Class XII Session 2025-26
Subject - Chemistry
Sample Question Paper - 9

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. Which of the following is a disaccharide? **[1]**

   a) Glucose b) Starch

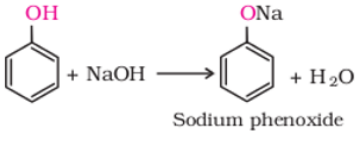
   c) Cellulose d) Lactose

2. When diethyl ether is heated with excess of HI, it produces : **[1]**

   a) ethyl iodide b) ethanol

   c) iodoform d) methyl iodide

3. In the reaction **[1]**

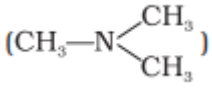


   a) Cleavage of O - H bond b) Phenols are acidic in nature.

   c) All of these d) They can donate a proton to a stronger base

4. Chloromethane on treatment with excess of ammonia yields mainly **[1]**

   a) N, N-Dimethylmethanamine b) N–methylmethanamine (CH_3—NH—CH_3)



   c) Methanamine (CH_3NH_2) d) Mixture containing all these in equal proportion

5. Which one among the following metals of 3d series has the lowest melting point? **[1]**

a) Mn

b) Fe

c) Cu

d) Zn

6. Match the item given in Column I with expression given in Column II. **[1]**

Column I	Column II
(a) Osmotic Pressure	(i) $p = K_H . \chi_B$
(b) Relative lowering of vapour pressure	(ii) $\frac{\triangle P}{P^o_A} = \chi_B$
(c) Henry Law	(iii) $\triangle T_b = K_b . m$
(d) Elevation in boiling point	(iv) p = iCRT

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

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

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

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

7. Which of the following does not give silver mirror test? **[1]**

a) HCOOH

b) CH_3CH_2CHO

c) CH_3COCH_3

d) CH_3CHO

8. The fragrance of the aldehyde and ketone are used for perfume and similar uses depend on: **[1]**

a) moisture of the air.

b) on its reactivity with other functional groups.

c) only solubility of aldehydes and ketones.

d) size and solubility of the aldehyde and ketone molecule.

9. For a certain reaction R $\longrightarrow$ products, a plot of log [R] vs. time gives a straight line with a slope of 1.25 s^{-1}. The order of the reaction is: **[1]**

a) Two

b) One

c) Fractional

d) Zero

10. Value of Henry's constant K_H: **[1]**

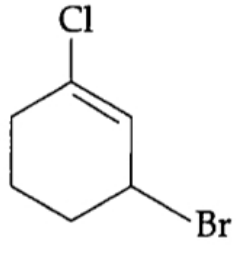
a) increases with increase in temperature.

b) increases with decrease in temperature.

c) remains constant.

d) decreases with increase in temperature.

11. The IUPAC name of the compound shown below is: **[1]**



a) 1-bromo-3-chlorocyclohexene

b) 3-bromo-1-chlorocyclohexene

c) 2-bromo-6-chlorocyclohex-1-ene

d) 6-bromo-2-chlorocyclohexene

12. Gabriel synthesis is used for the preparation of: **[1]**

a) Secondary amine

b) Tertiary amine

c) Quaternary salt

d) Primary amines

13. **Assertion (A):** Vitamin A and D are not absorbed in the body unless fat digestion and absorption proceed normally. **[1]**

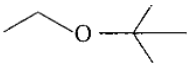
Reason (R): Vitamin A and D are fat-soluble vitamins.

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):** Hydrolysis of ether  with aq. HI is S_N1 reaction. **[1]**

Reason (R): $I^{\ominus}$ is strong nucleophile so, it attacks from less hindered side.

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):** Rate of addition of HCN on carbonyl compounds increases in presence of NaCN. **[1]**

Reason (R): Reaction involves the addition of Cn^- in rate determining step.

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):** Isopropyl chloride is less reactive than CH_3Br in S_N2 reactions. **[1]**

Reason (R): S_N2 reactions are always accompanied by inversion of configuration.

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. Why are Fe^{2+} compounds easily oxidises to Fe^{3+} as compared to Mn^{+2} compounds. **[2]**

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

(a) a. Write the mathematical relation between rate constant and half-life of a first order reaction. **[1]**

b. What is collision frequency?

