57. SiO_2

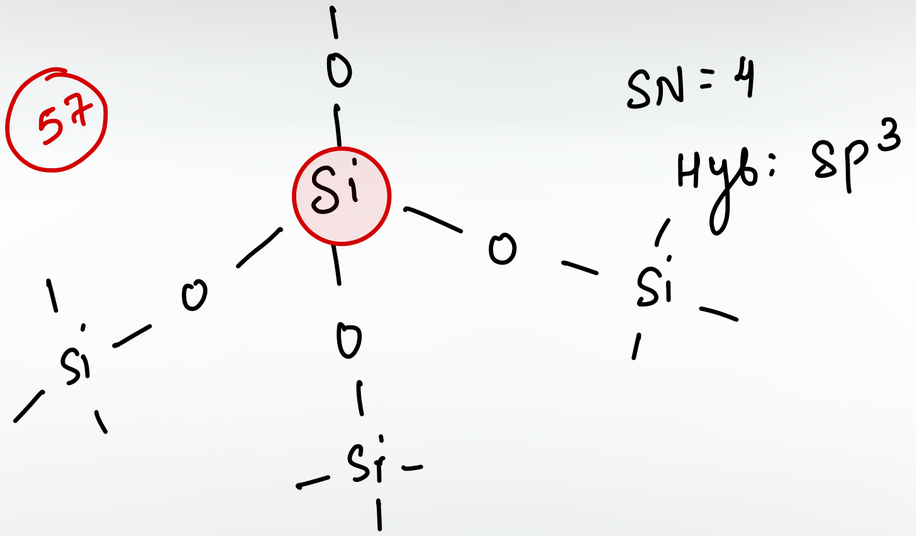
58. $\bar{N}H_2$(amide ion)

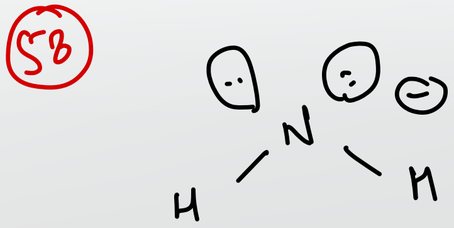
59. N_2H_4 (hydrazine)

60 .$SOCl_2$(Thionyl chloride)

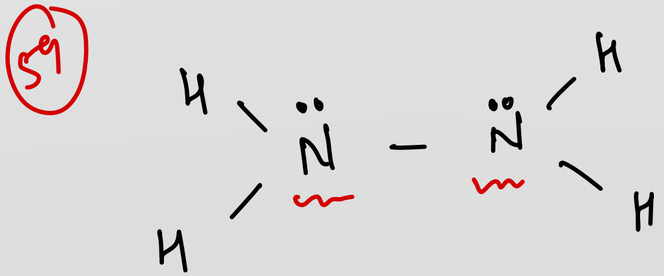
61.SO_2Cl_2 (sulfuryl chloride)

62. PCl_2F_3

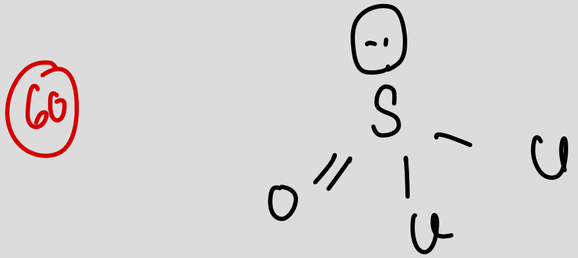




SN = 4
Hyb : sp^3
Geo : V Bent / Shape

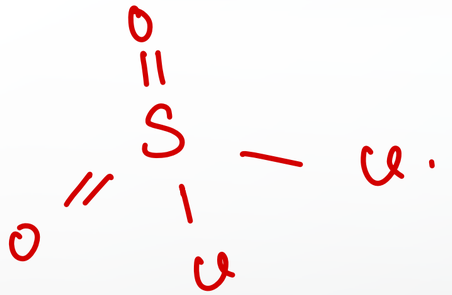


SN = 4
Hyb : sp^3



SN = 4
Hyb : sp^3
Geo : Trigonal pyramidal

(61)



SN = 4

Hyb: sp^3

Geo: Tetrahedral.

(62)

SN = 5

Hyb: sp^3d

Geo: TBP.

4-

63. XeO_6 (perxenate ion)

64. O_3

65. $\bar{N}_3$ (Azide ion)

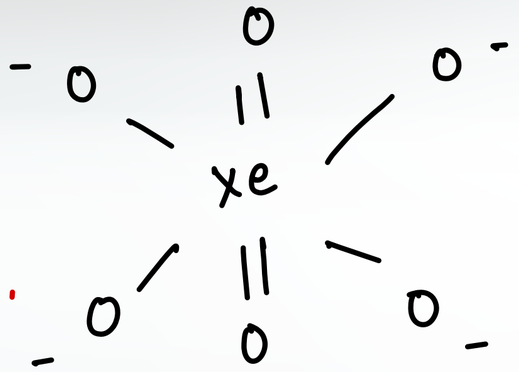
66. $\overset{+}{C}H_3$ (methyl carbocation)

67. $\bar{C}H_3$

(63) SN = 6.

