SYLLABUS FOR THE POST OF LECTURER 10+2 CHEMISTRY

PHYSICAL CHEMISTRY

Thermodynamics

Partial molar properties; partial molar free energy, partial molar volume from density measurements, Gibbs-Duhem equation, Fugacity of gases, calculation of fugacity from P, T data concept of ideal solutions, Rault's Law, Duhen-Margules equation, Henry Law, Concept of activity and activity co-efficients.

Chemical Kinetics and Photochemistry

Theories of reaction rates, absolute reaction rates and collision theory, ionic reactions, photochemical reactions, explosion reactions, flash photolysis.

Surface Chemistry

Langmuir adsorption isotherm, B.E.T. adsorption isotherm, Chemisorptions-its kinetics and thermodynamics.

Electro Chemistry

Liquid junction potential

Quantum Chemistry

Eigen functions and eigen values; Angular momentum and eigen values of angular momentum, spin, Pauli exclusion principle, operator concept and wave mechanics of simple systems, particle in ring and rigid rotator, simple harmonic oscillator and the Hydrogen atom.

Postulates of quantum, mechanics, elementary concept of perturbation theory, application of variation method and perturbation method to simple harmonic oscillator. Schrödinger's equation (time dependent).

INORGANIC CHEMISTRY

Description of VB, MO and VSEPR theories, Three electron bond, Hydrogen bond, theories of hydrogen bonding, Inorganic semi conductors and super conductors, structure and bonding in Zoolites and orthosilicates, Borates; Nitrogen-Phosphorus cyclic compounds polyhalides.

Organometallic Compounds

Definition, classification, Transition metal-to carbon sigma bonded compounds. Synthesis and bonding of Alkyne and allyl transition metal complexes, cyclo pentadienyl and arene metal complexes, Homogeneous catalysis involving organometallic compounds; Hydrogenation, Polymerisation, preparation, structure and applications of organometallic compounds of Boron.

Coordination Numbers

Spectrochemical series, John-Teller distortion, colour and magnetic properties of coordination compounds, crystal field theory, M.O treatment of actahedral complexes.

Spectroscopy

Vibrational spectra, rotational spectra, electronic spectra of polyatomic molecules, H.M.R., change of molecular shape on electronic excitation, Fluorescence and Phosphorescence.

ORGANIC CHEMISTRY

Reactive Intermediator

Structure, Stability, general methods of generation and fate of carbocations, classical and non-classical carbocations, carbanions, free radicals, anions and arynes.

Aromaticity

Concept, Huckle Rules, Annulenes, charged and fused ring systems, Aromaticity of non-benzenoid systems, Homoaromaticity and Anti-aromaticity.

Electrophillic Substitution

Theoretical treatment, structure-reactivity relationship in monosubstituted benzene, Isomer proportions, orientation in benzene rings with more than one substituent, Vilsmeir-Heack reaction, Reimer-Tiemann reaction, Pechmann reaction, Fries rearrangement.

Stereochemistry

Chilarity; Planar, central and axial symmetry; R and S concept conformational analysis of six membered and fused ring systems. Free radical substritution Sandmeyer's reaction, Kolbe electrolysis, formation of cyclic ethers with lead tetra acetate, photochemical arylation.

Aromatic Substitution Reactions

Aromatic nucleophilic reaction; general introduction to different mecxhanism, structure-reactivity relationship, substitution through diazonium ion.

Addition Reactions

Addition to carbon-carbon double bond involving addition of electrophiles and nucleophiles, general mechanism, orientation and stereo-chemistry, addition to cyclopropane, Hydroboration, Michael reaction.

Addition to Carbon-Hetero atom multiple bond

Mannich reaction, Reformatsky reaction, Tollen's Reaction, Witting reaction, Prins reaction, Aldol consideration , Perkin reaction, Knoevenagel condensation, Benzoin Condensation.

Elimination Reactions

Discussion of E_1, E_2, E_1CB and E_2CB mechanism and orientation. Sytzeff and Hoffmann rules, Pyrolytic elimination, cleavage of quaternary ammonium hydroxides, Conversion of vicinal dinitro compounds and vicinal dihalides in olefins.

Reaction Mechanism

Aliphatic Nucleophilic substitution, Reaction SN^1, SN^2 and SN-neighbouring group participation, Effect of substrate, substitution at Zallytic and vinylic carbon atoms.
Aliphatic Electrophilic Substitution Reactions: Mechanism, of SE reactions; Migration of double bond, Halogenation of aldehydes and ketones.

Mechanism of Molecular Rearrangements

Classification and general mechanistic treatment of free radical, nucleophilic and electrophilic molecular rearrangements.

Mechanism of following rearrangements

Wagner-Meerwin, Pinacolone, Tiffener Denjanov ring expansion, Benzil-Benzillic acid, Wolf, Hofmann, Curtius, Schmidt, Baeyer-Villiger, Stevens, Witting.

Sd/-
Secretary & COE
JK PSC