(b) If the rate equation is given below: **[1]**

Rate = $k[A]^2[B]$

then what will be the unit of its rate and rate constant?

19. Calculate the temperature at which the solution containing 54 g of glucose, $C_6H_{12}O_6$ in 250 g of water will freeze. (K_b for water = 1.86 $K\ kg\ mol^{-1}$) **[2]**

OR

Define the terms Mass percentage.

OR

An organic compound 'A' (molecular formula C_3H_6O) is resistant to oxidation but forms a compound 'B' (C_3H_8O) on reduction. 'B' reacts with HBr to form a bromide'C' which on treatment with alcoholic KOH forms an alkene 'D' (

C_3H_6). Deduce the structures of A, B, C and D.

20. Write the formulae for the following coordination compounds: **[2]**

i. Potassium tetrahydroxo sincate (II)

ii. Potassium trioxalatoaluminate (III)

iii. Dichloridobis cobalt III (ethane - 1, 2 diamine)

Section C

21. i. Write the mechanism of the following reaction: **[3]**

$$2CH_3CH_2OH \xrightarrow[413K]{H^+} CH_3CH_2OCH_2CH_3 + H_2O$$

ii. Write the preparation of phenol from cumene.

OR

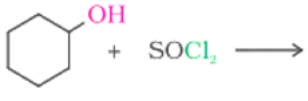
Write the reactions and conditions for the following conversions:

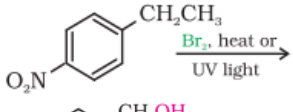
i. 2-Propanone into 2-methyl-2-Proponal

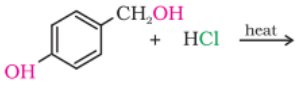
ii. n-Propyl alcohol into hexane

22. State Kohlrausch's law of independent migration of ions. How can the degree of dissociation of acetic acid in a solution be calculated from its molar conductivity data? **[3]**

23. Draw the structures of major monohalo products in each of the following reactions: **[3]**

i. 

ii. 

iii. 

24. In a reaction between A and B, the initial rate of reaction was measured for different initial concentrations of A and B as given below: **[3]**

$A/mol\,L^{-1}$	**0.20**	**0.20**	**0.40**
$B/mol\,L^{-1}$	0.30	0.10	0.05
$r_0/mol\,L^{-1}s^{-1}$	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

What is the order of the reaction with respect to A and B?

25. Calculate the emf of the following cell: **[3]**

$Mg(s)|Mg^{2+}(0.2M) \parallel Ag^{+}(1 \times 10^{-3}M) | Ag(s)$

$E^0(Ag^+/Ag) = 0.80V$

$E^0(Mg^{2+}/Mg) = -2.37V$

26. What are fuel cells? Explain the electrode reactions involved in the working of H_2 - O_2 fuel cell. **[3]**

27. How would you bring about the following conversions? **[3]**

i. Propanal to butanone

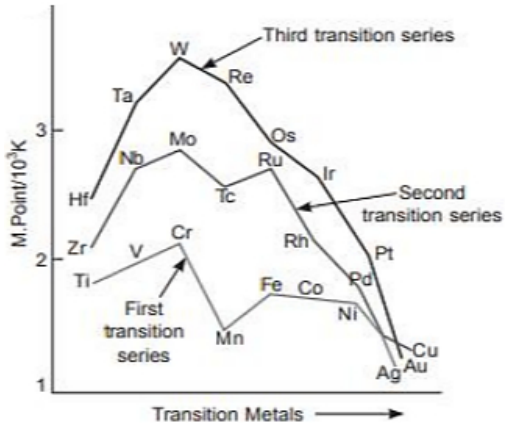
ii. Benzaldehyde to benzophenone

iii. Benzoyl chloride to benzonitrile

Section D

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

Observe the graph of transition metal and their melting points



i. Why does W (tungsten) has highest melting point? (1)

ii. Which element in 3d series has lowest enthalpy of atomisation and why? (1)

iii. Why is mercury liquid? (2)

OR

Why are transition metals less electropositive than 's'-block elements? (2)

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

A raw mango placed in concentrated salt solution loses water via osmosis and shrivel into pickle. Wilted flowers revive when placed in fresh water. A carrot that has become limp because of water loss into the atmosphere can be placed into the water making it firm once again. Water will move into its cells through osmosis. When placed in water containing less than 0.9% (mass/volume) salt, blood cells swell due to flow of water in them by osmosis.

i. People taking a lot of salt or salty food suffer from puffiness or edema. What is the reason behind this?

ii. The preservation of meat by salting and of fruits by adding sugar protects against bacterial action. How?

iii. Why the direction of osmosis gets reversed if a pressure larger than the osmotic pressure is applied to the solution side? Write its one application.

