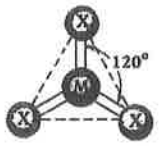
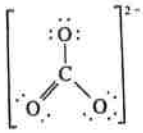
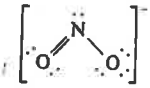
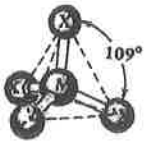
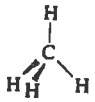
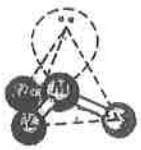
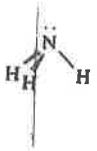
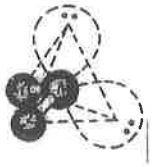
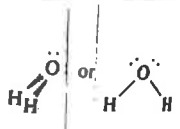
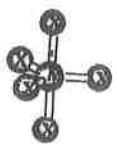
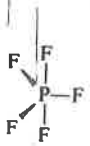
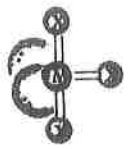
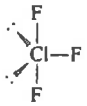
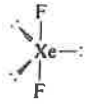
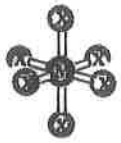
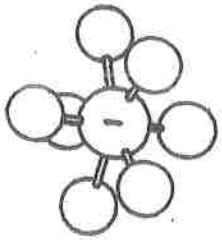
VSEPR – Molecular Shape – Hybridization

Molecular shape can be described according to the way s and p (and occasionally d) orbitals overlap. This termed hybridization. The type of hybridization of a central atom in a molecule is determined by distributing shared and unshared (lone pairs) of electrons as follows:

1. First pair goes to an "s" orbital.
2. Up to three additional pairs go to "p" orbitals (for a total of four)
3. The remaining pairs go to "d" orbitals.

The resulting hybridization determines the electron-pair geometry as follows:

Hybridization	Hybrid Orbital Shape	Shared/ Lone(unshared)	Molecular Geometry	Picture of Molecular Shape	Example
sp		2/0 (2)	Linear		
sp^2		3/0 (3)	Trigonal planar		
sp^2		2/1 (3)	Bent (V-shape)		
sp^3		4/0 (4)	Tetrahedral		
sp^3		3/1 (4)	Trigonal pyramidal		
sp^3		2/2 (4)	Bent (V-shape)		
sp^3d		5/0 (5)	Trigonal bipyramidal		
sp^3d		4/1 (5)	Irregular tetrahedron (See-Saw)		

sp^3d		3/2 (5)	T-shaped planar		
sp^3d		2/3 (5)	Linear		
sp^3d^2		6/0 (6)	Octahedral		
sp^3d^2		5/1 (6)	Square pyramidal		
sp^3d^2		4/2 (6)	Square planar		
sp^3d^3		7/0 (7)	Pentagonal bipyramid		
sp^3d^3		6/1 (7)	Pentagonal pyramidal (Irregular octahedron)