CHEMISTRY

Class - XII

Board of Secondary Education Rajasthan
Ajmer

Text Book Development Committee

Chemistry

Class - XII

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Chemistry

Class - XII

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Preface

Chemistry is a central science and revolutionized all spheres of life. The book for Class XII has been developed in a student-friendly manner. Fundamental concepts and principles are written with sufficient details and examples for easy grasp of the subject. Each topic is expressed from its origin and illustrated using good number of figures, tables, numerical data, equations, etc. IUPAC nomenclature along with common names has been given for chemical compounds. The text has been written in an easy to learn manner by using easy language and working examples. Commercial and industrial importance of chemicals have also been highlighted to created interest in young minds which gives inspiration for start-ups in the field of chemical sciences for economic development. Emphasis in given to impart knowledge of the subject rather than just to clear examination through rote learning. Efforts have been made to make the book free from any type of error. Any constructive criticism is highly appreciated.

-Dr. Rameshwar Ameta
Convener

SYLLABUS

Chemistry
Class-XII

Chapter 1 : Solid State : Classification of solids on the basis of different bond forces-molecular, ionic, covalent, metallic solid, crystalline and non-crystalline solid (primary introduction) crystals, lattice and unit cells, calculation of density of unit cell, close-packed structures, voids, number of atoms in a unit cell, imperfection or defects in solids, electromagnetic and dielectric properties of solids.

Chapter 2 : Solution : Types of solution, units of concentration of solution, solubility of gases in liquids, ideal and non-ideal solutions, deviation from ideal behavior constant boiling mixtures, solid solution, colligative properties-relative lowerign of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular weight by colligative properties, abnormal molecular weight, van't Haff factor.

Chapter 3 : Electrochemistry : Electrolytes, electrolysis and laws of electrolysis, electrolytic cell, electrochemical cell, primary and secondary cells, fuel cell, electrode potential, standard electrode potential, electromotive force (e.m.f.) of cell and its measurement, relation between e.m.f. and Gibb's free energy, Nernst equation and its application in electrochemical cells, conductance of electrolytic solutions, specific and equivalent conductance and molar conductance, Variation of conductivity with concentration, kohlrausch law and application, theory of corrosion and means to protect it.

Chapter 4 : Chemical Kinetics : Rate of chemical reaction, factors affecting rate of a reaction, molecularity and order of reaction, rate law and specific rate constant, integrated rate equation, half-life (for reactions of zero and first order), effect of temperature on the rate of reaction, activation energy, Arrhenius equation), theories of reaction rate (introduction), collision and transition state theories.

Chapter 5 : Surface Chemistry : Adsorption, difference between Adsorption and absorption, kinds of adsorption, factors affecting the adsorption of gases on solids, catalysis and types of catalysis, important properties of solid catalysis, enzyme catalysis and its mechanism, classification of colloids, true solution, difference between colloidal solution and suspension, properties of colloids (Tyndall effect, Brownian motion, charge on colloidal particle, electrophoresis, coagulation) purification of colloidal solutions, protection of colloids, application of colloids, emulsions and their types.

Chapter 6 : Principles and processes of Isolation of Elements : Ores, principles and methods of extraction of metals-concentration, oxidation, reduction, electrolytic method and purification, Aluminum, copper, zinc and Iron-their occurrence and principle of extraction.

Chapter 7 : p-block Elements : Elements of Group 15 -

(i) General introduction, electronic configuration, occurrence, periodicity in properties, oxidation states, chemical reactivity.
(ii) Nitrogen-preparation, properties and uses, preparation and properties of amonia and nitric acid, structure of oxides of nitrogen
(iii) Phosphorous and its allotropes, preparation and properties of phosphene and halides of phosphorous, structure of oxyacids of phosphorous.

Elements of Group 16 :

(i) General introduction, electronic configuration, occurrence, periodicity in properties, oxidation states, chemical reactivity.

(ii) Preparation, properties and uses of dioxygen and ozone.

(iii) Sulphur and its allotropes, preparation, properties and uses of sulphur dioxide and sulphuric acid; strucutres of oxyacids of sulphur.

Elements of Group 17 :

(i) General introduction, electronic configuration, occurrence, periodicity in properties, oxidation states, chemical reactivity.

(ii) Preparation, properties and uses of chlorine and hydrochloirc acid.

(iii) Interhalogen compounds (only introduction).

(iv) Structures of oxyacids of halogen.

Elements of Group 18 :

(i) General introduction, electronic configuration, occurrence, periodicity in properties, oxidation states, chemical reactivity.

