

## Lesson Plan [Academic Session 2022-2023]

Class: B. Sc First Year [Isemester]

Subject: (CH-103) Organic Chemistry

Ms. Kirna Devi, Lecturer of Chemistry

Month	Topic	Academic Activities
September, 2022	<b>Structure and Bonding:</b> Localized and delocalized chemical bond, Van der Waal's interactions and resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison.	Introduction of Syllabus and Course outcomes Doubt solving sessions Discussion of Previous Years Questions
October, 2022	<b>Stereochemistry of Organic Compounds:</b> 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 erythrodiastereomers, 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.	Sessional Test on topics of Structure and Bonding Discussion on Test Doubt solving sessions Discussion of Previous Years Questions
November, 2022	<b>Mechanism of Organic Reactions:</b> 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. Reactive intermediates: carbocations, carbanions, free radicals, carbenes, (formation, structure & stability). <b>Alkanes and Cycloalkanes:</b> IUPAC nomenclature of branched and unbranched alkanes, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation: Wurtz	Presentation of students Doubt solving sessions Discussion of Previous Years Questions

	reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties.	
<b>December, 2022</b>	<b>Alkanes and Cycloalkanes:</b> Mechanism of free radical halogenation of alkanes: reactivity and selectivity. 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. <b>Syllabus Revision</b>	Discussion of Previous Years Questions  Doubt solving sessions

## Lesson Plan [Academic Session 2022-2023]

Class: B. Sc First Year [Isemester]

Subject: (CH-102) Physical Chemistry

Ms. Kirna Devi, Lecturer of Chemistry

Month	Topic	Academic Activities
September, 2022	<b>Gaseous States:</b> 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)	Introduction of Syllabus and Course outcomes Test to identify Slow and Advanced Learners Doubt solving sessions Discussion of Previous Years Questions
October, 2022	<b>Solid State:</b> 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.	Assignment on topics of Gaseous States Discussion on Assignment Doubt solving sessions Discussion of Previous Years Questions
November, 2022	<b>Critical Phenomenon:</b> Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Van der Waal's equation, relationship between critical constants and Van der Waal's constants. Critical compressibility factor. The Law of corresponding states.	Class Test of Solid State Discussion on Test Doubt solving sessions Discussion of Previous Years Questions
December, 2022	<b>Liquid States:</b> Structure of liquids, Properties of liquids: surface tension, refractive index, viscosity, vapour pressure and optical rotation.  <b>Revision of syllabus</b>	Discussion of Previous Years Questions

## Lesson Plan [Academic Session 2022-2023]

Class: B. Sc Second Year [III semester]

Subject: (CH-203) Organic Chemistry

Ms. Kirna Devi, Lecturer of Chemistry

Month	Topic	Academic Activities
September, 2022	<b>Alcohols:</b> Monohydric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols. Dihydric alcohols: nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc) <sub>4</sub> and HIO <sub>4</sub> ] and pinacol-pinacolone rearrangement.	Introduction of Syllabus and Course outcomes Test to identify Slow and Advanced Learners Doubt solving sessions Discussion of Previous Years Questions
October, 2022	<b>Carboxylic Acids &amp; Acid Derivatives:</b> Nomenclature of Carboxylic acids, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic).	Assignment on Alcohols Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions
November, 2022	<b>Phenols:</b> Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction and Schotten and Baumann reactions. <b>Epoxides:</b> Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. <b>Ultraviolet (UV) absorption spectroscopy:</b> Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts.	Class Test on Carboxylic acid and its derivatives  Discussion on Test  Doubt solving sessions  Presentation of students  Discussion of Previous Years Questions
December, 2022	<b>Ultraviolet (UV) absorption spectroscopy:</b> UV spectra of conjugated dienes and enones, Woodward-Fieser rules, calculation of max of simple conjugated dienes and	Discussion of Previous Years Questions

	unsaturated ketones. Applications of UV Spectroscopy in structure elucidation of simple organic compounds. <b>Revision of syllabus</b>	
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### Lesson Plan [Academic Session 2022-2023]

**Class: B. ScSecond Year [IIIsemester]**

**Subject: (CH-202) Physical Chemistry**

**Ms. Kirna Devi, Lecturer of Chemistry**

Month	Topic	Academic Activities
September, 2022	<b>Thermodynamics:</b> Definition of thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Thermodynamic equilibrium, Concept of heat and work.	Introduction of Syllabus and Course outcomes Doubt solving sessions Discussion of Previous Years Questions
October, 2022	<b>Thermodynamics:</b> First law of thermodynamics: statement, concepts of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule–Thomson coefficient for ideal gas and real gas and inversion temperature. Calculation of $w, q, dU$ & $dH$ for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.	Assignment on various topics of Thermodynamics Discussion on Assignment Doubt solving sessions Discussion of Previous Years Questions
November, 2022	<b>Chemical Equilibrium:</b> Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant. Clausius–Clapeyron equation and its applications. <b>Distribution Law:</b> Nernst distribution law – its thermodynamic derivation, Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride	Class Test of Chemical Equilibrium Discussion on Test Doubt solving sessions Discussion of Previous Years Questions
December, 2022	<b>Distribution Law:</b> (ii) Determination of equilibrium constant of potassium tri-iodide complex and (iii) Process of extraction. More stress on numerical problems. <b>Revision of syllabus</b>	Doubt solving sessions Discussion of Previous Years Questions

## Lesson Plan [Academic Session 2021-2022]

Class: B. Sc Third Year [Vsemester]

Subject: (CH-303) Organic Chemistry

Ms. Kirna Devi, Lecturer of Chemistry

Month	Topic	Academic Activities
September, 2022	<b>Carbohydrates:</b> Classification and nomenclature of Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose. Formation of glycosides, Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.	Introduction of Syllabus and Course outcomes Doubt solving sessions Discussion of Previous Years Questions
October, 2022	<b>Organometallic Compounds:</b> Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.	Assignment on Carbohydrates. Discussion on Assignment Doubt solving sessions Discussion of Previous Years Questions
November, 2022	<b>NMR Spectroscopy:</b> Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift, shielding and deshielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons.	Class Test of Organometallic Compounds Discussion on Test Doubt solving sessions Discussion of Previous Years Questions
December, 2022	<b>NMR Spectroscopy:</b> Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift, shielding and deshielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons. <b>Revision of syllabus</b>	Doubt solving sessions Discussion of Previous Years Questions