

Chemistry				
SYLLABUS: Class-XI & XII				
Unit -1 Atomic Structure				
Contents	CONCEPT			
Introduction to Structure of Atom	Dalton's atomic theory			
Atomic models	Thomson model			
	Rutherford model			
	Bohr model			
	Dual behavior of Matter			
Quantum Mechanical Model	Concept of orbitals			
	Heisenberg's uncertainty principle			
	Quantum numbers			
	Shape of s, p and d orbitals			
Shapes of Atomic Orbitals	Node and nodal surface			
	Shielding effect			
	Aufbau principle			
Rules for Filling Electrons in Orbitals	Pauli's exclusion principle			
	Hund's rule Electronic configuration of atoms			
Stability of Completely Filled and half-filled Orbitals				
Unit-2 Chemical Bonding				
Types of Chemical Bonds	Ionic bond			
Bonds	Covalent bond			
	Polar covalent bond			
Valence Bond Theory	Hybridization			
	VSEPR theory			
	Resonance			
Molecular Orbital Theory	Magnetic characteristics			
	Bond order			
Hydrogen Bond	Intermolecular hydrogen bonding			
	Intramolecular hydrogen bonding			
Unit-3 States of Matter: Gases and Liquids				
Intermolecular Forces	Types of intermolecular forces			
	Nature of intermolecular forces			
Laws Governing Gaseous State	Boyle's law			
	Charles law			
	Gay-lussac			
	Avogadro law			
	Ideal gas equation			
Ideal Behaviour	Dalton's law of partial pressure			
	Kinetic theory of gases pressure			
Deviation from Ideal Behaviour	Compressibility factor			
	Boyle's Temperature			
Liquefaction of Gases	Critical temperature, critical pressure and critical volume			
Liquid State	Vapour pressure			
	Viscosity			
	Surface tension			
Unit-4 Thermodynamics				
Thermodynamic Terms	Concepts of : system, surrounding types of system state of a system state function and path function extensive and intensive properties reversible and irreversible process			
	Thermodynamic Quantities	Work Heat		
		First Law of Thermodynamics	Internal Energy Enthalpy Heat capacity Measurement of ΔU Measurement of ΔH	
	Thermochemistry		Enthalpy change in a chemical reaction Endothermic and Exothermic reactions Standard enthalpy of reactions Enthalpy changes during phase transformations Standard enthalpy of formation Thermochemical equations Hess's Law of Constant Heat Summation Enthalpies for different types of reactions	
			Spontaneity	Entropy Second law of Thermodynamics Gibb's energy change for spontaneous and non-spontaneous processes Criteria for equilibrium
				Third Law of Thermodynamics

Unit-5 Chemical Equilibrium	
Introduction to Equilibrium	Dynamic nature of equilibrium
Equilibrium in Physical Processes	Solid - liquid equilibrium
	Liquid - vapour equilibrium
	Solid - vapour equilibrium
	Equilibrium involving dissolution of solid and gases in liquids
Equilibrium in Chemical Processes	Dynamic nature of chemical equilibrium
	Law of chemical equilibrium
	Equilibrium constant
Types of Chemical Equilibria	Homogeneous Equilibria
	Heterogeneous Equilibria
Applications of Equilibrium Constant	Predicting the extent of a reaction
	Predicting the direction of the reaction
	Calculating Equilibrium Concentrations
Factors Affecting Equilibria	Le Chatelier's principle
Ionic Equilibrium in Solution	Strong and weak electrolytes
	Acids, bases and salts
Ionization of Acids and Bases	Ionic product of Water
	pH scale
	Ionization constant of weak acids and bases
	Factors affecting acid strength
	Common ion effect
Buffer Solutions	Buffer action and relevant examples
Solubility Equilibria of Sparingly Soluble Salts	Solubility product
	Common ion effect of solubility of ionic salts
Unit -6 Solid State	
Introduction to Solid State Chemistry	Characteristics of Solid State
Classification of Solids on the Basis of Order in the Arrangement	Crystalline and amorphous Solids
Crystal Lattices and Unit Cells	Primitive and Centred Unit Cells
	Number of atoms in per unit Cell in a cubic unit cell
Close Packing in solids	Packing in Solids
	Voids
	Packing Efficiency
	Calculation of Density of unit cell
Imperfections in Solids	Types of Point Defects
	Stoichiometric and Non-Stoichiometric Defects
	Metal Excess Defect
	Metal Deficiency Defect
	Impurity Defects
Electrical Properties	Conductors, semiconductors and insulators
	Band theory of solids
	n & p type semiconductors
Magnetic Properties	Paramagnetic
	Diamagnetic
	Ferromagnetic
	Antiferromagnetic
	Ferrimagnetic
Unit-7 Solutions	
Introduction to solutions	Solute
	Solvent
	Solution
Types of Solutions	Gaseous Solutions
	Liquid Solutions
	Solid solutions
Expressing the Concentration of Solutions of Solids in Liquids	Various quantities used to express concentration of a solution
	Mole Fraction
	Molarity
	Molality
Solubility	Solubility of solid in liquid
	Solubility of gas in liquid
	Henry's Law
Vapour Pressure of Liquid Solutions	Solution of two volatile liquids
	Solution containing non-volatile solute
	Raoult's Law
Classification of Liquid-Liquid Solutions on the basis of Raoult's Law	Ideal solutions
	Non Ideal solutions
	Positive deviation
	Negative deviation
Colligative Properties	Relative lowering of vapour pressure
	Elevation of boiling point
	Depression of freezing point
	Osmotic pressure
	Determination of molecular masses using colligative properties
Abnormal Molecular Mass	van't Hoff Factor - Numericals based on the above
Unit-8 Redox reactions and Electrochemistry	
Oxidation and Reduction Reactions	
Redox Reactions in Terms of Electron Transfer Reactions	Mechanism of redox reactions by electron transfer process
	Evolution of the electrochemical series.
