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Page No. ____
Date | | | |

Deg II Chem. Hons, Paper III & Deg II Sub

Topic :- Coordination compound

Molecular or addition compounds are stable only in solid state. They donot retain their identity when brought into the solution. They dissociate into cation and anion.

$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$ (Potash alum) is a double salt or addition compound because in solution it dissociates into K^+, Al^{+++}, SO_4^{--}.

Such molecular or addition compounds which retain their identity even in solution and the properties of which are different from those of their constituents are called Co-ordination compound or Complex Compound.

When solution of $Fe(CN)_2$ is mixed with KCN solution, Potassium ferrocyanide $K_4[Fe(CN)_6]$ is formed which in aqueous solution does not give test for Fe^{++} and CN^- ions but gives the test of

ferrocyanide ion $[Fe(CN)_6]^{4-}$ and K^+.

$$K_4[Fe(CN)_6] \rightleftharpoons 4K^+ + [Fe(CN)_6]^{4-}$$

In the Co-ordination compound, individual compound KCN and $Fe(CN)_2$ lose their identity, A Complex Compound Contain a simple Cation and a Complex anion or a Complex Cation and a simple anion

$$K_2[PtCl_6] \rightleftharpoons 2K^+ + [PtCl_6]^{--}$$

Complex anion

$$[Pt(NH_3)_4Br_2]Br_2 \rightleftharpoons 2Br^- + [Pt(NH_4)_2Br_2]^{++}$$

Complex Cation

$$[Co(NH_3)_6]Cl_3 \rightleftharpoons 3Cl^- + [Co(NH_3)_6]^{+++}$$

complex Cation

Tetramine cupric sulphate when dissolved in water does not give the test of Cu^{++} ion but instead gives $[Cu(NH_3)_4]^{++}$ ion

$$[Cu(NH_3)_4]SO_4 \rightleftharpoons [Cu(NH_3)_4]^{++} + SO_4^{--}$$

Complex Cation.

Complex ion is an electrically charged radical which is formed by the union of a metal cation with one or more neutral molecules or anions.

Ligands :—

The neutral molecules or ions generally anions which are attached with a central metal ion are called ligands.

Ions or molecules which are capable of donating a pair of electrons to the central metal ion is called a co-ordinating groups or ligands.

In ligand the particular atom which actually donates the electron pair is called the donor atom. For example in Potassium ferrocyanide complex the six CN^- ion are ligands and nitrogen in CN^- is the donor atom