

UNIT 4

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Dipole moment:

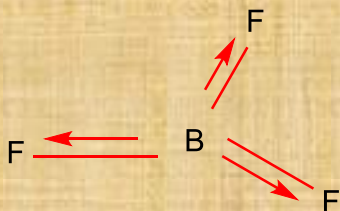
The product of magnitude of charge and distance between charges is known as Dipole moment.

Dipole moment (μ) = Charge (q) x Distance (l)

- μ is usually expressed in debye units.

$$1D = 3.3 \times 10^{-30} \text{ cm}$$

- Dipole moment of polyatomic molecules also depends on spatial orientation of various bonds.
- The net dipole moment is vector sum of various bonds.
- For symmetric molecules dipole moments will be zero as dipole moments of various bonds cancel up each other.



Hydrogen bonding:

The bond between hydrogen attached to more electronegative atom and other electronegative atom is known as H – bond.

- Magnitude of H – bond depends on polarity of molecule and physical state of compound.

Types of Hydrogen bond:

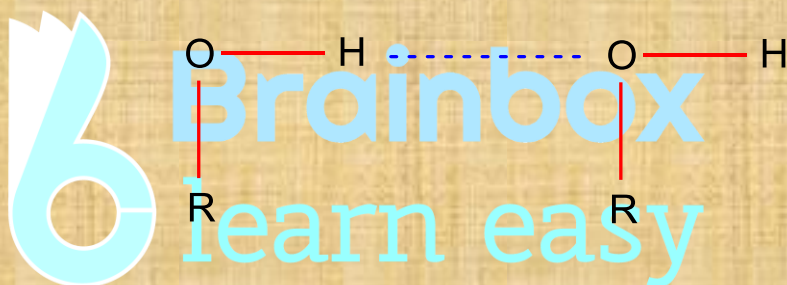
Hydrogen bond is of two types.

Inter molecular hydrogen bonding and

Intra molecular hydrogen bonding

- The hydrogen bond between two different molecules is known as Inter molecular hydrogen bond.

Ex. Alcohol ($R - OH$)



- The hydrogen bond within the same molecule is known as intra molecular hydrogen bonding.

O – Nitro phenol

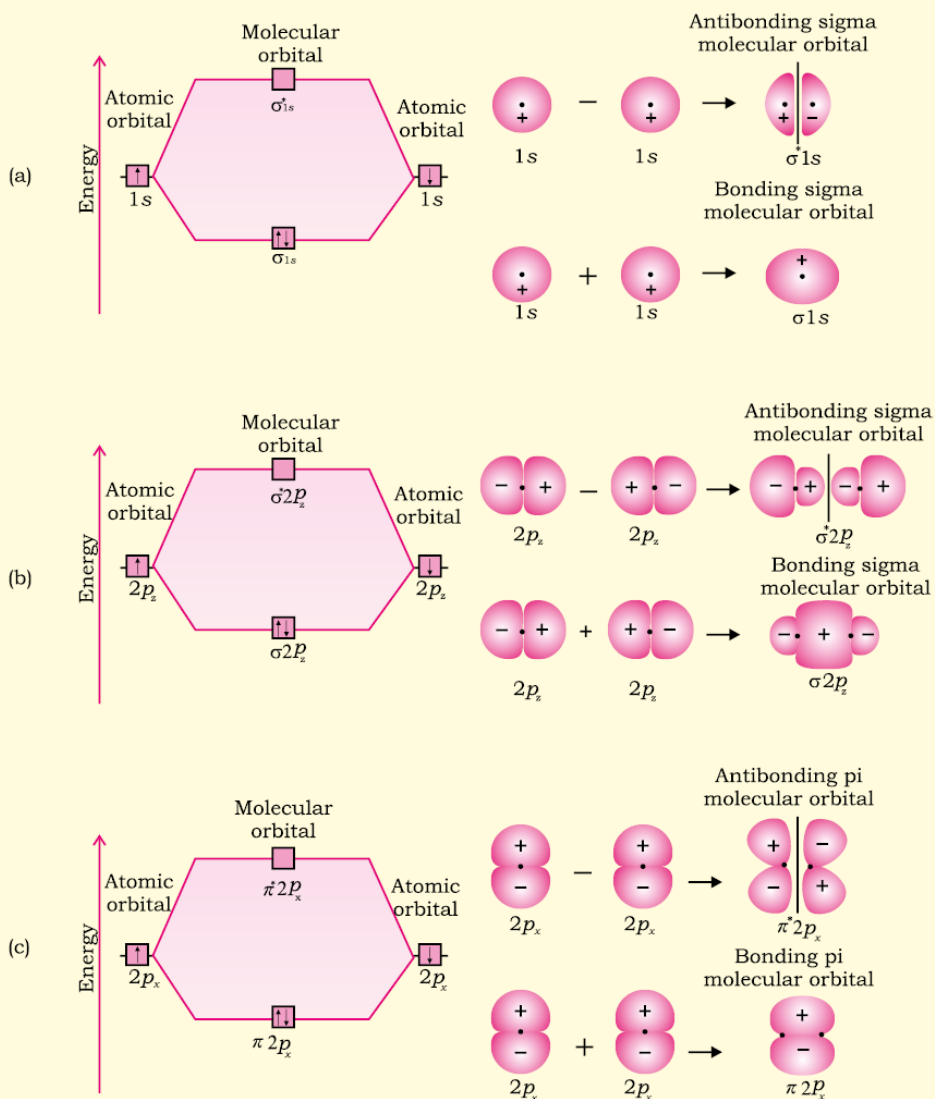


Fig. Contours and energies of bonding and antibonding molecular orbitals formed through combinations of (a) $1s$ atomic orbitals; (b) $2p_z$ atomic orbitals and (c) $2p_x$ atomic orbitals.