INTERSTELLAR MOLECULES

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A number of molecules have been detected in the interstellar medium, in circumstellar envelopes around evolved stars, and comae and tails of comets through observation of their microwave, infrared, or optical spectra. The following list gives the molecules and the particular isotopic species that have been reported thus far. Molecules are listed by molecular formula in the Hill order. All species not footnoted otherwise are observed in interstellar clouds, while some are also found in comets and circumstellar clouds. The list was last updated in November 2005 and lists 147 molecules (263 isotopic forms).

Molecular formula	Name	Isotopic species
AlCl	Aluminum monochloride	AlCl[a]
		$Al^{37}Cl$[a]
AlF	Aluminum monofluoride	AlF[a]
CAlN	Aluminum isocyanide	AlNC[a]
CF^+	Flouromethylidynium ion	CF^+
CH	Methylidyne	CH
CH^+	Methyliumylidene	CH^+
CHN	Hydrogen cyanide	HCN
		$H^{13}CN$
		$HC^{15}N$
		DCN
CHN	Hydrogen isocyanide	HNC
		$H^{15}NC$
		$HN^{13}C$
		DNC
		$D^{15}NC$
CHNO	Isocyanic acid	HNCO
		DNCO
CHNS	Isothiocyanic acid	HNCS
CHO	Oxomethyl	HCO
CHO^+	Oxomethylium	HCO^+
		$H^{13}CO^+$
		$HC^{17}O^+$
		$HC^{18}O^+$
		DCO^+
		$D^{13}CO^+$
CHO^+	Hydroxymethylidyne	HOC^+
CHO_2^+	Hydroxyoxomethylium	$HOCO^+$
CHS^+	Thiooxomethylium	HCS^+
CH_2	Methylene	CH_2
CH_2N^+	Iminomethylium	$HCNH^+$
CH_2N	Methylene amidogen	CH_2N
CH_2N_2	Cyanamide	NH_2CN
CH_2O	Formaldehyde	H_2CO
		$H_2{}^{13}CO$
		$H_2C^{18}O$
		HDCO
		D_2CO
CH_2O_2	Formic acid	HCOOH
		$H^{13}COOH$
		HCOOD
		DCOOH
CH_2S	Thioformaldehyde	H_2CS
		$H_2{}^{13}CS$
		$H_2C^{34}S$
		HDCS
		D_2CS
CH_3	Methyl	CH_3[a]
CH_3N	Methanimine	CH_2NH
		$^{13}CH_2NH$
CH_3NO	Formamide	NH_2CHO
		$NH_2{}^{13}CHO$
CH_3O^+	Hydroxy methylium ion	H_2COH^+
CH_4	Methane	CH_4
CH_4O	Methanol	CH_3OH
		$^{13}CH_3OH$
		$CH_3{}^{18}OH$
		CH_2DOH
		CH_3OD
		CHD_2OH
		CD_3OH
CH_4S	Methanethiol	CH_3SH
CH_5N	Methylamine	CH_3NH_2
CMgN	Magnesium cyanide	MgCN[a]
CMgN	Magnesium isocyanide	$^{24}MgNC$[a]
		$^{25}MgNC$[a]
		$^{26}MgNC$[a]
CN	Cyanide radical	CN
		^{13}CN
		$C^{15}N$
CN^+	Cyanide radical ion	CN^+[b]
CNNa	Sodium cyanide	NaCN[a]
CNSi	Silicon cyanide	SiNC[a]
CNSi	Silicon isocyanide	SiNC[a]
CN_2	Cyanoimidogen	NCN[b]
CO	Carbon monoxide	CO
		^{13}CO
		$C^{17}O$
		$C^{18}O$
		$^{13}C^{18}O$
CO^+	Carbon monoxide ion	CO^+
COS	Carbon oxysulfide	OCS
		$OC^{34}S$
		$O^{13}CS$
		^{18}OCS
CO_2	Carbon dioxide	CO_2
CO_2^+	Carbon dioxide ion	CO_2^+[b]
CP	Carbon phosphide	CP[a]

References

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2. Snyder, L. E., "Cometary Molecules," Internat. Astron. Union Symposium No. 150, *Astrochemistry of Cosmic Phenomena*, Ed. P.D. Singh, Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 427–434 (1992).

