

Department of Chemistry
12 Oxford Street
Cambridge, Massachusetts 02138

December 31, 1964

Dear Contributor:

This is the ^{eighth} ~~seventh~~ microwave spectroscopy information letter and is being sent to those who contributed.

1. ALLAHABAD UNIVERSITY
Physics Department
Krishnaji

HCOOH	Formic acid	A. Singh	30 new Q-branch lines recorded and tentative assignment made. Analysis in progress.
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2. UNIVERSITY OF BIRMINGHAM
Department of Chemistry
J. Sheridan

C_3H_3NO	Isoxazole	W. C. Mackrodt	Stark analysis to confirm assignment.
$C_4H_2O_3$	Maleic anhydride	W. C. Mackrodt	Preliminary assignment.
CH_2FBr	Fluorobromomethane	P. E. Curnuck	Second order quadrupole analysis.
CD_2FBr	Fluorobromomethane	P. E. Curnuck	Second order quadrupole analysis.
CH_2FI	Fluoroiodomethane	P. E. Curnuck	Second order quadrupole analysis.
C_2HF_3	Trifluorethylene	O. L. Stiefvater	Constants assigned for carbon-13 species and 7 excited vibrational states.

3. UNIVERSITY OF BRISTOL
Physics Department
J. G. Baker

NO_2	Nitrogen dioxide	R. M. Lees	2.5 mm transition assigned.
CH_2OH	Methyl alcohol	R. M. Lees	2-3 mm transition observed and partly assigned.

4. UNIVERSITY OF CALIFORNIA
 Berkeley, California
 Department of Chemistry
 W. D. Gwinn
 R. J. Myers

CH_3SF_5	Methyl sulfurpentafluoride	R. J. Myers	Paper in progress.
IF_5	Iodine Pentafluoride	R. J. Myers	Paper in progress.
CH_6OSi	Silyl methyl ether	R. J. Myers	Work in progress.
$\text{C}_2\text{H}_5\text{N}$	Ethyleneimine		Quadrupole and barrier preprint
$\text{C}_3\text{H}_6\text{S}$	Trimethylene sulfide		Assignment, including excited states, barrier to ring puckering.
C_4H_6	Cyclobutene		Preprint.
CF_3NO_2	Trifluoronitromethane		Preprint.
CH_3NO_2 (CH_3ONO)	Methyl nitrite		Paper in progress.
$\text{C}_4\text{H}_8\text{O}$	Tetrahydrofuran		Assignment, including excited states, barrier to pseudorotation, paper in progress.
$\text{C}_4\text{H}_7\text{Cl}$	Chlorocyclobutane		Paper in progress.
$\text{C}_5\text{H}_8\text{F}_2$	1,1-Difluorocyclopentane		Barrier to pseudorotation, preprint.
$\text{C}_4\text{H}_6\text{O}$	Dihydrofuran		Paper in progress.
$\text{C}_5\text{H}_9\text{ClO}$	Chloropentanone		Assignment, including excited states.
$\text{C}_2\text{H}_4\text{ClN}$	Chloroaziridine		Assignment, including quadrupole splittings.
$\text{C}_4\text{H}_7\text{F}$	Cyclobutyl fluoride		Paper in progress.

5. THE UNIVERSITY OF CAMBRIDGE
 Department of Physical Chemistry
 T. M. Sugden
 M. C. L. Gerry

$\text{C}_2\text{H}_4\text{Si}$	Silyl acetylene	M. C. L. Gerry	Almost complete.
CH_3NOSi	Silyl isocyanate	M. C. L. Gerry	Almost complete.

6. COLUMBIA UNIVERSITY
 Department of Chemistry
 B. F. Dailey

C_6H_5Br	Bromobenzene	E. Rosenthal	Paper in progress.
C_6H_5OH	Phenol	H. Forest	Paper in progress.
C_3H_5Br	Cyclopropyl bromide	F. Jam	Analysis nearly complete.

