HYBRIDIZATION

It is defined as the mixing two atomic orbitals with same energy level to give new hybrid orbitals. This process is called hybridization. The new orbital thus formed is known as hybrid orbitals.

Types of Hybridization

Based on the types of orbitals involving in mixing the hybridization can be classified as sp, sp^2, sp^3, sp^3d, sp^3d^2, sp^3d^3.

① sp Hybridization -

It is observed when one s and one p orbital in same shell mix to form new sp hybridized orbital.

It form linear molecules with an angle 180° (180)

Ex- $BeCl_2$, C_2H_2 etc

② Sp^2 Hybridization

It is observed when one s and two p Orbitals of same energy level Mix

together to form new sp^2 hybrid orbitals.

The shape of sp^2 hybrid orbital is Trigonal (symmetry) at angle 120°.

Ex- BF_3, C_2H_4.

Sp^3 Hybridization-

It is observed when one s and three p orbitals belonging to same ~~shell~~ shell, mixed together and form Sp^3 - (Hybrid orbitals)

The shape of an Sp^3 - Tetrahedron Metred at angle 109° 28'.

Ex- C_2H_6, CH_4

Sp^3d Hybridization -

It invdves the mixing of 1s, 3p and 1d orbital

The shape of sp^3d - Triagonal Bipyramidal at angle of 120°.

Ex- PCl_5

Shortcut To find Hybridization

Hybridization of any atom

= no. of atom attached + Lone pair of atom

Sum		Type	
2	→	sp	—
3	→	sp^2	— sp
4	→	sp^3	—
5	→	sp^3d	
6	→	sp^3d^2	

So on Type of Hybridization

Ex- ① CH_4

$= 4 + 0 = 4 = sp^3$

Shape - Tetrahedron

(2) NH_3

$= 3 + 1 = 4 = sp^3$

Tetrahedron

(3) H_2O

$= 2 + 2 = 4 = sp^3$

Tetrahedron

(4) XeF_4

$= 4 + 2 = 6 = sp^3d^2$

(5) $BeCl_2$

$= 2 + 0 = 2$ sp

Linear

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