Hybridisation

121. (a) Acidic character increases when we come down a group, so *HI* is the strongest acid.

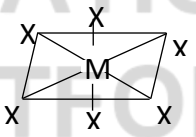
122. (c) SO_2 has sp^2 hybridization have the *V* shape structure $(< 120°)$ due to 2 lone pair of electron over *S* atom. CO_2 and N_2O have the *sp* hybridization.

123. (a) In H_2CO_3 and BF_3 central atom are in sp^2 hybridization but in H_2CO_3 due to the ionic character of $O-H$ bond it will be polar (High electronegativity of oxygen).

124. (a) Due to sp^3 hybridization and presence of lone pair of electron on *p* atom PCl_3 are of pyramidal shape like that of NH_3.

125. (b) There is *sp* hybridization in C_2H_2 so it has the linear structure.

126. (c) In octahedral molecule six hybrid orbitals directed towards the corner of a regular octahedron with a bond angle of 90°



according to this geometry, the number of $x-M-x$ bond at 180° must be three.

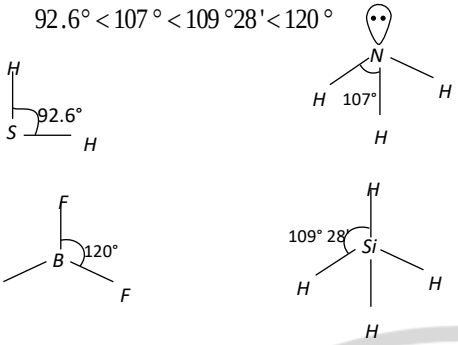
127. (d) sp^3d^2 hybrid orbital have octahedral shape

128. (c) In the formation of d^2sp^3 hybrid orbitals two $(n-1)d$ orbitals of *e.g.*, set [*i.e.*, $(n-1)dz^2$ and $(n-1)dx^2-y^2$ orbitals] one *ns* and three *np* [np_x, np_y and np_z] orbitals combine together and form six d^2sp^3 hybrid orbitals.

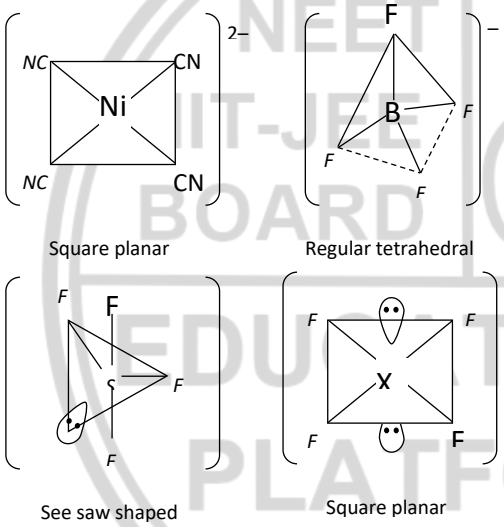
129. (c) The correct order of bond angle (Smallest first) is

$H_2S < NH_3 < SiH_4 < BF_3$

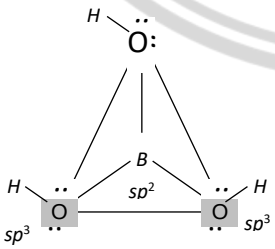
$92.6° < 107° < 109°28' < 120°$



130. (a)

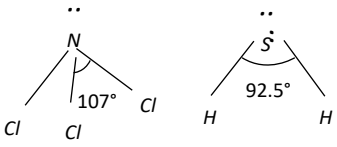


131. (b)



132. (b) In the formation of BF_3 molecule, one *s* and 2*p* orbital hybridise. Therefore it is sp^2 hybridization.

