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**MLL**

**IN**

**CHEMISTRY**

**MINIMUM LEVEL OF LEARNING**

# CHAPTER 1: SOLUTIONS

## MINIMUM LEARNING LEVEL CONTENT

1.Concentration of solutions :  (a) molality (m), molarity (M) mole fraction(X) - Numericals

2.Definations : (a) Azeotropes :  (constant  boiling  mixture) – Minimum boiling and maximum boiling azeotropes.

(b)  Colligative  properties – Formula and numericals

(c) Van't Hoff  factor – Definition and numerical and conceptual question.

(d) Osmosis, Desalination of sea water (reverse osmosis), osmotic pressure.

2.Henry's law: Statement and its applications.

3.Raoult's law : Statement and derivation

4. Differences : (a) Ideal and non-ideal solutions

(b) Solutions showing positive and negative deviations from Raoult's

Law.

5. Graphs : Ideal and non ideal solutions, Positive and negative deviation shoving solutions

6. Important formulae for numericals:

(a) Relative lowering in vapour pressure: $\dfrac{P^0 - P}{P^o} = \dfrac{W_b \times M_a}{M_b \times W_a}$

(b) Elevation of boiling point :  $\Delta T_b = K_b m$

(c) Depression of freezing point :  $\Delta T_f = K_f m$

(d) osmotic pressure :  $\pi = CRT$

# CHAPTER 2: ELECTROCHEMISTRY

## MINIMUM LEARNING LEVEL CONTENT

- ➤ ELECTROCHEMICAL CELL-
  1. Galvanic cell -cell reactions, cell notation
  2. Differentiate between galvanic and electrolytic cells
  3. Standard electrode potential of cell ($E_{cell}^0$) values and comparison of oxidising and reducing power.
  4. Numericals on calculation of standard electrode potential of cell ($E_{cell}^0$).
  5. Numericals on Nernst equation-calculation of $E_{cell}$.
  6. Relation between $E_{cell}^0$, equilibrium constant, Gibbs energy of the reaction.

- ➤ CONDUCTANCE OF ELECTROLYTIC SOLUTIONS-
  1. Definition and units of resistivity, conductivity, molar conductivity.
  2. Differentiate between ionic and electronic conductivity.
  3. Measurement of conductivity of ionic solutions
  4. Variation of conductivity and molar conductivity with concentration.
  5. Effect on dilution on conductivity of strong and weak electrolytes.
  6. Limiting molar conductivity
  7. Kohlrausch's Law and applications
  8. Calculation of degree of dissociation and dissociation constant.

- ➤ ELECTROLYTIC CELLS AND ELECTROLYSIS
  1. .Faradays laws of electrolysis -statements, numericals
  2. Product of electrolysis of NaCl (molten).NaCl (aq), $H_2SO_4$.

- ➤ BATTERIES
  1. Electrode reactions of primary cells-dry cell, ,mercury cell
  2. Electrode reactions of secondary cells-nickel cadmium cell,lead storage battery
  3. Fuel cells-cell reactions and application.
  4. Differentiate between primary and secondary cells.
- ➤ CORROSION
  1. Corrosion and methods of prevention of corrosion.
  2. Rusting of iron as redox reaction-Electrode reactions

# CHAPTER 3: CHEMICAL KINETICS

## MINIMUM LEARNING LEVEL CONTENT

1. **Definition portion:**
   (a) Rate of reaction with unit
   (b) Average rate of reaction & instant rate of reaction definition with difference
   (c) Factors effecting ROR:
   1. Concentration of reactant: **Practically determine Rate equation**
   2. Catalyst: **Role of activation energy in reaction**
   3. Temperature: **Arrhenius equation**
   (d) Difference between the order and molecularity of the reaction
   (e) Difference between elementary reaction and complex reaction
   (f) Specific reaction rate or rate constant and its unit
   (g) Rate determining step
   (h) Collision frequency
   (i) Half life
   (j) Pseudo first order reaction

2. **Formula portion:**
   (a) To demonstrate ROR for any balanced reaction in the form of equation. Eg.

