

SUN

Valence Shell Electron Pair Repulsion Theory (VSEPR) (Nyholm & Gillespie, 1957)

(i) If the central atom is surrounded by bond pairs of electrons only, the repulsions between them are similar. As a result the shape of the molecule is symmetrical and molecule is said to have a regular geometry.

(ii) If the central atom is surrounded by bond pairs as well as lone pairs of electrons, the repulsions between them are different. As a result, the molecule has an irregular or distorted geometry.

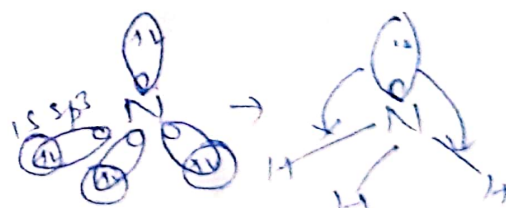
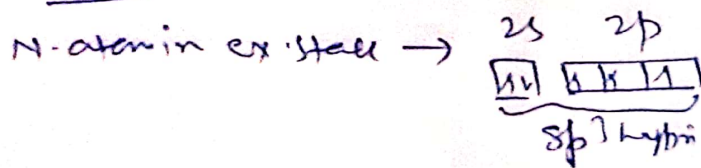
(iii) The order of repulsions between electron pairs is :-

Lone pair - Lone pair > Lone pair - Bond pair > Bond pair - B.P.

(iv) The exact shape of the molecule depends upon the total no. of electron pairs present round the central atom.

e.g. 1) NH_3 , H_2O , CH_3^- , $\text{CH}_3\text{-CH}_2^-$; R_3C^- --- etc.

In NH_3 :

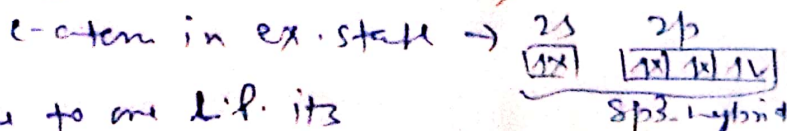


Structure - Tetrahedral shape \rightarrow Pyramidal
B.A $\approx 107^\circ$

In H_2O , due to two L.P.
its shape becomes angular \rightarrow
B.A $\approx 105^\circ$



In CH_3^- (methyl carbanion)



(x \rightarrow electron of H-atom)

due to one L.P. its shape becomes pyramidal

