

Elective Paper IV (Group A)

Organometalls in organic synthesis & Coordination Chemistry

60 Hrs.

1. Organometallic Reagents

24 Hrs.

- Principle, preparations, properties and applications of the following in organic synthesis with mechanistic details.
- Group I and II metal organic compounds
Li, Mg, Hg, Cd and Zn compounds.
- Transition metals
Cu, Pd, Ni, Fe, Co and Rh compounds.
- Other elements
S, Si, B and Te compounds.

2. Symmetry operations of the molecular point groups (O_h , T_d & D_{4h}).

4 Hrs.

Point groups of following stoichiometries in coordination compounds:

- MA_6 , MA_5B , Cis- & trans- MA_4B_2 , fac- & Mer- MA_2B_3
- MA_4 , MA_3B & MA_2B_2
- MA_4 , MA_3B , MA_2B_2 & MABCD

3. Russel Saunder's states, Hund's rules ground state energy terms,

6 Hrs.

Interelectron repulsion parameter, variation of Racah B & C parameter in different transition series, spin orbit coupling parameters. Spectrochemical series and effect of covalency, Nephelauxetic series.

4. Temperature independent paramagnetic (TIP) behaviour.

6 Hrs.

Quenching of orbital angular momentum by ligand fields. The magnetic properties of A, E and T terms. Electron delocalization and the magnetic properties of complexes with A, E and T ground terms. Application of magnetic measurements to structure determination of transition and non-transition metal complexes.

5. Classification and nomenclature of macrocycles.

8 Hrs.

Type of macrocyclic ligands-design synthesis by coordination template effect. Synthesis and characterization of complexes of macrocyclic polyamines and polyether. Applications of macrocyclic complexes.

6. 4 Hrs.

Transition metal complexes with molecular nitrogen and molecular oxygen. Synthesis, important reactions and bonding.

7. Photochemical Reactions

8 Hrs.

Basics of photochemistry: Absorption, excitation, Frank-Condon principle, Energy dissipation by radiative and non-radiative processes, quantum yield.

- Photosubstitution and photoaquation reactions in chromium(III) complexes.
- Photosubstitution and photoredox reactions in cobalt(III) complexes.
- Ligand photoreactions.