

GOVERNMENT COLLEGE BIROHAR (JHAJJAR)

Summary of Lesson Plans of College Faculty for Academic Session 2024- 2025

Name of Assistant/Associate Professor: RAJESH KUMAR

Class & Sem.: B.Sc. 2nd/4th Sem Subject: CHEMISTRY (Physical)

Months	Topics/Chapters to be Covered
Jan 2025	"Thermodynamics - III" :- Second law of Thermodynamics, need for the law, different statement of Law, Carnot's cycles and its efficiency, Carnot's theorem, Thermodynamic scale of temp. Concept of Entropy - Entropy as a state function, entropy as a function of V and T, P and T, Entropy change in Physical change, Entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.
Feb 2025	"Thermodynamic - IV" 3rd law of thermodynamics, Nernst Heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions :- Gibbs function G and Helmholtz function A as thermodynamic quantities, A and G as a criteria of thermodynamic equilibrium and spontaneity, their advantage over entropy change variation of G and A with P, V and Temperature.
March 2025	"Electrochemistry - III" :- Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells, EMF of cell and its measurement, Weston standard cell, activity and activity coefficients, calculation of thermodynamic quantities of cell reaction (ΔG, ΔH and K) Types of reversible electrodes - metal-metal ion gas electrode, metal-insoluble salt-anion and redox electrodes. Electrode reactions. Nernst equations, derivation of cell EMF and single electrode Potential. SHE, reference electrode, standard electrode potential, sign conventions, electrochemical series and its applications.
April 2025	"Electrochemistry - IV" Concentration cells with and without transference, liquid junction potential, application of EMF measurement i.e. Valency of ions, solubility product, activity coefficient, potentiometric titration (acid-base and redox). Determination of pH using Hydrogen electrode, Quinhydrone electrode and glass electrode by potentiometric methods.

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Name of Assistant/Associate Professor: RAJESH KUMAR

Class & Sem.: B.Sc. 2nd / 4th Sem Subject: CHEMISTRY (ORGANIC)

Months	Topics/Chapters to be Covered
Jan 2025	<u>"Infrared (IR) Absorption Spectroscopy"</u> molecular vibration, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds.
Feb 2025	<u>"Amines"</u> Structure and nomenclature of amines, physical properties, separation of a mixture of 1°, 2° and 3° amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines:- Reduction of nitro compounds, nitrites, reductive amination of aldehydic and ketonic comp. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid.
March 2025	1. <u>Diazonium Salts</u>:- mech. of Diazotization, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO₂, CN groups. reduction of diazonium salts to hydrazines, coupling reaction and its synthetic applications. 2. <u>Nitro Compounds</u>:- Prep. of nitro alkanes and nitro arenes and their chemical reactions. Mechanism of electrophilic substitution reactions in nitro arenes and their reductions in acidic, neutral and alkaline medium.
April 2025	<u>Aldehyde and ketones</u>:- Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chloride, advantage of oxidation of alcohols with chromium trioxide pyridinium chlorochromate (PCC) and Pyridinium dichromate, Physical properties, comparison of reactivities of aldehydes and ketones. Mech. of nucleophilic additions to carbonyl grps. with particular emphasis on benzoin, aldol, Perkin, Knoevenagel condensations, Condensations with NH₃ and its derivatives. Wittig R¹, Mannich R¹, oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro R¹, MPV, Clemmensen, Wolff-Kishner, LiAlH₄ and NaBH₄ reductions.

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Name of Assistant/Associate Professor: TRAJESH KUMAR

Class & Sem.: B.Sc. 2nd / 4th Sem Subject: CHEMISTRY (Inorganic)

Months	Topics/Chapters to be Covered
Jan 2025	<u>"Chemistry of f-Block Elements"</u> Lanthanides:- → Electronic structure → Oxidation state and Ionic radii → Lanthanide contraction → Complex formation → Occurrence and isolation of Lanthanide compounds.
Feb 2025	<u>"Chemistry of f-Block Elements"</u> Actinides:- → General features and chemistry of Actinides. → Chemistry of separation of Np, Pu and Am from U. → Comparison of properties of Lanthanide and Actinide → Comparison of f-Block Elements with transition Elements.
March 2025	<u>Theory of Qualitative and Quantitative Inorganic Analysis-I</u> → Chemistry of analysis of various acidic radicals. → Chemistry of acid radicals in typical combinations → Chemistry of interference of acid radicals including their removal in the analysis of basic radicals.
April 2025	<u>Theory of Qualitative and Quantitative Inorganic Analysis-II</u> Chemistry of analysis of various groups of basic radicals → Theory of precipitation → Co-precipitation → Post-precipitation → Purification of precipitates.



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