**Govt. College , Nalwa (Hisar)**

**LESSON PLAN (w.e.f.2 Dec. 2020)**

**Name: ...Renu Rani.. Subject: Chemistry**

**Class: B.Sc. I 1st Sem (Non-Med.) Paper: Inorganic Chemistry**

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| **Month/Week** | Contents |
| **December** |  |
| Week 1 | Review of: Bohr’s theory and its limitations, dual behaviour of matter and radiation, de Broglie’s relation |
| Week 2 | Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure. What is Quantum mechanics? |
| Week 3 | Time independent Schrodinger equation and meaning of various terms in it. Significance of *ψ* and *ψ*2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations for 1*s*, 2*s*, 2*p*, 3*s*, 3*p* and 3*d* orbitals (Only graphical representation). |
| Week 4 | Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1*s* and 2*s* atomic orbitals. |
| Week 5 | Significance of quantum numbers, orbital angular momentum and quantum numbers *ml* and *ms*. Shapes of *s*, *p* and *d* atomic orbitals, nodal planes. |
| **January** |  |
| Week 1 | Discovery of spin, spin quantum number (*s*) and magnetic spin quantum number (*ms*). Discussion and problems |
| Week 2 | Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals **Assignment 1** |
| Week3 | Concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations. **Test** |
| Week 4 | *Ionic Bonding:* General characteristics of ionic bonding*.* Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. |
| Week 5 | Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. **Assignment 2** |
| **February** |  |
| Week 1 | Fajan’s rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. |
| Week 2 | *Covalent bonding:* VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar |
| Week 3 | Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements and related examples. |
| Week 4 | Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals. |
| **March** |  |
| Week 1 | Nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of *s-p* mixing) Heteronuclear diatomic molecules such as CO, NO and NO+. |
| Week 2 | Comparison of VB and MO approaches. Back log of chapter if any, discussion and problems taken and class test. |
| Week 3 | Revision |

**Incharge**

**Chemistry Department**

**Govt. College, Nalwa (Hisar)**

**LESSON PLAN (w.e.f 2 Dec,2020)**

**Name: Renu Rani Subject: Chemistry**

**Class: B.Sc. I -1st Sem (Non-Med.) Paper : Organic Chemistry**

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| **Month/Week** | **Contents** |
| **December** |  |
| Week 1 | **Fundamentals of Organic Chemistry**  Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect Resonance and Hyperconjugation. Cleavage of Bonds: |
| Week 2 | Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules, Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. |
| Week 3 | Strength of organic acids and bases, Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel’s rule. |
| Week 4 | **Stereochemistry**  Conformations with respect to ethane, butane and cyclohexane. |
| Week 5 | Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. |
| **January** |  |
| Week 1 | Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). |
| Week 2 | Threo and erythro; D and L; cis - trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) **Assignment 1** |
| Week3 | E / Z Nomenclature (for upto two C=C systems). **Test** |
| Week 4 | **Aliphatic Hydrocarbons-I**: Alkanes: Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe’s synthesis, from Grignard reagent. |
| Week 5 | Reactions: Free radical Substitution: Halogenation. Alkenes: (Upto 5 Carbons) Preparation, **Assignment 2** |
| **February** |  |
| Week 1 | Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff’s rule); |
| Week 2 | cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO4) and trans-addition (bromine), |
| Week 3 | Addition of HX (Markownikoff’s and anti-Markownikoff’s addition) Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation. |
| Week 4 | **Aliphatic Hydrocarbons-II**: Alkynes: Preparation: Acetylene from CaC2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides |
| **March** |  |
| Week 1 | Reactions: formation of metal acetylides, addition of bromine and alkaline KMnO4 |
| Week 2 | Ozonolysis and oxidation with hot alkaline KMnO4.  Backlog of chapter if any , discussion and problems taken. |
| Week 3 | Revision |

