

Properties of ionic Compounds

i) Crystalline nature → Ionic Compounds are usually crystalline in nature. X-ray diffraction patterns have proved that the constituent units in a crystal are ions and not molecules. These ions are arranged together in a regular ~~molecules~~ way in a lattice. The attraction between ions is electrostatic and non-directional. For example in a crystal of Sodium chloride, every ion is surrounded by six evenly-spaced Chloride ions and every chloride ion by six evenly spaced Sodium ions in a regular fashion. This arrangement extends through out the crystal lattice resulting in strong electrostatic forces through out the crystal.

ii) Melting and boiling point → Ionic Compound possess high M.pt. and B.pt. Their relative high M.pt. & B.pt. are due to electrostatic forces of attraction and considerable amount of energy is needed to break up their crystal lattice. The closer the ions in a crystal, stronger will be the electrostatic attraction forces and consequently higher will be the Melting and Boiling points.

iii) Low volatility → The Strong electrostatic forces existing in ionic solid also explain their low volatility.

iv) Conductance of Current in ionic Solid State →

Ionic solids don't conduct electricity in solid state. The ionic solids consists of ions. There are no neutral molecules. However they do not conduct electricity or low conductance of electricity in solid state. The reason is that the anions and cations, on account of electrostatic forces remain intact occupying fixed position in the crystal lattice. The ions therefore are unable to move to any large extent when an electric field is applied. Hence no current or a little current flows.

v) Conductance of current in molten state or in solution → When ionic compounds are melted or dissolved in a solvent of high dielectric constant the binding forces in the crystal lattice disappear and the component ions becomes mobile. As the ions are charged, they are attracted towards the electrodes and thus acts as carrier of electric current. It means that ionic solids are able to conduct electricity in the molten state or in solution.

vi) Solubility → Ionic compounds are quite soluble in solvents of high dielectric constant and of polar nature. It is

because the high dielectric constant of the solvent lowers the attractive forces between the ions of the lattice. Also, because of the polar nature the solvent interacts highly with the ions and the energy of solvent is sufficient to overcome the attractive forces between the ions. Non-polar solvents like benzene, Carbon tetrachloride etc. which have low dielectric constant, do not solvate the ions. Hence ionic compounds are soluble in polar solvents but insoluble in non-polar solvents.

vii) Ionic reactions → Chemical reactions of an ionic compound are the reactions of its constituent ions. These are usually rapid.

