## Lesson Plan

Name of Assistant/Associate Prof. : CHIRANJIV TAYAL
Class & Section : B.Sc. 1st Semester
Subject : Organic Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 25.07.2023 to 27.07.2023 | • Structure and Bonding Localized and delocalized chemical bond, van der Waals interactions, resonance, conditions. |
| 28.07.2023 to 03.08.2023 | • Resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison. |
| 04.08.2023 to 10.08.2023 | • Stereochemistry of Organic Compounds-I Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers. |
| 11.08.2023 to 17.08.2023 | • Stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres. |
| 18.08.2023 to 24.08.2023 | • Diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. |
| 25.08.2023 to 31.08.2023 | • Stereochemistry of Organic Compounds-II Relative and absolute configuration, sequence rules, R & S systems of nomenclature. |
| 01.09.2023 to 07.09.2023 | • Geometric isomerism determination of configuration of geometric isomers. E & Z system of nomenclature. |
| 08.09.2023 to 14.09.2023 | • Conformational isomerism conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds. |
| 15.09.2023 to 21.09.2023 | • Newman projection and Sawhorse formulae, Difference between configuration and conformation. |
| 22.09.2023 to 28.09.2023 | • Mechanism of Organic Reactions 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 |
| 29.09.2023 to 05.10.2023 | • Types of organic reactions. Energy considerations |
| 06.10.2023 to 12.10.2023 | • Reactive intermediates carbocations, carbanions, free radicals, carbenes , arynes and nitrenes (formation, structure & stability). Assigning formal charges on intermediates and other ionic species. |
| 13.10.2023 to 19.10.2023 | • Alkanes and Cycloalkanes IUPAC nomenclature of branched and unbranched alkanes the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources. |
| 20.10.2023 to 26.10.2023 | • Methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), Physical properties. |
| 27.10.2023 to 02.11.2023 | • Cycloalkanes nomenclature, synthesis of cycloalkanes and their derivatives , photochemical (2+2) cycloaddition reactions, dehalogenation of dihalides, |

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| 03.11.2023 to 09.11.2023 | • Pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations., theory of Strainless rings. |
| **10.11.2023 to 16.11.2023** | **Diwali Vacation** |
| 17.11.2023 to 24.11.2023 | Revision of Syllabus |

CHIRANJIV TAYAL
DEPARTMENT OF CHEMISTRY
G.C.W NARNAUL

## Lesson Plan

Name of Assistant/Associate Prof. : CHIRANJIV TAYAL
Class & Section : B.Sc. 5th Semester
Subject : Organic /Physical Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 25.07.2023 to 27.07.2023 | • NMR Spectroscopy-I 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. |
| 28.07.2023 to 03.08.2023 | • Proton counting,splitting of signals and coupling constants, magnetic equivalence of protons. NMR Spectroscopy-II Discuss ion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane, ethanol. |
| 04.08.2023 to 10.08.2023 | • Ethyl acetate, toluene, benzaldehyde and acetophenone..Simple problems on PMR spectroscopy for structure determination of organic compounds |
| 11.08.2023 to 17.08.2023 | • Carbohydrates-I Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, |
| 18.08.2023 to 24.08.2023 | • Chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose in to mannose. Formation of glycos ides, ethers and esters. |
| 25.08.2023 to 31.08.2023 | • Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism ofmutarotation. Structures of ribose and deoxyribose. |
| 01.09.2023 to 07.09.2023 | • Carbohydrates-II An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. |
| 08.09.2023 to 14.09.2023 | • Organometallic Compounds Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. |
| 15.09.2023 to 21.09.2023 | • Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. |
| 22.09.2023 to 28.09.2023 | • Spectroscopy-I Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Bornoppenheimer approximation, Degrees of freedom. |
| 29.09.2023 to 05.10.2023 | • Rotational Spectrum Diatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution). |
| 06.10.2023 to 12.10.2023 | • Determination of bond length, qualitative description of non-rigid rotor, isotope effect,Numerical Problem. |
| 13.10.2023 to 19.10.2023 | • Spectroscopy-II Vibrational spectrum Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond |

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| | energies. |
| 20.10.2023 to 26.10.2023 | • Effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups. |
| 27.10.2023 to 02.11.2023 | • Raman Spectrum: Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, Quantum theory of Raman spectra. |
| 03.11.2023 to 09.11.2023 | • Selection rules, Quantum theory of Raman spectra. |
| **10.11.2023 to 16.11.2023** | **Diwali Vacation** |
| 17.11.2023 to 24.11.2023 | Revision of Syllabus |

