

## Valence Bond Theory

The important postulates are;

1. Covalent bonds are formed when two valence orbitals of two different atoms overlap on one another.
2. The electron density in the area between the two bonding atoms increases as a result of overlapping. This increases the stability of the molecule formed.
3. The paired electrons in the valence shell do not involve in bond formation.
4. When there is more than one unpaired electron in the valence shell of an atom, they form multiple bonds with other atoms.
5. Covalent bonds are directional in nature. They are parallel to the region corresponding to the atomic orbitals that overlapped.
6. Sigma bonds and pi bonds differ in the pattern that the atomic orbitals overlap.
7. Pi-bonds are formed from sidewise overlapping and sigma bonds result due to overlapping of orbitals along the axis.

## Molecular Orbital Theory

1. The atomic orbitals combine to form a new orbitals known as ***bonding molecular orbital(B.M.O)*** and ***antibonding molecular orbital(A.M.O)***. After this, the atomic orbitals lose their identity.
2. The no. of M.Os formed are equal to the no. of A.Os combined.
3. The molecular orbitals are the energy states of a molecule, in which the electrons of the molecule are filled just like in case of atomic orbitals. The filling of M.Os takes place by same rules like Aufbau, Pauli exclusion and Hund's rule.
4. A M.O is electron probability distribution around a group of nuclei involved in bonding.
5. A.Os with comparable energy and orientations combine to form M.Os.
6. The B.M.O has lower energy and hence greater stability than the corresponding A.M.O.
7. The B.M.Os are represented as  $\sigma, \pi, \delta$  etc. while antibonding M.Os are represented by  $\sigma^*, \pi^*, \delta^*$  etc.
8. The shapes of molecular orbitals depend upon the type of combining atomic orbitals.