Hyb: sp^3d^2

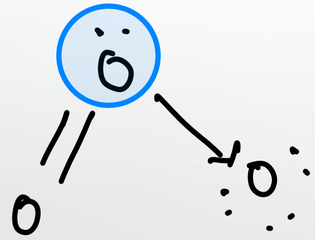
Shape: octahedral.

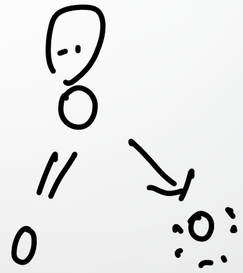


(64) SN = 2 + 1 = 3

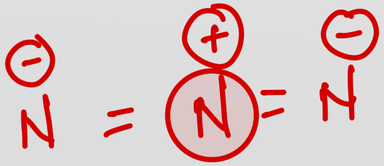
Hyb: sp^2

Shape: V/Bent.

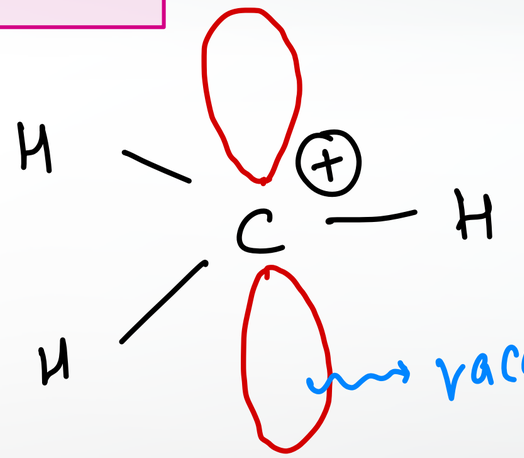




(65) Shape: linear.



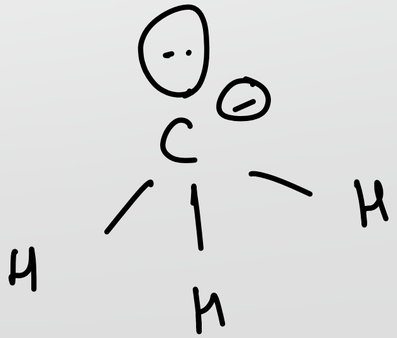
(66)



Hyb: sp^2

Shape: Trigonal planar.

(67)



Hyb: sp^3

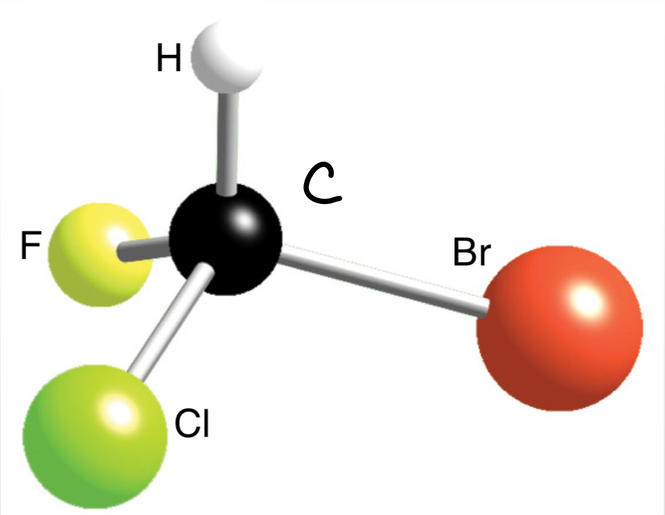
Shape: Trigonal pyramidal.

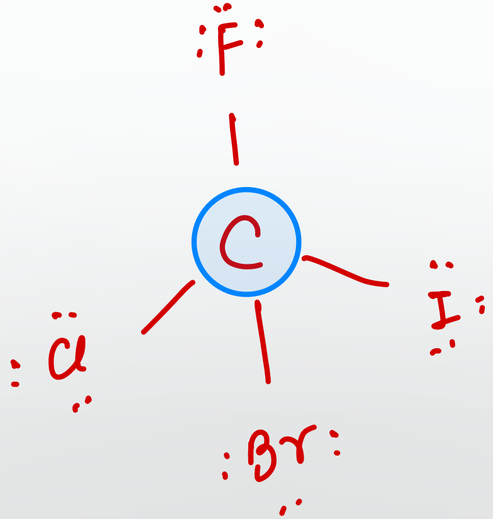
SN = σ bond + lp

= 3 + 1

= 4

68. CFClBrI





(Q) Is it a regular tetrahedral?

NO.

