Preparation and Application of coordination compounds.

(1) **Preparation :** Coordination compounds are generally prepared by the application of the following methods,

(i) ***Ligand substitution reaction* :** A reaction involving the replacement of the ligands attached to the central metal ion in the complex by other ligands is called a ligand substitution reaction.

$$\underset{\text{Light blue}}{[Cu(H_2O)_4]^{2+}(aq)} + 3NH_{3(aq))} \rightarrow \underset{\text{Deep blue}}{[Cu(NH_3)_4]^{2+}(aq)} + 4H_2O(l)$$

(ii) ***Direct mixing of reagent* :** $PtCl_2 + 2H_2N - \underset{(en)}{CH_2 - CH_2} - NH_2 \rightarrow \underset{\substack{\text{(Dichloro bis}\\\text{(ethylene diam mine platinum (II)}}}{[Pt(en)_2Cl_2]}$

(iii) ***Redox reactions* :**In these reactions, either oxidation or reduction is involved

$$2CO(NO_3)_2 + 8NH_3 + 2NH_4NO_3 + H_2O_2 \underset{\text{Penta ammine nitrocobalt (II)nitrate.}}{2[CO(NH_3)NO_2](NO_3)_2} + 2H_2O$$

Application

(1) Estimation of hardness in water, as Ca^{++} and Mg^{2+} ions form complexes with EDTA.

(2) Animal and plant world e.g. chlorophyll is a complex of Mg^{2+} and haemoglobin is a complex of Fe^{2+} vitamin B_{12} is a complex of Co^{2+}.

(3) Electroplating of metals involves the use of complex salt as electrolytes e.g. $K[Ag(CN)_2]$ in silver plating.

(4) Extraction of metals *e.g. Ag* and *Au* are extracted from ores by dissolving in *NaCN* to form complexes.

(5) Estimation and detection of metal ions e.g. Ni^{2+} ion is estimated using dimethyl glyoxime.

(6) Medicines e.g. cis-platin*i.e.* cis $[PtCl_2(NH_3)_2]$ is used in treatment of cancer.