

**Chemistry Syllabus**

Subjects	Topic to be Covered
The 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.
Crystal Lattices and Unit Cells	
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.
Electrochemistry	Redox reactions, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law 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.
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.
Surface Chemistry	Adsorption - physisorption and chemisorption, factors affecting adsorption of gases on solids, catalysis, homogenous and heterogenous activity and selectivity; enzyme catalysis colloidal state distinction between true solutions, colloids and

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	suspension; lyophilic , lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation, emulsion - types of emulsions.
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.
The p-Block Elements	<p>Group 15 Elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen preparation properties &amp; 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 <math>\text{PCl}_3</math> , <math>\text{PCl}_5</math> and oxoacids (elementary idea only).</p> <p>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, Sulphure - allotropic forms; compounds of sulphure: Preparation properties and uses of sulphur-dioxide, sulphuric acid: industrial process of manufacture, properties and uses; oxoacids of sulphur (Structures only).</p> <p>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).</p> <p>Group 18 Elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.</p>
The 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

	<p>properties of <math>K_2Cr_2O_7</math> and <math>KMnO_4</math>.</p> <p>Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.</p> <p>Actinoids - Electronic configuration, oxidation states and comparison with lanthanoids.</p>
Coordination Compounds	<p>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 stereo isomerism, importance of coordination compounds (in qualitative inclusion, extraction of metals and biological system).</p>
Haloalkanes and Haloarenes	<p>Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions, optical rotation.</p> <p>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.</p>
Alcohols, Phenols and Ethers	<p>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.</p> <p>Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.</p> <p>Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.</p>
Aldehydes, Ketones and Carboxylic Acids	<p>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.</p> <p>Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.</p>

Organic compounds containing Nitrogen	<p>Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.</p> <p>Cyanides and Isocyanides - will be mentioned at relevant places in context.</p> <p>Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.</p>
Biomolecules	<p>Carbohydrates - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen) importance.</p> <p>Proteins - Elementary idea of <math>\alpha</math> - amino acids, peptide bond, polypeptides, proteins, structure of proteins - primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins; enzymes. Hormones - Elementary idea excluding structure. Vitamins - Classification and functions.</p> <p>Nucleic Acids: DNA and RNA.</p>
Polymers	<p>Classification - natural and synthetic, methods of polymerization (addition and condensation), copolymerization, and some important polymers: natural and synthetic like polythene, nylon polyesters, bakelite, and rubber. Biodegradable and non-biodegradable polymers.</p>
Chemistry in Everyday life	<p>Chemicals in medicines - analgesics, tranquilizers antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.</p> <p>Chemicals in food - preservations, artificial sweetening agents, elementary idea of antioxidants.</p> <p>Cleansing agents - soaps and detergents, cleansing action.</p>