Chemical Bonding

69. HNO_3

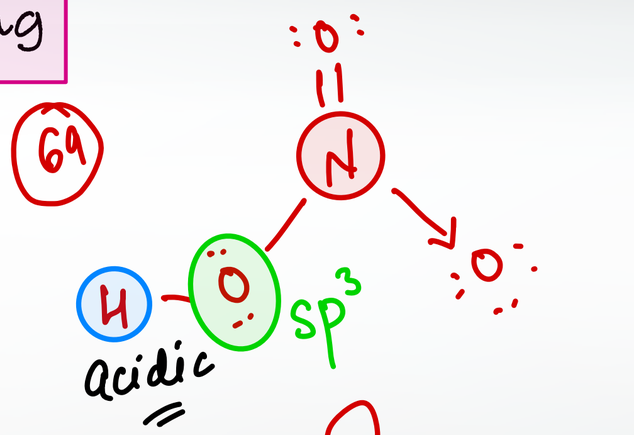
70. HNO_2

71. CO_3^{2-}

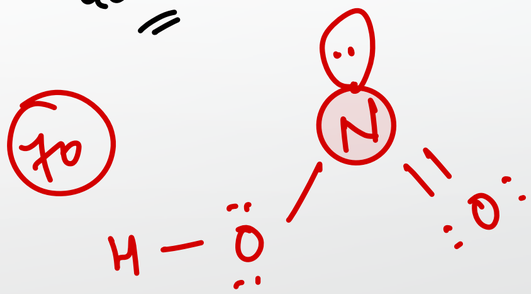
72. $SnCl_2$

73. BF_4^-

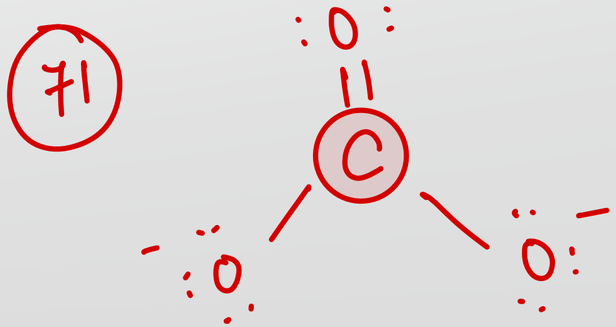
74. PF_3



Hybridization (N) : sp^2

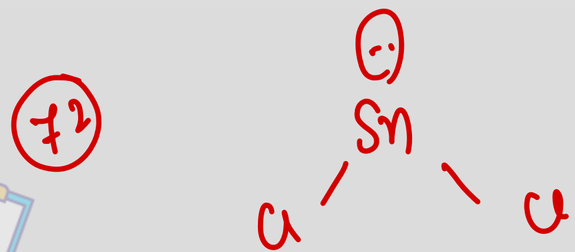


Hybridization (N) : sp^2



Hybridization (C) : sp^2

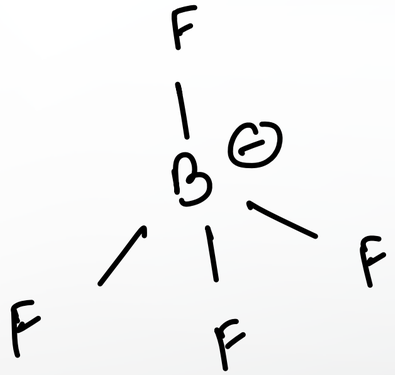
Shape: Trigonal planar.



Hybridization (Sn) = sp^2

Shape: V / Bent shape.

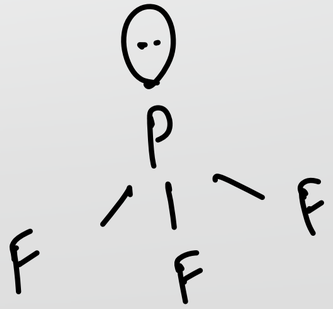
(73)



Hyb: sp^3

Shape: Tetrahedral

(74)



Hyb: sp^3

Shape: Trigonal pyramidal

75. $AsCl_3$

76. $SbCl_5$

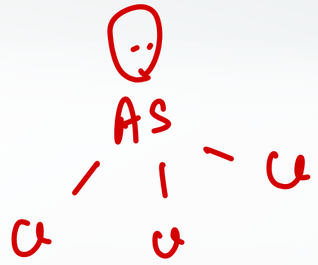
77. SeF_6

78. SbF_5^{2-}

79. SbF_4^-

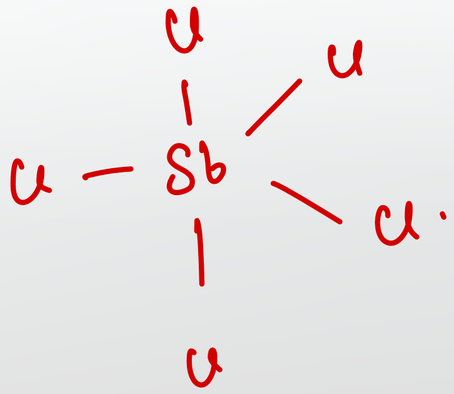
80. SiH_4(silane)

(75)



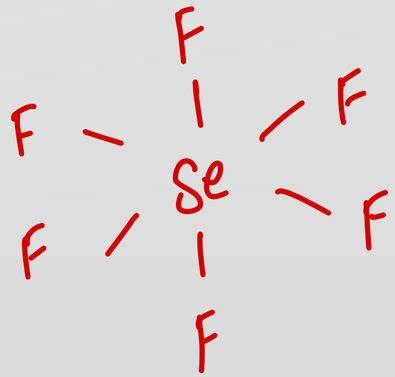
Shape: Trigonal pyramidal.

