

UNIT 4

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Ionic bond and Lattice enthalpy:

- Formation of ionic compound depends upon ease of formation of cation and anion from respective neutral atom.
- An element with low ionisation enthalpy forms cation easily.
- An element with more negative electron gain enthalpy forms easily.
- A qualitative measure of the stability of an ionic compound is provided by its lattice enthalpy.

Lattice enthalpy:

The energy required to completely separate one mole of solid ionic compound into gaseous constituent ions.

Ex. 788 KJ is the energy required to separate one mole of $\text{Na}^+_{(s)}$ and one mole of $\text{Cl}^-_{(g)}$ to an infinite distance.

Bond parameters:

Bond length:

The equilibrium distance between the nuclei of two bonded atoms in a molecule.

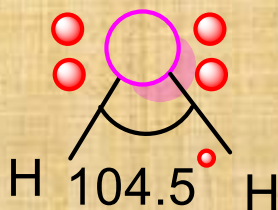
Half of bond length is considered as atomic radius.

Atomic radius can be covalent radius, metallic radius or Vander Waal's radius.

Bond angle:

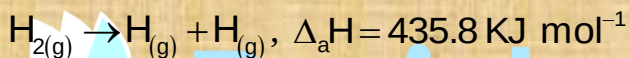
The angle between the orbitals containing bonding electron pairs around the central atom in a molecule.

Ex. In H_2O molecule

**Bond enthalpy:**

The amount of energy required to break one mole of bonds, in given molecule.

Ex. In H_2 molecule



In polyatomic molecule, the term average bond enthalpy is used.

Ex. In H_2O molecule average bond enthalpy is $464.5 \text{ KJ mol}^{-1}$.

Bond order:

No of bond present between two atoms in a given molecule.

Ex. Bond order in H_2 is 1.

Isoelectronic molecules (or) ions have same bond order.