CHIRANJIV TAYAL
Dept. of Chemistry
GCW, Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : CHIRANJIV TAYAL
Class & Section : B.Sc 6th Sem
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Heterocyclic Compounds-I Introduction: Molecular orbital Picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution |
| 22.01.2024 to 28.01.2024 | • Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine , Piperidine and Pyrole. Introduction to condensed five and six- membered heterocycles. |
| 29.01.2024 to 04.02.2024 | • Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline |
| 05.02.2024 to 11.02.2024 | • Organosulphur Compounds Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyl and aryl sulphonates |
| 12.02.2024 to 18.02.2024 | • Organic Synthesis via Enolates Acidity of -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate |
| 19.02.2024 to 25.02.2024 | • Synthetic Polymers Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensat ion or step growth polymerization. Polyeste rs ,polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy re sins and polyurethanes. Natural and synthetic rubbers. |
| 26.02.2024 to 03.03.2024 | • Solutions: Dilute Solutions and Colligative Properties Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution,Colligative properties, Raolut's law, relative lowering of vapour pressure, molelcular weight determination. |
| 04.03.2024 to 10.03.2024 | • Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. |
| 11.03.2024 to 17.03.2024 | • Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes |
| 18.03.2024 to 22.03.2024 | • Phase Equillibrium 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 and Sulphur systems. |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |

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| 01.04.2024 to 07.04.2024 | • Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilerisation of lead |
| 08.04.2024 to 14.04.2024 | • Revision of Syllabus |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |
| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

Chiranjiv Tayal
Dept. of Chemistry
GCW, Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : Chiranjiv Tayal
Class & Section : B.Sc. 2nd Semester
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Alkenes Nomenclature of alkenes, , mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides,. The Saytzeff rule, Hofmann elimination, physical p roperties and relative stabilities of alkenes. Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration–oxidation, oxymercurationreduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO4 |
| 22.01.2024 to 28.01.2024 | • Arenes and Aromaticity Nomenclatu re of benzene deriva tives:. Aromatic nucleus and side chain. Aromaticity: the Huckel rule, aromatic ions, annulenes up to 10 carbon atoms, aromatic, anti - aromatic and non – aromatic compounds. Aromatic electrophilic substitution general pattern of the mechanism, mechansim of nitration, halogenation, sulphonation, and Friedel-Crafts reaction. Energy profile diagrams. Activating , deactivating substituents and orientation. |
| 29.01.2024 to 04.02.2024 | • Dienes and Alkynes Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of butadiene,. Chemical reactions 1,2 and 1,4 additions (Electrophilic & free radical mechanism), Diels-Alder reaction. Kinetics-I Rate of reaction, rate equation, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. |
| 05.02.2024 to 11.02.2024 | • Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-Oxidation of Alkynes. Order of a reaction, integrated rate expression for zero order, first order, second and third order reaction. Half life period of a reaction. Methods of determination of order of reaction. |
| 12.02.2024 to 18.02.2024 | • Alkyl and Aryl Halides Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides , SN2 and SN1reactions with energy profile diagrams. Kinetics-II Effect of temperature on the rate of reaction – Arrhenius equation. |
| 19.02.2024 to 25.02.2024 | • Methods of formation and reactions of aryl halides, The additionelimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides. Theories of reaction rate – Simple collision theory for unimolecular and bimolecular collision. Transition state theory of Bimolecular reactions |
| 26.02.2024 to 03.03.2024 | • Electrochemistry-I Electrolytic conduction, factors affecting electrolytic conduction, specific, conductance, molar conductance,equivalent conductance and relation among them, their vartion with concentration.Arrhenius theory of ionization, Ostwald's Dilution Law. Debye- Huckel – Onsager's equation for strong electrolytes |

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| | (elementary treatment only) Transport number, definition and determination by Hittorfs methods, (numerical included) |
| 04.03.2024 to 10.03.2024 | • Electrochemistry-II Kohlarausch's Law, calculation of molar ionic conductance and effect of viscosity temperature & pressure on it. Application of Kohlarausch's Law in calculation of conductance of weak electrolytes at infinite diloution. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids determination of solubility product of spa ringly soluble salts, conductometric titrations. Definition of pH and pKa, Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action. |
| 11.03.2024 to 17.03.2024 | • Hydrogen Bonding & Vander Waals Forces Hydrogen Bonding – Definition, Types, effects of hydrogen bonding on properties of substances, applicat ion Brief discussion of various types of Vander Waals Forces . Metallic Bond and Semiconductors Metallic Bond- Brie f introduction to meta llic bond, band theory of metallic bond Semiconductors- Introduction, types and applications. |
| 18.03.2024 to 22.03.2024 | • S-Block Elements Comparative study of the elements including , diagonal relationships, salient features of hydrides (methods of preparation excluded), solvation and complexation tendencies including their function in biosystems. Chemis try of Noble Gases Chemical properties of the noble gases with emphasis on their low chemical reactivity, chemistry of xenon, structure and bonding of fluorides, oxides & oxyfluorides of xenon |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |
| 01.04.2024 to 07.04.2024 | • P-Block Elements Emphasis on comparative study of properties of p-block elements (including diagonal relationship and excluding methods of preparation). Boron family (13th gp):- Diborane – properties and structure (as an example of electron – deficient compound and multicentre bonding), Borazene – chemical properties and structure Trihalides of Boron – Trends in fewis acid character structure of aluminium (III).chloride. Carbon Family (14th group) Catenation, p π– d π bonding (an idea), carbides, fluorocarbons, silicates structural aspects), silicons – general methods of preparations, properties and uses |
| 08.04.2024 to 14.04.2024 | • Nitrogen Family (15th group) Oxides – structures of oxides of N,P. oxyacids – structure and relative acid strengths of oxyacids of Nitrogen and phosphorus. Structure of white, yellow and red phosphorus. Oxygen Family (16th group) Oxyacids of sulphur – structures and acidic strength $H_2O_2$ –structure, properties and uses. Halogen Fami l y (17th group) Basic prope r ties of ha logen, interha logens types propert ies ,hydro and oxyacids of chlorine – structure and comparison of acid strength . |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |
| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