7. UNIVERSITY OF COPENHAGEN
 Department of Chemical Physics
 Jørge Bak

$C_2H_2N_2S$	1,3,4-Thiadiazole		Deuterated species assigned.
C_3H_4O	Methyl ketene		Manuscript in preparation.
C_4H_5N	Pyrrole		Reinvestigation of deuterated species.
C_5H_5N	Pyridine		^{15}N -species assigned, quadrupole corrections on main species.
$C_6H_4F_2$	o-Difluorobenzene		Spectrum assigned.

8. UNIVERSITY OF FREIBURG
 Physikalisches Institut
 H. D. Rudolph
 H. Dreizler

$(CH_3)_2SO$	Dimethyl sulfoxide	H. Dreizler G. Dendl	Paper in print, isotopic species in progress.
$(CH_3)_2CO$	Acetone	R. Peter	Paper concluded.
$(CH_3)_3N.BH_3$	Trimethylamine-borane complex	H. G. Schirdewahn	Paper prepared.
$S(CN)_2$	Sulfur dicyanide	W. Arnold	Letter in print.
$C_4H_4N_2$	Pyridazine	W. Werner	Isotopic species, HFS in progress.
$CH_3C_6H_4F$	Fluoro-toluene	H. D. Rudolph H. Seiler	Assignment completed, barrier determined.
$C_5H_4O_2$	Furfural	F. Mönnig	Assignment of two conformations, letter being prepared.

9. HARVARD UNIVERSITY
Department of Chemistry
E. B. Wilson, Jr.

$C_2H_2N_2O$	1,2,5-Oxadiazole	E. Saegebarth	Written up.
PH_5Si_2	Fluorodisilane	P. Cox and R. Varma	Work done.
GeH_6Si	Germyl silane	R. Varma and P. Cox	In progress.
$C_2H_2F_2O$	Fluoroacetyl fluoride	E. Saegebarth	One rotamer done.
C_2HF_3O	Trifluoroacetaldehyde	R. C. Woods	Ground state done and barrier
C_2H_5FO	2-Fluoroethanol	K. Buckton	Partial assignment.
C_3H_6O	Methyl vinyl ether	N. Owen	One rotamer assigned.
C_4H_8O	Trans dimethyl ethylene oxide	M. Emptage	Work done.
C_3H_5F	3-Fluoropropene	E. Hirota	Submitted.
PF_3O	Phosphorous oxyfluoride	A. Ronn	Relaxation effects and double quantum transitions investigated
GeH_3CN	Germyl cyanide	K. Buckton, R. Varma	Partially assigned.

10. UNIVERSITY OF ILLINOIS
Department of Chemistry and Chemical Engineering
W. H. Flygare

$CH_3CCl:CH_2$	2-Chloropropene	Unland, Weiss	J. Chem. Phys., accepted.
$CH_3CH:CF_2$	1,1-Difluoropropene	Weiss	Tentative assignment.
$CH_3CF:CHCl$ cis and trans	1-chloro, 2-fluoro-propene	Weiss	Work in progress.
C_7H_7F	2-fluorotoluene	Lo	Work in progress.
C_7H_7Cl	2-chlorotoluene	Lo	Work in progress.
CH_3NCO	Methyl isocyanate	Lett	Work in progress.
CH_3SCN	Methyl isothiocyanate	Lett	Work in progress.
CH_3NCS	Methyl thiocyanate	Lett	Work in progress.
H_2CO^{17}	Formaldehyde	Lowe	Work in progress.
CH_2ClCH_2Cl	1,2-dichloroethane	Kemp	Work in progress.

11. THE UNIVERSITY OF KANSAS
 Department of Chemistry
 M. D. Harmony

$\text{CH}_4\text{N}_2\text{O}$	Urea	Li	Tentative assignment.
$\text{C}_5\text{H}_7\text{Cl}$	Spiropentyl chloride	Woerner	Assignment in progress.
C_6H_8	1,3-Cyclohexadiene	Luss	Assignment in progress.