(ii) Compound of Xenon.

Chapter 8 : d- and f-block Elements

(i) d-block elements- General introduction, electronic configuration, characteristics of transition metals and occurrence, general tendencies of properties of elements of first transition series-metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic properties, magnetic properties, interstitial compounds and alloys.
(ii) f-block elements :- General introduction, electronic configuration, oxidation states, chemical reactivity, Lanthanide contraction and its effect, comparison of lanthanides and actinides.

Chapter 9 : Coordination Compounds : General introduction, ligands and their classification, coordination numbers, coordination sphere, Nomenclature of coordination compounds (IUPAC) and formula writing, isomerism, bonding in coordination compounds (VBT & CFT), colour of transition metals and complexes, stability, of coordination compounds and factors affecting the stability, qualitative analysis and importance of coordination compounds in biosystems.

Chapter 10 : Halogen Derivatives :

(i) Haloalkanes : Nomenclature, nature of bond physical and chemical properties, mechanism of substitution reactions (S_N1, S_N2), elimination reactions.
(ii) Haloarenes : Nomenclature, nature of C-X bond, substitution reactions, directive influence of halogen in mono substituted compounds, uses of trichloro methane, iodoform, freon, DDT, BHC and their effect on environment.

Chapter 11 : Functional groups with oxygen (Part-I) : Alcohols-Nomenclature, preparation, physical and chemical properties, ascending and descending carbon series in alcohols, distinction of primary, secondary and tertiary alcohols, mechanism of dehydration, uses industrial production of methanol and ethanol.

Phenols - Nomenclature, preparation, physical and chemical properties, acidic nature of phenol, uses of phenols.

Ether - Nomenclature, preparation, physical and chemical properties.

Chapter 12 : Functional groups with oxygen (Part-II) : Aldehydes and Ketones - Nomenelature, nature of carbonyl group, methods of preparation, physical and chemical properties. Mechanism of Nucleophilic addition, reactivity of hydrogen of addehydes, similarity and dissimilarity in aldehydes and ketones, uses.

Chapter 13 : Organic compound containing functional groups with nitrogen :-

(i) Amines and nitro compounds - Nomenclature, classification, methods of preparation, physical and chemical properties, uses, distinction of primary, secondary and tertiary amines.
(ii) Cyanides and isocyanides :- Methods of preparation, physical and chemical properties, uses.
(iii) Diazonium salts : Preparation, chemical reactions, importance in synthetic chemistry.
(iv) Urea - Methods of preparation, physical and chemical properties, uses.

Chapter 14 : Biomolecules - Cells and Energy cycles. Carbohydrates- classification (aldose, ketose), mono saccharides (glucose, fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose).

Proteins - Composition of protein, amino acids and classification, essential amino acids, physical properties, peptide bond, polypeptide, structure of primary, secondary, tertiary and quaternary protein, denaturation of protein, enzymes, hormones (only introduction) Vitamins - classification and functions.

Nucleic acids - DNA and RNA.

Chapter 15 : Polymers, classification, methods of polymerization copolymerization and heteropolymerization, polyethene nylon, polyester, Bakelite, rubber, molecular mass of polymers, some main polymers of commercial importance (PVC, Terelene, Nylon 66, Teflon). biodegradable and non-biodegradable polymers.

Chapter 16 : Stereochemistry : Isomerism - definition and types (Configuration and conformation), geometrical isomerism - Nomenclature and properties of geometrical isomers.

Optical isomerism - polarized light, polarity, chirality, chiral moleculs, elements of symmetry, configuration of chiral molecule and Fisher - projection formula, relative and

absolute configuration, racemic mixture, racemization, compounds with two chiral centers, separation of racemic mixture.

Conformational Isomerism - Saw Horse and Newman projection formula, conformational analysis of ethane conformation, types of conformations, conformational isomerism in cyclic system.

Chapter 17 : Chemistry in daily life :

(1) Medicines and chemistry in human health (analgesics tranquilizers, antimicrobials, antibiotics, antihistamines or anti-allergic drugs, antiseptics, anti-fertility drugs, antacids).
(2) Dyes - Dyes and pigments, characteristics of dyes (structural), presence of chromophores, classification of dyes on the basis of structure and uses.
(3) Chemical in Food : Preservatives, artificial sweetners, antioxidants, food colours.
(4) Detergents - Distinction between soap and detergents, classification of detergents.
(5) Insect - repellents, pheromones, rocket propellants and advanced materials.

INDEX