Chiranjiv Tayal
Dept. of Chemistry
G.C.W Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : Dr. Deepika Rana
Class & Section : B.Sc 6th Sem
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Organometallic Chemistry Definition, nomenclature and classification of organometallic compounds. |
| 22.01.2024 to 28.01.2024 | • Preparation, properties, and bonding of alkyls of Li, Al, Hg, and Sn a brief account of metal-ethylenic complexes |
| 29.01.2024 to 04.02.2024 | • Mononuclear carbonyls and the nature of bonding in metal carbonyls. |
| 05.02.2024 to 11.02.2024 | • Acids and Bases, HSAB Concept Arrhenius, Bronsted – Lowry, the Lux – Flood, Solvent system and Lewis concepts of acids & bases. |
| 12.02.2024 to 18.02.2024 | • Relative strength of acids & bases, Concept of Hard and Soft Acids & Bases |
| 19.02.2024 to 25.02.2024 | • Symbiosis, electronegativity and hardness and softness |
| 26.02.2024 to 03.03.2024 | • Bioinorganic Chemistry Essential and trace elements in biological processes. |
| 04.03.2024 to 10.03.2024 | • Metalloporphyrins with special reference to haemoglobin and myoglobin |
| 11.03.2024 to 17.03.2024 | • Biological role of alkali and alkaline earth metal ions with special reference to Ca2+. Nitrogen fixation |
| 18.03.2024 to 22.03.2024 | • Spectroscopy-III Electronic Spectrum Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck- Condon principle. Qualitative description of sigma and pie and n molecular orbital (MO) their energy level and respective transitions. |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |
| 01.04.2024 to 07.04.2024 | • Silicones and phosphazenes, their preparation, properties,structure and use |
| 08.04.2024 to 14.04.2024 | • Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, Stark- Einstein law (law of photochemical equivalence) Jablonski diagram depiciting various processes occurring in the excited state. qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes. |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |
| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

Dr. Deepika Rana
DEPARTMENT OF CHEMISTRY
G.C.W NARNAUL

## Lesson Plan

Name of Assistant/Associate Prof. : Dr. Deepika Rana
Class & Section : B.Sc. 4th Semester
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Chemistry of f – block elements Lanthanides Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds. |
| 22.01.2024 to 28.01.2024 | • Chemis try of f – block elements Actinides General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Comparison of properties of Lanthanides and Actinides and with trans ition elements |
| 29.01.2024 to 04.02.2024 | • Theory of Quali tative and Quanti tative Inorganic Analysis-I Chemistry of analysis of various acidic radicals, Chemistry of identification of acid radicals in typical combinations. |
| 05.02.2024 to 11.02.2024 | • Chemistry of interference of acid radicals including their removal in the analys is of basic radicals. |
| 12.02.2024 to 18.02.2024 | • Theory of Quali tative and Quanti tative Inorganic Analysis-II Chemistry of analysis of various groups of basic radicals, Theory of precipitation, co- precipitation, Post-precipitation, purification of precipitates. |
| 19.02.2024 to 25.02.2024 | • Diazonium Salts 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 hyrazines, coupling reaction and its synthetic application |
| 26.02.2024 to 03.03.2024 | • Nitro Compounds Preparation of nitro alkanes and nitro arenes and their chemical reactions. |
| 04.03.2024 to 10.03.2024 | • Mechanism of electrophilic substitution reactions in nitro arenes and their reductions in acidic, neutral and alkaline medium |
| 11.03.2024 to 17.03.2024 | • Aldehydes and Ketones Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides. |
| 18.03.2024 to 22.03.2024 | • 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. |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |
| 01.04.2024 to 07.04.2024 | • Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. |
| 08.04.2024 to 14.04.2024 | • Wittig reaction. Mannich reaction.Oxidation of aldehydes, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, LiAlH4 and $NaBH_4$ reduction |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |

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| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

