

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY-II

UNIT – I (Inorganic Chemistry)

(15 Hours)

- 1.1. Oxidation and reduction reactions – oxidation number concept, balancing redox equations by oxidation number method and ion-electron method – equivalent weight of oxidizing and reducing agents.
- 1.2. Halogen family – comparative study of halogens and their compounds.
 - 1.2.1 Oxides and oxyacids of halogens (structure only) – estimation of available chlorine in bleaching powder.
 - 1.2.2 Interhalogen compounds – preparation, properties and uses
 - 1.2.3 Pseudohalogen – Preparation, properties and uses of cyanogens and thiocyanogen- comparison with halogens
 - 1.2.4 Basic properties of halogens . – Anomalous properties of fluorine

UNIT –II (Inorganic Chemistry)

(15 Hours)

- 2.1 Oxygen family – comparative study. Oxygen fluorides.
- 2.2 Ozone – Preparation, properties, structural elucidation and uses. Green-house effect, ozone hole and protection of ozone layer
- 2.3 Hydrogen peroxide – Preparation, properties, estimation, structure and uses.
- 2.4 Peroxides of sulphur – their preparation, properties, uses and structures.
- 2.5 Thionic acids – their preparation, properties, uses and structures.
- 2.6 Sodium hyposulphite and sodium thiosulphate – Preparation, properties, uses and structures.

UNIT –III (Organic Chemistry)

(15 Hours)

- 3.1. Alkynes.
 - 3.1.1 Acidity of alkynes, formation of acetylides, addition of water with HgSO_4 catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration. (with mechanisms of above reactions)
- 3.2. Dienes - types of dienes – conjugated, isolated and cumulated.
 - 3.2.1. Stability and chemical reactivity – 1,2 and 1, 4 additions, kinetic and thermodynamic controls of a reaction. Diels-Alder reaction.
 - 3.2.2. Synthesis of dienes – 1, 3 Butadiene, isoprene and chloroprene.
- 3.3. Problems and conversions involving the reactions of alkynes and dienes.

UNIT –IV (Organic Chemistry)

(15 Hours)

- 4.1. Polymerisation.
 - 4.1.1. Types of polymerization – free radical, cationic and anionic polymerizations including mechanisms.
 - 4.1.2. Preparation of polymers – addition polymers (Polyethylene, PVC, Teflon and Polystyrene). Condensation polymers (nylon-6, 6 terephthalate) – synthetic rubbers (Buna, Butyl rubber, SBR and neoprene) – natural rubber.
- 4.2. Cycloalkanes.

- 4.2.1. Preparation using Wurtz's reaction, Dieckmann's ring closure and reductions of aromatic hydrocarbons.
- 4.2.2. Substitution and ring opening reactions.
- 4.2.3. Bayer's strain theory and theory of strainless rings.

UNIT -V (Physical Chemistry)
Hours)

(18

- 5.1. Solid state.
 - 5.1.1. Isotropic and anisotropic solids.
 - 5.1.2. Nature of the solid state – seven crystal systems – Bravais lattice, unit cell, law of rational indices (Weiss indices) Miller indices, symmetry elements in crystals (for cubic system only in detail).
 - 5.1.3. X-Ray diffraction by crystals – derivation of Bragg's equation — Bragg method- powder method crystal structure of NaCl, KCl, ZnS and CsCl – radius ratio and packing in crystals – determination of Avogadro's number.
 - 5.1.4. Vitreous state.

UNIT -VI (Physical Chemistry)

(12 Hours)

- 6.1. Macromolecules.
 - 6.1.1. Number average and weight average molecular weight of macromolecules – determination of molecular weight by osmometry (number average), ultra centrifuge (weight average) ,Viscometry and light scattering
- 6.2 Solutions
 - 6.2.1 Definition of ideal and nonideal solutions – concentration units – molality – molarity – formality – mole fraction – normality – weight percent and volume percent – activity and activity coefficient.
 - * Numerical problems wherever possible (all units)

References:

1. S.S.Dara – A text book of environmental chemistry and pollution control – S.Chand and Co.
2. D.N.Bajpai – Advanced physical chemistry – S.Chand and Co.
3. Bruce H.Mahan “ University Chemistry ,” Narosa Publishers, NewDelhi.1989.
4. R.T Morrison and R.N.Boyd , “ Organic Chemistry ,” 6 th Edition