(76)



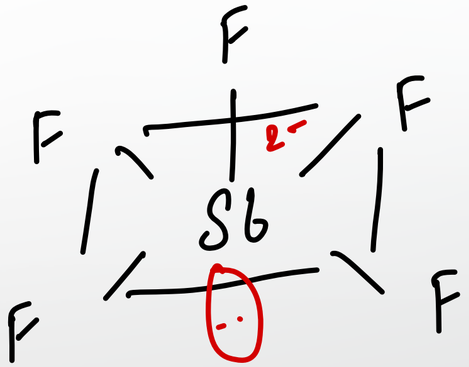
Shape: TBP.

(77)



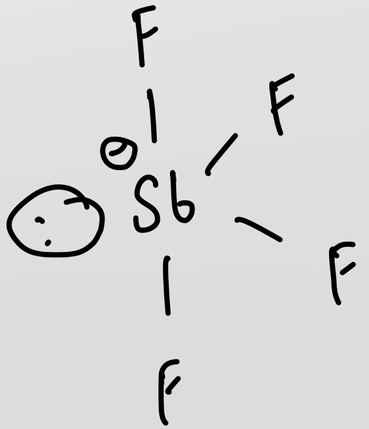
Shape: octahedral / square bipyramidal.

(78) SbF_5^{2-}



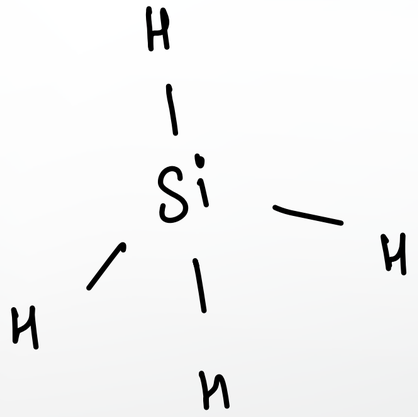
Shape: Square pyramidal.

(79) $SbF_4^{\ominus}$



Shape: See - Saw.

Q6



Shape: tetrahedral.

Hyb: sp^3

81. $HgCl_2$

(81) Cl—Hg—Cl Hyb: sp Geo | shape: Linear.

82. $\overset{-}{O}CN$

(82)  Hyb: sp Geo | shape: Linear.

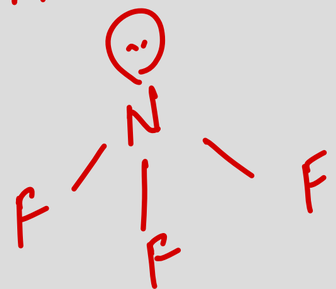
83. CS_2

(83)  Hyb: sp Geo | shape: Linear.

84. H_2S

(84)  Hyb: sp^3 Geo | shape: Bent

85. NF_3

(85)  Hyb: sp^3 Geo | shape: Trigonal pyramidal

86. $\underset{\sim}{S}NF_3$

87. $\bar{A}sCl_4$

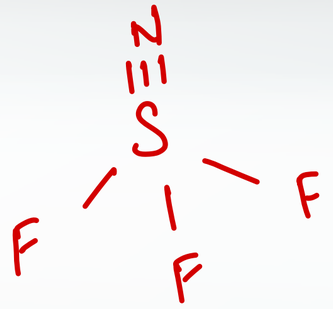
+

88. IF_4

89. OCS

90. $\bar{S}CN$

(86)



Shape: tetrahedral.

Hyb:

(87)

Shape: See-saw.

Hyb:

(88)

Shape: See-saw.

Hyb:

(89) $O = C = S$

Shape: Linear.

(90) $\overset{\ominus}{S} - C \equiv N$

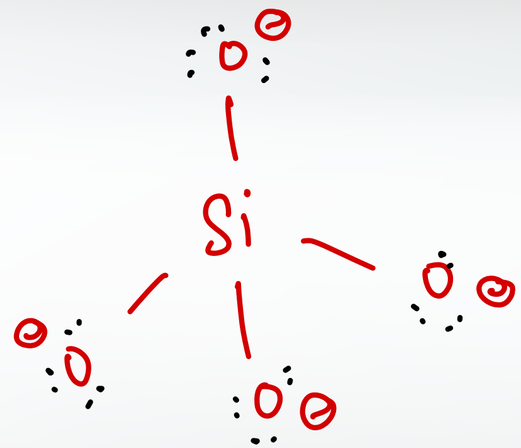
$S = C = \overset{\ominus}{N}$

Shape: Linear.

