Class XII Session 2024-25
Subject - Chemistry
Sample Question Paper - 7

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

Read the following instructions carefully.

1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

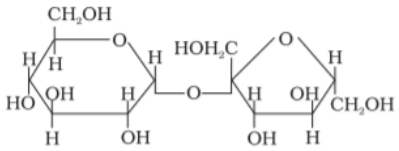
Section A

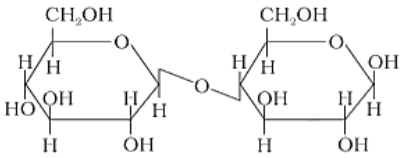
1. A halogen used in potential blood substitutes in surgery is: **[1]**

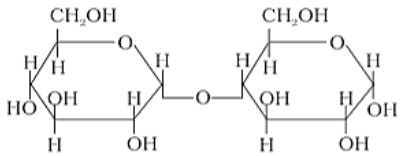
   a) Fluorine b) Bromine

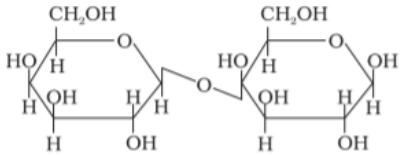
   c) Iodine d) Chlorine

2. In disaccharides, if the reducing groups of monosaccharides i.e. aldehydic or ketonic groups are bonded, these are non-reducing sugars. Which of the following disaccharide is a non-reducing sugar? **[1]**

   a) 

   b) 

   c) 

   d) 

3. Phenol on distillation with zinc dust gives **[1]**

   a) benzaldehyde b) benzophenone

   c) benzene d) benzonic acid

4. Which of the following has most acidic hydrogen? **[1]**

   a) 2, 3 – Hexanedione b) 2, 5 – Hexanedione

   c) 2, 4 – Hexanedione d) 3 – Hexanone

5. Consider the reaction **[1]**

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

The equality relation between $\frac{d[NH_3]}{dt}$ and $\frac{-d[H_2]}{dt}$ is:

a) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$ b) $\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$

c) $\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

6. Match the items of column I with appropriate entries of column II. **[1]**

Column I	Column II
(a) For electrolyte $CaSO_4$	(i) i = 5
(b) For ideal Solution	(ii) i = 2
(c) For electrolyte $Al_2(SO_4)_3$	(iii) i = 4
(d) For electrolyte Na_3PO_4	(iv) i = 1

a) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii). b) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv).

c) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i). d) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii).

7. Decomposition of benzene diozonium chloride by using Cu_2Cl_2/HCl to form chlorobenzene is: **[1]**

a) Wurtz – Fittig reaction b) Friedel – Crafts reaction

c) Sandmeyer's reaction d) Finkelstein reaction

8. Which of the following characteristics of transition metals is associated with their catalytic activity? **[1]**

a) Paramagnetic nature b) High enthalpy of atomisation

c) Variable oxidation states d) Colour of hydrated ions

9. In a chemical reaction X $\rightarrow$ Y, it is found that the rate of reaction doubles when the concentration of X is increased four times. The order of the reaction with respect to X is **[1]**

a) $\frac{1}{2}$ b) 2

c) 1 d) 0

10. Methyl ketones are usually characterized by: **[1]**

a) Benedict's reagent b) Iodoform test

c) Schiff's test d) Tollen's reagent

11. Monochlorination of toluene in sunlight followed by hydrolysis by aq. NaOH yields **[1]**

a) benzyl alcohol b) o-cresol

c) 2,4-dihydroxytoluene d) m-cresol

12. In order to prepare a 1^o amine from an alkyl halide with simultaneous addition of one CH_2 group in the carbon chain, the reagent used as source of nitrogen is _____. **[1]**

a) Sodium amide, $NaNH_2$ b) Sodium azide, NaN_3

c) Potassium phthalimide, $C_6H_4(CO)_2N^-K^+$ d) Ethanolic NaCN

13. **Assertion:** Fructose can reduce Tollen's reagent. **[1]**

Reason: Fructose is a ketone.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

