

Smt. A.A.A. Govt. P. G. College, Kalka

Department Of Chemistry

Name of Assistant Professor: Dr. Indu

Class- B. Sc. I (Sem-I)

Paper	Month	Topic
(Inorganic Chemistry)	October	Atomic Structure: Idea of de Broglie matter waves, Heisenberg's uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ^2 , probability distribution curves, shapes of s, p, d, f orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rules, Electronic configuration of elements, effective nuclear charge, Slater's rules.
	November	Periodic table and atomic properties: Classification of periodic table into s, p, d, f blocks, atomic and ionic radii, ionisation energy, electron affinity and electronegativity definition, methods of determination or evaluation, trend in periodic table (in s and p-block elements), Pauling, Mulliken, Allred Rachow and Mulliken Jaffe's electronegativity scale, Sanderson's electron density ratio.
	December	Covalent Bond: Valence bond theory (Heitler-London and Pauling approach) and its limitation, directional characteristics of covalent bond, various type of hybridisation and shapes of simple inorganic molecules and ions (BeF_2 , BF_3 , CH_4 , PF_5 , SF_6 , IF_7 , SO_4^{2-} , ClO_4^- , NO_3^-) valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 , ClF_3 , H_2O , SnCl_2 , ClO_3^- and ICl_2^- . Molecular orbital theory of homonuclear (N_2 , O_2) heteronuclear (CO and NO) diatomic molecules and ions, bond energy, bond angle, bond length and dipole moments, percentage ionic character from dipole moment and electronegativity difference.
	January	Ionic Solids: Ionic structures (NaCl , CsCl , ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, Madelung constant, Stoichiometric and Non stoichiometric defects in crystals, Lattice energy (mathematical derivation excluded) and Born-Haber cycle, Solvation energy and its relation with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.
(Physical Chemistry)	October	Liquid States: Structure of liquids, Properties of liquids – surface tension, refractive index, viscosity, vapour pressure and optical rotation.alkynes.
	November	Gaseous States: Kinetic Molecular Theory of Gases, Maxwell's distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behavior, Derivation of Van der Waal's Equation of State, its application in the calculation of Boyle's temperature (compression factor)
	December	Critical Phenomenon: Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal's equation, relationship between critical constants and Vander Waal's constants. Critical compressibility factor. The Law of corresponding states.
	January	Solid State: Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of Laue method, rotating crystal method and powder pattern method.
(Organic Chemistry)	October	Structure and Bonding: Localized and delocalized chemical bond, Vander Waal's interactions, resonance: conditions, resonance effect and its applications, hyper conjugation, inductive effect, Electromeric effect & their comparison.
	November	Mechanism of Organic Reactions: Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. carbocations, carbanions, free radicals,—Reactive intermediates carbenes, (formation, structure & stability).
	December	Stereochemistry of Organic Compounds: Concept of isomerism. Types of isomerism. elements of symmetry, molecular chirality, Optical isomerism enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic

	centers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, R & S systems of nomenclature. determination of configuration of—Geometric isomerism geometric isomers. E & Z system of nomenclature, conformational analysis of ethane—Conformational isomerism and n-butane, conformations of cyclohexane, axial and equatorial bonds. Newman projection and Sawhorse formulae, Difference between configuration and conformation.
January	Alkanes and Cycloalkanes: IUPAC nomenclature of branched and unbranched alkanes, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity. nomenclature, synthesis of cycloalkanes and their derivatives Cycloalkanes, dihalides, α,ω -photochemical (2+2) cycloaddition reactions, dehalogenation of pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations., theory of strain less rings.