12. UNIVERSITÄT KIEL
 Lehrstuhl für Chemische Physik
 Werner Zeil

$\text{C}_6\text{H}_9\text{Cl}$ ($(\text{CH}_3)_3\text{CCCl}$)	Tertiary butyl acetylene chloride	Bodensch, Gegenheimer	
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13. UNIVERSITY OF LOUVAIN
 Centre de Physique Nucléaire
 M. de Hemptinne

$\text{C}_2\text{H}_6\text{O}$	Ethyl alcohol	J. Michielsen-Effinger	In press. Work in progress for isotopes.
$\text{C}_2\text{D}_6\text{O}$	Ethyl alcohol	M. Chermanne	Work in progress.
$\text{C}_2\text{H}_3\text{Br}$	Vinyl bromide	G. A. Savariraj	Paper in press.
$\text{S}^{33}\text{O}_2^{18}$	Sulfur dioxide	R. Van Riet	Work in progress.
$\text{S}^{32}\text{O}^{17}\text{O}^{18}$	Sulfur dioxide	A. Defossez	Work in progress.

14. UNIVERSITY OF MARYLAND
 Institute for Molecular Physics
 L. C. Krisher

CH_3CONH_2	Acetamide	L. Krisher	In progress.
CH_3COI	Acetyl iodide	L. Krisher M. Moloney	In progress.

15. MICHIGAN STATE UNIVERSITY
 Department of Chemistry
 R. H. Schwendeman

$^{13}\text{CD}_3\text{Cl}$	Methyl chloride	J. Kelly	In press.
$^{13}\text{CD}_3\text{Br}$	Methyl bromide	J. Kelly	In press.
$\text{C}_3\text{H}_7\text{Br}$	2-Bromopropane	F. Tobiason	Manuscript in preparation.
$\text{C}_4\text{H}_9\text{Br}$	n-Butyl bromide	R. Schwendeman	C-13 species assigned.

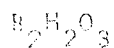
C_2H_5NO (CH_3CH_2NOH)	Acetoxime	R. Rogowski	Both species of parent assigned.
$C_2H_5BO_2$ ($CH_2OBHOCH_2$)	1,3,2-Dioxaborolane	J. Hand	11_B , 10_B species assigned.
C_3H_7NO	Dimethyl formamide	R. Schwendeman	Parent partially assigned.

16. NATIONAL BUREAU OF STANDARDS
Infrared and Microwave Spectroscopy Section
D. R. Lide

$AlCl_3$, AlF_3	Aluminum monohalides	Lide	In press.
SO_2F_2	Sulfuryl fluoride	Lide	In press (excited states).
$ClCN$	Cyanogen chloride	Lafferty, Lide	Manuscript in preparation (excited states).
FCN	Fluorine cyanide	Lafferty	Measurements in progress (excited states).
N_2O	Nitrous oxide	Lafferty, Lide	In press (excited states).
HCN	Hydrogen cyanide	Maki	Measurements completed (excited states).
HBF_2	Difluoroborine	Kasuya, Lide	Almost complete.
CH_3CCSiH_3	Methylsilylacetylene	Kirchhoff, Lide	Manuscript in preparation.
$HNSO$	Thionylimine	Kirchhoff	Assigned.
ClO_3F	Perchloryl fluoride	Lide	Assigned.
PN		Krisher, Lide	Assigned.
PF_3BH_3		Kuczkowski	Assigned.
CF_2N_2	Difluorodiazirine	Kuczkowski	Abandoned, no spectrum.
$HOCN$	Cyanic acid	Lafferty	In progress (excited states).
$C_3H_4N_2$	Pyrazole	Kirchhoff	In progress.
C_4H_8	cis-2-Butene	Sarachman	Manuscript in preparation.

17. NATIONAL RESEARCH COUNCIL, OTTAWA
Division of Pure Physics
C. C. Costain

C_6H_8	Cyclohexadiene	S. S. Butcher	Conformation, dipole moment, normal species. In manuscript.
C_6H_6	Cyclohexatriene	S. S. Butcher	Conformation, dipole moment, normal species. In manuscript.



Porter, Brooks

r_e structure, 6 isotopic species. In manuscript.