Oxidation Number	Calculation of oxidation number
Types of Redox Reactions	
Balancing of Redox Reactions	Oxidation number method
	Half reaction
	Method
Types of Electrochemical Cells	Electrolytic cells
	Galvanic cells
Electrolysis	Electrode
	Sign conventions at anode and cathode
	Laws of electrolysis
Conductance in Electrolytic Solutions	Metallic and electrolytic conductance
	Types of electrolytes
	Conductance
	Resistance
	Molar conductivity
	Variation of conductivity with concentration
Galvanic Cells	Kohlrausch's law
	EMF of a cell
	Standard electrode potential
	Nernst equation and its application to chemical cells
Corrosion	Relation between Gibbs energy change and emf of a cell
	Concept and mechanism of corrosion in relation to emf

Unit-9 s- Block & p-Block Elements and metallurgy	
S-Block Elements Group 1 Elements & Group 2 Elements	Electronic configuration
	Physical Properties
	Chemical properties
	Position of hydrogen in the periodic table
	Diagonal relationship
	Biological importance
	Water and hydrogen peroxide
P-Block Elements Group 13, 14, 15, 16, 17 and 18 Elements	Some Alkali metal compounds
	Some Alkaline earth metal compounds
	Electronic configuration
Unit-10 d and f - Block Elements and Coordination Compounds	
d-Block elements	General properties of 3d elements.
	Electronic configuration
	Variable valency concept Color
	Magnetic properties
	Catalytic properties
F-Block Elements	Compounds
	Electronic configuration
	Oxidation states
Coordination Compounds	Lanthanide contraction
	General composition
	Coordination number
	Types of ligands
IUPAC Nomenclature of Coordination Compounds	Werner theory
	IUPAC rules
Valence Bond Theory as Applied to Coordination Compounds	Valence bond theory
	Crystal field theory
Importance of Coordination Compounds	Analytical applications
	Industrial applications
Unit-11 Surface Chemistry	
Adsorption on a Surface	Physisorption
	Chemisorption
	Factors affecting the adsorption of gases on solids
Catalysis	Homogenous and heterogeneous catalysis
	Shape selective catalysis
	Enzyme catalysis
Colloids	Distinction between true solution, colloid and suspension
	Classification of colloids
	Properties of colloids: Mechanical, Optical, Electrical
	Hardy-Schulze rule
Unit-12 Chemical Kinetics	
Rate of Chemical Reaction	Average rate of reaction
	Instantaneous rate of reaction
Factors Affecting Rate of a Reaction	Concentration of reactants, temperature, catalyst, nature of reactants, pressure (gases), presence of light, surface area of the reactants
	Rate Law and Specific Rate Constant
	Order And Molecularity
Integrated Rate Equations and Half life	Zero order reactions
	First order reactions
	Pseudo First order reaction
Temperature Dependence of Rate of Reaction	Activation Energy
	Energy
	Arrhenius Equation
Collision Theory	
Unit-13 Hydrocarbons, Haloalkanes and Haloarenes	
Types of Hybridization of Carbon	Types of hybridization in carbon compounds
	Shapes of organic molecules
	2D and 3D structural representation of organic compounds
Classification of Organic Compounds	based on functional groups
	based on structure
IUPAC Nomenclature of Organic Compounds	Priority order of functional groups
	Prefixes and suffixes for functional groups
	Derivation of structural formula from a given IUPAC name and vice-versa
Stereochemistry and Isomerism	Structural isomerism
	Stereochemistry and stereoisomerism
	Projection formulae
	Interconversion of projection formulas
	Conformations and their relative stabilities (ethane and butane)
	Geometrical isomerism (cis and trans)
Optical isomerism	
Homolytic and Heterolytic Fission of a Covalent Bond	Absolute and relative nomenclature of optical isomers
	carbocation
	carbanion
Basics of Organic Reaction	free radical
	Electrophilic and nucleophilic reagents
Electronic Displacements in a Covalent Bond	Types of organic reactions
	inductive effect
	electromeric effect
	resonance
Aromaticity	hyperconjugation
	Stability of aromatic compounds
Alkanes (Upto 5 Carbon Atoms)	Huckel's rule
