

CHEMISTRY
for 2nd year Science

Course Structure		Marks
Unit	Title	
I	Solid State	
II	Solutions	
III	Electrochemistry	23
IV	Chemical Kinetics	
V	Surface Chemistry	
VI	Isolation of Elements	
VII	p-Block Elements	
VIII	d- and f- Block Elements	19
IX	Coordination Compounds	
X	Haloalkanes and Haloarenes	
XI	Alcohols, Phenols and Ethers	
XII	Aldehydes, Ketones and Carboxylic Acids	
XIII	Organic Compounds containing Nitrogen	28
XIV	Biomolecules	
XV	Polymers	
XVI	Chemistry in Everyday Life	
Total		70

Unit I: Solid State

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, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Band theory of metals, conductors, semiconductors and insulators and n & p type semiconductors.

Unit II: Solutions

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, Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, van't Hoff factor.

Unit III: Electrochemistry

Redox reactions, electrolytes and non-electrolyte conductor, conductance in electrolytic solutions, specific and molar conductivity, variation 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, Relation between Gibbs energy change and emf of a cell, fuel cells, corrosion.

Unit IV: Chemical Kinetics

Rate of a reaction (Average and instantaneous), factors affecting rate 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). Activation energy, Arrhenius equation.

Unit V: Surface Chemistry

Adsorption - physisorption and chemisorption, factors affecting adsorption of gases on solids, catalysts, homogenous and heterogenous activity and selectivity; enzyme catalysts colloidal state distinction between true solutions, colloids and suspension; 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

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

Group 15 Elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen preparation properties & uses; compounds of nitrogen, preparation and properties of ammonia and nitric acid, oxides of nitrogen (Structure only); Phosphorus - allotropic forms, compounds of phosphorus: preparation and properties of phosphine, halides PCl_3 , 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, classification of oxides, Ozone, Sulphur 0 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 (structure only).

Group 18 Elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

Unit VIII: d and f Block Elements

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 and its consequences.

Actinoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

Actinoids - Electronic configuration, oxidation states and comparison with lanthanoids.

Unit IX: Coordination Compounds

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

Unit X: Haloalkanes and Haloarenes

Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions, optical rotation.

Haloarenes: Nature of C - X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only).

Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT, BHC.

Unit XI: Alcohols, Phenols and Ethers

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses with special reference to 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

Aldehydes and Ketones : Nomenclature nature of carbonyl group methods of preparation, physical and chemical properties, 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

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

Cyanide and Isocyanides-will be mentioned at relevant places in context

Diazonium salt - Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit XIV : Biomolecules

Carbohydrates - Classification(aldoses and ketoses) Monosaccharides(glucose and fructose), D-L configuration oligosaccharides(sucrose, lactose, maltose) polysaccharides(starch, cellulose, glycogen) importance.

Proteins-Elementary idea of L- amino acids, peptide bond, polypeptide, proteins, structure of proteins-primary secondary, tertiary structure and quaternary structure(qualitative idea only), denaturation of proteins, enzymes, hormones-Elementary idea excluding structure

Vitamins-Classification and functions

Nucleic Acids : DNA and RNA

Unit XV: Polymers

Classification-Natural and synthetic methods of polymerization(addition and condensation)co polymerization, some important polymers, natural and synthetic like polythene, nylon, polyester, bakelite, rubber, Biodegradable and non-biodegradable polymers.

Unit XVI : Chemistry in Everyday life

Chemical in Medicines- Analgesics, tranquilizers antiseptics, disinfectants, antimicrobials, antifertility, drugs, antibiotics, antacids, antihistamines.

Chemical in food-Preservations, artificial sweetening agents, elementary idea of antioxidants

Cleansing agents-Soap and detergents, cleansing action.