

# Chemistry

Unit No. Title Marks

Unit I Solid State 4

Unit II Solutions 5

Unit III Electrochemistry 5

Unit IV Chemical kinetics 5

Unit V Surface Chemistry 4

Unit VI General principles and processes of Isolation of Elements 3

Unit VII p-Block Elements 8

Unit VIII d-and f-Block Elements 5

Unit IX Coordination Compounds 3

Unit X Haloalkanes and Haloarenes 4

Unit XI Alcohols, Phenols and Ethers 4

Unit XII Aldehydes, Ketones and Carboxylic acids 6

Unit XIII Organic Compounds containing Nitrogen 4

Unit XIV Biomolecules 4

Unit XV Polymers 3

Unit XVI Chemistry in Everyday life 3

Total : 70

Unit I: Solid State (Periods 12)

Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Unit II: Solutions (Periods 12)

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapour pressure, elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass.

Unit III: Electrochemistry (Periods 14)

Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of

electrolysis (elementary idea), dry cell electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, fuel cells; corrosion.

#### Unit IV: Chemical Kinetic (Periods 12)

Rate of a reaction (average and instantaneous), factors affecting rates of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment)

#### Unit V: Surface Chemistry (Periods 8)

Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis; homogeneous and heterogeneous, activity and selectivity; enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophilic, lyophobic, multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsion types of emulsions.

#### Unit VI: General Principles and Processes of Isolation of Elements (Periods 8)

Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and Iron.

#### Unit VII: p-Block Elements (Periods 14)

Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous–allotropic forms; compounds of phosphorous: preparation and properties of phosphine, halides ( $\text{PCl}_3$ ,  $\text{PCl}_5$ ) and oxoacids (elementary idea only).

Group 16 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen; preparation, properties and uses; simple oxides; Ozone, Sulphur – allotropic forms; compounds of sulphur; preparation, properties and uses of sulphur dioxide sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).

Group 17 elements : General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens; preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only).

Group 18 elements: (General introduction, electronic configuration. Occurrence, trends in physical and chemical properties, uses.

#### Unit VIII: d and f Block Elements (Periods 14)

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals metallic character, ionization enthalpy, oxidation states, ionic radii, colour catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ . Lanthanoids–electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction.

Actionoids – Electronic configuration, oxidation states.

#### Unit IX: Coordination Compounds (Periods 12)

Coordination compounds – introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds bonding; isomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

#### Unit X: Haloalkanes and Haloarenes. (Periods 12)

Haloalkanes:

Nomenclature, nature of C–X bond, physical and chemical properties, mechanism of substitution reactions.

Haloarenes: Nature of C–X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only) Uses and environmental effects of – dichloro methane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

#### Unit XI: Alcohols, Phenols and Ethers (Periods 12)

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses, some important compounds – methanol and ethanol.

Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols. Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

#### Unit XII: Aldehydes, Ketones and Carboxylic Acids (Periods 12)

Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of  $\alpha$  hydrogen in aldehydes; uses. Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

#### Unit XIII: Organic compounds containing Nitrogen (Periods 10)

Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.

Cyanides and Isocyanides – will be mentioned at relevant places in context. Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

#### Unit XIV: Biomolecules (Periods 8)

Carbohydrates – Classification (aldoses and ketoses), monosaccharides (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); importance. Proteins – Elementary idea of  $\alpha$ -amino acids, peptide bond, polypeptides proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes. Vitamins – Classification and functions. Nucleic Acids: DNA & RNA.

#### Unit XV: Polymers (Periods 8)

Classification – natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers; natural and synthetic like polythene, nylon, polyesters, bakelite, rubber.

#### Unit XVI: Chemistry in everyday life : (Period 8)

1. Chemicals in medicines – analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.

2. Chemicals in food– preservatives, artificial sweetening agents.
3. Cleansing agents – soaps and detergents, cleansing action.