Dr Deepika Rana
Dept. of Chemistry
G.C.W Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : Dr. Deepika Rana
Class & Section : B.Sc. 1st Semester
Subject : Organic Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 25.07.2023 to 27.07.2023 | • Atomic Structure Idea of de Broglie matter waves, Heisenberg uncertainty principle. |
| 28.07.2023 to 03.08.2023 | • Atomic orbitals, , Quantum numbers |
| 04.08.2023 to 10.08.2023 | • Radial and angular wave functions and probability distribution curves,<br>• shapes of s, p, d orbitals. |
| 11.08.2023 to 17.08.2023 | • Periodic Properties General principles of periodic table: Aufbau and Pauli exclusion principles. |
| 18.08.2023 to 24.08.2023 | • Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge, Slater's rules |
| 25.08.2023 to 31.08.2023 | • Atomic and ionic radii, ionization energy, |
| 01.09.2023 to 07.09.2023 | • Electron affinity and electronegativity –definition, methods of determination or evaluation, trends in periodic table (in s &p block elements) |
| 08.09.2023 to 14.09.2023 | • Covalent Bond Valence bond theory and its limitations, directional characteristics of covalent bond. |
| 15.09.2023 to 21.09.2023 | • Various types of hybridization and shapes of simple inorganic molecules and ions ( BeF2, BF3, CH4, PF5, SF6,IF7, SO42 -, ClO4- ) |
| 22.09.2023 to 28.09.2023 | • Valence shell electron pair repulsion (VSEPR)theory to NH3, H3O+, SF4, ClF3, ICl2- and H2O. |
| 29.09.2023 to 05.10.2023 | • MO theoryof heteronuclear (CO and NO) diatomic.molecules, , bond strength and bond energy, pe rcentage ionic character from dipole moment and electronegativity difference |
| 06.10.2023 to 12.10.2023 | • Pe rcentage ionic character from dipole moment and electronegativity difference |
| 13.10.2023 to 19.10.2023 | • Ionic Solids Ionic structures (NaCl,CsCl, ZnS(Zinc Blende), CaF2) |
| 20.10.2023 to 26.10.2023 | • Radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects |
| 27.10.2023 to 02.11.2023 | • Semiconductors, lattice energy (methamtical derivation exc luded) and Born-Haber cycle. |
| 03.11.2023 to 09.11.2023 | • Solvation ene rgy and its relation with solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule. |
| **10.11.2023 to 16.11.2023** | **Diwali Vacation** |

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| 17.11.2023 to 24.11.2023 | Revision of Syllabus |

Dr. Deepika Rama
DEPARTMENT OF CHEMISTRY
G.C.W NARNAUL

## Lesson Plan

Name of Assistant/Associate Prof. : Dr. Deepika Rana
Class & Section : B.Sc. 5th Semester
Subject : Inorganic /Physical Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 25.07.2023 to 27.07.2023 | • Metal-ligand Bonding in Transition Metal Complexes Limitations of valence bond theory. |
| 28.07.2023 to 03.08.2023 | • An elementary idea of cr ystal-f ield theory, crystal field split ting in octahedral, tetrahedral and square planar complexes |
| 04.08.2023 to 10.08.2023 | • Factors affecting the crystal-f ield parameters. |
| 11.08.2023 to 17.08.2023 | • Thermodynamic and Kinetic Aspects of Metal Complexe A brief outline of thermodynamic stability of metal complexes . |
| 18.08.2023 to 24.08.2023 | • factors affec ting the s tab ility, substitution reac tions of square planar complexes of Pt(II). |
| 25.08.2023 to 31.08.2023 | • Magnetic Properties of Transition Metal Complexe Types of magnetic behaviour, methods of determining magnetic susceptibility. |
| 01.09.2023 to 07.09.2023 | • Spin-only formula. L-S coupling, correlation of s and eff values, orbital contribution to magnetic moments, application of magnetic moment data for 3dmetal complexes |
| 08.09.2023 to 14.09.2023 | • Electron Spectra of Transition Metal Complexes Types of electronic transitions. |
| 15.09.2023 to 21.09.2023 | • Selection rules for d-d transitions, spectroscopic ground states, spectrochemical series |
| 22.09.2023 to 28.09.2023 | • Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion. |
| 29.09.2023 to 05.10.2023 | • Quantum Mechanic s-I Black-body radiation, Plank's radiation law, photoelectric effect, heat capacity of solids, Compton effect,wave function and its significance of Postulates of quantum mechanics , quantum mechanical operator, commutation relations. |
| 06.10.2023 to 12.10.2023 | • Hamiltonial operator, Hermitian operator, average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics |
| 13.10.2023 to 19.10.2023 | • To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a partic le in one dimensional box, Pictorial representation and its significance. |
| 20.10.2023 to 26.10.2023 | • Physical Properties and Molecular Structure Optica l activity, polarization – (clausius – Mossotti equation). Orientation of dipoles in an electric field, dipole moment, included dipole moment. |
| 27.10.2023 to 02.11.2023 | • Measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic |

