

**Lesson Plan**

Name of the Assistant/ Associate Professor: **KULDEEP** Sem Ist

Class and Section: **B.Sc Ist**

Subject: **Chemistry**

Month	Topics
21 <sup>st</sup> July 2023 to 31 <sup>st</sup> July 2023	Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, , quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals. General principles of periodic table: Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge, Slater's rules. Atomic and ionic radii, ionization energy, electron affinity and electronegativity –definition, methods of determination or evaluation, trends in periodic table
1 <sup>st</sup> August 2023 to 31 <sup>st</sup> August 2023	Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions ( BeF <sub>2</sub> , BF <sub>3</sub> , CH <sub>4</sub> , PF <sub>5</sub> , SF <sub>6</sub> , IF <sub>7</sub> SO <sub>4</sub> <sup>2-</sup> , ClO <sub>4</sub> <sup>-</sup> )Valence shell electron pair repulsion (VSEPR) theory to NH <sub>3</sub> , H <sub>3</sub> O <sup>+</sup> , SF <sub>4</sub> , ClF <sub>3</sub> , ICl <sub>2</sub> <sup>-</sup> and H <sub>2</sub> O. MO theory of heteronuclear (CO and NO) diatomic molecules, , bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference. Ionic structures (NaCl, CsCl, ZnS (Zinc Blende), CaF <sub>2</sub> ) radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, 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.
1 <sup>st</sup> September 2023 to 30 <sup>th</sup> Sept. 2023	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. Deviation of Real gases from ideal behaviour. Derivation of Vander Waal's Equation of State, its application in the calculation of Boyle's temperature (compression factor) Explanation of behaviour of real gases using Vander Waal's equation. 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. Liquefaction of gases.
1 <sup>st</sup> October 2023 to 31 <sup>st</sup> Oct. 2023	Structure of liquids. Properties of liquids – surface tension, viscosity vapour pressure and optical rotations and their determination. Classification of solids, Laws of crystallography – (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements of crystals. Definition of unit cell & space lattice. Bravais lattices, crystal system. X-ray diffraction by crystals. Derivation of Bragg equation. Determination of crystal structure of NaCl, KCl. Liquid crystals: Difference between solids, liquids and liquid crystals, types of liquid crystals. Applications of liquid crystals. resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison
1 <sup>st</sup> Nov. 2023 to 24 <sup>th</sup> Nov. 2023	. Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, 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. Geometric isomerism determination of configuration of geometric isomers. E & Z system of nomenclature, Conformational isomerism conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds, Newman projection and Sawhorse formulae, Difference between configuration and conformation. 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.

*Kuldeep*



Energy considerations. Reactive intermediates carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (formation, structure & stability). Assigning formal charges on intermediates and other ionic species. IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties. Cycloalkanes nomenclature, synthesis of cycloalkanes and their derivatives – photochemical (2+2) cycloaddition reactions, dehalogenation of -dihalides, pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations., theory of strainless rings.

Kuldeep  
Teacher's Signature