OR

What care is generally taken during intravenous injections and why?

Section E

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

(a) Define native state in reference to proteins. **[1]**

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

a. Polysaccharides

b. Nucleotides

(c) Deficiency of which vitamin causes scurvy? **[1]**

(d) What happens when D-glucose is treated with the following? Give equations to support your answer. **[1]**

a. HI

b. HNO_3

(e) Name the disaccharide which on hydrolysis gives glucose and galactose. **[1]**

(f) Write the products obtained after hydrolysis of lactose. **[1]**

(g) Give the reaction of glucose with hydrogen cyanide. Presence of which group is confirmed by this reaction? **[1]**

31. a. Give plausible explanation for each of the following: **[5]**

i. Why are amines less acidic than alcohols of comparable molecular masses?

ii. Why are primary amines highest boiling than tertiary amines?

iii. Why are aliphatic amines stronger bases than aromatic amines?

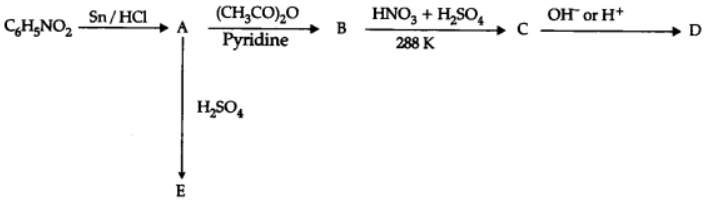
b. Complete the following reactions:

i. $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

ii. $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$

OR

Write the structure of A, B, C, D and E in the following reactions:



32. a. Write IUPAC name for each of the following complexes: **[5]**

i. $[Ni(NH_3)_6]CI_2$

ii. $K_3[Fe(CN)_6]$

iii. $[Co(en)_3]^{3+}$

b. Draw one of the geometrical isomers of the complex $[Pt(en)_2CI]^{2+}$ which is optically inactive. Also write the name of this entity according to the IUPAC nomenclature.

OR

Using crystal field theory, draw energy level diagram, write the electronic configuration of the central metal atom/ion and determine the magnetic moment value in the following:

i. $[CoF_6]^{3-}$, $[Co(H_2O)_6]^{2+}$, $[Co(CN)_6]^{3-}$

ii. $[FeF_6]^{3-}$, $[Fe(H_2O)_6]^{2+}$, $[Fe(CN)_6]^{4-}$

Solution

Section A

1. **(d)** Lactose

   Explanation:

   Lactose

2. **(a)** ethyl iodide

   Explanation:

   ethyl iodide

3. **(c)** All of these

   Explanation:

   Phenol reacts with sodium hydroxide solution to give a colourless solution containing sodium phenoxide. In this reaction, the hydrogen ion has been removed by the strongly basic hydroxide ion in the sodium hydroxide solution.

4. **(c)** Methanamine (CH_3NH_2)

   Explanation:

   $CH_3Cl + NH_3 \rightarrow CH_3NH_2 + HCl$

   Ammonia molecule is a nucleophile in nature as it has unpaired electrons. This nucleophile attacks the chloromethane CH_3Cl molecule and forms methylamine or methenamine by a nucleophilic substitution reaction mechanism. The carbon atom is partially positive in the molecule, due to the electronegativity of the halide attached which is partially negative. The electron-rich nucleophile attacks the positive ion, causing the halide ion to be separated from the molecule.

5. **(d)** Zn

   Explanation:

   Zn metal of 3d series has the lowest melting point.

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

   Explanation:

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

7. **(c)** CH_3COCH_3

   Explanation:

   CH_3COCH_3 will not give a silver mirror test (Tollens Test). Tollens test is given by aldehydes only and HCOOH is the only acid that gives tollen's test. Ketones do not give tollen's test.

8. **(d)** size and solubility of the aldehyde and ketone molecule.

