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| **Deepak Kumar (Assistant Professor)** **Lesson plan of Organic Chemistry** **B.Sc – Non-Medical, 4th semester, (2021-2022)** |
| **WEEKS** | **CHAPTER** |
| 1. | IR SPECTROSCOPY :- Molecular Vibrations, Hook’s law, selection rules Intensit and position of IR bands, measurement of IR spectrum, Finger printregion |
| 2. | Characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds. Application of IR spectroscopy in structureelucidation of simple organic compounds |
| 3. | Aldehydes and ketones:- Nomenclature and structure of carbonyl group synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromiumtrioxide(sarett reagent) PCC and pyridine dichromate |
| 4. | Physical properties of aldehydes and ketones, comparison of reactivities of aldehydes and ketones. Mechanism of benzoin condensation , aldol condensation&perkin condensation |
| 5. | Mechanism of knoevenagel condensation, condensation with ammonia and itsderivatives , wittig reaction |
| 6. | Mannich reaction, oxidation of aldehydes, Baeyer villiger oxidation of ketones,cannizzaro reaction, MPV reaction, clemmenson, wolfkishner, LiAlH4, NaBH4 reduction |
| 7. | Assignment and test of aldehydes and ketones |
| 8. | Diazonium salt :- Nomenclature, preparation of Diazonium salt, Physical andchemical Properties, synthetic applications of diazonium salt |
| 9. | Nitrocompounds :- preparations of nitro compounds, physical properties of nitrocompounds, reactions of nitro alkanes and nitroarenes |
| 10. | Amines:- Structure of amines, nomenclature of amines, preparation of amines, , |
| 11. | separation of primary secondary and tertiary amines, chemical properties ofamines, distinction of primary secondary and tertiary amines, |
| 12. | basicity of amines, effect of substituents on the basicity of amines |
| 13. | Revision of Amines, nitro compounds and diazonium salt |
| 14. | Practice of numericals of IR |
| 15. | Test and assignment of amines nitrocompounds and diazonium salt |

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| **WEEKS** | **CHAPTER** |
| 1. | **Alkenes :-**Nomenclature of alkenes, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides,. |
| 2. | The Saytzeff rule, Hofmann elimination, physical properties and relativestabilities of alkenes |
| 3. | Chemical reactions of alkenes, mechanisms involved in hydrogenation,electrophilic and free radical additions, |
| 4. | Markownikoff’s rule, hydroboration–oxidation, oxymercurationreduction |
| 5. | ozonolysis, hydration, hydroxylation and oxidation with KMnO4, |
| 6. | **Arenes and Aromaticity:-** Nomenclature of benzene derivatives:.Aromatic nucleus and side chain. |
| 7. | Aromaticity: the Huckel rule, aromatic ions, annulenes up to 10 carbonatoms,aromatic, anti - aromatic and non – aromatic compounds |
| 8. | Aromatic electrophilicsubstitution general pattern of the mechanism, mechansim of nitration,halogenation, sulphonation, and Friedel-Craftsreaction. |
| 9. | Energy profile diagrams, Activating , deactivating subs tituents andorientation. |
| 10. | **Dienes and Alkynes:-**Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes.Structure of butadiene,. Chemical reactions1,2 and 1,4 additions (Electrophilic &free radical mechanism), |
| 11. | Diels-Alder reaction, Nomenclature, structure and bondingin alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes.Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidationof alkynes |
| 12. | **Alkyl and Aryl Halides:-**Nomenclature and classes of alkyl halides,methods of formation, chemical reactions. |
| 13. | Mechanisms and stereochemistry of nucleophilic substitution reactions ofalkyl halides , SN2 and SN1reactions with energy profile diagrams. |
| 14. | Methods of formation and reactions of aryl halides, |
| 15. | The additionelimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities ofalkyl halides vsallyl, vinyl and aryl halides. |