18. STATE UNIVERSITY OF NEW YORK AT BUFFALO
 Department of Physics
 T. Sarachman

Buffalo
n. y.

HCOOH Formic acid T. Sarachman Excited states assigned.

19. RICE UNIVERSITY
 Department of Chemistry
 R. F. Curl

CH₃NSO Methyl thionitrite V. M. Rao Work in progress.
 N¹⁴O¹⁶O¹⁷ O¹⁷-nitrogen dioxide R. F. Curl Some lines assigned.
 C₄H₆O Methyl vinyl ketone V. M. Rao a and b type assigned.

20. STANFORD UNIVERSITY
 Department of Chemistry
 V. W. Laurie

C₄H₆O Cyclobutanone L. Scharpen Paper in progress.
 C₅H₈ Methylenecyclo-
butane L. Scharpen Assignment.
 C₃H₈ Propane L. Scharpen Torsional states.

21. UNIVERSITY OF STOCKHOLM
 Institute of Physics
 H. Selén

C₆H₅FO o-fluorophenol
m-fluorophenol H. Selén Work in progress.
 C₆H₅I Iodobenzene J. Oldeberg
K. Johansson Work in progress.

22. SWISS FEDERAL INSTITUTE OF TECHNOLOGY
 Physical Chemistry Department
 Hs. H. Günthard

C₂H₃NO₂ Nitroethylene H. D. Hess Quadrupole splittings, rota-
(CH₂=CHNO₂) tional constants of a
deuterium compound.
 C₃H₅Cl 2-Chloropropene W. Good Rotational and quadrupole
coupling constants.

C_3H_5Br	2-Bromopropene	H. P. Benz	Preliminary rotational and quadrupole coupling constants
$C_{10}H_8$	Azulene	H. J. Tobler	Rotational constants.

23. THE UNIVERSITY OF TEXAS
Department of Chemistry
J. E. Boggs

C_2HF_5	Pentafluoroethane	A. Tipton	Assignment made.
$C_3H_4O_2$	Propiolactone	D. Boone	Assignment of excited states
$C_3H_4O_3$	Ethylene carbonate	I. Mao	Assignment of normal species.
$C_3H_2O_3$	Vinylene carbonate	K. Dorris	Assignment of excited states.
CH_3NO	Nitrosomethane	D. Coffey	Assignment of normal species, barrier in progress.
C_6H_5NO	Nitrosobenzene	Y. Hanyu	Assignment of normal species.

24. THE UNIVERSITY OF TOKYO
Department of Chemistry
Y. Morino

H_2CO, D_2CO	Formaldehyde	K. Takagi	Excited vib. states, paper in progress.
OCS	Carbonyl sulfide	C. Matsumura	Vib.-rot. interaction and equilibrium structure, manuscript in preparation.
OCSe	Carbonyl selenide	C. Matsumura	Vib.-rot. interaction and equilibrium structure, work almost complete.
F_2O	Oxygen difluoride	S. Saito	Excited vib. states, manuscript in preparation.
F_2CO	Carbonyl fluoride	S. Saito	Excited vib. states, paper submitted.
$ClNO_2$	Nitryl chloride	T. Tanaka	Excited vib. states, manuscript prepared.
FNO_2	Nitryl fluoride	T. Tanaka	Excited vib. states, work in progress.
CH_2F_2	Methylene fluoride	E. Hirota	Excited vib. states, work in progress.
CH_3Br, CD_3Br	Methyl bromide	C. Hirose	Excited vib. states, work almost complete.
C_3H_5F ($CH_2=CHCH_2F$)	Allyl fluoride	E. Hirota	Rotational isomerism in cis and gauche forms, paper submitted.
	Butene-1	S. Zende	Rotational isomerism in cis and gauche forms, work in progress.
	Isoprene	E. Hirota	Rotational isomerism in cis and gauche forms, work in progress.