   Explanation:

   Size and solubility of aldehyde and ketone determine fragrance. For example, aldehyde C-10 is used in floral blends like rose, jasmine, etc. While aldehyde C-11 has a strong citrus smell and aldehyde C-16 has a strong strawberry smell.

9.

(b) One

Explanation:

ln R = ln R_O – kT, slope = –k, slope = –1.46, so k = 1.46 sec–1 unit of k in first order is sec–1 so this is first order reaction.

10. **(a)** increases with increase in temperature.

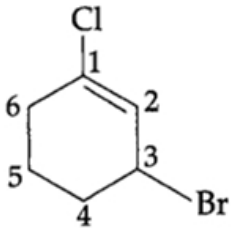
Explanation:

Value of henry constant increases with increase in temperature.

11.

(b) 3-bromo-1-chlorocyclohexene

Explanation:



IUPAC name: 3-bromo 1-chlorocyclohexene

12.

(d) Primary amines

Explanation:

In Gabriel Phthalimide reaction, the sodium or potassium salt of phthalimide is N-alkylated with a primary alkyl halide to give the corresponding *N*-alkylphthalimideis for producing primary amines. This is because of the reaction of sodium or potassium salt of phthalimide with alkyl halide impure SN_2 reaction.

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

Explanation:

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

14.

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

Explanation:

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

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

Explanation:

The addition of HCN to carbonyl compounds involves the addition of CN^- in rate determining step which are supplied easily by NaCN and thus addition becomes fast.

16.

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

Explanation:

As the size of the alkyl groups increases, the S_N2 reactivity decreases, further C - Cl bond is stronger and more difficult to cleave than C - Br bond. So CH_3Br is more reactive than $(CH_3)_2CHCl$.

Section B

17. Mn^{2+} compounds are less readily converted to its +3 oxidation state (Mn^{3+}) as compared to Fe^{2+} because Mn^{2+} ($3d^5$) is more stable than Mn^{3+} ($3d^4$) due to stable half filled d-orbital electronic configuration. Whereas Fe^{3+} ($3d^5$) is more stable than Fe^{2+} ($3d^6$) due to half filled d-orbitals therefore Fe^{2+} gets easily converted to Fe^{3+}

18. Answer the following:

(i) a. $t_{1/2} = \frac{0.693}{k}$

b. The number of collisions per second per unit volume of the reaction mixture.

(ii) Unit of rate = mol $L^{-1}s^{-1}$

Unit of rate constant (k) = $\frac{\text{Unit of rate}}{\text{Unit of } \left[A^2\right] \times \text{Unit of } [B]}$

$= \frac{molL^{-1}s^{-1}}{(molL^{-1})^2(molL^{-1})}$

$= mol^{-2}L^2s^{-1}$

19. Molecular mass of glucose

$M_B = 72 + 12 + 96 = 180\, g\, mol^{-1}$

$\Delta T_f = \frac{K_f \times w_B \times 1000}{M_B \times w_A}$

$= \frac{1.86 \times 54 \times 1000}{180 \times 250} = 2.23$ K

Freezing point of solution = $T^0_f - \triangle Tf = 273 - 2.23 = 270.77K$

OR

Mass percentage: The mass percentage of a component in a given solution is defined as the mass of the component per 100g of the solution.

Mass % of a component $= \frac{\text{Mass of the component in the solution}}{\text{Total mass of the solution}} \times 100$

OR

Structure of A, B, C and D are deduced in the following manner.

$$\underset{(A)}{CH_3 - CO - CH_3} \xrightarrow[\text{Reduction}]{LiAlH_4} \underset{(B)}{CH_3CH(OH)CH_3}$$

$$\underset{(B)}{CH_3CH(OH)CH_3} + HBr \rightarrow \underset{(C)}{CH_3CH(Br)CH_3}$$

$$\underset{(C)}{CH_3CH(Br)CH_3} + KOH(alc.) \rightarrow \underset{(D)}{CH_3 - CH = CH_2} + KBr + H_2O$$

