

Govt. College, Bherian (Pehowa)
Lesson Plan
2023-24 (Even Semester)

B.Phys.Sc. Chemistry 2nd Semester

Mr. Lalit Vats

Subject : Chemistry

Week 1

Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties.

Week 2

Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strainless rings. Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism.

Week 3

The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration-oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.

Week 4

Hydroboration-oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.

Week 5

Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction.

Week 6

Integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation

Week 7

Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, of distribution law.

Week 8
Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride
Week 9
Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application
Week 10
Brief discussion of various types of Van der Waals forces. Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators).
Week 11
Semiconductors – Introduction, types, and applications.
Week 12
Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.
Week 13
Molecular orbital theory of homonuclear (N_2 , O_2) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond.
Week 14
Ionic structures ($NaCl$, $CsCl$, ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, Concept of Lattice energy, Born- Haber cycle.
Week 15
Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.

Aradhya
(Chait)

Govt. College, Bherian (Pehowa)

Lesson Plan

2023-24 (Even Semester)

B.Sc. Chemistry 4th Semester

Mr. Lalit Vats

Subject : Chemistry

Week 1

Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines

Week 2

Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds)

Week 3

Gabriel -phthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.

Week 4

Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO₂ and CN groups reduction of diazonium salts to hydrazines, coupling reaction and its synthetic application.

Week 5

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides,

Week 6

Advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridinium chlorochromate (PCC) and pyridinium dichromate. Physical properties, Comparison of reactivities of aldehydes and ketones.

Week 7

Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations

Week 8

Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, LiAlH₄ and NaBH₄ reductions

Week 9
Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum
Week 10
Fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds
Week 11
Thermodynamics. Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycle and its efficiency, Carnot's theorem and its problems
Week 12
Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium.
Week 13
Problems based on entropy. Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data.
Week 14
Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, G as criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T.
Week 15
Numericals based on thermodynamics

Aradhya
(Calicut)

Govt. College, Bherian (Pehowa)

Lesson Plan

February 2023 to May 2023 (Even Semester)

B.Sc. Chemistry 6th Semester

Mr. Lalit Vats

Subject : Chemistry

Week 1

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine

Week 2

Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives.

Week 3

Comparison of basicity of pyridine, piperidine and pyrrole.
Introduction to condensed five and six- membered heterocycles

Week 4

Preparation and reactions of indole, quinoline and isoquinoline. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline.

Week 5

Acidity of α -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate

Week 6

Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler -Natta polymerization and vinyl polymers.

Week 7

Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers.

Week 8

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult's law.

Week 9

Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure



Week 10
Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.
Week 11
Statement and meaning of the terms – phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system – Example – water system.
Week 12
Phase equilibria of two component systems solid-liquid equilibria, simple eutectic. Example Pb-Ag system, desilverisation of lead
Week 13
Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of α -amino acids.
Week 14
Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides
Week 15
Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptides and proteins : Primary & Secondary structure.

Aradhya
(Kaleet)