

Paper – I CHN-601(P) Physical Chemistry

Unit :- 1

☀ Photo chemistry – 1

- Einstein law, quantum yield (numerical), Types of Photochemical reaction. Classification of photo chemical reactions.
- Rate constants and life times of reactive energy states.
- Determination of rate constants of reactions.
- Effect of light intensity on the rate of photochemical reactions.
- Photofragmentation or a photodissociation., Isomerisation and other rearrangement reactions, Photoreduction and related reactions.
- Photoreduction of dyes by two electron transfer process.
- Photooxidation and photooxygenation.,

Unit :- 2

☀ Adsorption

- Chemical & Physical adsorption, surface tension, Adsorption Isotherms, Freundlich, Langmuir and BET adsorption equation,
- Adsorption from solution, Gibb's adsorption isotherm, methods for determination of surface area, thermodynamic of adsorption isotherm.
- Insoluble films, types of films and their advantages. Heat of adsorption and experimental determination of heat of adsorption.
- Detergency and Adsorption, Adsorption theory and Homogeneous/Heterogeneous catalysis.

Unit :- 3

☀ Solid state chemistry :

- Type of solids, Difference between crystalline solid and Amorphous solid, Factors affecting the shape of growing crystal, Techniques of single crystal growth.
- Close packing, perfect and imperfect crystals, intrinsic and extrinsic defects, point defects, line and plane defects. Thermodynamics of Schottky and Frenkel defect formation.
- Metals, insulators semiconductors, Band theory, free electron theory of metals, Zone theory of solids. BCS theory of superconductors, Meissner's effect Superconductors of type I and II.
- Solid state reactions : General principles, experimental procedures, co-precipitation as a precursor to solid state reaction, kinetics of solid state reaction.

Unit :- 4

☀ Spectroscopy

- Infrared Spectroscopy :- Instrumentation, Calculation of Vibrational frequencies and Interpretation of IR spectra.
- Proton Nuclear magnetic resonance spectroscopy (^1H NMR): Theory of ^1H NMR, ^1H NMR spectrum, chemical shift, signal intensities, spin-spin coupling, complex ^1H NMR spectra and spin – spin splitting.
- ^{13}C NMR : ^{13}C NMR spectrum, operating frequency, ^{13}C – H coupling DEPT ^{13}C spectra, ^{13}C – C correlation.
- UV – Visible chiroptical spectroscopy : Linearly and Circularly polarized light, optical rotatory dispersion (ORD) and circular dichroism (CD), chiroptical properties, octant rule, Application of ORD – CD.