



CO-ORDINATION CHEMISTRY (CHEMISTRY OF TRANSITION ELEMENTS)

PROF. DEBASHIS RAY

Department of Chemistry
IIT Kharagpur

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)

EXAM DATE : April 24, 2022

PRE-REQUISITES : Basic Inorganic Chemistry

INTENDED AUDIENCE : B.Sc., M.Sc., B.Pharm., M. Pharm., B.Sc. (biotech)

INDUSTRIES APPLICABLE TO : Indian Rare Earths Ltd., NTPC, ONGC, SAIL, CIL, MECL, Hind Zinc, Hind Copper, BASF, Tata Chemicals

COURSE OUTLINE :

It will give an excellent opportunity to study and use the century old Nobel prize winning knowledge of coordination chemistry. The study will also lead to understand the difference between a coordinated ligand and charge balancing ion in a coordination compound. Complexation reactions, stability constants, structures, geometrical and optical isomerism, bonding, reactions and reactivity will be discussed. Color and electronic, and magnetic properties will be delineated with respect to their application in analytical chemistry, industry and medicine. Use of coordination compounds of some precious metal ions will be explained in relation to homogeneous catalysis for the production of useful organic and pharmaceutically important substances.

ABOUT INSTRUCTOR :

Prof. Debashis Ray is an M. Sc. (Gold Medalist) from Burdwan University in 1985 and did his Ph. D. from IACS (degree from Jadavpur University) in 1989 and in faculty roll of IIT Kharagpur from 1990. Specialization: Inorganic Chemistry, Coordination Chemistry, Bioinorganic Chemistry, Analytical Chemistry. Received INSA YS Medal in 1994 and CRSI Bronze Medal in 2007. PHE Dept.

COURSE PLAN :

Week 1: Introduction - Definitions and Classification of Ligands

Week 2: Nomenclature

Week 3: Coordination Number and Stereochemistry

Week 4: Structures, Symmetries Isomerism and Coordination Equilibria

Week 5: Bonding in Complexes

Week 6: Jahn-Teller Effect and Spin Crossover

Week 7: Colors and Optical Spectra

Week 8: Orgel and Tanabe Sugano Diagrams

Week 9: Applications of CFT and Spinels

Week 10: Magnetochemistry

Week 11: Ligand Field Theory – Sigma and Pi Orbitals

Week 12: Reactions, Reactivity and Biological Inorganic Chemistry Structures, Symmetries Isomerism and Coordination Equilibria