Molecular formula	Name	Isotopic species
CS	Carbon monosulfide	CS
		$C^{33}S$
		$C^{34}S$
		$C^{36}S$
		^{13}CS
		$^{13}C^{34}S$
CSi	Silicon carbide	SiC[a]
C_2	Dicarbon	C_2
C_2H	Ethynyl	C_2H
		^{13}CCH
		$C^{13}CH$
		C_2D
C_2HN	Cyanomethylene	HCCN
C_2H_2	Acetylene	HCCH
C_2H_2N	Cyanomethyl	CH_2CN
C_2H_2O	Ketene	H_2CCO
C_2H_3N	Acetonitrile	CH_3CN
		$^{13}CH_3CN$
		$CH_3{}^{13}CN$
		$CH_3C^{15}N$
		CH_2DCN
C_2H_3N	Isocyanomethane	CH_3NC
C_2H_4	Ethylene	H_2CCH_2
C_2H_4O	Acetaldehyde	CH_3CHO
C_2H_4O	Ethylene oxide	*c*-C_2H_4O[c]
C_2H_4O	Ethenol	CH_2CHOH
$C_2H_4O_2$	Methyl formate	CH_3OCHO
$C_2H_4O_2$	Acetic acid	CH_3COOH
$C_2H_4O_2$	Glycolaldehyde	CH_2OHCHO
C_2H_6	Ethane	CH_3CH_3[b]
C_2H_6O	*trans*-Ethanol	*t*-CH_3CH_2OH
C_2H_6O	*gauche*-Ethanol	*g*-CH_3CH_2OH
C_2H_6O	Dimethyl ether	CH_3OCH_3
$C_2H_6O_2$	Ethylene glycol	$HOCH_2CH_2OH$
C_2O	Oxoethenylidene	CCO
C_2S	Thioxoethenylidene	CCS
		$CC^{34}S$
C_2Si	Silicon dicarbide	*c*-SiC_2
		c-$^{29}SiC_2$
		c-$^{30}SiC_2$
		c-$Si^{13}CC$
C_3	Tricarbon	C_3
C_3H	Cyclopropenylidyne	*c*-C_3H
C_3H	Propenylidyne	*l*-C_3H
C_3HN	Cyanoacetylene	HCCCN
		$H^{13}CCCN$
		$HC^{13}CCN$
		$HCC^{13}CN$
		$HCCC^{15}N$
		DCCCN
C_3HN	Isocyanoacetylene	HCCNC
C_3HN	1,2-Propadienylidene, 3-imino	HNCCC
C_3H_2	Cyclopropenylidene	*c*-C_3H_2
		c-$H^{13}CCCH$
		c-$HC^{13}CCH$
		c-C_3HD
C_3H_2	Propadienylidene	*l*-H_2CCC
$C_3H_2N^+$	Protonated cyanoacetylene	$HCCCNH^+$
C_3H_2O	2-Propynal	HCCCHO
C_3H_2O	Cyclopropenone	*c*-C_3H_2O