133. (e) In NCl_3 and H_2S the central atom of both (N and S) are in sp^3 hybridization state

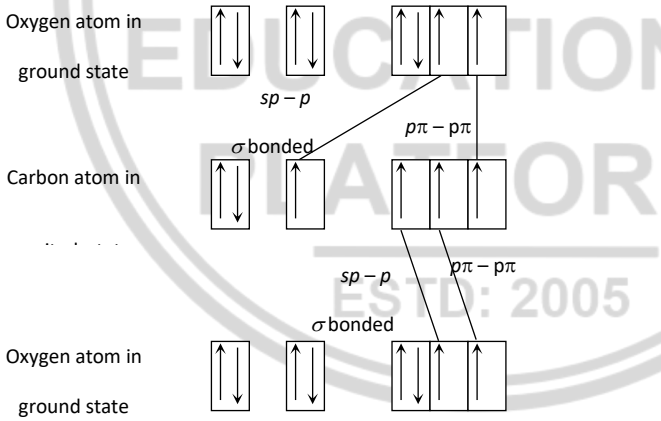


while in BF_3 and NCl_3 central atoms are in sp^2 and sp^3 hybridization respectively. In H_2S and $BeCl_2$ central atom are in sp^3 and sp^2 hybridization In BF_3, NCl_3 & H_2S central atom are in sp^2, sp^3 & sp^3 hybridization and in the central atom are in sp^3 and sp hybridization.

134. (c) $C_{\text{ground state}} = 2s^2, 2p_x^1 p_y^1$; $C_{\text{excited state}} = 2s^1, 2p_x^1 p_y^1 p_z^1$

$O_{\text{ground state}} = 2s^2, 2p_x^2 p_y^1 p_z^1$

In the formation of CO_2 molecule, hybridization of orbitals of carbon occur only to a limited extent involving only one s and one p orbitals there is thus sp hybridisation of valence shell orbitals of the carbon atom resulting in the formation of two sp hybrid orbitals.

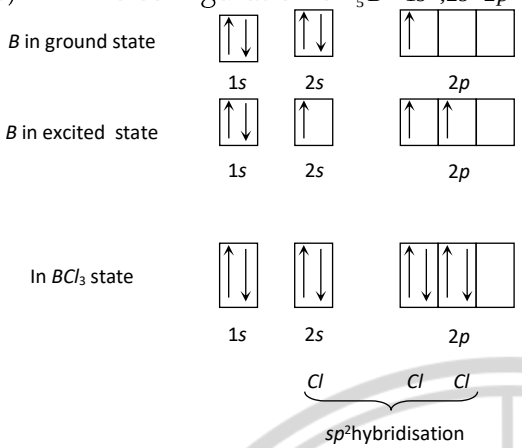


135. (d) In NH_3, N undergoes sp^3 hybridization. Due to the presence of one lone pair, it is pyramidal in shape.

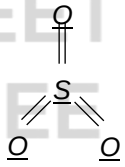
136. (b)

NO_2	SF_4	PF_6^-
sp	sp^3d	sp^3d^2

137. (b) The configuration of $_5B = 1s^2, 2s^2 2p^1$

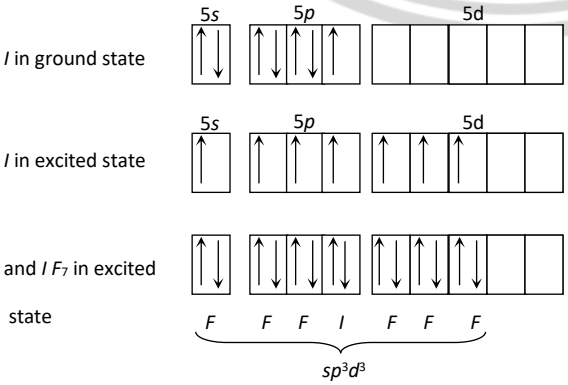


138. (d) In SO_3 molecule, S atom remains sp^2 hybrid, hence it has trigonal planar structure



139. (a) In PCl_3 molecule, phosphorous is sp^3 – hybridised but due to presence of lone pair of electron, it has pyramidal structure

140. (a) The electronic configuration of $I = [Xe]\,5s^2, 5p^5$ hence



IF_7 shows sp^3d^2 hybridization. So, its structure is pentagonal bipyramidal.