Co-ordination Compounds 1.

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

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WERNER'S THEORY

In 1893 Werner produced a theory of coordination compounds to explain the structures and formation of compounds.

Werner was the first inorganic chemist to be awarded the Nobel Prize for Chemistry in 1913.

Werner postulated that metals exhibits two types of valencies:

① Primary valency

② Secondary valency

* The primary valency is ionizable and non-directional The primary valency must be satisfied only by negative ions as in simple salts such as $CoCl_3$.

In modern terms, the number of primary valencies corresponds to the number of charges on the central metal atom.

The complex $[Co(NH_3)_6]Cl_3$ actually exists as $[Co(NH_3)_6]^{3+}$ and $3Cl^-$. Thus the primary valency is three.

The anions satisfying the primary valency do not give any geometry to the complex compound.

Secondary valency is non-ionizable and directional.

In modern terms, the number of secondary valencies equals the number of ligand atoms coordinated to the metal.

This is now called the coordination number.

The secondary or auxiliary valencies of metal are satisfied either by negative ions or neutral molecules or both.

In the structure of coordination compounds, the metal cation and the species satisfying secondary valencies are placed inside the coordination sphere.

* The species satisfying secondary valencies are not Obtained in aqueous solution in free state instead a complex ion is obtained.

* Secondary valency gives definite geometry to the complex.

* The anions which satisfy only primary valency are written out side the coordination sphere.

* The anion which satisfy primary as well as secondary valency are placed inside coordination sphere.