91. SiO_4^{4-}

92. IO_6^{5-}

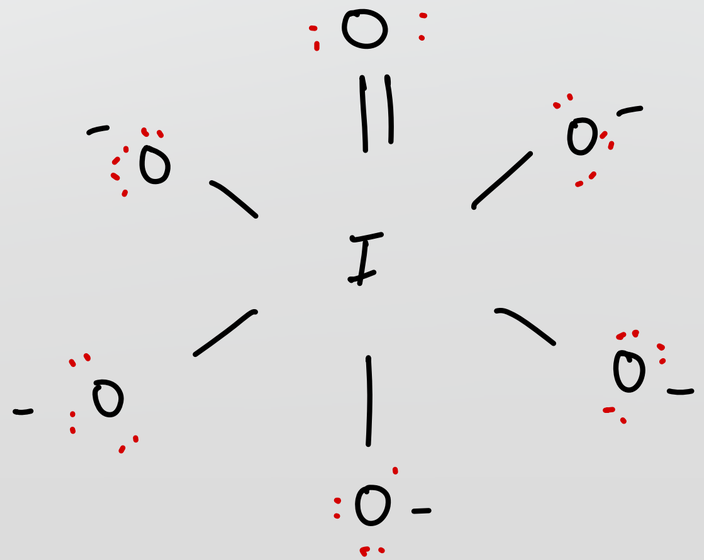
(91)



Shape: tetrahedral.

Silicate

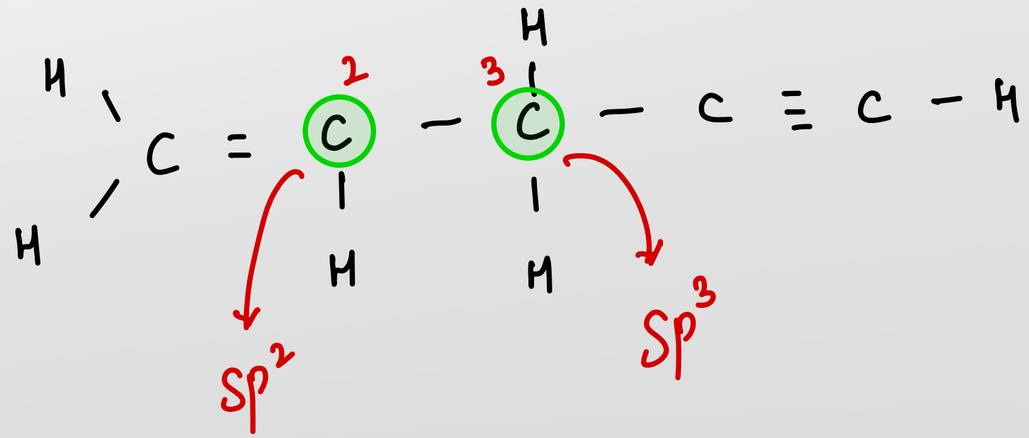
(92)



Shape: octahedral.

1. In the following compound $\overset{1}{C}H_2=\overset{2}{C}H-\overset{3}{C}H_2-C\equiv CH$, the C_2-C_3 bond is of the type :

(A) $sp-sp^2$ (B) sp^3-sp^3 (C) $sp-sp^3$ (D) sp^2-sp^3



(C_2H_4)

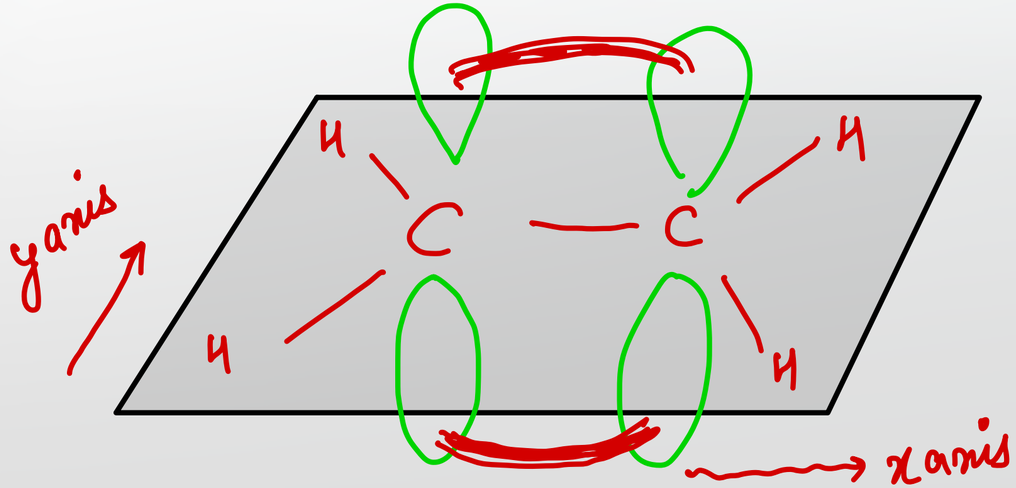
2. If ethylene molecule lies in X-Y plane then nodal planes of the π-bond will lie in

