

ANDHRA UNIVERSITY
INSTITUTE OF PNCO (PHYSICAL AND NUCLEAR CHEMISTRY & CHEMICAL
OCEANOGRAPHY)

Syllabus

M.Sc. Chemistry: I Semester
Paper IV: Physical Chemistry-I

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| Unit 1 | States of Matter | Transport properties of Gases – Thermal Conductivity – Diffusion, Theories of liquid structure; Calculation of collision numbers |
| | Solids | X-Ray diffraction studies: Bragg's equation – Crystal structure determination; lattice type and lattice dimensions – crystal defects – Band theory of solids – Semiconductors – Theories of specific heats of solids |
| Unit 2 | Thermodynamics | Free energy, entropy and enthalpy – chemical equilibrium – Thermodynamic criteria of the chemical equilibrium – effect of temperature on equilibrium constant – Vant Hoff isochore – Maxwell relations – Gibbs-Duhem equation; Duhem-margules equations; Classius-Clapeyron equations – Nernst heat theorem; Third law of thermodynamics and determination of absolute entropy – limitation of third law of thermodynamics |
| Unit 3 | Kinetics I | Theories of Reaction rates – Collision theory – limitation; transition state theory – effect of ionic strength – Debye-Huckel theory – primary and secondary salt effects – effect of dielectric constants of solvent-ion-ion interaction; solvent models – Born-Abraham, Langevin dipole model |
| Unit 4 | Kinetics II | Effect of substituent – Hammett equation – limitations – Taft equation – prediction of rate constant of a reaction; consecutive reactions, parallel reactions, opposing reactions (unimolecular steps only – no derivation) – specific and general acid-base catalysis – Skrabal diagram – fast reactions – flow systems – temperature and pressure jump methods – relaxation. |

Books suggested:

For Units 1 and 2

1. Physical Chemistry by Glasstone
2. Physical Chemistry by Moore
3. Physical Chemistry by Castellan

For Units 3 and 4

1. Physical Chemistry (7th edition, 2002) by Atkins and Paule