14. **Assertion (A):** Isobutanal does not give the iodoform test. **[1]**

Reason (R): It does not have alpha-hydrogen.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

15. **Assertion (A):** The nucleophilic substitution of vinyl chloride is difficult than ethyl chloride. **[1]**

Reason (R): Vinyl group is an electron-donating group.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

16. **Assertion (A):** 4-nitrophenol is more acidic than 2, 4, 6-trinitrophenol. **[1]**

Reason (R): Phenol is a weaker acid than carbonic acid.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

17. When a coordination compound $CoCl_3 \cdot 6NH_3$ is mixed with $AgNO_3$, 3 moles of AgCl are precipitated per mole of the compound. Write **[2]**

i. structural formula of the complex.

ii. IUPAC name of the complex.

18. What is lanthanoid contraction? What are the consequences of lanthanoid contraction? **[2]**

19. **Answer the following:** **[2]**

(a) What is the order of photochemical reaction? **[1]**

(b) For the homogeneous decomposition of N_2O_5 into NO_2 and O_2; $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ **[1]**

Rate = k $[N_2O_5]$

Find out the order of reaction with respect to N_2O_5.

20. Calculate the volume of water which could be added to 20 ml of 0.65 m HCl to dilute the solution to 0.2 m? **[2]**

OR

What factors are responsible for deviations for Raoult's law?

21. How are the following conversions carried out? **[2]**

i. Ethanol to 1, 2-Ethanediol

ii. Phenol to Acetophenone

Section C

22. What do you understand by the term 'conductance'? What are its units? **[3]**

23. For the reaction R $\rightarrow$ P, the concentration of a reactant changes from 0.03 M to 0.02 M in 25 minutes. Calculate the average rate of reaction using units of time both in minutes and seconds. **[3]**

24. Write the equation of the reaction of hydrogen iodide with: **[3]**

i. 1-propoxypropane

ii. Methoxybenzene

iii. Benzyl ethyl ether

OR

How would you account for the following:

i. Phenols are much more acidic than alcohols.

ii. The boiling point of ethers are much lower than those of the alcohols of comparable molar masses.

25. Write the products formed when $(CH_3)_3$ C – CHO reacts with the following reagents : **[3]**

i. CH_3COCH_3 in the presence of dilute NaOH

ii. HCN

iii. Conc. NaOH

26. Depict the galvanic cell in which the reaction: **[3]**

$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

takes place. Further show:

i. Which of the electrodes is negatively charged?

ii. The carries of current in the cell.

iii. Individual reaction at each electrode.

27. What are haloarenes? How are they classified? Give one method for each of the preparation of nuclear and side chain substituted halorenes. **[3]**

28. Conductivity of saturated solution of $BaSO_4$ at 315 K is 3.648 $\times$ 10^{-6} ohm^{-1} cm^{-1} and that of water is 1.25 $\times$ 10^{-6} ohm^{-1} cm^{-1}. Ionic conductance of Ba^{2+} and SO_4^{2-} are 110 and 136.6 ohm^{-1} cm^2 mol^{-1} respectively. Calculate the solubility of $BaSO_4$ in g/L. **[3]**

Section D

29. **Read the following text carefully and answer the questions that follow:** **[4]**

The actinoids include the fourteen elements from Th to Lr. The actinoids are radioactive elements and the earlier members have relatively long half-lives, the latter ones have half-life values ranging from a day to 3 minutes for lawrencium. The latter members could be prepared only in nanogram quantities. Actinoids show a greater range of oxidation states. The elements, in the first half of the series frequently exhibit higher oxidation states. The actinoids resemble the lanthanoids in having more compounds in +3 state than in the +4 state. All the actinoids are believed to have the electronic configuration of $7s^2$ and variable occupancy of the 5f and 6d subshells. The magnetic properties of the actinoids are more complex than those of the lanthanoids. The variation in the magnetic susceptibility of the actinoids with the number of unpaired 5f electrons is roughly parallel to the corresponding results for the lanthanoid.