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| | susceptibility and its determination |
| 03.11.2023 to 09.11.2023 | • Applica tion of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetics. |
| **10.11.2023 to 16.11.2023** | **Diwali Vacation** |
| 17.11.2023 to 24.11.2023 | Revision of Syllabus |

Dr Deepika Rana
Dept. of Chemistry
GCW, Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : SANDEEP KUMAR
Class & Section : B.Sc 6th Sem
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Heterocyclic Compounds-I Introduction: Molecular orbital Picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution |
| 22.01.2024 to 28.01.2024 | • Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine , Piperidine and Pyrole. Introduction to condensed five and six- membered heterocycles. |
| 29.01.2024 to 04.02.2024 | • Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline |
| 05.02.2024 to 11.02.2024 | • Organosulphur Compounds Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyl and aryl sulphonates |
| 12.02.2024 to 18.02.2024 | • Organic Synthesis via Enolates Acidity of -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate |
| 19.02.2024 to 25.02.2024 | • Synthetic Polymers Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensat ion or step growth polymerization. Polyeste rs ,polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy re sins and polyurethanes. Natural and synthetic rubbers. |
| 26.02.2024 to 03.03.2024 | • Solutions: Dilute Solutions and Colligative Properties Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution,Colligative properties, Raolut's law, relative lowering of vapour pressure, molelcular weight determination. |
| 04.03.2024 to 10.03.2024 | • Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. |
| 11.03.2024 to 17.03.2024 | • Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes |
| 18.03.2024 to 22.03.2024 | • Phase Equillibrium 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 and Sulphur systems. |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |
| 01.04.2024 to 07.04.2024 | • Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilerisation of lead |

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| 08.04.2024 to 14.04.2024 | • Revision of Syllabus |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |
| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

SANDEEP KUMAR
DEPARTMENT OF CHEMISTRY
G.C.W NARNAUL

## Lesson Plan

Name of Assistant/Associate Prof. : SANDEEP KUMAR
Class & Section : B.Sc. 2nd Semester
Subject : Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 15.01.2024 to 21.01.2024 | • Alkenes Nomenclature of alkenes, , mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides,. The Saytzeff rule, Hofmann elimination, physical p roperties and relative stabilities of alkenes. Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration–oxidation, oxymercurationreduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO4 |
| 22.01.2024 to 28.01.2024 | • Arenes and Aromaticity Nomenclatu re of benzene deriva tives:. Aromatic nucleus and side chain. Aromaticity: the Huckel rule, aromatic ions, annulenes up to 10 carbon atoms, aromatic, anti - aromatic and non – aromatic compounds. Aromatic electrophilic substitution general pattern of the mechanism, mechansim of nitration, halogenation, sulphonation, and Friedel-Crafts reaction. Energy profile diagrams. Activating , deactivating substituents and orientation. |
| 29.01.2024 to 04.02.2024 | • Dienes and Alkynes Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of butadiene,. Chemical reactions 1,2 and 1,4 additions (Electrophilic & free radical mechanism), Diels-Alder reaction. Kinetics-I Rate of reaction, rate equation, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. |
| 05.02.2024 to 11.02.2024 | • Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-Oxidation of Alkynes. Order of a reaction, integrated rate expression for zero order, first order, second and third order reaction. Half life period of a reaction. Methods of determination of order of reaction. |
| 12.02.2024 to 18.02.2024 | • Alkyl and Aryl Halides Nomenclature and classes of alkyl halides, methods of formation, chemical reactions. Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides , SN2 and SN1reactions with energy profile diagrams. Kinetics-II Effect of temperature on the rate of reaction – Arrhenius equation. |
| 19.02.2024 to 25.02.2024 | • Methods of formation and reactions of aryl halides, The additionelimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides. Theories of reaction rate – Simple collision theory for unimolecular and bimolecular collision. Transition state theory of Bimolecular reactions |
| 26.02.2024 to 03.03.2024 | • Electrochemistry-I Electrolytic conduction, factors affecting electrolytic conduction, specific, conductance, molar conductance,equivalent conductance and relation among them, their vartion with concentration.Arrhenius theory of ionization, Ostwald's Dilution Law. Debye- Huckel – Onsager's equation for strong electrolytes |