   For the reaction: $aA + bB \rightarrow cC + dD$

   Rate
   $$= \frac{dx}{dt} = \frac{-1}{a}\frac{d[A]}{dt} = \frac{-1}{b}\frac{d[B]}{dt} = \frac{1}{c}\frac{d[C]}{dt} = \frac{1}{d}\frac{d[D]}{dt}$$

   (b) Average ROR and instant ROR calculation from graphical method
   (c) Integrated rate equation for zero and first order reactions.
   (d) To calculate order of reaction by reading language of reaction or by doing sum of the power of the reactants in practical rate equation
   (e) Formula of half-life for zero and first order kinetic reactions.
   (f) Formula of Arrhenius equation and calculation of $E_a$ by $K_1$ and $K_2$.

3. **Graphical portion:**
   To draw different graphs based on integrated rate equation, half-life equation and Arrhenius equation given in the chapter using formula
   y = mx + c and y = mx

   And try to correlate different graphs given in different chapters with these formula and establish pattern between them so students can easily understand similarities between these graphs.

# CHAPTER  4: d AND f – BLOCK ELEMENTS

## MINIMUM LEARNING LEVEL CONTENT

- Electronic Configuration of 3d series elements and their ions
- Physical Properties – Reasoning
    - Variable oxidation states
    - Ionisation enthalpies
    - Atomization Enthalpies
    - Melting Point
    - Coloured ions
    - Magnetic properties
    - Complex formation
    - Catalytic properties
- Preparation and oxidation reactions of $KMnO_4$.
- Preparation and oxidation reactions of $K_2Cr_2O_7$ .
- Lanthanoids and Actinoids.
- Lanthanoid contraction and actinoid contraction.
- Misch metal alloys.
- Comparison of Lanthanoids and Actinoids.


# CHAPTER  5: COORDINATION COMPOUNDS

## MINIMUM LEARNING LEVEL CONTENT

- Nomenclature
- Definitions
- Isomerism
- Strong and weak field ligands
- VBT-Hybridisation,shape,magnetic properties,high spin and low spin complex,inner and outer orbital complex.
- CFT- d-d transition, colour complexes,splitting in tetrahedral and in octahedral
- Bonding in metal carbonyl

# CHAPTER 6: HALOALKANES AND HALOARENES

## MINIMUM LEARNING LEVEL CONTENT

Topics to be covered

(1)     Classification

(2)     Nomenclature

(3)     Nature of C-X bond in haloalkane and haloarenes

(4)     Methods of preparation

    (i)      From alcohols

    (ii)     From alkene and halogen acid Covering Markownikoff's and Anti

       Markownikoff's rule

    (iii)    Finkelstein reaction

    (iv)     Swarts reaction

    (v)      Sandemyer reaction

    (vii)    Balz Schiemann reaction

(5)     Physical Properties Boiling point, melting point and solubility

(6)     Chemical properties

    (i)      Nucleophilic substitution reaction $SN^1$ and $SN^2$

    (ii)     Elimination reaction of alkyl halide with alcoholic KOH

    (iii)    Reaction of alkyl halide with metals.Wurtz and Wurtz Fittig reaction.

(7)     Reaction of halo arenes

    (i)      Electrophilic substitution reaction

    (ii)     Reaction with metals.

# CHAPTER 7: ALCOHOLS, PHENOLS & ETHERS

## MINIMUM LEARNING LEVEL CONTENT

1.Introduction

2.Nomenclature

    (a). Common Name   (b). IUPAC Name

3.Classification of alcohol

(i) On the basis of degree of carbon

    (a). Primary   (b). Secondary      (c). Tertiary

(ii)On the basis of type of hybridization

(iii) On the basis of no. of –OH group

4. Structure of functional group

5. Methods of Preparation alcohol and phenol

6. Physical Properties alcohol and phenol

7.Chemical Reactions of alcohol and phenol

8.Mechanism:

(a) Hydration of alkene

(b) Dehydration of alcohol at 443K

9.Name Reactions- Kolbe᾿s reaction, Reimer-Tiemann reaction, Williamson synthesis, Friedel-Crafts reaction, Esterification.