i. Actinoid contraction is greater from element to element than lanthanoid contraction. Why? (1)

ii. Actinoids show irregularities in their electronic configuration. Justify? (1)

iii. The actinoid metals are all silvery in appearance but display a variety of structures than lanthanoid give reason. (2)

OR

The magnetic properties of the actinoids are more complex than those of the lanthanoids. Why? (2)

30. **Read the following text carefully and answer the questions that follow:** **[4]**

The boiling point elevation and the freezing point depression of solutions have a number of practical applications. Ethylene glycol ($CH_2OH \cdot CH_2OH$) is used in automobile radiators as an antifreeze because it lowers the freezing point of the coolant. The same substance also helps to prevent the radiator coolant from boiling away by elevating the boiling point. Ethylene glycol has a low vapour pressure. We can also use glycerol as an antifreeze. In order for boiling point elevation to occur, the solute must be non-volatile, but no such restriction applies to freezing point depression. For example, methanol (CH_3OH), a fairly volatile liquid that boils only at 65^oC is sometimes used as antifreeze in automobile radiators.

i. Out of the CH_3OH and $C_6H_{12}O_6$, which is a better reagent for depression in freezing point but not for elevation in boiling point? (1)

ii. Will the depression in freezing point be same or different, if 0.1 moles of sugar or 0.1 moles of glucose is dissolved in 1 L of water? (1)

iii. 124 g each of the two reagents glycerol and glycol are added in 5 kg water of the radiators in the two cars. Which one is better for a car? Justify your answer. (2)

OR

If the cost of glycerol, glycol and methanol are the same, then what would be the sequence of the economy to use these compounds as antifreeze? (2)

Section E

31. **Attempt any five of the following:** **[5]**

(a) Deficiency of which vitamin causes night-blindness. **[1]**

(b) Give two examples of reducing sugars. **[1]**

(c) Define the following terms: **[1]**

i. Glycosidic linkage

ii. Native protein

(d) Write function of carbohydrates in plants. **[1]**

(e) Differentiate between: **[1]**

i. Peptide linkage and Glycosidic linkage

ii. Nucleoside and Nucleotide

(f) What type of linkage holds together the monomers of DNA? **[1]**

(g) Write the product obtained when D-glucose reacts with H_2N-OH. **[1]**

32. $[NICl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral. Why? **[5]**

OR

$CoSO_4Cl.{}_5NH_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with $AgNO_3$ to give white precipitate but does not react with $BaCl_2$. Isomer 'B' gives a white precipitate with $BaCl_2$ but does not react with $AgNO_3$. Answer the following questions.

i. Identify 'A' and 'B' and write their structural formulas.

ii. Name the type of isomerism involved.

iii. Give the IUPAC name of 'A' and 'B'.

33. Giving an example for each describe the following reactions : **[5]**

i. Hofmann bromamide reaction.

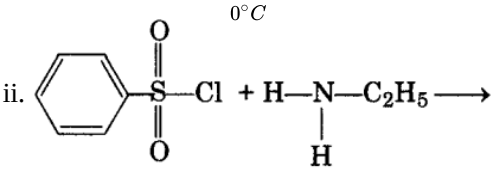
ii. Gattermann reaction.

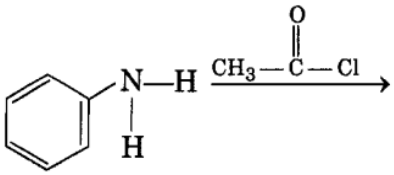
iii. Coupling reaction.

OR

Write the main products of the following reactions:

i. $CH_3CH_2NH_2 \xrightarrow[0^\circ C]{HNO_2}$

ii. 

iii. 