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| | (elementary treatment only) Transport number, definition and determination by Hittorfs methods, (numerical included) |
| 04.03.2024 to 10.03.2024 | • Electrochemistry-II Kohlarausch's Law, calculation of molar ionic conductance and effect of viscosity temperature & pressure on it. Application of Kohlarausch's Law in calculation of conductance of weak electrolytes at infinite diloution. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids determination of solubility product of spa ringly soluble salts, conductometric titrations. Definition of pH and pKa, Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action. |
| 11.03.2024 to 17.03.2024 | • Hydrogen Bonding & Vander Waals Forces Hydrogen Bonding – Definition, Types, effects of hydrogen bonding on properties of substances, applicat ion Brief discussion of various types of Vander Waals Forces . Metallic Bond and Semiconductors Metallic Bond- Brie f introduction to meta llic bond, band theory of metallic bond Semiconductors- Introduction, types and applications. |
| 18.03.2024 to 22.03.2024 | • S-Block Elements Comparative study of the elements including , diagonal relationships, salient features of hydrides (methods of preparation excluded), solvation and complexation tendencies including their function in biosystems. Chemis try of Noble Gases Chemical properties of the noble gases with emphasis on their low chemical reactivity, chemistry of xenon, structure and bonding of fluorides, oxides & oxyfluorides of xenon |
| **23.03.2024 to 31.03.2024** | **Holi Vacation** |
| 01.04.2024 to 07.04.2024 | • P-Block Elements Emphasis on comparative study of properties of p-block elements (including diagonal relationship and excluding methods of preparation). Boron family (13th gp):- Diborane – properties and structure (as an example of electron – deficient compound and multicentre bonding), Borazene – chemical properties and structure Trihalides of Boron – Trends in fewis acid character structure of aluminium (III) chloride. Carbon Family (14th group) Catenation, p π– d π bonding (an idea), carbides, fluorocarbons, silicates structural aspects), silicons – general methods of preparations, properties and uses |
| 08.04.2024 to 14.04.2024 | • Nitrogen Family (15th group) Oxides – structures of oxides of N,P. oxyacids – structure and relative acid strengths of oxyacids of Nitrogen and phosphorus. Structure of white, yellow and red phosphorus. Oxygen Family (16th group) Oxyacids of sulphur – structures and acidic strength $H_2O_2$ –structure, properties and uses. Halogen Fami l y (17th group) Basic prope r ties of ha logen, interha logens types propert ies ,hydro and oxyacids of chlorine – structure and comparison of acid strength . |
| 15.04.2024 to 21.04.2024 | • Revision of Syllabus |
| 22.04.2024 to 30.04.2024 | • Revision of Syllabus |

Sandeep Kumar
Dept. of Chemistry
G.C.W Narnaul

## Lesson Plan

Name of Assistant/Associate Prof. : SANDEEP KUMAR
Class & Section : B.Sc. 5th Semester
Subject : Organic /Physical Chemistry
Session : 2023-24

| Date | Contents |
|---|---|
| 25.07.2023 to 27.07.2023 | • NMR Spectroscopy-I 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. |
| 28.07.2023 to 03.08.2023 | • Proton counting,splitting of signals and coupling constants, magnetic equivalence of protons. NMR Spectroscopy-II Discuss ion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane, ethanol. |
| 04.08.2023 to 10.08.2023 | • Ethyl acetate, toluene, benzaldehyde and acetophenone..Simple problems on PMR spectroscopy for structure determination of organic compounds |
| 11.08.2023 to 17.08.2023 | • Carbohydrates-I Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, |
| 18.08.2023 to 24.08.2023 | • Chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose in to mannose. Formation of glycos ides, ethers and esters. |
| 25.08.2023 to 31.08.2023 | • Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism ofmutarotation. Structures of ribose and deoxyribose. |
| 01.09.2023 to 07.09.2023 | • Carbohydrates-II An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination. |
| 08.09.2023 to 14.09.2023 | • Organometallic Compounds Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. |
| 15.09.2023 to 21.09.2023 | • Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. |
| 22.09.2023 to 28.09.2023 | • Spectroscopy-I Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Bornoppenheimer approximation, Degrees of freedom. |
| 29.09.2023 to 05.10.2023 | • Rotational Spectrum Diatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution). |
| 06.10.2023 to 12.10.2023 | • Determination of bond length, qualitative description of non-rigid rotor, isotope effect,Numerical Problem. |
| 13.10.2023 to 19.10.2023 | • Spectroscopy-II Vibrational spectrum Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond |

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| | energies. |
| 20.10.2023 to 26.10.2023 | • Effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups. |
| 27.10.2023 to 02.11.2023 | • Raman Spectrum: Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, Quantum theory of Raman spectra. |
| 03.11.2023 to 09.11.2023 | • Selection rules, Quantum theory of Raman spectra. |
| **10.11.2023 to 16.11.2023** | **Diwali Vacation** |
| 17.11.2023 to 24.11.2023 | Revision of Syllabus |

Sandeep Kumar
Dept. of Chemistry
GCW, Narnaul

LESSON PLAN (Session 23-24)

