Course Module for Chemistry (Course Course-5)
Semester-III
Session: 2018-19
Course Tittle: Physical Chemistry-II
Core Course: CC5 (Theo)

Transport processes

- Fick's law, Flux & force 1Lecture
- Phenomenological coefficient&their inter-relationship 1Lecture
- Different transport phenomena &their examples 2Lectures

Liquid

- Viscosity and dependence of it on other parameter. 4 Lectures
- Poiseuille's equation &its determination 4 Lectures

Conductance

- Basic concept of conductance, specificconductance, ionconductance 2Lectures
- Variation specificconductance & equivalent conductance with concentration 1 Lecture
- Activity and activity coefficient, mean ionic activity, activity coefficient, ion atmosphere, electrophoretic and relaxation effect. 5 Lectures
- Onsagar equation, Debye-Huckel theory and the limiting law, solubility of sparingly soluble salts, ionic strength of medium. 5 Lectures
- Specific and molar conductance, variation with temperature and concentration, Kohrausch's law, transport numbers. 8 Lectures
- Asymmetric effect, electrophoretic effect 1Lecture
- Conductometric titration. 2 Lectures
- Conductance & solubility product 1 Lecture
- Ostwald dilution law & its limitation 1 Lecture

Transport number

- Transport number and its determination 2 Lectures
- Principle of Hittrof's rule & moving boundary method 1 Lecture
- Debye-Falkenhagen effect & Walden's rule 2Lectures

Application of thermodynamics-1

- Chemical potential & partial molar properties 2Lectures
- Relation between chemical potential with G, H,U & S 2Lectures
- Concept of fugacity &fugacity coefficient 1Lecture
- Gibbs Duhem equation &binary system 1Lecture
- Calculation of $\Delta G, \Delta H, \Delta S$ & ΔU for binary solutions 2Lectures

Chemical equilibrium

- Condition of spontaneity of a reaction and equilibrium. 3 Lectures
- Concept & definition of Kp, Kc&Kx for different reactions 1Lectures
- van'tHoffs reaction isobar &isochore 2Lectures
- Le Chatelier principle& its quantitative expression 2 Lectures

Nernst distribution law

- Nernst distribution law&its statement, explanation limitation 1Lecture
- Application for $KI+I_2=KI_3$ reaction 1Lecture
- Application for dimerization reaction 1Lecture

Chemical potential and other properties in pure & mixture

- Chemical potential for ideal gas & in mixture 2Lectures
- Concept of standard state & thermodynamic functions 2Lectures
- Concept of ideal solution and its deviation 1Lecture
- Ideal solution and Raoult,s law and Henry's law. 2Lectures

Foundation of Quantum mechanics

- Electromagnetic radiation and its properties 2Lectures
- Wave-particle duality 2Lectures
- Photoelectric effect, Compton effect & mathematical equations 3Lectures
- Concept of electron as wave 1Lecture
- de Broglie hypothesis & uncertainty relation 2Lectures

Wave Functions

- Time-independentSchrödinger equation& wave function 1Lecture
- Condition of acceptability of wave functions & physical interpretation 2 Lectures

Concept of operators

- Elementary concept of operators 1Lecture

- Eigen function &eigenvalues, their expression & calculations 2Lectures
- Commutation & uncertainty relation between two operators 2Lectures
- Hermitian operators & postulates of quantum mechanics 2Lectures

Particle in a box

- Construction of Schrödinger equation for particle in a 1D box & its solution. 1Lecture
- Normalization, orthogonality, probability distribution calculations of wave function regardingparticle in a 1D box 2Lectures
- Calculations of expectation value of x, x^2, P_x& P_x^2 3Lectures
- Degeneracy in energy levels 1Lecture

Simple Harmonic Oscillator

- Concept simple harmonic oscillator model 1Lecture
- Construction of Schrödinger equation forsimple harmonic oscillator & energy expression 1Lecture
- Expression of wave functionsforsimple harmonic oscillator for n=1 & n=2 1Lecture

Course Tittle: Physical Chemistry-II

Core Course: CC5 (Practical)

- Determination of viscosity of unknown liquid (glycerol, sugar) w.r.t water
- Determination of partition coefficient of I_2 in water & CCl_4
- Determination of equilibrium constant for $KI+I_2=KI_3$ reaction by partition method
- Conductometric titration of acid with base
- Study of saponification reaction conducmetrically
- Verification of Ostwald's Dilution law.

Course Code: Generic Elective-3 + CC (Gen) Theory

Course Tittle: Chemical energetics, equilibria, organic chemistry-II

Chemical energetics

- Extensive property & intensive properties 1Lectures
- System and surroundings. 2 Lectures
- Derivatives, exact differentials, state and path functions. 4 Lectures

- Reversible and irreversible processes and their mathematical derivations and different processes like isothermal and adiabatic etc. — 8 Lectures

- Zeroth law, first, second law of thermodynamics and their mathematical implications. — 6 Lectures
- Different functions like H, U, G and their relations — 4 Lectures

Chemical Equilibrium

- Condition of spontaneity of a reaction and equilibrium. — 3 Lectures
- Concept & definition of Kp, Kc&Kx for different reactions — 1Lectures
- van'tHoffs reaction isobar &isochore — 2Lectures
- Le Chatelier principle & its quantitative expression — 2 Lectures

Ionic Equilibria

- Oswald's dilution law, pH, Kw, buffer solution. — 6 Lectures
- Hydrolysis of salts, indicator. — 4 Lectures
- Solubility & solubility product of a sparingly salt — 2Lectures

Aromatic hydrocarbon

- Synthesis, reactions with mechanism — 8Lectures

Organometallic compounds

- Grignard reagents & their preparations — 1 Lecture
- Synthesis of different compounds from Grignard reagents — 2 Lectures
- Reformatsky reaction & other reaction — 1Lecture

Aryl halide

- Synthesis of different types of Aryl halides — 2Lectures
- Some important name reactions of these compounds — 2Lectures
- Nucleophilic aromatic substitution reactions — 1Lecture

Alcohol, phenols, ethers

- Synthesis of primary, secondary & tertiary alcohols usingGrignard reagents fromdifferent substrates — 2Lectures
- Different types of reaction of alcohols — 2Lectures

- Preparation of diols using oxidation method (with OsO_4) 1Lecture
- Pinacol-pinacolone rearrangement reactions 1Lecture

Phenols

- Synthesis of phenols 1Lecture
- Some important reactions using phenols 5Lecture

Ethers

- Williamson's ether synthesis 1Lecture
- Reactions with ethers 2Lecture
- Cleavage of ethers using HI 1Lecture

Carbonyl compounds

- Discussion on aromatic & aliphatic aldehydes and ketones 2Lectures
- Their synthesis fromGrignard reagents& also from other reagents 4Lectures
- Properties of aldehydes & ketones 2Lectures
- Reactions with HCN, ROH, $NaHSO_4$,NH_2-G 4Lectures

Course Code: Generic Elective-3 + CC (Gen) Practical

Course Tittle: Chemical energetics, equilibria, organic chemistry-II

- Measurement of pH of different solutions like fruit juices, shampoo, soap using pH meter.
- Determination of pH of unknown buffer solution by colour matching method.
- Study of solubility of benzoic acid in water.
- Identification of different pure organic compounds (solid & liquid).