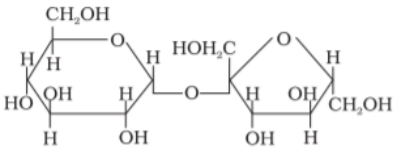
Solution

Section A

1. **(a)** Fluorine

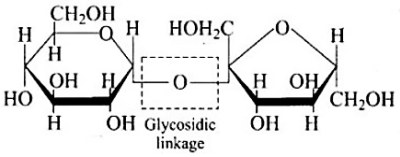
   Explanation: Certain fully fluorinated compounds are being considered as potential blood substitutes in surgery. So fluorine is the element used in these blood substitutes.

2. **(a)**



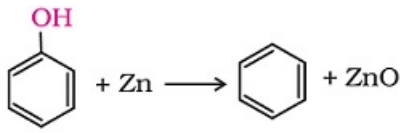
   Explanation:

   This structure represents sucrose(diasaccharides) in which α-D glucose and β-D-fructose is attached to each other by C_1-C_2 glycosidic linkage. Since reducing groups of glucose and fructose are involved in glycosidic bond formation, this is considered as a non-reducing sugar.



3. **(c)** benzene

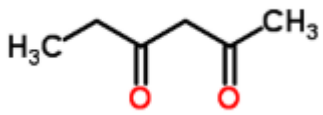
   Explanation: Phenol is reduced to benzene when it is distilled with zinc dust or its vapour is passed over granules of zinc at 400^oC.



4. **(c)** 2, 4 – Hexanedione

   Explanation: 2,4-hexanedione will have active methylene group.

   The structure of 2,4-hexanedione is



   $-CH_2$ group present between the two carbonyl group is active methylene group, these hydrogens are highly acidic as their conjugate base is highly stable.

5. **(b)** $\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$

   Explanation: For the given reaction,

   $rate = -\frac{1}{2}\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

6. **(d)** (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii).

   Explanation: (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii).

7. **(c)** Sandmeyer's reaction

   Explanation: $C_6H_5N_2^+Cl^- + Cu_2Cl_2/HCl \rightarrow C_6H_5Cl$

Mixing the solution of the freshly prepared diazonium salt with cuprous chloride or cuprous bromide results in the replacement of the diazonium group by –Cl or –Br. This is called Sandmeyer's reaction.

8. **(c)** Variable oxidation states
Explanation: Variable oxidation states is associated with their catalyst activity.

9. **(a)** $\frac{1}{2}$
Explanation: X $\rightarrow$ Y
Rate(r) $\propto$ [X]^n [Where n = order of reaction]
If the concentration X is increased by 4 times
X' = 4X
Then, Rate(r') $\propto$ [X']^n
$\frac{r'}{r} = \frac{[4X]^n}{[X]^n} = 2$
r' is new rate, X' is a new concentration
[4]^n = 2
$\therefore n = \frac{1}{2}$
Order of reaction = $\frac{1}{2}$

10. **(b)** Iodoform test
Explanation: $CH_3COR + I_2 + NaOH \rightarrow CHI_3 + RCOO^-Na^+$
Iodoform test is a characteristic test given by methyl ketones. CHI formed is yellow precipitate.

11. **(a)** benzyl alcohol
Explanation: Monochlorination of toluene gives benzylchloride.
$C_6H_5CH_3 + Cl_2 + hv \rightarrow C_6H_5CH_2Cl$
benzyl chloride on reaction with aq. NaOH will give benzyl alcohol by substitution reaction.
$C_6H_5CH_2Cl + NaOH(aq) \rightarrow C_6H_5CH_2OH$

12. **(d)** Ethanolic NaCN
Explanation: KCN is used to increase the number of carbon atoms.
RX + NaCN $\rightarrow$ RCN + KX
$R - CN + 4H \xrightarrow{H_2/Raney\ Ni} RCH_2NH_2$

13. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Fructose does not contain an aldehyde group but still reduce Tollen's reagent. In presence of the dilute solution of alkali, fructose undergoes epimerization to form glucose and mannose.

14. **(c)** A is true but R is false.
Explanation: Isobutanal does not give an iodoform test because it does not have the $-COCH_3$ group.