Semester-Odd

**Department: Chemistry**

**Class: B.Sc. II**

**Name of the faculty: Sh. Sandeep Kumar**

**Nomenclature of the paper: Organic Chemistry**

| Month | Week | Topicsto becovered |
|---|---|---|
| July | 21.07.23-27.07.23 | Introduction of the curriculum. Revision of basic Concepts. |
| | | Definition and classification of alcohols. IUPAC Nomenclature of alcohols,Carbinol system of nomenclature |
| August | 31.07.23-05.08.23 | Synthesis of alcohols:From carbonyl compounds, Use of LAH and NaBH4 with mechanism. Mechanism of reduction of Carboxylic acids and esters using LAH. DifferencebetweenLAHandNABH4.What are Chemo selective reagents. Reacton and mechanism of MPV reaction. |
| | 07.08.23-12.08.23 | BoveaultBlac reduction and catalytic hydrogenation.<br>Physical properties of alcohols:B.Pt.solubility. Effect of branching on solubility and b.pt of alcohols.<br>Acidic nature of alcohols: reaction with active metals.<br>Comparison of acidic strengths of 1*, 2* and 3* alcohols. Alcohols are weaker acids even weaker than water. |
| | 14.08.23-19.08.23 | Chemical properties of alcohols: Reaction with Grignard reagent, carboxylic acids and acid chloride and anhydride (acylation of alcohols) Schotton Baumann reaction. |
| | 21.08.23-26.08.23 | Halogenation of alcohols: reactivities of 1*, 2*,3*alcohols and different hydrogenhalides. Lucas test / Grove's Process, Mechanism of halogenations:SN1 and SN2. Role of anh. ZnCl2.Halogenationinvolvingrearrangements. |
| | 28.08.23-2.09.23 | Dehydration of alcohols.Sayzeffrule and |

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| | | throughrearrangement.Oxidationof1*,2*and 3* alcohols. What happens when vapours of primary,secondary,teriaryalcoholsarepassed through red hot Cu at 573K. discussion of past year question papers. |
| September | 04.09.23-09.09.23 | Epoxides: Definition and nomenclature and synthesis of epoxides :From alkenes. Ring cleavage in presence of water acid and base catalysed.WithNH3andRMgX.Ringcleavage rexn. of unsymmetrical epoxides acid and base catalysed. |
| | 11.09.23-16.09.23 | Glycols: definition, classification and nomenclature.Synthesis:Cishydroxylation and trans hydroxylation, bimolecular reduction and from chlorohydrins.<br>Physical and chemical properties.Reaction with Na, HCl, HBr and HI.With aldehydes and ketones, dehydration under different conditions, oxidation in presence of HNO3, Oxidative cleavage/ Malaprade reagent and Pinacol- Pinacolone rearrangement. |
| | 18.09.23-23.09.23 | TEST , Assignment .UNIT-II<br>Caboxylicacids:definition.Importance, structure.How and why behave differently from carbonyl compounds? Synthesis:Fromalcohols, acid derivatives,Nitriles,carbonation of Grignard reagent, Malonic esters. |
| | 25.09.23-30.09.23 | Physical properties of alcohols:m.pt,b.pt, solubility<br>Chemical properties: Acidic nature , effect of EWG . comparison of acidic strengths of $CH_3COOH$,HCOOH and$C_6H_5COOH$.Effectof substituents on the acidic strength of aromatic acids.Synthesis of all acid derivatives, Decarboxylation reaction , effect of substituent onthedecarboxylationofaliphaticacids |
| October | 02.10.23-07-10.23 | Hunsdiecker reaction and HVZreaction in detail.Abnormal behavior of Formic acid.Acid derivatives : synthesis anf mechanism of SN reactions of all aid derivatives their reactivity order and stability order. |
| | 09.10.23-14.10.23 | Hydrolysis, ammonolysis and alcoholysis reactions of all acid derivatives' Fridel craft acylation , trans esterification Acid and base hydrolysis,ampotericnatureofamides.Reaction with$P_2O_5$,$HNO_2$ and Hoffmann bromamide |

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| | | Degradation rexn of amides.Sessionalexams. Phenolsan introduction and synthesis. |
| | 16.10.23-21.10.23 | Synthesis from Cumene, physical properties of phenols.Chemical properties:Claissen and Fries rearrangements |
| | 23.10.23-28.10.23 | Kolbes rexn, Reimer-Tiemann rexn Elecrtrophilic substitution reactions:How to get Mono sub. Product. |
| | 30.10.23-04.11.23 | UVspectroscopy |
| | 06.11.23-10.11.23 | UVspectroscopy |
| Vacations | 10.11.23-16.11.23 | Diwali Vacations |
| | 17.11.23 -24.11.23 | Revision and Test |

Sandeep Kumar
Dept. Chemistry

# Lesson Plan

B. Sc. III YearNon- Medical(Vth Semester)

Paper-Physical Chemistry

Session 2023-24

Teacher name: Dr. Nitu Kumari

August 2023

Quantum Mechanics-I Black-body radiation, Plank's radiation law, photoelectric effect, postulates of quantum mechanics, quantum mechanical operators, commutation relations, Hamiltonian operator, Hermitian operator, average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics, To sw quantum mechanically that position and momentum cannot be predicated simultaneously

September 2023

Determination of wave function & energy of a particle in one dimensional box. Physical Properties and Molecular Structure Optical activity, polarization – (Clausius – Mossotti equationderivation excluded ). Orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules