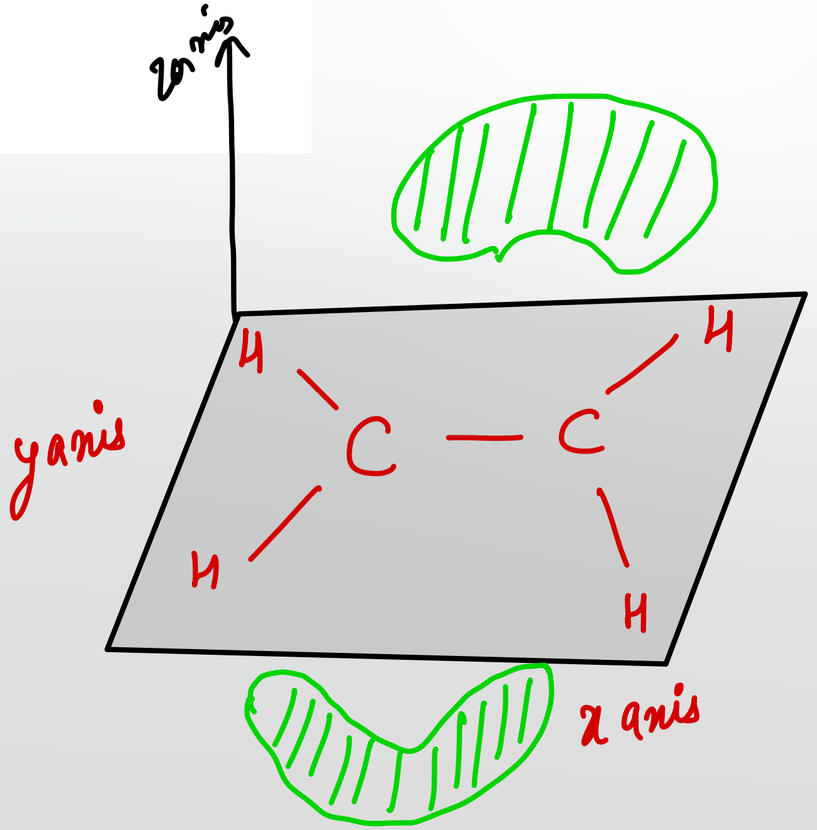
(A) XZ plane

(B) YZ plane

(C) In a plane that bisects C–C axis

(D) XY plane ✓

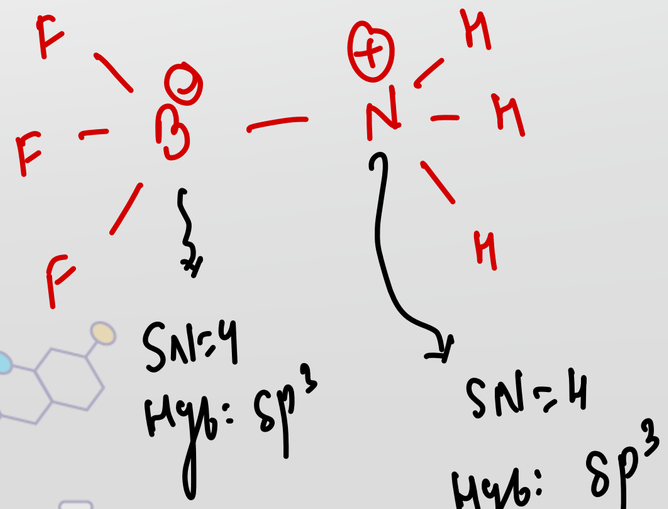




3. Which of the following contains maximum number of lone pairs on the central atom? JEE (2005, 1M)

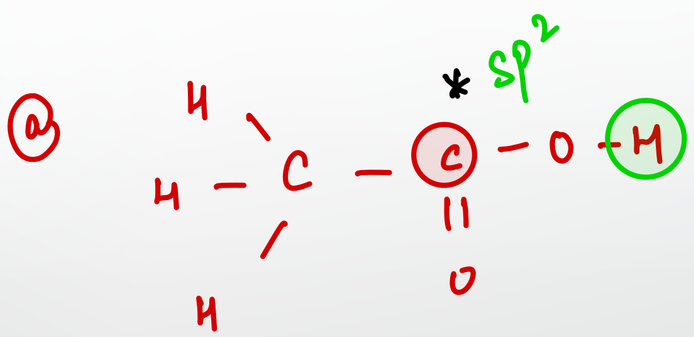
(a) ClO_3^- (b) XeF_4 (c) SF_4 (d) I_3^-