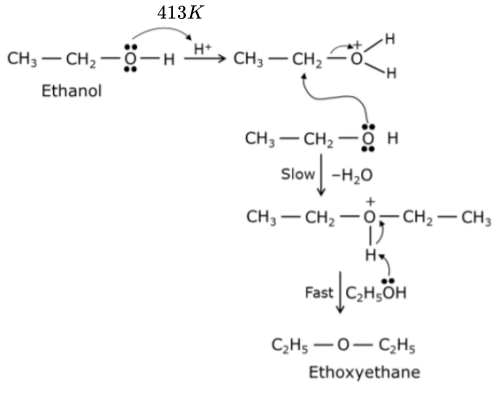
20. i. $K_2[Zn(OH)_4]$

ii. $K_3[Al(C_2O_4)_3]$

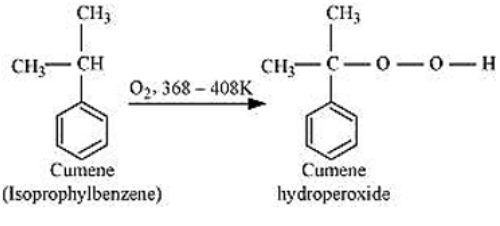
iii. $[CoCl_2(en)_2]^+$

Section C

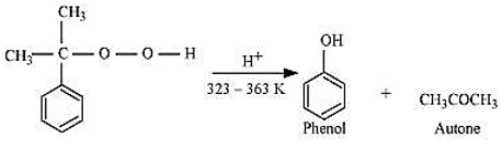
21. i. $2CH_3CH_2OH \xrightarrow[413K]{H^+} CH_3CH_2OCH_2CH_3 + H_2O$



ii. To prepare phenol, cumene is first oxidized in the presence of air of cumene hydro-peroxide.



Then, cumene hydroxide is treated with dilute acid to prepare phenol and acetone as by-products.



OR

i. $CH_3 - \underset{\underset{2-propanone}{}}{\overset{\overset{||}{C}}{}} - CH_3 + CH_3MgBr \xrightarrow[addition]{dry\ ether} \left[CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OMgBr}{|}}{C}} - CH_3\right] \xrightarrow{H_2O/H^+} CH_3 - \underset{\underset{2-methyl-2-propanol}{}}{\overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}} - CH_3}$

ii. n-Propyl alcohol to hexane

$CH_3CH_2CH_2OH + PCl_5 \rightarrow CH_3CH_2CH_2Cl + POCl_3 + HCl$

$\underset{1-Chloropropane}{2CH_3CH_2CH_2Cl} + 2Na \xrightarrow[either]{Dry} \underset{n-Hexane}{CH_3CH_2CH_2C_2CH_3} + 2NaCl$

22. **Kohlrausch law of independent migration of ions:** It states that limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte. If λ^oNa^+ and λ^oCl^- are limiting molar conductivity for sodium chloride is given by

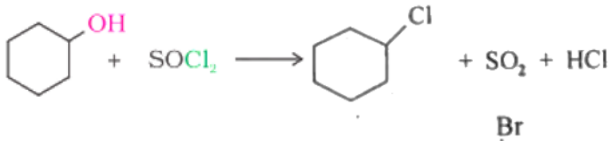
$\lambda^0_m\ (NaCl) = \lambda^oNa + \lambda^0Cl^-$

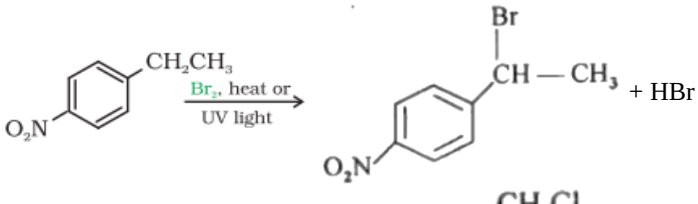
Calculation of degree of dissociation of weak electrolyte like acetic acid. The degree of dissociation α is given by:

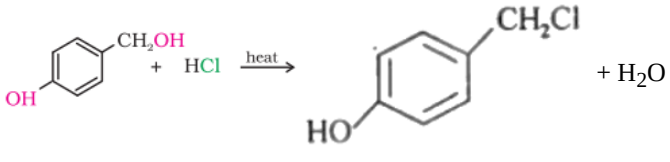
$\alpha = \frac{\lambda_m}{\lambda^0_m}$

where λ_m be molar conductivity and λ^0_m be the limiting molar conductivity.

23. Major monohalo product are as follows:

i. 

ii. 

iii. 

