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Ionic bond :→

An ionic bond is formed by the transfer of electron from one atom to the other. Hence this process will be facilitated when one of the constituent atom has smaller ionisation potential, so that the electron could be removed from the outermost orbit. And the second atom should have a high value of electron affinity so that it could easily accept the electron released by the other atom.

General characteristics of ionic compounds :→

Following are the characteristics of ionic compounds.

(I) Melting and boiling Point :→

Melting and boiling Points are depends on the nature of binding forces in the crystalline solid. Melting involves breaking of the crystal lattice. Since electrostatic interaction between positive and negative ions in the crystal are generaly strong, therefore their breakdown requires higher energy and hence the ionic compounds have higher melting and boiling Points. Significant variations in melting and boiling Points within ionic compounds are attributed primarily to (i) charge on the ions (ii) ionic radii

Greater the charge on ions, greater is the melting Point. Larger the size of ions weaker is the attractive forces and lower would be the melting Point.

(II) Hardness :→ The electrostatic interaction between oppositely charged ions determines hardness of an ionic compound.

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for a given ionic charge, hardness increases with increase in interionic distance for crystals with similar structure. Alkaline earth metal oxides have similar NaCl type structure but their interionic distance increases moving down the group. Consequently their hardness decreases down the group. In short, more compact the structure, harder is the substance. Hardness increases with increase in the charge on the ions for crystal with similar interionic distances for ionic compounds having similar structure.

(iii) **Brittleness:→**

It may be observed that if requisite energy is supplied to the crystal layers, the movement of layers of ions brings ions of like charges near each other and this causes strong repulsions which lead to breakdown of the crystal. For this reason ionic crystals, in spite of their hardness, are brittle and can be powdered easily.

(iv) **Cleavage:→**

The phenomenon of cleavage is observed in ionic crystals. That is in the crystals the splitting of layers is easier in some directions than others. In a crystal of NaCl, cleavage can be achieved only along planes parallel to cube faces.

(v) **Solubility:→**

Ionic compounds are soluble in highly polar solvents. Water is a good solvent for dissolving ionic compounds because

(a) It has a larger dipole moment which provides high hydration energy due to strong ion solvent dipole interactions. If hydration energy is greater than the crystal energy, the lattice breaks

(b) It has high dielectric constant which is responsible for reducing attractive force between cations and anions in solutions. This keeps the unlike charges apart from each other. Suitable solvents for dissolving ionic compounds should have high dipole moment and high dielectric constant.

(vi) In ionic crystal, the ions are situated in fixed positions in the lattice, that is, they are not mobile. Therefore, ionic solid do not conduct electricity in the solid state. However in molten state these ions are free to move about and conduct electricity.