25. UNIVERSITY OF UTRECHT
Organic Chemistry Laboratory
D. den Engelsen

Utrecht
Den Engelsen

C_3H_4O (CH_3OCCH)	Methoxy ethyne	D. den Engelsen	Paper in progress.
C_3H_3DO (CH_3OCCD)	Methoxy ethyne	D. den Engelsen	Paper in progress.
C_3H_4S (CH_3SCCH)	Methoxy thioethyne	D. den Engelsen	Tentative assignment of micro-wave spectrum.

26. UNIVERSITY OF WISCONSIN
Department of Chemistry
C. D. Cornwell

CH_3F_4P	Monomethyl tetrafluoro phosphorane	E. A. Cohen	In progress.
CF_7P	Trifluoromethyl tetrafluoro phosphorane	E. A. Cohen	In progress.
F_5IO	Iodine oxide pentafluoride	S. B. Pierce	In progress.
H_5B_2Br	Bromodiborane	A. Ferguson	Isotopic samples being prepared

FORMULA INDEX

(Arrangement as in Townes and Schawlow
Numbers refer to Institution)

- AlCl aluminum monochloride - 16
 AlF aluminum monofluoride - 16
 BH_3F_3P (PF_3BH_3) - 16
 CClN (ClCN) cyanogen chloride - 16
 CFN (FCN) fluorine cyanide - 16
 CF_2N_2 difluorodiazirine - 16
 CF_2O (F_2CO) carbonyl fluoride - 24
 CF_3NO_2 trifluoronitromethane - 4
 CF_7P trifluoromethyl tetrafluoro phosphorane - 26
 CHN (HCN) hydrogen cyanide - 16
 CH_2BrF (CH_2FBr) fluorobromomethane - 2
 CH_2BrF (CD_2FBr) fluorobromomethane - 2
 CH_2F_2 methylene fluoride - 24
 CH_2FI fluoroiodomethane - 2
 CH_2O (H_2CO) formaldehyde - 24
 CH_2O (D_2CO) formaldehyde - 24
 CH_2O (H_2CO^{17}) formaldehyde - 10
 CH_2O_2 (HCOOH) formic acid - 1, 18
 CH_3Br ($^{13}CD_3Br$) methyl bromide 15, 24
 CH_3Cl ($^{13}CD_3Cl$) methyl chloride - 15
 CH_3F_4P (CH_3PF_4) monomethyl tetrafluoro phosphorane - 26
 CH_3F_5S (CH_3SF_5) methyl sulfurpentafluoride - 4
 CH_3GeN (GeH_3CN) germyl cyanide - 9
 CH_3NOS (CH_3SNO) methyl thionitrite - 19
 CH_3NOSi silyl isocyanate - 5
 CH_3NO_2 (CH_3ONO) methyl nitrite - 4
 CH_4N_2O ($CO(NH_2)_2$) urea - 11
 CH_4O (CH_3OH) methyl alcohol - 3
 CH_6OSi (CH_3OSiH_3) silyl methyl ether - 4
 COS (OCS) carbonyl sulfide - 24
 COSe (OCS_e) carbonyl selenide - 24
 C_2HF_3 ($CHF:CF_2$) trifluoroethylene - 2
 C_2HF_3O (CF_3CHO) trifluoroacetaldehyde - 9
 C_2HF_5 (CF_3CHF_2) pentafluoroethane - 23
 $C_2H_2F_2O$ fluoroacetyl fluoride - 9
 $C_2H_2N_2O$ (CHNONCH) 1,2,5-oxadiazole - 9
 $C_2H_2N_2S$ 1,3,4-thiadiazole - 7
 C_2H_3Br vinyl bromide - 13
 C_2H_3IO (CH_3COI) acetyl iodide - 14
 C_2H_3NO (CH_3NCO) methyl isocyanate - 10
 $C_3H_3NO_2$ ($H_2C=CHNO_2$) nitroethylene - 22
 C_2H_3NS (CH_3SCN) methyl isothiocyanate - 10
 C_2H_3NS (CH_3NCS) methyl thiocyanate - 10
 $C_2H_4Cl_2$ (CH_2ClCH_2Cl) 1,2-dichloroethane - 1
 C_2H_4ClN chloroaziridine - 4
 C_2H_4Si silyl acetylene - 5
 $C_2H_5BO_2$ ($CH_2OBHOCH_2$) 1,3,2-dioxaborolane - 1
 C_2H_5FO (CH_2FCH_2OH) 2-fluoroethanol - 1