24. Consider the order of the reaction with respect to A is x and with respect to B is y.

Therefore, $r_0 = k[A]^x[B]^y$

$5.07 \times 10^{-5} = k[0.20]^x[0.30]^y$ ..... (i)

$5.07 \times 10^{-5} = k[0.20]^x[0.10]^y$ ..... (ii)

$1.43 \times 10^{-4} = k[0.40]^x[0.05]^y$ ..... (iii)

Dividing equation (i) by (ii), we obtain

$\frac{5.07\times10^{-5}}{5.07\times10^{-5}} = \frac{k[0.20]^x[0.30]^y}{k[0.20]^x[0.10]^y}$

$1 = \frac{[0.30]^y}{[0.10]^y}\left(\frac{0.30}{0.10}\right)^0 = \left(\frac{0.30}{0.10}\right)^y$

y = 0

Dividing equation (iii) by (ii), we obtain

$\frac{1.43\times10^{-4}}{5.07\times10^{-5}} = \frac{k[0.40]^x[0.05]^y}{k[0.20]^x[0.30]^y}$

$\frac{1.43\times10^{-4}}{5.07\times10^{-5}} = \frac{[0.40]^y}{[0.20]^y}\ \ [Since\, y = 0,\ [0.05]^y = [0.30]^y = 1]$

$2.821 = 2^x$

$\log 2.821 = x \log 2\ (Taking\ \log\ on\, both\ sides) x = \frac{\log 2.821}{\log 2}$

= 1.496

= 1.5 (approximately)

Hence, the order of the reaction with respect to A is 1.5 and with respect to B is 0.

25. $$Mg(s) \longrightarrow Mg^{2+}(aq) + 2e^-$$
$$2\,Ag^+(aq) + 2e^- \longrightarrow 2\,Ag(s)$$
$$Mg(s) + 2Ag^+(aq) \longrightarrow Mg^{2+}(aq) + 2Ag(s)$$

applying nernst equation

$E_{cell} = E^0_{cell} - \frac{0.0591}{2}\log\frac{[Mg^{2+}]}{[Ag^{2+}]}$

$E^0(Ag^+/Ag) - E^0(Mg^{2+}/Mg) - \frac{0.0591}{2}\log\frac{0.2}{(10^{-3})^2}$

$= +0.80V - (-2.37V) - \frac{0.0591}{2}\log(2\times10^5)$

$= +3.17V - \frac{0.0591}{2}[\log 2 + \log 10^5]$

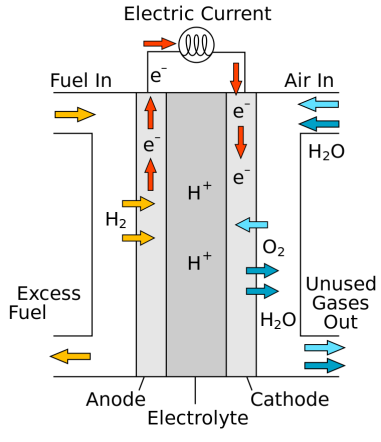
$= +3.17V - \frac{0.0591}{2}\times 5.3010$

= +3.17V - 0.1566V

= 3.0134 V

26. **Fuel cells :** Those galvanic cells in which chemical energy of combustion of fuels like hydrogen, methane, etc. is converted into electrical energy are called fuel cells.

H_2-O_2 fuel cell: The cell consists of three compartments separated by a porous electrode. Hydrogen gas is introduced into one compartment and oxygen into another compartment. These gases then diffuse slowly through the electrode and react with an electrolyte that is in the central part of the cell. The electrodes are made of porous carbon and electrolyte is a resin containing concentrated aqueous sodium hydroxide solution. Hydrogen is oxidized at anode and oxygen is reduced at the cathode.