**Incharge**

**Chemsitry Department**

**Govt. College Nalwa (Hisar)**

**LESSON PLAN (w.e.f 2 Dec,2020)**

**Name: Renu Rani Subject: Chemistry**

**Class: B.Sc. IInd 3rd Sem (Non-Med.) Paper: Organic Chemsitry**

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|  | Contents |
| Week 1 | Carboxylic acids (aliphatic and aromatic) |
| Week 2 | *Preparation:* Acidic and Alkaline hydrolysis of esters.  *Reactions:* Hell-Vohlard-Zelinsky Reaction. |
| Week 3 | **Carboxylic acid derivatives (aliphatic)**  (Upto 5 carbons) *Preparation* Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion. |
| Week 4 | *Reactions:* Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. |
| Week 5 | **Amines (Aliphatic and Aromatic):**  (Upto 5 carbons) *Preparation*: from alkyl halides,  **Assignment 1** |
| Week 6 | *Preparation*: Gabriel’s Phthalimide synthesis, Hofmann Bromamide reaction.  **Test** |
| Week 7 | *Reactions:* Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO2, |
| Week 8 | Schotten-Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation.  **Assignment 2** |
| Week 9 | **Diazonium salts**:  *Preparation:* from aromatic amines. *Reactions:* conversion to benzene, phenol, dyes. |
| Week 10 | *Preparation of Amino Acids:* Strecker synthesis using Gabriel’s phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis. |
| Week 11 | *Reactions of Amino acids*: ester of –COOH group, acetylation of –NH2 group, complexation with Cu2+ ions, ninhydrin test. |
| Week 12 | Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C–terminal (thiohydantoin and with carboxypeptidase enzyme). |
| Week 13 | Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis. |
| Week 14 | **Carbohydrates:**  Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), |
| Week 15 | Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, |
| Week 16 | Ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) |
| Week 17 | Polysacharrides (starch and cellulose) excluding their structure elucidation. Revision and Surprise Test. . Study in detail Reformatsky Reaction, Perkin condensation. |

**Incharge**

**Chemistry Department**

**Govt. College Nalwa (Hisar)**

**LESSON PLAN (w.e.f 21 Dec,2020)**

**Name: Dr. Sudesh Subject: Chemistry**

**Class: B.Sc. IInd 3rd Sem (Non-Med.) Paper: Organic Chemsitry**

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|  | Contents |
| Week 1 | Carboxylic acids (aliphatic and aromatic) |
| Week 2 | *Preparation:* Acidic and Alkaline hydrolysis of esters.  *Reactions:* Hell-Vohlard-Zelinsky Reaction. |
| Week 3 | **Carboxylic acid derivatives (aliphatic)**  (Upto 5 carbons) *Preparation* Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion. |
| Week 4 | *Reactions:* Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. |
| Week 5 | **Amines (Aliphatic and Aromatic):**  (Upto 5 carbons) *Preparation*: from alkyl halides,  **Assignment 1** |
| Week 6 | *Preparation*: Gabriel’s Phthalimide synthesis, Hofmann Bromamide reaction.  **Test** |
| Week 7 | *Reactions:* Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO2, |
| Week 8 | Schotten-Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation.  **Assignment 2** |
| Week 9 | **Diazonium salts**:  *Preparation:* from aromatic amines. *Reactions:* conversion to benzene, phenol, dyes. |
| Week 10 | *Preparation of Amino Acids:* Strecker synthesis using Gabriel’s phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis. |
| Week 11 | *Reactions of Amino acids*: ester of –COOH group, acetylation of –NH2 group, complexation with Cu2+ ions, ninhydrin test. |
| Week 12 | Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C–terminal (thiohydantoin and with carboxypeptidase enzyme). |
| Week 13 | Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis. |
| Week 14 | **Carbohydrates:**  Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), |
| Week 15 | Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, |
| Week 16 | Ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) |
| Week 17 | Polysacharrides (starch and cellulose) excluding their structure elucidation. Revision and Surprise Test. . Study in detail Reformatsky Reaction, Perkin condensation. |

