

GOVERNMENT COLLEGE BIROHAR (JHAJJAR)

Summary of Lesson Plans of College Faculty for Academic Session 2024-25 w.e.f. 22-07-2024

Name of Assistant/Associate Professor: RAJESH KUMAR

Class: B.Sc. 2nd

Subject: CHEMISTRY (Inorganic) IIIrd Sem

Semester: IIIrd

Months	Topics/Chapters to be Covered
July 2024	CHEMISTRY of d-Block Elements.
	→ Definition of Transition elements, position in the Periodic Table.
	→ General characteristics.
August 2024	→ Properties of 1 st transition elements.
	→ Structure and Properties of some compounds of transition elements → TiO_2 , $VOCl_3$, $FeCl_3$, $CuCl_2$ and $Ni(CO)_4$ (basicity). Gravimetric Analysis.
	Quantitative estimation of Cu^{2+} as Copper thiocyanate.
	Chemistry of Elements of II nd and III rd transition Series
→ General characteristics and properties of II nd and III rd transition elements. Test of 1 st transition series	
September 2024	Comparison of Properties of 3d elements with 4d and 5d elements with reference only to ionic radii.
	→ Oxidation state
	→ Magnetic and spectral properties and
	→ stereochemistry.
	Practical Quantitative estimation of Ni^{2+} as Ni-DMS.
	② To verify Beer-Lambert's Law for $KMnO_4$ / $K_2Cr_2O_7$ and determine the concentration of the given $KMnO_4$ / $K_2Cr_2O_7$ solution

"Coordination Compounds"	
October 2024	<ul style="list-style-type: none"> → Werner's Coordination theory, effective atomic number concept, Chelates → Nomenclature of coordination compound. isomerism in coordination compounds. Valence Bond Theory of Transition metal complexes. → Before assignment of Coordination Compounds <p><u>Practicals</u></p> <p>Separation of Cu^{2+}, Prussian blue from Fe^{3+} fillings, tetraamminecopperic sulphate, chrome alum.</p>
"Non-Aqueous Solvents"	
November 2024	<ul style="list-style-type: none"> → Physical Properties of a solvent → Type of solvents and their general characteristics → Reactions in non-aqueous solvents with reference to lig. NH_3 and lig. SO_2. Test of Non-aq. solvents <p><u>Practical</u> :- Prep. of Potassium trioxalochromate III.</p>


 Signature of Asst/Asso. Professor

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Summary of Lesson Plans of College Faculty for Academic Session 2024-25

Name of Assistant/Associate Professor: RAJESH KUMAR
 Class: B.Sc. 2nd Subject: CHEMISTRY (Physical)
 Semester: IIIrd

Months	Topics/Chapters to be Covered
July 2024	Thermodynamics - I → Definition of thermodynamic terms: - System, surrounding etc → Types of system.
August 2024	Intensive and extensive Properties. State and Path function and their differentials - Thermodynamic process. Concept of Heat and work. Zeroth law of thermodynamics. 1st law of thermodynamics - Statement, definition of internal energy and enthalpy. Heat capacity at const. volume and pressure and their relationship. Joule's law - Thomson coefficient for ideal and real gas and inversion temperature. Test of Unit - Thermodynamic - 1st Practical Systematic identification (detection of extra elements, functional groups, determine the m.pt. and b.pt.)
September 2024	Thermodynamics - II Calculation of $w, q, \Delta U$ and ΔH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process; Temp. dependence of enthalpy Kirchoff's equation. Bond energies and application of bond energies. Prepare assignment of Thermodynamic - II → Preparation of Naphthalene anthracene, benzyl chloride, p-dichlorobenzene

October
2024

Chemical Equilibrium

Equilibrium constant and free energy, concept of chemical potential. Thermodynamic derivation of law of chemical equilibrium. Temp. dependence of equilibrium const. Van't Hoff reaction isochore. Van't Hoff reaction isotherm - Le-Chatelier's principle and its applications. Clapeyron equation and Clausius-Clapeyron equation its applications. Test of chemical equilibrium. Practicals:-
Prep. of p-nitrotoluene, resorcinol, benzophenone, cinnamic acid, benzoic acid.

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Distribution Law

November
2024

Nernst distribution law - its thermodynamic derivation, modification of distribution law when solute undergoes dissociation, association and chemical combination. Applications of distribution law - (i) Determination of degree of hydrolysis and hydrolysis const. of aniline HCl (ii) Determination of equilibrium const. of potassium tri-iodide complex and process of extraction.



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Summary of Lesson Plans of College Faculty for Academic Session 2024-25

Name of Assistant/Associate Professor: RAJESH KUMAR

Class: B.Sc. IInd Subject: CHEMISTRY (ORGANIC)

Semester: 3rd

Months	Topics/Chapters to be Covered
July 2024	Alcohols :- Monohydric alcohols, nomenclature, methods of formation by reducing aldehyde, ketones, carboxylic acids and esters. H-Bonding, Acidic nature. Reactions of alcohols. Dihydric alcohols - Nomenclature
August 2024	Methods of Dihydric alcohols. Chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement. Epoxide :- Synthesis of epoxide. Acid and Base-catalyzed ring opening of epoxides, orientation of epoxide ring opening. Re's of Grignard and organolithium reagents with epoxide. Test of alcohol Unit - Practical: To determine the CST of phenol-water system.
September 2024	"Phenol" Nomenclature, structure and bonding. Preparation of Phenols, Physical prop. and acidic character. Comparative acidic strengths of alcohols and phenols. Resonance stabilization of phenoxide ion. Re's of phenol - electrophilic aromatic substitution. Mech. of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann Re's, Kolbe's reaction and Schotten and Baumann reactions. Prepare assignment of Phenol Practical: To determine the solubility of benzoic acid at various temp. and to determine the ΔH of dissolution process.

October 2024

"Ultraviolet (UV) absorption spectroscopy"

→ Absorption law (Beer-Lambert law), molar absorptivity, presentation and analysis of UV-spectra, Types of electronic transition, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts. UV spectra of conjugated enes and enones, Woodward-Fieser rules. Calculation of λ_{max} of simple conjugated dienes and α,β -unsaturated ketones. Applications of UV-spectroscopy in str. elucidation of simple organic compounds.

Test of UV-absorption spectroscopy

Practicals To determine enthalpy of soln of solid salts.

→ To study the distribution of iodine b/w H_2O and CCl_4 .

November 2024

"Carboxylic Acids and Acid Derivatives"

→ Nomenclature, structure, bonding, physical and chemical properties. Preparation of carboxylic acids. Re^{ns} of acids - Hell-volhard-Zelinsky Reⁿ, Reduction, decarboxylation process. Relative stability of acyl derivatives. Physical Prop., interconversion of acid derivative by nucleophilic acyl substitution. Mech. of esterification and hydrolysis (acidic and basic) Practicals

→ To determine the enthalpy of neutralization of a weak acid/weak base vs strong base/strong acid and determine the enthalpy of ionization of the weak acid/weak base.


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