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
Shapes of Atomic Orbitals	Shape of s, p and d orbitals
	Node and nodal surface
	Shielding effect
Rules for Filling Electrons in Orbitals	Aufbau principle
	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
	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 Behaviour	Ideal gas equation
	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	Homogenous 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
Vapou r 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
	Kohlrausch's law
Galvanic Cells	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
Corrosion	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
	Some Alkali metal compounds
	Some Alkaline earth metal compounds
P-Block Elements Group 13, 14, 15, 16, 17 and 18 Elements	Electronic configuration
	Occurrence Inert pair effect Reactivity
	Some compounds of Group 13 to 18 elements
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
	Compounds
F-Block Elements	Electronic configuration
	Oxidation states
	Lanthanide contraction
Coordination Compounds	General composition
	Coordination number
	Types of ligands
	Werner theory
IUPAC Nomenclature of Coordination Compounds	IUPAC rules
Valence Bond Theory as Applied to Coordination Compounds	Valence bond theory
	Crystal field theory
Importance of Coordination Compounds	Analytical applications
	Industrial applications
	Biological 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
	application of colloids
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
	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
	Absolute and relative nomenclature of optical isomers
Homolytic and Heterolytic Fission of a Covalent Bond	carbocation
	carbanion
	free radical
Basics of Organic Reaction	Electrophilic and nucleophilic reagents
	Types of organic reactions
Electronic Displacements in a Covalent Bond	inductive effect
	electromeric effect
	resonance
	hyperconjugation
Aromaticity	Stability of aromatic compounds
	Huckel's rule
Alkanes (Upto 5 Carbon Atoms)	Methods of preparation (Reduction, Wurtz reaction, Kolbe's electrolysis)
	Physical properties
	Chemical reactions (Halogenation, Isomerisation, Oxidation, Aromatization, Combustion, Pyrolysis)
Alkenes (Upto 5 Carbon Atoms)	Methods of preparation (Partial reduction, dehydrohalogenation, dehydration, dehalogenation)
	Physical properties
	Chemical reactions (Addition of H2, X2, Markovnikov's and anti-Markovnikov's rule)
	Addition of HX, and H2O, ozonolysis, oxidation and polymerization
Alkynes (Upto 5 Carbon Atoms)	Methods of preparation (Hydrolysis of calcium carbide, dehydrohalo- genation)
	Physical properties
	Chemical reactions (Addition of H2, X2, HX, and H2O and polymerization)
Arenes	Nomenclature, resonance and stability of benzene, orientation effect of substituents in benzene, preparation physical and chemical properties of benzene
Haloalkanes and haloarenes	Structure
	Classification
	Structure of 1^0, 2^0 and 3^0 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, Kolbes Reimer - Tiemann, deoxygenation and oxidation)
Preparation of Ethers & chemical Properties	Preparation from alcohols
	Williamsons 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, Cannizzarro reaction, electrophiclic 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 azodyes 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	Environmental pollution
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