

Unit

1

The Solid State

Non-Stoichiometric and Impurity defects:

Non-Stoichiometric defects:

The defects, which alters composition & disturb stoichiometry of crystal.

Metal excess defect:

It may be arised due to,

(i) **Anionic vacancies:** The particles from anionic sites are occupied by electrons maintaining neutrality.

- The anionic sites occupied by free electrons are called F – centres.

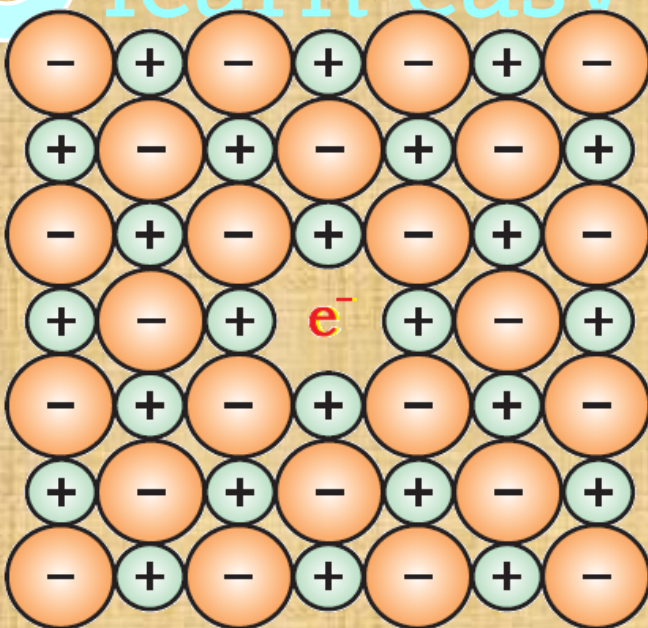


Fig. An F-centre in a crystal

- F – centres are colours in ionic crystals.

Ex. Excess of Li in LiCl makes it pink.

(ii) Extra cations occupying interstitial sites. Metal kernels & electrons occupy neighbouring sites to maintain electrical neutrality.

Ex. ZnO on heating give metal excess effect due to extra cation occupying interstitial sites.

Metal deficiency defect:

This is shown by metallic compounds in which metal is polyvalent metal kernels occupy lattice sites leaving some vacant sites.

Ex. In FeO, some positions of Fe^{+2} occupied by Fe^{+3} ions, by balancing charge giving a composition ranging from $\text{Fe}_{0.93}\text{O}$ to $\text{Fe}_{0.96}\text{O}$.

Impurity defects:

If ionic crystals are added with some impurities by balancing charges it is called Impurity defect.

Ex. Molten NaCl with little amount of SrCl_2 .

Impurity defect increases conducting properties of solids.