10.Ether

(a). Isomerism

(b). Preparation

(c)Physical Properties

(d)Chemical Reaction

(e)Name Reactions

(f) Mechanism: - Dehydration of alcohol at 413K.

# CHAPTER 8: ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

## MINIMUM LEARNING LEVEL CONTENT

1. Arrange in Order

   (i) Boiling point order

   (ii) Reactivity of aldehydes and ketones towards nucleophilic addition reactions

   (iii) Acidic strength of carboxylic acids

2. Distinguish Tests

   (i) Tollen's test or Silver Mirror test

   (ii) Fehling's Test

   (iii) Iodoform Test

   (iv) Ferric Chloride Test

   (v) Sodium Bicarbonate Test

3. Reagents

   (i) DIBAL-H

   (ii) PCC

   (iii) Jones Reagent

4. Name Reactions

   (i) Rosenmund Reduction

   (ii) Stephen Reaction

   (iii) Etard Reaction

   (iv) Clemmensen Reduction

   (v) Wolff- Kishner Reduction

   (vi) Aldol Condensation

   (vii) Cross Aldol Condensation

   (viii) Cannizzaro Reaction

   (ix) Hell-Volhard-Zelinsky Reaction

5. Word Problems

6. Reasoning Based Questions

# CHAPTER 9: AMINES

## MINIMUM LEARNING LEVEL CONTENT

1. Arrange in Order

   (i) Boiling point order

   (ii) Solubility of Amines Primary, Secondary and Tertiary amines

   (iii) Basic strength of Amines

2. Distinguish Tests

   (i) Carbylamine test

   (ii) Hinsberg's test

   (iii) Coupling reaction- Azo dye test

   (iv) Hydrolysis test

3. Reagents

   (i) Direct Nitration of aniline

   (ii) Nitrous Acid

   (iii) Alkaline Chloroform

4. Name Reactions

   (i) Sandmeyer Reaction

   (ii) Balz Scheimann Reaction

   (iii) Carbylamine Reaction

   (iv) Gabriel Phthalimide synthesis

   (v) Coupling reaction

   (vi) Gatterman Reaction

   (vii) Hinsberg Test

5. Word Problems

6. Reasoning Based Questions

7. Complete the Reaction

# CHAPTER 10: BIOMOLECULES
## MINIMUM LEARNING LEVEL CONTENT

➢ CARBOHYDRATE – 1. Classification based on hydrolysis product as monosaccharides, oligosaccharides & polysaccharides (with examples)

2. Classification based on functional group as aldose & ketose

3. Preparation of Glucose from Sucrose & Starch

4. Chemical reactions of Glucose with HI, $NH_2OH$, $Br_2$ water, $HNO_3$ & Acetic anhydride

5. Evidences in favor of ring structure of Glucose (any two)

6. Meaning of D & L configurations

7. Cyclic structures of Glucose & Fructose (pyranose & Furanose ring structure)

8. Name of disaccharides with hydrolysis products

9. Glycosidic linkage

10. Structural difference between Starch & Cellulose.

11. Components of Starch – Amylose and Amylopectin

12. Reducing & non-reducing sugar

13. Importance of carbohydrates

➢ PROTEINS - 1. Amino acids – Essential and non-essential amino acids

2. Zwitter ion- meaning and an example

3. Peptide linkage

4. Basic idea about the all four structures of Proteins

5. Denaturation of Proteins

➢ VITAMINS- 1. Definition

2. Classification as Fat soluble and Water soluble

3. Source and deficiency disease of some important Vitamins

➢ NUCEIC ACID- 1. Types of nucleic acids as DNA & RNA

2. Structural difference based on Pentose sugar, Nitrogenous base & Strand

3. Nucleoside and Nucleotide

4. Phosphodiester linkage

5. Types of RNA

6. Biological functions of Nucleic acids.

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