The electrode reactions involved in the working of the H_2-O_2 fuel cell are as:

At cathode,

$O_2(g) + 2H_2O(l) + 4e^- \longrightarrow 4OH^-(aq)$

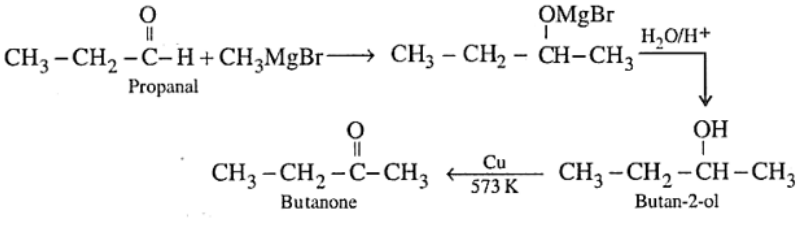
At anode,

$2H_2(g) + 4OH^-(aq) \longrightarrow 4H_2O(l) + 4e^-$

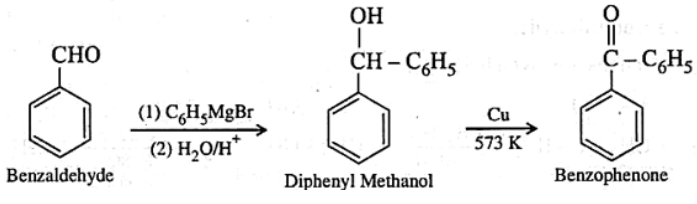
Overall cell reaction: $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

27. The following steps are involved in the conversions:

i. Propanal to butanone



ii. Benzaldehyde to Benzophenone



iii. Benzoyl Chloride to Benzonitrile

$$\underset{\text{Benzoyl chloride}}{C_6H_5COCl} \xrightarrow[\text{Heat}]{NH_3} \underset{\text{Benzamide}}{C_6H_5CONH_2} \xrightarrow[\text{heat}]{P_2O_5} \underset{\text{Benzonitrile}}{C_6H_5C \equiv N}$$

Section D

28. i. It is due to presence of most number of unpaired electrons and there is more frequent metal-metal bonding in 5d series than 3d and 4d series.

ii. Zinc has lowest enthalpy of atomisation due to weak metallic bond which is due to absence of unpaired electrons.

iii. It is due to larger size, absence of unpaired electron and weak interatomic attraction and weaker metallic bond.

OR

It is due to smaller atomic size and higher ionisation enthalpies.

29. i. People experience water retention in tissue cells and intercellular spaces due to osmosis.

ii. Through the process of osmosis, a bacterium on salted meat or candid fruit loses water, shrivels and dies.

iii. The pure solvent flows out of the solution through the semi permeable membrane due to reverse osmosis. It is used in desalination of sea water.

OR

During intravenous injection, the concentration of the solution should be same as that of blood so that they are isotonic. Because if the solution concentration is hypertonic than blood cell will shrink and if it is hypotonic than blood cell will swells/burst.

Section E

30. Attempt any five of the following:

(i) Native state of protein is the sequence in which the amino acids are linked together with the help of peptide bond.

(ii) a. Polysaccharides contain a large number of monosaccharide units joined together by glycosidic linkages.

b. Sugar + Phosphate + base / Nucleoside linked to a phosphate group.

(iii)Vitamin C

(iv) a. n-hexane is formed

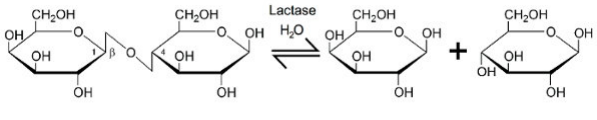
$$\underset{CH_2OH}{\overset{CHO}{(CHOH)_4}} \xrightarrow{HI\ ,\ \triangle} CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_3$$

b. Saccharic acid is formed

$$\underset{CH_2OH}{\overset{CHO}{(CHOH)_4}} \xrightarrow{Oxidation} \underset{COOH}{\overset{COOH}{(CHOH)_4}}$$

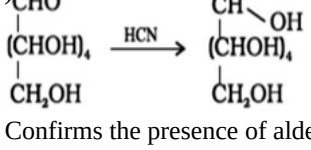
(v) Lactose

(vi)Hydrolysis of Lactose gives D-galactose and D-glucose.



Lactose D-galactose D-glucose

(vii)



Confirms the presence of aldehydic/carbonyl group.

31. a. i. Loss of proton from amines give ion whereas loss of a proton from alcohol gives an alkoxide ion.

Since O is more electronegative than N, therefore, RO^- can accommodate the -ve charge more easily than RNH^-.

Consequently, RO^- is more stable than RNH^-. Thus, alcohols are more acidic than amines.

ii. Primary amines (RNH_2) have two hydrogen atoms on the N atom and therefore, form intermolecular hydrogen bonding.