15. **(c)** A is true but R is false.
Explanation: A is true but R is false.

16. **(d)** A is false but R is true.
Explanation:
Electron withdrawing groups such as -NO_2, - CN, - X, increase the acidity. Greater the number of electron-withdrawing groups more is the acidic character, i.e. 2, 4, 6-trinitrophenol is more acidic than 4-nitrophenol.

Section B

17. i. When one mole of $CoCl_3.6NH_3$ is mixed with $AgNO_3$, three moles of AgCl are precipitated which indicates that three ionisable chloride ions in the complex are present. Hence, its structural formula is $[Co(NH_3)_6]Cl_3$.

ii. IUPAC name of the complex $[Co(NH_3)_6]Cl_3$ is Hexa ammine cobalt (III) chloride.

18. The decrease in atomic and ionic size with increase in atomic number in lanthanoids is called lanthanoid contraction. Its consequences are

(i) It causes the radii of the members of the third transition series to be very similar to those of the corresponding members of the second series. The almost identical radii of Zr (160 pm) and Hf (159 pm), have almost similar sizes.

(ii) Difficulty in separation of lanthanoids.

19. Answer the following:

(i) Zero Order reaction

(ii) It is first order with respect to N_2O_5.

20. For dilution -

$M_1V_1 = M_2V_2$

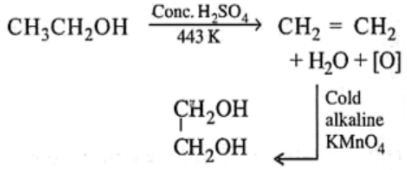
$V_2 = \frac{M_1V_1}{M_2} = \frac{0.65M \times 20\text{ml}}{0.2M} = 65\text{ml}$

Vol of water to be added to 20 ml = $V_2 - V_1$ = 65 ml - 20 ml = 45 ml.

OR

If the force of attraction between A - B are different from A - A and B - B, there will be deviation from Raoult's law. As a result of this difference in interaction, there will be difference in vapour pressure of the mixture of A and B compared to pure A and pure B.

21. i.



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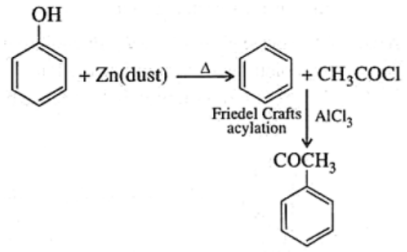


Section C

22. The reciprocal of electrical resistance is called conductance. It is usually represented by 'G'.

Thus $G = \frac{1}{R}$

Units: The units of conductance are reciprocal ohms written as

ohm^{-1} or mho

or siemens (S)

$1S = 1\Omega^{-1}$

23. Average rate of reaction $-\frac{\Delta[R]}{\Delta t}$

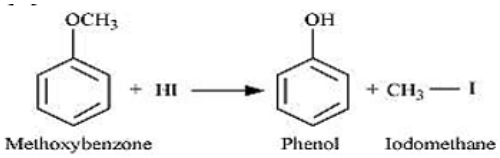
$= -\frac{[R]_2 - [R]_1}{t_2 - t_1} = -\frac{0.02 - 0.03}{25} M\,\text{min}^{-1}$

$= -\frac{-0.01}{25} M\,\text{min}^{-1} = 4 \times 10^{-4} M\,\text{min}^{-1}$

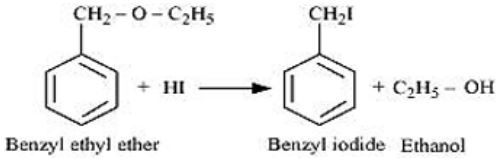
$= \frac{4 \times 10^{-4}}{60}\ M\,s^{-1} = 6.67 \times 10^{-6} Ms^{-1}$

24. i. $\underset{\text{1-Proproxypropane}}{C_2H_2CH_2 - O - CH_2C_2H_5} + HI \xrightarrow{373K} \underset{\text{Propan-1-ol}}{CH_3CH_2CH_2 - OH} + \underset{\text{1-Iodopropane}}{CH_3CH_2CH_2 - I}$

ii.



iii.