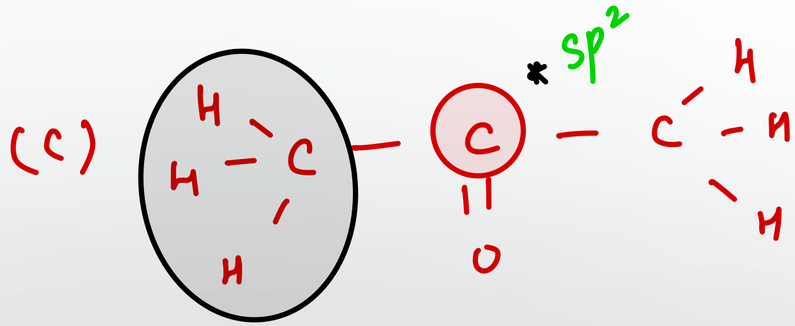
4. Specify the coordination geometry around and hybridisation of N and B atoms in a 1 : 1 complex of BF_3 and NH_3.
(a) N : tetrahedral, sp^3 ; B: tetrahedral, sp^3 JEE (2002, 3M)
(b) N : pyramidal, sp^3; B: pyramidal, sp^3
(c) N: pyramidal, sp^3; B: planar, sp^2
(d) N: pyramidal, sp^3; B: tetrahedral, sp^3

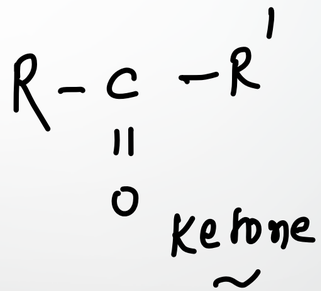


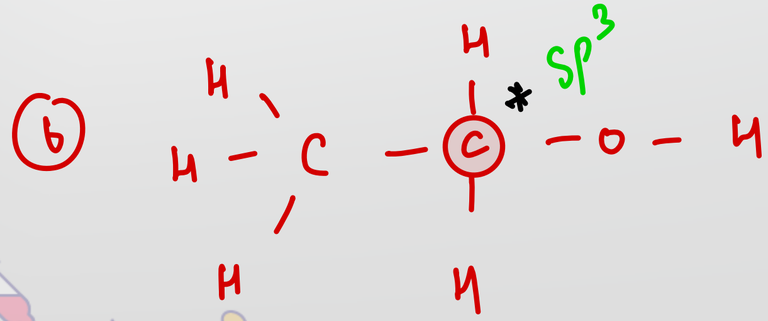
5. In which of the following species is the underlined carbon having sp^3 - hybridisation ? ***[AIEEE 2002]***

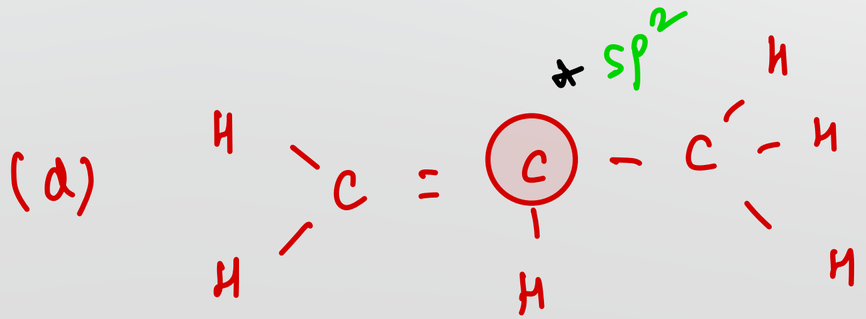
(A) $CH_3-\underline{C}OOH$ (B) $CH_3\underline{C}H_2OH$ (C) $CH_3\underline{C}OCH_3$ (D) $CH_2=\underline{C}H-CH_3$











(Q) Are the given species isostructural or not? Justify

$[\bar{B}H_4]$ CH_4 $\overset{+}{N}H_4$

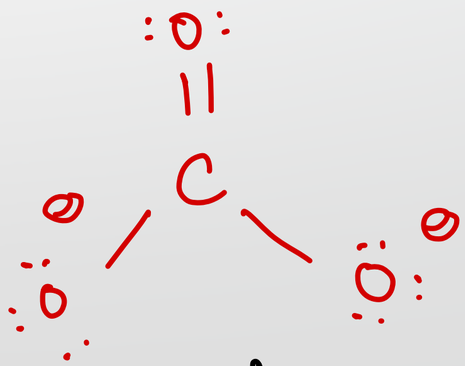
* All are iso structural : tetrahedral.

Isostructural : Molecule/ions having same geometry/shape are isostructural species

(Q) Are the given isostructural or not justify ?

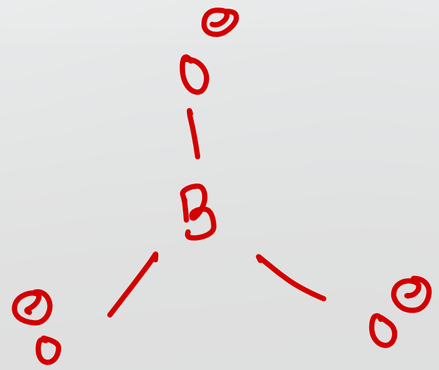
(a) CO_3^{2-}

(b) BO_3^{3-}



CO_3^{2-}

Shape: Trigonal planar



BO_3^{3-}

Shape: Trigonal planar

The correct statement about ICl_5 and ICl_4^- is

(2019 Main, 8 April II)

