

SYLLABUS :-

Prerequisites: None

Course Contents

Theory Component: Thermodynamics of Chemical Processes: Concept of entropy, Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibria, Maxwell relations, Real gas and real solution.

Electrochemical Systems: Electrochemical cells and EMF, Applications of EMF measurements: Thermodynamic data, activity coefficients, solubility product and pH, corrosion.

Kinetics of Chemical Reactions: Reversible, consecutive and parallel reactions, Steady state approximation, Chain reactions, Photochemical kinetics.

Bonding Models in Inorganic Chemistry: Molecular orbital theory, Valence-bond theory, Crystal field theory.

Fundamentals of Microwave, IR and UV-VIS Spectroscopy: Basic concepts of spectroscopy, Selection rule, Determination of molecular structure.

Coordination Chemistry: Coordination numbers, Chelate effect, Coordination complexes and application, Bio-inorganic chemistry: Metal ions in Biological systems, environmental aspects of Metals, NO_x, CO, CO₂.

Organic Reaction Mechanism: Mechanisms of selected organic, bio-organic, polymerization and catalytic reactions.

Stereochemistry of Carbon Compounds: Selected Organic Compounds: Natural products and Biomolecules (Amino acids/nucleic acids/proteins).

Laboratory Component: Suggested Experiments :

- 1.Surface tension and parachor
- 2.Measurement of the coefficient of viscosity : CMC of a surfactant
- 3.Conductometric titration
- 4.pH-metric/potentiometric titration
- 5.Solubility product
- 6.Kinetics of ester hydrolysis
- 7.Estimation of Fe²⁺
- 8.EDTA titration
- 9.Estimation of base content and acid content of commercially available antacid and vitamin C respectively
- 10.Synthesis of Mohr's salt
- 11.Synthesis of aspirin
- 12.Demonstration of a few important physico-chemical processes. (e.g. Gel electrophoresis, Oscillatory reactions)