Molecular formula	Name	Isotopic species
C_3H_3N	Acrylonitrile (vinyl cyanide)	CH_2CHCN
C_3H_4	Propyne	CH_3CCH
		$CH_3C^{13}CH$
		$^{13}CH_3CCH$
		CH_2DCCH
		CH_3CCD
C_3H_4O	Propenal	CH_2CHCHO
C_3H_5N	Propanenitrile (ethyl cyanide)	CH_3CH_2CN
C_3H_6O	Acetone	$(CH_3)_2CO$
C_3H_6O	Propanal	CH_3CH_2CHO
C_3N	Cyanoethynyl	CCCN
C_3O	1,2-Propadienylidene, 3-oxo	CCCO
C_3S	1,2-Propadienylidene, 3-thioxo	CCCS
C_3Si	Silicon tricarbon	SiC_3
C_4H	1,3-Butadiynyl radical	HCCCC
		$H^{13}CCCC$
		$HC^{13}CCC$
		$HCC^{13}CC$
		$HCCC^{13}C$
		DCCCC
C_4HN	3-Cyano-1,2-propadienylidene	HCCCCN
C_4H_2	Butatrienylidene	H_2CCCC
C_4H_2	1,3-Butadiyne	HCCCCH[a]
C_4H_3N	2-Butynenitrile	CH_3CCCN
C_4H_3N	Cyanoallene	CH_2CCHCN
C_4Si	Silicon tetracarbide	SiC_4[a]
C_5	Pentacarbon	C_5[a]
C_5H	2,4-Pentadiynylidyne	HCCCCC
C_5HN	2,4-Pentadiynenitrile	HCCCCCN
		$H^{13}CCCCCN$
		$HC^{13}CCCCN$
		$HCC^{13}CCCN$
		$HCCC^{13}CCN$
		$HCCCC^{13}CN$
		DCCCCCN
C_5H_4	1,3-Pentadiyne	CH_3C_4H
C_5N	1,3-Butadiynylium, 4-cyano	C_5N
C_6H	1,3,5-Hexatriynyl	HCCCCCC
C_6H_2	1,3,5-Hexatriyne	HCCCCCCH[a]
C_6H_2	1,2,3,4,5-Hexapentaenylidene	$H_2CCCCCC$
C_6H_3N	Methylcyanodiacetylene	CH_3C_4CN
C_6H_6	Benzene	C_6H_6
C_7H	2,4,6-Heptatriynylidyne	HCCCCCCC
C_7HN	2,4,6-Heptatriynenitrile	HC_7N
C_8H	1,3,5,7-Octatetraynyl	HC_8
C_9HN	2,4,6,8-Nonatetraynenitrile	HC_9N
$C_{11}HN$	2,4,6,8,10-Undecapentaynenitrile	$HC_{11}N$
ClH	Hydrogen chloride	$H^{35}Cl$
		$H^{37}Cl$
ClK	Potassium chloride	$K^{35}Cl$[a]
		$K^{37}Cl$[a]
ClNa	Sodium chloride	$Na^{35}Cl$[a]
		$Na^{37}Cl$[a]
FH	Hydrogen fluoride	HF
FeO	Iron monoxide	FeO
HLi	Lithium hydride	^7LiH

Molecular formula	Name	Isotopic species
HN	Imidogen	HN
HNO	Nitrosyl hydride	HNO
HN_2^+	Hydrodinitrogen(1+)	N_2H^+
		$^{15}NNH^+$
		$N^{15}NH^+$
		N_2D^+
HO	Hydroxyl	OH
		^{17}OH
		^{18}OH
HO^+	Oxoniumylidene	HO^+ [b]
HS	Mercapto	SH
H_2	Hydrogen	H_2
H_2N	Amidogen	NH_2
H_2O	Water	H_2O
		$H_2{}^{18}O$
		HDO
H_2O^+	Oxoniumyl	H_2O^+ [b]
H_2S	Hydrogen sulfide	H_2S
		$H_2{}^{34}S$
		HDS
		D_2S
H_3^+	Trihydrogen ion	H_3^+
		H_2D^+
		D_2H^+
H_3N	Ammonia	NH_3
		$^{15}NH_3$
		NH_2D
		NHD_2
		ND_3
H_3O^+	Oxonium hydride	H_3O^+

Molecular formula	Name	Isotopic species
H_4Si	Silane	SiH_4 [a]
NO	Nitric oxide	NO
NP	Phosphorus nitride	NP
NS	Nitrogen sulfide	NS
		$N^{34}S$
NSi	Silicon nitride	SiN
N_2	Nitrogen	N_2
N_2^+	Nitrogen ion	N_2^+ [b]
N_2O	Nitrous oxide	N_2O
OS	Sulfur monoxide	SO
		^{34}SO
		^{33}SO
		$S^{18}O$
OS^+	Sulfur monoxide ion	SO^+
OSi	Silicon monoxide	SiO
		$Si^{18}O$
		^{29}SiO
		^{30}SiO
O_2S	Sulfur dioxide	SO_2
		$^{33}SO_2$
		$^{34}SO_2$
		$OS^{18}O$
SSi	Silicon monosulfide	SiS
		$Si^{33}S$
		$Si^{34}S$
		^{29}SiS
		^{30}SiS
		$Si^{36}S$
S_2	Disulfur	S_2 [b]

l- before the isotopic species indicates a linear configuration, while *c-* indicates a cyclic molecule.

[a] Reported only in circumstellar clouds.

[b] Reported only in comets.