- C_2H_5N ethyleneimine - 4
 C_2H_5NO (CH_3CONH_2) acetamide - 14
 C_2H_5NO ($CH_3CH:NOH$) acetoxime 15
 C_2H_6O ethyl alcohol - 13
 C_2H_6O (C_2D_6O) ethyl alcohol - 13
 C_2H_6OS ($(CH_3)_2SO$) dimethyl sulfoxide - 8
 C_2N_2S ($S(CN)_2$) sulfurdicyanide - 8
 $C_3H_2O_3$ ($CH=CHOC=O$) vinylene carbonate - 23
 C_3H_3NO isoxazole - 2
 C_3H_4ClF ($CH_3CF:CHCl$) 1-chloro, 2-fluoro propene - 10
 $C_3H_4F_2$ ($CH_3CH:CF$) 1,1-difluoropropene - 10
 $C_3H_4N_2$ pyrazole - 16
 C_3H_4O (CH_3CHCO) methyl ketene - 7
 C_3H_4O ($H-C\bar{C}-OCH_3$) ($D-C\bar{C}-OCH_3$) methoxy ethyne - 25
 $C_3H_4O_2$ ($CH_2CH_2C=O$) propiolactone - 23
 $C_3H_4O_3$ ($CH_2CH_2OC=O$) ethylene carbonate - 23
 C_3H_4S ($H-C\bar{C}-SCH_3$) methoxy thioethyne - 25
 C_3H_5Br ($H_2C=CBr.CH_3$) 2-bromopropene - 22
 C_3H_5Br cyclopropyl bromide - 6
 C_3H_5Cl ($CH_3CCl:CH_2$) 2-chloropropene - 10
 C_3H_5Cl ($CH_2=CHCH_2Cl$) allyl chloride - 24
 C_3H_5F ($CH_2FCH:CH_2$) 3-fluoropropene - 9
 C_3H_6 ($CH_2=CHCH_3$) propylene - 24
 C_3H_6O ($(CH_3)_2CO$) acetone - 8
 C_3H_6O ($(CH_3)_2C=O$) methyl vinyl ether - 9
 C_3H_6S trimethylene sulfide - 4
 C_3H_6Si (CH_3CCSiH_3) methylsilylacetylene
 C_3H_7Br ($CH_3CHBrCH_3$) 2-bromopropane - 15
 C_3H_7NO ($(CH_3)_2NCHO$) dimethylformamide -
 C_3H_8 propane - 20
 $C_3H_{12}BN$ ($((CH_3)_3N.BH_3)$) trimethylamine-borane complex -
 $C_4H_2O_3$ maleic anhydride - 2
 $C_4H_4N_2$ pyridazine - 8
 C_4H_5N pyrrole - 7
 C_4H_6 cyclobutene - 4
 C_4H_6O dihydrofuran - 4
 C_4H_6O cyclobutanone - 20
 C_4H_6O methyl vinyl ketone - 19
 C_4H_7Cl chlorocyclobutane - 4
 C_4H_7F cyclobutyl fluoride - 4
 C_4H_8 ($CH_2=CHCH_2CH_3$) butene-1 - 24
 C_4H_8 cis-2-butene - 16
 C_4H_8O ($CH_3CHOCHCH_3$) trans dimethylethyl oxide - 9
 C_4H_8O tetrahydrofuran - 4
 C_4H_9Br ($(CH_3)_3CBr$) t-butyl bromide - 15
 $C_5H_4O_2$ furfural - 8
 C_5H_5N pyridine - 7
 C_5H_7Cl spiropentyl chloride - 11
 C_5H_8 methylenecyclobutane - 20
 $C_5H_8F_2$ 1,1-difluorocyclopentane - 4
 C_5H_9ClO chloropentanone - 4
 $C_6H_4F_2$ o-difluorobenzene - 7