

## Teaching Plan for B.Sc. (P) Chemistry, Semester VI (Jan 2024 – May 2024)

Organometallics, Bioinorganic Chemistry, Polynuclear Hydrocarbons and UV, IR Spectroscopy (DSC-12, Part-B - Organic Chemistry)

Faculty Name: **Dr. Kavita Yadav**

S. No.	Month	Week	Topic
1.	Jan-24	3 <sup>rd</sup>	Polynuclear and heteronuclear aromatic compounds: Structure elucidation of naphthalene, preparation and properties of naphthalene and anthracene.
		4 <sup>th</sup>	Polynuclear and heteronuclear aromatic compounds: Structure elucidation of naphthalene, preparation and properties of naphthalene and anthracene.
2.	Feb-24	1 <sup>st</sup>	Preparation and Properties of the following compounds with reference to electrophilic and nucleophilic substitution: furan, pyrrole, thiophene, and pyridine.
		2 <sup>nd</sup>	Preparation and Properties of the following compounds with reference to electrophilic and nucleophilic substitution: furan, pyrrole, thiophene, and pyridine.
		3 <sup>rd</sup>	Preparation and Properties of the following compounds with reference to electrophilic and nucleophilic substitution: furan, pyrrole, thiophene, and pyridine.
		4 <sup>th</sup>	Preparation and Properties of the following compounds with reference to electrophilic and nucleophilic substitution: furan, pyrrole, thiophene, and pyridine.
3.	Mar-24	1 <sup>st</sup>	Internal Test 1/Practice Problems
		2 <sup>nd</sup>	Active methylene compounds Preparation: Claisen ester condensation, Keto-enol tautomerism.
		3 <sup>rd</sup>	Reactions: Synthetic uses of ethyl acetoacetate (preparation of non-hetero molecules having up to 6 carbons).
		4 <sup>th</sup>	Mid-Semester Break
4.	Apr-24	1 <sup>st</sup>	UV-Visible and infrared spectroscopy and their application to simple organic molecules.
		2 <sup>nd</sup>	Electromagnetic radiations and their properties; double bond equivalence and hydrogen deficiency.
		3 <sup>rd</sup>	UV-Visible spectroscopy (electronic spectroscopy): General electronic transitions, $\lambda_{max}$ & $\epsilon_{max}$ , chromophores & auxochromes, bathochromic & hypsochromic shifts. Application of Woodward rules for calculation of $\lambda_{max}$ for the following systems: conjugated dienes - alicyclic, homoannular and heteroannular; $\alpha,\beta$ -unsaturated aldehydes and ketones, charge transfer complex.
		4 <sup>th</sup>	UV-Visible spectroscopy (electronic spectroscopy): General electronic transitions, $\lambda_{max}$ & $\epsilon_{max}$ , chromophores & auxochromes, bathochromic & hypsochromic shifts. Application of Woodward rules for calculation of $\lambda_{max}$ for the following systems: conjugated dienes - alicyclic, homoannular and

			heteroannular; $\alpha,\beta$ -unsaturated aldehydes and ketones, charge transfer complex.
5.	May-24	1 <sup>st</sup>	Infrared (IR) Spectroscopy: Infrared radiation and types of molecular vibrations, significance of functional group & fingerprint region. IR spectra of alkanes, alkenes, aromatic hydrocarbons (effect of conjugation and resonance on IR absorptions), simple alcohols (inter and intramolecular hydrogen bonding and IR absorptions), phenol, carbonyl compounds, carboxylic acids and their derivatives (effect of substitution on $>C=O$ stretching absorptions).
		2 <sup>nd</sup>	<ul style="list-style-type: none"> <li>• Infrared (IR) Spectroscopy: Infrared radiation and types of molecular vibrations, significance of functional group &amp; fingerprint region. IR spectra of alkanes, alkenes, aromatic hydrocarbons (effect of conjugation and resonance on IR absorptions), simple alcohols (inter and intramolecular hydrogen bonding and IR absorptions), phenol, carbonyl compounds, carboxylic acids and their derivatives (effect of substitution on <math>&gt;C=O</math> stretching absorptions).</li> <li>• Internal Test 2/Practice Problems</li> </ul>

## Teaching Plan for B.Sc. (H) Chemistry, Semester II (Jan 2024 – May 2024)

Haloalkanes, Arenes, Haloarenes, Alcohols, Phenols, Ethers and Epoxides

(DSC-5: Organic Chemistry-II)

Faculty Name: **Dr. Kavita Yadav**

S. No.	Month	Week	Topic
1.	Jan-24	3 <sup>rd</sup>	Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent; nucleophilic substitution v/s elimination.
		4 <sup>th</sup>	Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent; nucleophilic substitution v/s elimination.
2.	Feb-24	1 <sup>st</sup>	Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent; nucleophilic substitution v/s elimination.
		2 <sup>nd</sup>	Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent; nucleophilic substitution v/s elimination.
		3 <sup>rd</sup>	Organometallic compounds of Mg (Grignard reagent) – Use in synthesis of organic compounds.
		4 <sup>th</sup>	Internal Test 1/Practice Problems
3.	Mar-24	1 <sup>st</sup>	Concept of Aromaticity and anti-aromaticity; Electrophilic aromatic substitution: halogenation, nitration, sulphonation, Friedel Crafts alkylation/acylation with their mechanism. Directing effects of groups in electrophilic substitution.
		2 <sup>nd</sup>	Concept of Aromaticity and anti-aromaticity; Electrophilic aromatic substitution: halogenation, nitration, sulphonation, Friedel Crafts alkylation/acylation with their mechanism. Directing effects of groups in electrophilic substitution.
		3 <sup>rd</sup>	Concept of Aromaticity and anti-aromaticity; Electrophilic aromatic substitution: halogenation, nitration, sulphonation, Friedel Crafts alkylation/acylation with their mechanism. Directing effects of groups in electrophilic substitution.
		4 <sup>th</sup>	Mid-Semester Break
4.	Apr-24	1 <sup>st</sup> & 2 <sup>nd</sup>	Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.
		3 <sup>rd</sup>	Alcohols: Relative reactivity of 1°, 2°, 3° alcohols, reactions of alcohols with sodium, HX (Lucas test), esterification, oxidation (with PCC, alkaline KMnO4, acidic dichromate, conc. HNO3).

			Oppenauer oxidation; Diols: oxidation of diols by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement.
		4 <sup>th</sup>	Alcohols: Relative reactivity of 1°, 2°, 3° alcohols, reactions of alcohols with sodium, HX (Lucas test), esterification, oxidation (with PCC, alkaline KMnO <sub>4</sub> , acidic dichromate, conc. HNO <sub>3</sub> ). Oppenauer oxidation; Diols: oxidation of diols by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement.
5.	May-24	1 <sup>st</sup>	Phenols: Preparation using Cumene hydroperoxide, Acidity and factors affecting it, Kolbe's-Schmidt reactions, Riemer-Tiemann reaction, Houben-Hoesch condensation, Schotten-Baumann reaction, Fries and Claisen rearrangements and their mechanism. Ethers and Epoxides: Acid and Base catalyzed cleavage reactions.
		2 <sup>nd</sup>	Phenols: Preparation using Cumene hydroperoxide, Acidity and factors affecting it, Kolbe's-Schmidt reactions, Riemer-Tiemann reaction, Houben-Hoesch condensation, Schotten-Baumann reaction, Fries and Claisen rearrangements and their mechanism. Ethers and Epoxides: Acid and Base catalyzed cleavage reactions.  Internal Test 2/Practice Problems