**Deepak kumar (Assistant Professor) Lesson plan of Organic Chemistry**

B.Sc–Non-Medical, 2nd semester, 2021-2022

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| 1. | **Thermodynamics** :- Second law of thermodynamics, Need for the Law andits different statements, Carnot cycle |
| 2. | Thermodynamics scale of temperature. Concept of entropy- Entropy as a statefunction, entropy as a function of “V”, “T” and “P”,Entropychange in reversible and irreversible process |
| 3. | Criteria for Spontaneity, Entropy change in ideal gases and mixing of gases |
| 4. | Gibbs (G) and Helmholtz functions (A) as thermodynamic quantities |
| 5. | Assignment and Unit Test of Thermodynamics |
| 6. | **Electrochemistry :-** Electrolytic and Galvanic cells – Reverssible andirreversible cells |
| 7. | Conventional representation of electrochemical cells, emf of cell and itsmeasurement |
| 8. | Westron standard cell, Activity and activity coefficients, Calculation |
| 9. | Calculation of thermodynamic quantities (∆ G, ∆ A & K), Types of reversible electrodes Metal-metal ion gas electrode, metal ion soluble salt anion andredox electrodes, Electrode reactions |
| 10. | Nernst equations, derivation of cell EMF and single electrode potential, Standard hydrogen Electrode, reference electrodes, standard Electrodepotential |
| 11. | Electrochemical series and its Applications, Concentration Cells With andwithout transference, Liquid junction potential |
| 12. | Applications of EMF measurement i.eValency of ions, Solubility of product,activity coefficient |
| 13. | Potentiometric titrations (Acid base and redox), determination of pH usinghydrogen electrode |
| 14. | Quinhydrone electrode and glass electrode and glass electrode bypotentiometric methods |
| 15. | Assignment and test of Electrochemistry |

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|  **Vikash**  Lesson plan of Physical Chemistry  |  |
|  | **B.Sc. -Nonmedical, 6th semester, session-2021-2022** |
| **WEEKS** | **CHAPTER** |  |

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| 1. | Electronic Spectrum -Concept of potential energy curves for bonding and antibonding molecular orbitals |  |
| 2. | qualitative description of selection rules |  |
| 3. |  Franck Condon principle |  |
| 4. | Qualitative description of sigma and pie and n molecular orbital (MO) |  |
| 5. | energy level and respective transitions.  |  |
| 6. | Doubts, Class test |  |
| 7. | Photochemistry- Interaction of radiation with matter, difference between thermal and photochemical processes. |  |
| 8. |  Laws of photochemistry: Grotthus-Drapper law, Stark Einstein law (law of photochemical equivalence) |  |
| 9. |  Jablonski diagram depiciting -various processes occurring in the excited state, |  |
| 10. | qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing)  |  |
| 11. | Quantum yield, photosensitized reactions-energy transfer processes (simple examples). |  |
| 12. | Doubts ,Class test |  |

Dr. Ajay Kumar

 Lesson Plan of Physical Chemistry

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| **WEEKS** | **CHAPTER** |
| 1 | **Kinetics-I**Rate of reaction, rate equation, factors influencing the rate of a reaction –concentration, temperature, pressure, solvent, light, catalyst. |
| 2 | Order of a reaction, integrated rate expression for zero order, first order, |
| 3 | Second and third order reaction.Half life period of a reaction. Methods of determination of order of reaction. |
| 4 | **Kinetics-II**Effect of temperature on the rate of reaction – Arrhenius equation. Theories of reaction rate – Simple collision theory for unimolecular and bimolecular collision. |
| 5 | Transition state theory of Bimolecular reactions. |
| 6 | ASSIGNMENT AND TEST OF CHEMICAL KINETICS CHAPTER |
| 7 | **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, |
| 8 | Ostwald’s Dilution Law. Debye- Huckel – Onsager’s equation for strong electrolytes (elementary treatment only) Transport number, definition and determination byHittorfs methods, (numerical included) |
| 9 | **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 ofconductance of weak electrolytes at infinite diloution. |
| 10 | Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids .determination of solubility product of spa ringly soluble salts, |
| 11 | Conductometric titrations. Definition of pH and pKa, Buffer solution, Buffer action,Henderson |
| 12 | ASSIGNMENT AND TEST OF ELECTROCHEMISTRY |

B.Sc 2nd Sem, non- medical (2nd semester, 2021-2022)