October 2023

, Magnetic permeability, magnetic susceptibility and its determination. Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetism. Spectroscopy Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born-oppenheimer approximation, Degrees of freedom. 25 Rotational Spectrum Selection rules, Energy levels of rigid rotator (semi-classical principles), rotational spectra of diatomic molecules ,

November 2023

spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length and isotopic effect . Vibrational spectrum Selection rules, Energy levels of simple harmonic oscillator, pure vibrational spectrum of diatomic molecules, determination of force constant and qualitative relation of force constant and bond energy idea of vibrational frequencies of different functional groups. Raman Spectrum Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, Quantum theory of Raman spectra

B. Sc. II YearMedical(IVth Semester)

Paper- Inorganic Chemistry

Session 2023 -2024

Teacher name: Dr. Nitu Kumari

January 2024

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| Chemistry of f-Block elements Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour, ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds |

February 2024

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| Actinides: General characteristics of actinides, chemistry of separation of Np, Pu and Am from uranium, Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements. |

March 2024

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| Theory of Qualitative and Quantitative Analysis Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination, chemistry of interference of acid radicals including their removal in the analysis of basic radicals |

April 2024

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| Common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates. |

Lesson Plan

B. Sc. IInd Year Hon. Medical+ Medical (IVth Semester)

Paper – Physical Chemistry

Session 2023-24

Teacher name: Dr. Nitu Kumari

January 2024

Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycles and its efficiency, Carnot's theorem, 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. Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data.

February 2024

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. Electrochemistry Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H& K).

March 2024

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. Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transference, liquid junction potential and its measurement.

April 2024

Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. More stress on numerical problems.

# Lesson Plan

B. Sc. Ist YearNon- Medical(Ist Semester)

Paper – physical chemistry

Session -2023-24

**Teacher name -Dr. Nitu Kumari**

## August 2023

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.,

## September 2023

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) Critical Phenomenon Critical temperature

## October 2023

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.

## November 2023

The Law of corresponding states. Section-B (22 Periods) Liquid States Structure of liquids, Properties of liquids – surface tension, refractive index, viscosity, vapour pressure and optical rotation. Solid State 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.

Lesson Plan

Session 2023-24

B.Sc.- II 4th semester(Medical)
Subject: Organic Chemistry

Teacher name –Nitu Kumari

January 2024

Unit-I Infrared (IR) absorption spectroscopy Molecular vibrations, Hooke's law,selection rules.Intensity and position of IR bands, measurement of IR spectrum, fingerprintregion, characteristic absorptions of various functional groups and interpretation ofIR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organiccompounds.

February 2024

Unit-II Amines Structure and nomenclature of amines, physical properties.Separation of a mixture of primary, secondary and tertiary amines. Structuralfeatures affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles,reductive amination of aldehydic and ketonic compounds. Gabrielphthalimidereaction, Hofmann bromamide reaction. electrophilic aromatic substitution in arylamines,reactions of amines with nitrous acid.

March 2024

Unit-III Diazonium Salts: Mechanism of diazotisation, structure of benzenediazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO2 andCN groups, reduction of diazonium salts to hyrazines, coupling reaction and itssynthetic application. Nitro Compounds: Preparation of nitro alkanes and nitroarenes and theirchemical reactions. Mechanism of electrophilic substitution reactions in nitroarenes and their reductions in acidic, neutral and alkaline medium.

April 2024

Unit-IV . Aldehydes and Ketones Nomenclature and structure of the carbonylgroup. Synthesis of aldehydes and ketones with particular reference to thesynthesis of aldehydes from acid chlorides.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. Mechanism of nucleophilicadditions to carbonyl group with particular emphasis on benzoin, aldol, Perkin andKnoevenagel condensations. Condensation with ammonia and its derivatives.Wittig reaction. Mannichreaction.Oxidation of aldehydes, Baeyer–Villigeroxidation of ketones Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, LiAlH4 and NaBH4reductions

Lesson Plan

B. Sc. II Year Non-Medical (IVth Semester)
Paper- Inorganic Chemistry
Session 2023 -2024

Teacher name: Dr. Nitu Kumari

January 2024

Chemistry of f-Block elements Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour

February 2024

ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds

March 2024

Actinides: General characteristics of actinides, chemistry of separation of Np, Pu and Am from uranium

April 2024

Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements.

# Lesson Plan

B. Sc. III Year Non- Medical (Vth Semester)

Paper- Inorganic Chemistry

Session 2023-24

Teacher name: Dr. Nitu Kumari

August 2023

**Metal- Ligand Bonding in Transition Metal complexes** Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral

September 2023

Tetrahedral and square planer complexes, affecting the crystal field parameters.

October 2023

**Thermodynamics and Kinetic Aspects of metal complexes** A brief outline of thermodynamic stability of metal complexes and factors affecting the stability

November 2023

Irving William Series, substitution reactions of square planer complexes of Pt[II]

Yadav