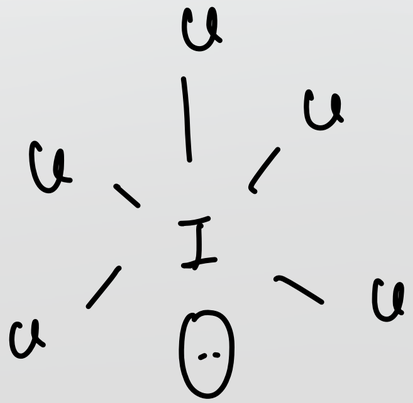
(a) ICl_5 is square pyramidal and ICl_4^- is tetrahedral

(b) ICl_5 is square pyramidal and ICl_4^- is square planar

(c) Both are isostructural

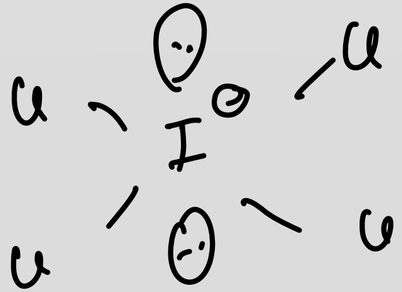
(d) ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral

① ICl_5 SN = 5+1 = 6 Hyb: sp^3d^2



Square pyramidal.

② $ICl_4^\ominus$ SN = 4+2 = 6 Hyb: sp^3d^2



Square planar.

(Q) Are the given species isostructural $[BN_2]^{3-}$ and CO_2.

Sol:

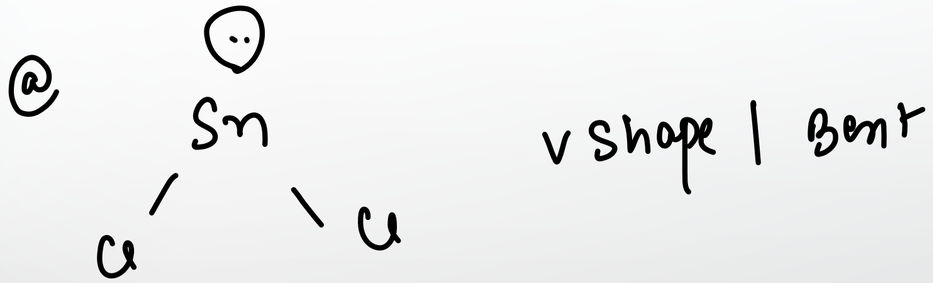
Linear

Linear.

Shape:

The linear structure assumed by JEE (1991, 1M)

(a) $SnCl_2$ (b) CS_2 (c) NO_2^+ (d) NCO^-



V shape / Bent

(b) $S = C = S$ linear.

(c) $O = \overset{+}{N} = O$ linear.

(d) $:O:^{\ominus} - C \equiv N$ linear.

Find hybridisation of underlined atom

(A) $CH_3\underline{C}H_2OH$

Alcohol.

(B) $CH_3-\underline{C}(=O)-OH$

Carboxylic acid.

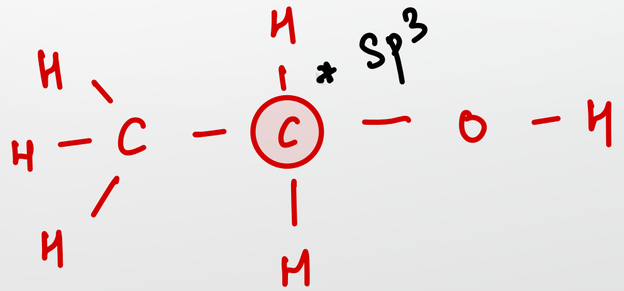
(C) $CH_3-\underline{C}H_2-CH_3$

Alkane.

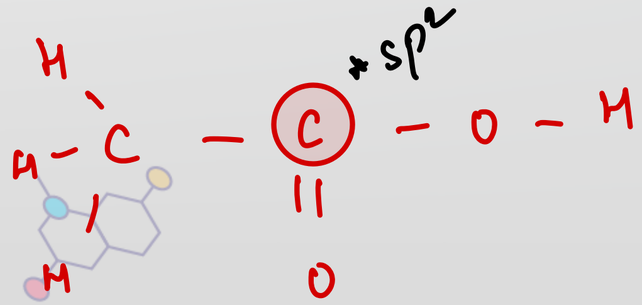
(D) $CH_3-\underline{C}(=O)-NH_2$

Amide

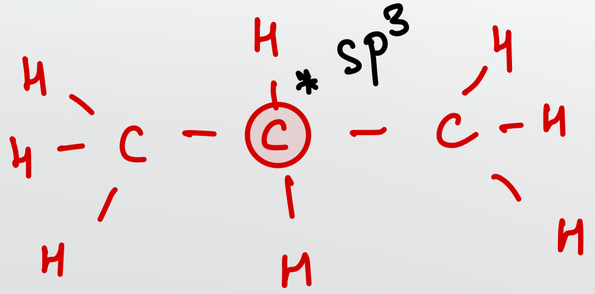
@



(b)



(c)



(d)