Dr. rajkumari jadon

Lesson plan of Physical Chemistry

B.Sc. -Nonmedical, Medical and Biotech 6th semester, session-2020-2021

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| **WEEKS** | **Topics to be covered** |  |
| 1. | **Unit-3:** 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 |  |
| 2. | Relative lowering of vapour pressure, molelcular weight determination, Osmosis law of osmotic pressure and its measurement |  |
| 3. | Determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point Thermodynamic derivation of relation between molecularweight and elevation in boiling point and depression in freezing point |  |
| 4. | Experimental methods for determining various colligative properties.Abnormal molar mass, degree of dissociation and association of solutes. |  |
| 5. | Doubts, Class test , Phase Equillibrium-Statement and meaning of the terms – phase component and degree of freedom. Thermodynamic derivation of Gibbs phase rule |  |
| 6. | Phase equilibria of one component system –Example – water and Sulpher systems. Phase equilibria of two component systems solid-liquid equilibria, Simple eutecticExample Pb-Ag system, desilerisation of lead , |  |
| 7. | Electronic Spectrum -Concept of potential energy curves for bonding and antibonding molecular orbitals , qualitative description of selection rules Franck Condon principle, Qualitative description of sigma and pie and n molecular orbital (MO) |  |
| 8. | Photochemistry- Interaction of radiation with matter, difference between thermal and photochemical processes |  |
| 9. | Laws of photochemistry: Grotthus-Drapper law, Stark Einstein law (law of photochemical equivalence), Jablonski diagram depiciting -various processes occurring in the excited state,  |  |
| 10.  | qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing) |  |
| 11. | Quantum yield, photosensitized reactions-energy transfer processes (simple examples). |  |
| 12. | Doubts ,Class test |  |

## Name of the Teacher :-Vikash

## Paper – B.Sc Inorganic Chemistry Semester – IInd Session 2021- 2022

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| Days | Topic to be covered |
| First Week | Hydrogen Bonding Definition, Types, E ffects of Hydrogen Bonding on Properties of Substances, A pplicatio n Brief discussion of varioustypes of Vander Waals Forces |
| SecondWeek | Metallic Bond- Brief Introduction to M etallic Bond, Band Theo ry ofMetallic Bond Semiconductors- Introduction, Types and Applications. |
| Third Week | Comparative Study of the Element s Including, Diagonal Relationships, Salient F eatures of Hydrides (Methods of Preparation Excluded),Solvation a nd C o mp le xa t io n Tende nc ies Including T he i r funct ion in Biosystems. |
| FourthWeek | Chemical Properties of the Noblegases with Emphasis on the ir LowChemical Reactivit y |
| Fifth Week | Chemistry of Xenon, Structure and Bonding of Fluorides, Oxides & Oxyfluor ides of Xenon |
| Sixth Week | Emphasis on Comparative Study of Properties of P- Block Elements ( Including Diagonal Relationship and Excluding Methods ofPreparation) |
| SeventhWeek | Diborane – Properties and Structure ( as an example of Electron –Deficient Compound and Multicentre Bonding), Borazene |
| Eight Week | Chemical Properties and Structure Trihalides of Boron – Trends in Fewis Acid Cha racter Structure of Aluminium ( III) chloride. |
| Ninth Week | Catenation, pπ– dπ Bonding (an Idea), Carbides, Fluorocarbons, Silicates ( Structural Aspects), Silicons – General Met hods ofPreparations, Properties and Uses. |
| Tenth Week | Oxides – Structures of Oxides of N,P. Oxyacids – S tructure and Relative Acid Strengths of Oxyacids of Nitrogen and Phosphorus.Structure of White, Ye llow and Red Phosphorus. |
| Eleventh Week | Oxyacids of Sulphur – Structures and Acidic Strength H2 O 2 – Structure, Properties and Uses. |
| Twelfth Week | Basic Propert ies of Halogen, Interhalogens Types Propert ies, Hydroand Oxyacids of Chlor ine – S t ructure and Compar iso n of Acid S t re ngth |

Department of Chemistry Name- Dr. Ajay Kumar(Assistant Professor)

# Subject- Inorganic Chemistry

Class- B.Sc. Nonmedical -4th semester session 2021-2022

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| **WEEKS** | **CHAPTER** |
| 1. | **Lanthanides**- Introduction, electronic structure and position in the periodic table, oxidation state, magnetic Doubts |
| 2. | Ionic radio and lanthanides contraction and it’s consequences |
| 3. | Complex formation by lanthanides , occurrence , Extraction of lanthanides from monazite sand , |
| 4. | Lanthanides compound ,Assignment and unit test |
| 5. | **Actinides:**-Introduction , electronic structure and position in the periodic table, oxidation states, physical pr |
| 6. | Transuranic elements , separation of Pu,Np,Am,fromU |
| 7. | Comparison of lanthanides and actinides , Possible new elements, Doubts, Assignment, Class test |
| 8. | **Theory of Qualitative and Quantitative Inorganic:**-Introduction, Qualitative analysis, Preliminary tests |
| 9. | Wet test for Acid radicals |
| 10. | Analysis of group 1,2,3,4,5,6 cations |
| 11. | Identification of acid radicals in typical combinations, Interference of acid radicals in the analysis of basic r |
| 12. |  | Solubility product,PHvalue,effect of temperature |
| *Unit test* |