Co-ordination Compounds

Degree-II (H) ,Paper-III ,Group-B

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Double Salts and Complex Salts

* Addition compounds are formed when stoichiometric amounts of two or more stable compounds join togethes.

For example :

$$KCl + MgCl_2 + 6H_2O \longrightarrow KCl \cdot MgCl_2 \cdot 6H_2O$$

Carnallite

$$K_2SO_4 + Al_2(SO_4)_3 + 24\,H_2O \longrightarrow$$

$$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24\,H_2O$$

Pot. alum

$$CuSO_4 + 4\,NH_3 + H_2O \longrightarrow CuSO_4 \cdot 4\,NH_3 \cdot H_2O$$

(Revision Notes)

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Addition Compounds are of two types :-

1. Those which lose their identity in solution : (Double salts)
2. Those which retain their identity in solution : (Complex salts)

Double Salts

* Double salts are those addition compounds which exists only in crystal lattice but lose their identity in solution. Double salts ionise when dissolved in water.

e.g. $KCl \cdot MgCl_2 \cdot 6H_2O \longrightarrow K^+ + Mg^{2+} + 3Cl^- + 6H_2O$

(Carnallite)

$FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O \longrightarrow Fe^{2+} + 2SO_4^{2-} + 2NH_4^+ + 6H_2O$

(Mohr's Salt)

$KeSO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O \longrightarrow 2K^+ + 2Al^{3+} + 4SO_4^{2-} + 24H_2O.$

(Potash allum)

Complex Salts

* Complex salts are those addition compounds which retain their identity in solid / crystal lattice as well as in the solution.

e.g. Potassium ferrocyanide is a complex compound which is formed by adding KCN to a saturated solution of ferrous cyanide.

$$4KCN + Fe(CN)_2 \longrightarrow K_4[Fe(CN)_6]$$

* $K_4[Fe(CN)_6]$ is dissolved in water, the resulting solution does not give positive tests for ferrous or cyanide ions but we get a positive test for $[Fe(CN)_6]^{4-}$.

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

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