

## SYLLABUS IN CHEMISTRY

- **Gaseous States:** Deviation from ideal behavior, Vander waals equation of state critical phenomena: PV isotherms of real gases, continuity of states, the isotherms of Vander waals equation.
- **Atomic Structure:** Idea of de Broglie matter waves, Heinsenberg uncertainty principle, Black-body radiation, Compton effect, photoelectric effect, concept of quantization. Quantum numbers, radial and angular, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, effective nuclear charge.
- **Periodic Properties:** Atomic and ionic radial, ionization energy, electron affinity and electro-negativity definition.
- **Chemical Bonding:**
  - A. Covalent Bond - Various types of hybridization and shape of simple inorganic molecules and ions, application to  $\text{NH}_3$ .
  - B. Ionic Solids: Born Haber cycle, Solvation energy and Solubility of ionic Solids, polarization and polarisability, Fajan's rule.
  - C. Weak Interactions: Hydrogen bonding
- **Nuclear Chemistry:** Artificial radioactivity, fission and fusion reactions and Radio Carbon dating.
- **Chemical Kinetic & Catalysis:** Chemical Kinetics and its scope. Concentrating dependence of rates, mathematical characteristics of simple chemical reactions-Zero order, first order, second order, pseudo-order, half life and mean life.
- **Nomenclature of Organic Compounds:** Mono & poly functional groups. IUPAC recommendation for naming organic compounds, bridge head compounds.
- **Mechanism in organic reaction:** Resonance Hyper conjugation, elimination, substitution, free radical mechanism.
- **Inorganic Qualitative Analysis:** Identification of the basic and the acid radicals of a mixture of Inorganic consisting of not more than six radicals.
- **Nomenclature in complex inorganic compound:** Werner's Theory of coordination compound, optical isomerism and geometrical isomerism.
- **Chemistry of elements:** Characteristics properties of d-block elements, properties of the elements of the first transition series, lanthanide and actinide.
- **Dilute Solution & Colligative Properties:** Colligative properties, *Raoult's law*, *relative lowering of vapour pressure*, *osmotic, of osmotic pressure* and its measurement, Determination of molecular weight from osmotic pressure, elevation of boiling point and depression of freezing point, strength of the solution.
- **Arenes and Aromaticity:** Nomenclature of benzene derivatives. The aryle group. Aromatic nucleus and side chain. Structure of benzene molecular formula and kekule structure, Aromaticity- the Huckel, the aromatic ions.
- **Volumetric Analysis:**
  1. Estimation of Ferrous and Ferric by dichromate method.
  2. Estimation of calcium content in chalk as calcium oxalate by permanganometry.
- **Chemical Equilibrium:** Equilibrium constant and free energy. Le-Chatelier's principle.
- **Electromagnetic spectrum:**

Ultraviolet Spectrometry

Basic principles

- **Infra-Spectrometry:**

Introduction, basic principles of I.R. spectrum

- **Nuclear Magnetic Resonance Spectrometry:**

Introduction, basic principles of NMR.

- **Mass Spectrometry:**

Basic principle

- **Chromatography:** Basic idea on principles of chromatography, paper chromatography, column chromatography, Gas-liquid chromatography, TLC.

- **Organic Qualitative Analysis:** Detection of elements (Nitrogen, Sulphur and halogens). Tests of functional groups-phenolic, carboxylic, carbonyl, esters, Carbohydrates, amides, nitro anilide, Identification of an organic compound through functional group analysis.

Determinations of melting point / boiling point of organic compound. Preparation of derivative and its melting point determination.

- **Estimation of Phenol and aniline:** Preparation of Picric acid, ethylbenzoate, Iodoform from ethanol and acetone.

- **Partition in Co-efficient:**

Room temperature.

Pseudo-first order hydrolysis rate.

- **Analytic Experiments:**

1. Determination of saponification value of ester

2. Estimation of magnesium and calcium in a mixture by EDTA titration.

\*\*\*