	Methods of preparation (Reduction, Wurtz reaction, Kolbe's electrolysis)
	Physical properties
Alkenes (Upto 5 Carbon Atoms)	Chemical reactions (Halogenation, Isomerisation, Oxidation, Aromatization, Combustion, Pyrolysis)
	Methods of preparation (Partial reduction, dehydrohalogenation, dehydration, dehalogenation)
	Physical properties
Alkynes (Upto 5 Carbon Atoms)	Chemical reactions (Addition of H ₂ , X ₂ , Markovnikov's and anti-Markovnikov's rule)
	Addition of HX, and H ₂ O, ozonolysis, oxidation and polymerization
	Methods of preparation (Hydrolysis of calcium carbide, dehydrohalogenation)
Arenes	Physical properties
	Chemical reactions (Addition of H ₂ , X ₂ , HX, and H ₂ O and polymerization)
Haloalkanes and haloarenes	Nomenclature, resonance and stability of benzene, orientation effect of substituents in benzene, preparation physical and chemical properties of benzene
	Structure
	Classification
	Structure of 1 ^o , 2 ^o and 3 ^o haloalkanes and haloarenes
	Nomenclature
Isomerism	
Preparation and properties	

Unit-14 Oxygen containing Organic compounds	
Structure	Structure of alcohols, phenols and ethers Classification
Preparation of Alcohols and Phenols	Preparation of alcohols (hydration of alkenes, hydroboration-oxidation, reduction of carbonyl compounds, from Grignard's reagent) Preparation of Phenols (from chlorobenzene, benzene and cumene)
Properties of Alcohols, Phenols and Ethers	Physical Properties of Alcohols, Phenols and Ethers Chemical Properties of Alcohols (with metals, esterification, esterification, with HX, dehydration) Chemical Properties of Phenols (halogenation, nitration and sulphonation, Kolbe Reimer - Tiemann, deoxygenation and oxidation)
Preparation of Ethers & chemical Properties	Preparation from alcohols Williamson's ether synthesis Ether cleavage by HX halogenation, nitration and Friedel Crafts reaction
Structure of Aldehydes, Ketones and Carboxylic Acids	
Preparation of Aldehydes and Ketones	From alcohols From alkenes From alkynes From aromatic hydrocarbons Gattermann-Koch From acid chlorides From nitriles
Physical, Chemical Properties and Uses of Aldehydes and Ketones	Physical Properties of aldehydes and ketones Chemical Properties of Aldehydes and Ketones (nucleophilic addition reactions, nucleophilic addition-elimination reactions, reduction, oxidation, Aldol condensation, Cannizzaro reaction, electrophilic substitution in aromatic aldehydes)
Carboxylic acids	Structure of carboxylic acid Preparation of carboxylic acids (by oxidation, hydrolysis, from Grignard reagents) Physical properties of carboxylic acids Chemical properties of carboxylic acids
Unit-15 Nitrogen containing Organic compounds	
Structure	
Preparation of Amines	By reduction of nitro compounds, nitriles and amides Ammonolysis of alkyl halides
Physical and Chemical Properties of Amines	Physical Properties of Amines Chemical Properties of Amines
Diazonium Salts	Nomenclature Structure Methods of Preparation Physical properties Chemical Properties Structure and importance of azo dyes and examples
Unit-16 Bio-Molecules and Polymers	
Biomolecules	Carbohydrates Amino acids and proteins Nucleic acids Vitamins
Polymers	Classification Methods of polymerization Preparation of Some polymers
Unit-17 Chemistry in everyday life	
Chemicals in Medicines, Food and Hygiene (Soaps and Detergents)	antacids, antihistamines, tranquilizers, analgesics, antimicrobials (antibiotics, antiseptics and disinfectants), antifertility drugs and chemotherapy food additives, artificial sweetening agents, preservatives and antioxidants saponification, Soaps & cleansing property detergents and bio-degradable detergents
Unit-18 Environmental Chemistry	
Environmental Pollution	Environmental pollution Conservation of natural resources
Water Pollution	Types of water pollutants Treatment of water pollution BOD
Industrial Pollution	Industrial and agricultural chemicals that cause environmental degradation Industrial waste management Green Chemistry