OR

i. Since the phenoxide ion left after the removal of a proton is stabilized by resonance whereas alkoxide ion left after the removal of a proton from alcohol is not.

ii. The large difference in boiling points of alcohols and ethers is due to the presence of hydrogen bonding in alcohols.

25. i. The product form when $(CH_3)_3$-C-CHO react with CH_3COCH_3 in the presence of dilute NaOH is:

$$(CH_3)_3 - C - CHO + CH_3 - CO - CH_3 \xrightarrow{NaOH(dil)} \underset{4-Hydroxy-5,5-\text{dim}ethylhexa-2-one}{(CH_3)_3 - C - \overset{OH}{\overset{|}{C}}H - CH_2 - \overset{O}{\overset{||}{C}} - CH_3}$$

ii. The product form when $(CH_3)_3$C-CHO react with HCN is$(CH_3)_3 - C - CHO + HCN \rightarrow (CH_3)_3 - \underset{CN}{\overset{H}{\overset{|}{\underset{|}{C}}}} - OH$

iii. The product form when $(CH_3)_3$-C-CHO react with conc. NaOH is:$2(CH_3)_3 - C - CHO \xrightarrow{Conc.\ NaOH}$

$(CH_3)_3 - COO^- Na^+ + (CH_3)_3 - CH_2OH$

26. We have,

$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

At Cathode (Reduction):

$2Ag^+(aq) + 2e^- \rightarrow 2Ag(s)$

At Anode (Oxidation):

$Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-$

The cell will be represented as:

$Zn(s)|Zn^{2+}(aq)||Ag^+(aq)|Ag(s)$

i. From half cell reaction, Zinc acts as Anode, i.e. zinc electrode will be negatively charged.

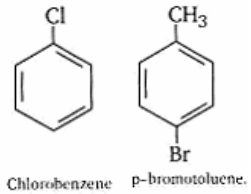
ii. The current will flow from silver to zinc in the external circuit and inside the solution, ions are responsible as shown in the half cell reaction. Zn^{2+} is formed in the anode container and goes to the solution and in the cathode container, Ag^+ goes from solution to the silver metal(cathode) and gets deposited. To maintain the concentration of ions in both the containers, salt bridge is used which contain an electrolyte i.e. KCl.

iii. At anode : $Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-$

At cathode: $Ag^+(aq) + e \rightarrow Ag(s)$

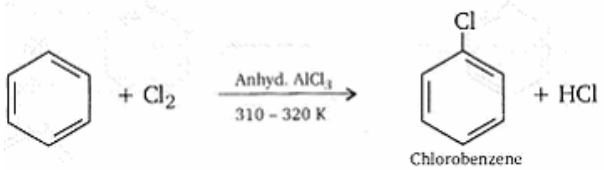
27. **Haloarenes:** The replacement of hydrogen atoms in a aromatic hydrocarbon by halogen atoms results in the formation of aryl halide (haloarene). Haloarenes contain halogen atoms attached to sp^2 hybridized carbon atoms of an aryl group. They are classified as:

i. **Nuclear halogen derivatives:** Halogen derivatives of aromatic hydrocarbons in which the halogen atom (F, Cl , Br, or I) is directly attached to an aromatic ring are called nuclear halogen derivatives. Some examples are:



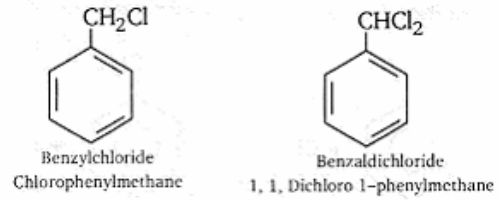
Chlorobenzene p-bromotoluene.

It is prepared by the direct chlorination of aromatic hydrocarbon.



