

M.Sc. SEMESTER-III

Physical Chemistry

CHNN-601(P)

Paper-I

Unit-1 Photo Chemistry

25% (15 Hours)

Basics: Einstein law, laws of Photochemistry (Grothus law, -Draper law, Bunsen-roscoe's, law of photochemical equivalence, Plotnikov law), quantum yield, Deviation from photochemical equivalence, (Reasons of high and low yield), experimental methods for determination of quantum yield , factors affecting quantum yield.

Photochemical kinetics: Rate constants of reactive energy states, life times of reactive energy states, seat of photochemical reactions, Determination of rate constants of reactions, effect of light intensity on the rate of photochemical reaction, photo reaction which do not involve chain reaction and reactions which involve chain reaction.

Photochemical reaction: types and classification of photo chemical reaction, photooxidation, photo oxygenation, photo fragmentation, photo dissociation, photo isomerisation and photo reduction,

Environmental photochemistry: photo dissociation of oxygen, photo oxidation of proteins, formation of smog, thermo luminescence, phonophoresis, photochemical inhibition, photo reduction of dyes by two electron transfer process.

Unit 2: Adsorption

25% (15 Hours)

Isotherm: Chemical & physical adsorption isotherm, Freundlich, Langmuir and BET adsorption equation, Gibb's adsorption isotherm, Temkin adsorption isotherm.

Experimental Adsorption Measurements: methods for surface area, Measurement of adsorption isotherm (Experimental), determination Enthalpy and heat of adsorption

Films: Structure of surface films, Status of monomolecular surface films and their advantage, Types of insoluble films, Gaseous films and continues film.

Application: Detergency and Adsorption and Homogeneous/ Heterogeneous catalysis, Adsorption and indicators, adsorption and Water (softening, deionization, electrical demineralization).

Unit: 3 Solid state chemistry**25% (15 Hours)**

Solid: Type of solids, Difference between crystalline solid and Amorphous solid, close packing perfect and imperfect crystals, intrinsic and extrinsic defects, point defects, line and plane defects. Schottky and Frenkel defects, consequences of stoichiometric defects,

Crystal Growth: Factors affecting the shape of growing crystal, crystal growth and Techniques of single crystal growth.

Conductorone theory of solids. Super conductors, upper conductors of type I and II BCS theory of superconductors, Messner's effect.

Solid state reactions: General principles, experimental procedures, co-precipitation as a precursor to solid state reaction, kinetics of solid-state reaction.

Unit: 4 Phase Equilibrium**25% (15 Hours)**

Phase, components, degree of freedom, condition for equilibrium between phases, The Gibb's phase rule, Derivation of the phase rule, One-component system, The water system, The carbon dioxide system, The sulphur system, Some typical solved examples for One-component System, The liquid helium system, High pressure phase diagrams, The water system, the carbon system, Two-component system, Type A simple eulectic systems, Thermal analysis: cooling curves, Lead-silver system, Bismuth-Cadmium System, potassium iodide-water system, Representation of triangular plot, Partially miscible ternary liquid system, Experimental methods used for Obtaining triangular, Phase transition-second order, Exercises.

Books:

1. Fundamentals of Photochemistry, R.K. Rohatgi and Mukherji, Tata McGraw Hall,
2. Essentials of Photochemistry, A. Gilbert and J. Baggott, Black well Scientific publishers.
3. Introductory Photochemistry, A. Cox and T camp, Mac Graw Hill.
4. Organic Photochemistry, J. Coxon and Hilton, Cambridge University Press.
5. Physical Chemistry, A.W. Atkin, ELBS
6. Advanced Physical Chemistry, Gurdeep Raj, Himalayan Publication 1997.
7. Solid State Chemistry and its Applications, A.R. West, john Wiley & Sons, New York (1984)

8. Solid state chemistry , D. K. Chakrabarty, New Age Int. Pub., New Delhi,(2009)
9. Atomic Structure & chemical bond, Manas Chandra, Tata McGraw Hill, (1995)
10. Treatise on solid state chemistry Vol I, VII, B.N. Haney, Plenum Press, (1975)
11. Introduction to solids, L.V. Azaroff, Mc Graw Hill, (1960) S
12. The Crystal as A Super molecular Entity: Perspectives in Super molecular Chemistry, G.R. Desiraju, Wiley-VCH (1996)
13. Advanced physical chemistry by Gurtu n Gurtu
14. Principle of physical chemistry by Puri Sharma Pathania.
15. Advanced physical Chemistry By Gurdeep Raj.