**Incharge**

**Chemistry Department**

**Govt. College , Nalwa (Hisar)**

**LESSON PLAN (w.e.f.21 Dec. 2020)**

**Name: Dr. Sudesh Subject: Chemistry**

**Class: B.Sc. II 3rd Sem (Non-Med) Paper: Physical Chemistry**

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| **Month/Week** | Contents |
| **December** |  |
| Week 4 | **Solutions:** Thermodynamics of ideal solutions: Ideal solutions and Raoult’s law, deviations from Raoult’s law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. |
| Week 5 | Distillation of solutions. Lever rule. Azeotropes.Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. |
| **January** |  |
| Week 1 | Immiscibility of liquids- Principle of steam distillation. Nernst distribution law and its applications, solvent extraction. Revision.  **Phase Equilibrium:** Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation.  **Assignment 1** |
| Week 2 | Derivation of Clausius – Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur)  **Test** |
| Week3 | Two component systems involving eutectics, congruent and incongruent melting points (lead-silver, FeCl3-H2O and Na-K only).  **Assignment 2** |
| Week 4 | **Conductance:** Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. |
| Week 5 | Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. |
| **February** |  |
| Week 1 | Applications of conductance measurements: determination of degree  of ionization of weak electrolyte, |
| Week 2 | Solubility and solubility products of sparingly soluble salts, Ionic product of water, hydrolysis constant of a salt. Conductometric titrations. Revision. |
| Week 3 | **Electrochemistry:** Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. |
| Week 4 | Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: Δ*G*, Δ*H* and Δ*S* from EMF data. Calculation of equilibrium constant from EMF data. |
| **March** |  |
| Week 1 | Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode.. |
| Week 2 | Potentiometric titrations -qualitative treatment (acid-base and oxidation-reduction only). Discussion and problems taken. Class test. |
| Week 3 | Revision |

**Incharge**

**Chemistry Department**

**Govt. College , Nalwa (Hisar)**

**LESSON PLAN (w.e.f.2 Dec. 2020)**

**Name: Renu Rani Subject: Chemistry**

**Class: B.Sc. II 3rd Sem (Non-Med) Paper: Physical Chemistry**

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| --- | --- |
|  | Contents |
| Week 1 | **Solutions**  Thermodynamics of ideal solutions: Ideal solutions and Raoult’s law, deviations from Raoult’s law – non-ideal solutions. |
| Week 2 | Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Lever rule. Azeotropes. |
| Week 3 | Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids- Principle of steam distillation. |
| Week 4 | Nernst distribution law and its applications, solvent extraction. Revision. |
| Week 5 | **Phase Equilibrium**  Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation.  **Assignment 1** |
| Week 6 | Derivation of Clausius – Clapeyron equation and its importance in phase equilibria.  **Test** |
| Week 7 | Phase diagrams of one-component systems (water and sulphur) |
| Week 8 | Two component systems involving eutectics, congruent and incongruent melting points (lead-silver, FeCl3-H2O and Na-K only).  **Assignment 2** |
| Week 9 | **Conductance**  Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. |
| Week 10 | Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. |
| Week 11 | Applications of conductance measurements: determination of degree  of ionization of weak electrolyte, |
| Week 12 | Solubility and solubility products of sparingly soluble salts, Ionic product of water, hydrolysis constant of a salt. |
| Week 13 | Conductometric titrations. Revision. |
| Week 14 | **Electrochemistry**  Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. |
| Week 15 | Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: Δ*G*, Δ*H* and Δ*S* from EMF data. Calculation of equilibrium constant from EMF data. |
| Week 16 | Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode.. |
| Week 17 | Potentiometric titrations -qualitative treatment (acid-base and oxidation-reduction only). Discussion and problems taken. Class test. |

**Class Teacher**

**Chemistry Department**