Chlorobenzene

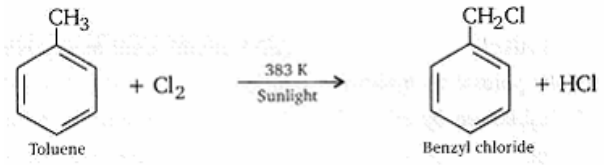
ii. **Side chain halogen derivatives:** Halogen derivatives of aromatic hydrocarbons in which the halogen atom is linked to one of the carbon atoms of the side chain carrying the aryl group are called aryl halides. For example,



Benzylchloride
Chlorophenylmethane

Benzaldichloride
1, 1, Dichloro 1-phenylmethane

Preparation: By the direct halogenation of a suitable arenas.



28. $\Lambda_m^{\circ}\left(BaSO_4\right)=\Lambda_m^{\circ}Ba^{2+}+\Lambda_m^{\circ}SO_4^{2-}=110+136.6=246.6ohm^{-1}cm^{-1}$

$K_{B,S04}=K_{B,s04}(\text{ solution })-K_{watar}=3.648\times10^{-6}-1.25\times10^{-6}$

$=2.398\times10^{-6}s\,cm^{-1}$

$\Lambda_m^c=\frac{K\times1000}{\text{Solubility}}=\frac{2.398\times10^{-6}\times1000}{246.6}=9.72\times10^{-6}mol/L$

Solubility = $9.72\times10^{-6}\times233=2.26\times10^{-3}$ g/L

Section D

29. i. This is because of relatively poor shielding by 5f electrons in actinoids in comparison with shielding of 4f electrons in lanthanoids.

ii. Actinoids have irregularities in the electronic configuration because of almost equal energy of 5f, 6d and 7s orbitals. Therefore, there are some irregularities in the filling of 5f, 6d, and 7s orbitals. The electron may enter either of these orbitals.

iii. The structural variability in actinoids is obtained due to irregularities in metallic radii which are far greater than in lanthanoids.

OR

Magnetic properties of actinoid complexes are borne by 5f open shell orbitals. These orbitals have a marked inner shell character, as in lanthanides, but interact more with the chemical environment than the 4f of lanthanides, leading to unique magnetic properties.

30. i. CH_3OH is a better reagent for depression in freezing point but not for elevation in boiling point.

ii. The depression in freezing point will be the same in both the solutions because both are non-electrolytes and gives the same number of solutes.

iii. Glycol will be better than glycerol because it is more volatile than glycerol.

OR

The sequence of the economy to use these compounds as antifreeze is Methanol > Glycol > Glycerol.

Section E

31. Attempt any five of the following:

(i) Vitamin A

(ii) Examples of reducing sugars - Maltose and Lactose.

(iii) i. A linkage between two monosaccharide units through oxygen atom.

ii. Protein having a unique three-dimensional structure and biological activity.

(iv)They store energy in the form of starch in plants.

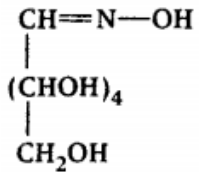
(v) i. **Peptide linkage:** A linkage formed when two amino acids are joined through -CONH- bond.
Glycosidic linkage: When two monosaccharides are joined through oxygen atom.

ii. **Nucleoside:** Base + Sugar
Nucleotide: Base + Sugar + Phosphate

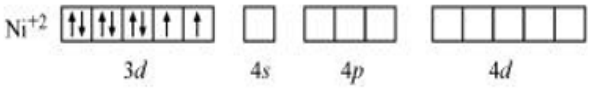
(vi)The 2 strands of DNA are attached to each other by hydrogen bonds that connect the nitrogenous bases of one strand to the bases of the other strand (this is called complementary base pairing) where Adenine pairs with Thymine by 2 hydrogen bonds and Guanine pairs with Cytosine using 3 hydrogen bonds.

