

Chemical kinematics and catalysis: Introduction to rate equation and reaction order, reaction mechanism, relation between rate equation and reaction mechanism, First order & Second order. Dependence of temperature on reaction rates. Arrhenius theory, collision theory, Transition – state theory, Physical adsorption, chemisorption, Freundlich's expression, Langmuir adsorption isotherm, Heterogeneous catalysis, examples of heterogeneously catalysed reactions.

Features of Coordination Chemistry & Organic Reaction Mechanism: Coordination chemistry, coordination number, chelate effect, coordination complexes and their applications. Electrophilic substitution reactions in aromatic systems. Some Name reactions viz. Hoffman's rearrangement, Beckman's reaction, Riemer-Tiemann reaction, Skraup synthesis, etc.

Thermodynamics and electrochemical Phenomenon: Heat, work and energy, reversible and irreversible processes, work done in an isothermal reversible expansion of ideal gas. Enthalpy. Entropy. Electrochemical and galvanic series, polarization, decomposition potential, over voltage. Theories of corrosion. Differential aeration theory. Factors influencing corrosion. Types of corrosion Control of corrosion: Design and material selection, anodic and cathodic protection, protective coatings, corrosion inhibitors. Fuel Cells.

Analytical aspects of water: Sources, conservation of water, impurities in water and their effects. WHO guideline and BIS guideline for drinking water. Chemistry involved in sedimentation, coagulation and sterilization. Softening of water, lime-soda, ion-exchange process and numerical problem. Boiler troubles, causes and effects, methods of prevention.

Engineering Materials: Glass, ceramics, refractory, composites, magnetic materials, Polymers & structure property relationship. Thermoplastic & thermosetting plastics. Preparation, properties & applications of some commodity and engineering polymers. Conducting polymers.

Interaction of radiation with matter: Molecular spectroscopy, vibrational, rotational, absorption, emission and light scattering phenomenon.

Text / References

Dara, S.S.; A Text Book of Engineering Chemistry (Tenth edition); S. Chand, 2003.

Kuriacose, J.C., Rajaram, J.; Chemistry in Engineering and Technology (Vol. 1&2); McGraw Hill, 1984.

Barrow, M. Gordon; Physical Chemistry (Fifth edition); McGraw-Hill, 1992.

March, Jerry.; Advance Organic Chemistry Reaction Mechanism and Structure (Fourth edition); John Wiley & Sons New York, 2004.

W. Kemp; Organic spectroscopy (III Edition) PALGRAVE, 2002.

Puri B.R., Sharma L.R., Pathania M.S; Principles of Physical Chemistry; Vishal Publishing Co. (42nd Edition)

- **Water and waste water analysis:** Determination of Hardness , Alkalinity, Dissolved oxygen, Free chlorine , Chlorides, fluorides and COD
- **Determination of capacity of Ion exchange resins**
- **Studies of adsorption of acetic acid on activated charcoal**
- **Calorific value determination by Bomb Calorimeter**
- **Spectrophotometry:** Beer-Lambert's law verification and determination of strength of unknown solution.

Text / References:

Dara, S.S.; A text book on Experiments and Calculations in Engineering Chemistry (ninth edition); S. Chand, 2003.

Rani, S.; Laboratory Manual on Engineering Chemistry; Dhanpat Rai, 1998.