehyde and formamide lines were observed in different sidebands and are blended in this observation.

p) The frequency for this unidentified line reported by Clark et al. (1979) was in error. The correct frequency is 93.780 GHz as shown here.

q) Units are  $10^{-16} \text{ W/cm}^2$ .

r) Blended with HCO<sup>+</sup>  $J=3-2$ .

s) Originally attributed to NH<sub>2</sub>CHO, however this assignment seems inconsistent with other observations. (Cum84)

t) Assignment from Cum84.

u) Not observed in Orion survey by Sutton et al. (Sut85).

v) This line may be blended with NS  $J=11/2-9/2$ .

w) This line may be blended with NO  $J=5/2-3/2$ .

x) Not seen in BTL survey at  $\sim 0.04\text{K}$  (Cum85).

y) Although this line is reported in a table of Lor84, it is not apparent in Fig. 2 of this reference.

z) The  $J=54-53$  of HC<sub>3</sub>N is calculated at 143764.97(10) MHz.

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TABLE 3. List of telescope abbreviations employed in Table 2

Abbreviation	Name location
ARO 46 m.....	Algonquin Radio Observatory Lake Traverse Ontario, Canada
Arecibo 350 m.....	Arecibo Observatory Puerto Rico
BTL 7 m.....	Bell Telephone Laboratory Holmdel, New Jersey
FCRAO 14 m.....	Five College Radio Astronomy Observatory Massachusetts
Hale 5 m.....	Hale Telescope Mount Palomar, California
IRTF 3 m.....	Infrared Telescope Facility Mauna Kea, Hawaii
IRT 13.7 m.....	Itapetinga Radio Telescope Sao Paulo, Brazil
KAO 1 m.....	G. P. Kuiper Airborne Observatory
MMT .....	Multiple Mirror Telescope Mt. Lemmon, Arizona
MMWO 4.9 m.....	McDonald Millimeter Wave Observatory Fort Davis, Texas
MPI 100 m.....	Max-Planck-Institut fur Radioastronomie Effelsberg, Germany
NEROC 37 m (120 ft)...	Northeast Radio Observatory Corporation Haystack Observatory Westford, Massachusetts
NRAO 11 m (36 ft)....	National Radio Astronomy Observatory Kitt Peak, Arizona
NRAO 43 m (140 ft)...	National Radio Astronomy Observatory Greenbank, West Virginia
NRL 26 m (85 ft).....	Naval Research Laboratory Maryland Point Observatory, Maryland
NRO 45 m.....	Nobeyama Radio Observatory University of Tokyo Nobeyama, Japan
OSO 26.6 m.....	Onsala Space Observatory Onsala, Sweden
OSO 20 m.....	Onsala Space Observatory Onsala, Sweden
OVRO 10.4 m.....	Owens Valley Radio Observatory Owens Valley, California
Parkes 64 m.....	Division of Radiophysics CSIRO Parkes, Australia
SRCAL 25 m.....	SRC Appleton Laboratory Chilbolton Observatory Stockbridge, Hants, England
TAO 6 m.....	Tokyo Astronomical Observatory Tokyo, Japan
UKIRT 3.8 m.....	UK Infrared Telescope Mauna Kea, Hawaii
UM/UCSD 1.5 m.....	University of Minnesota/UCSD 60 in Mt. Lemmon, Arizona