While nucleotides of DNA are held together by Phosphodiester linkages. The structure of DNA holds the nucleotides in place using phosphodiester bonds. A phosphodiester bond occurs when exactly two of the hydroxyl group in phosphoric acid react with hydroxyl groups on other molecules to form two ester bonds. The phosphodiester bond is the linkage between the 3' carbon atom of one sugar molecule and the 5 ' carbon atom of another, deoxyribose in DNA.

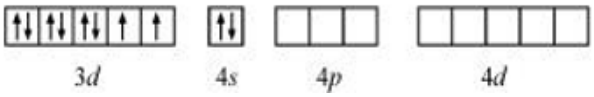
(vii)D-glucose on reaction with NH_2OH (hydroxylamine) yield glucose oxime.



32. Though both $[NICl_4]^{2-}$ and $[Ni(CO)_4]$ are tetrahedral, their magnetic characters are different. This is due to a difference in the nature of ligands. CN^- is a weak field ligand and it does not cause the pairing of unpaired 3d electrons. Hence, $[NICl_4]^{2-}$ is paramagnetic.



In $[Ni(CO)_4]$,Ni is in the zero oxidation state i.e., it has a configuration of $3d^8 4s^2$.



But CO is a strong field ligand. Therefore, it causes the pairing of unpaired 3d electrons. Also, it causes the 4s electrons to shift to the 3d orbital, thereby giving rise to sp^3hybridization. Since no unpaired electrons are present in this case, $[Ni(CO)_4]$ is diamagnetic.

OR

$CoSO_4Cl.5NH_3$:

i. Isomer A reacts with $AgNO_3$ but not with $BaCl_2$, it shows that it has Cl ion outside the coordination sphere. Hence, A = $[CO(NH_3)_5SO_4]CI$

Isomer B reacts with $BaCl_2$ but not with $AgNO_3$, it shows that it has SO_4^- outside the coordination sphere

Hence, B = $[CO(NH_3)_5Cl]SO_4$

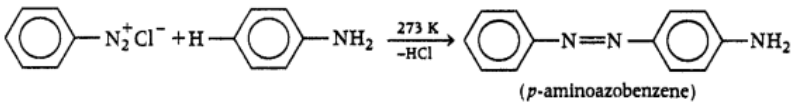
ii. Type of isomerism - Ionization isomerism.

iii. IUPAC name of, A = Pentaamminesulphatocobalt (III) chloride and B = Pentaamminesulphatocobalt (III) sulphate.

33. i. Hofmann bromamide degradation reaction It is a method for the preparation of primary amines by treating an amide with bromine in an aqueous or ethanolic solution of sodium hydroxide. The amines so formed contain one carbon less than that present in the parent amide.

ii. Gattermann reaction When benzene diazonium chloride is treated with Cu/HCl Cu/HBr, chlorobenzene or bromobenzene is obtained. This reaction is known as Gattermann reaction

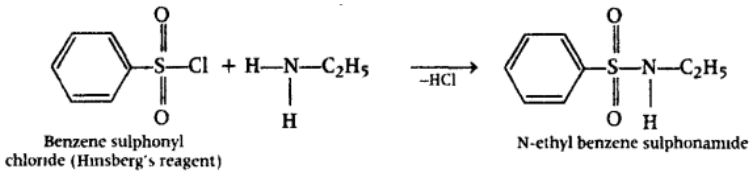
iii. Coupllng reaction Arenediazonium salts react with highly reactive (i.e. electron rich) aromatic compounds such as aniline, phenols to form brightly coloured azo compounds, Ar-N =N-Ar. This reaction is called coupling reaction. e.g. Benzene diazonium chloride reacts with aniline in faintly acidic medium (pH 4- 5) at 273·278K, in which the molecule at its para-position is coupled with the diazonium salt to form p-aminoazobenzene. This is an example of coupling reaction.



OR

i. $\underset{\text{Ethylamine}}{CH_3CH_2NH_2} + HNO_2 \xrightarrow{0^\circ C} \underset{\text{Ethyl alcohol}}{CH_3CH_2OH} + N_2 + H_2O$

ii.



iii.