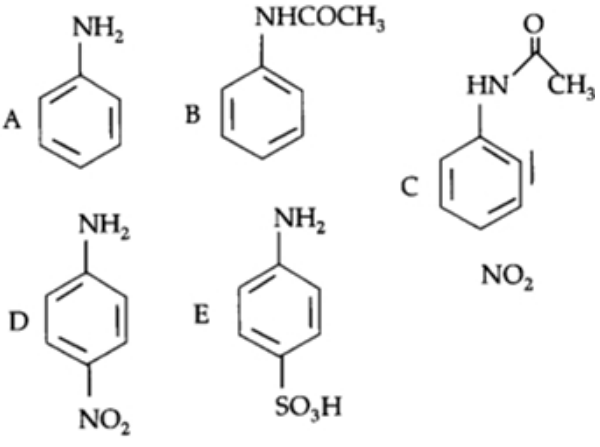
Tertiary amines (R_3N) donot have hydrogen atoms on the N atom and therefore, these donot form hydrogen bonds. As a result of hydrogen bonding in primary amines, they have higher boiling points than tertiary amines of comparable molecular mass.

iii. Both arylamines and alkylamines are basic in nature due to the presence of lone pair on N-atom. But arylamines are less basic than alkylamines.

b. i. $C_6H_5N_2Cl + C_2H_5OH \xrightarrow{Reduction} \underset{Benzene}{C_6H_6} + \underset{Ethanal}{CH_3CHO} + N_2 + HCl$

ii. $C_6H_5NH_2 + (CH_3CO)_2O \xrightarrow{CH_3COOH} \underset{Acetanilide}{C_6H_5CONHCH_3} + CH_3COOH$

OR

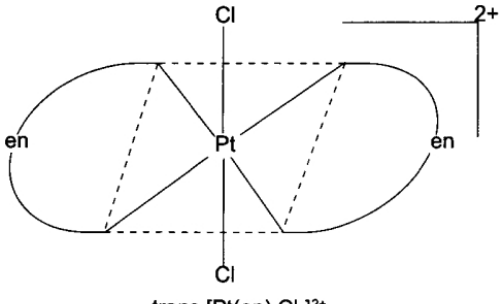


32. a. i. Hexaaminenickel (II) chloride

ii. Potassium hexacyanidoferrate (III)

iii. Tris(ethane-1,2-diamine)cobalt (III) ion

b.



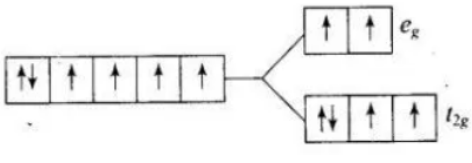
trans-$[Pt(en)_2Cl_2]^{2+}$

IUPAC Name of the entity:

Dichloridobis (ethane-1,2-diamine platinum

OR

i. $[CoF_6]^{3-}$:

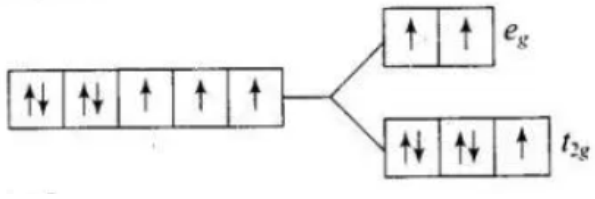


$Co^{2+} = 3d^7$

Number of unpaired electrons = 4

Magnetic moment = $\sqrt{n(n+2)} = \sqrt{4(4+2)}$ = 4.9 B.M

$[Co(H_2O)_6]^{2+}$:

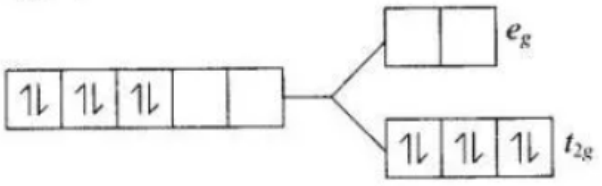


$Co^{2+} = 3d^7$

Number of unpaired electrons = 3

Magnetic moment = $\sqrt{3(3+2)}$ = 3.87 B.M

$[Co(CN)_6]^{3-}$:

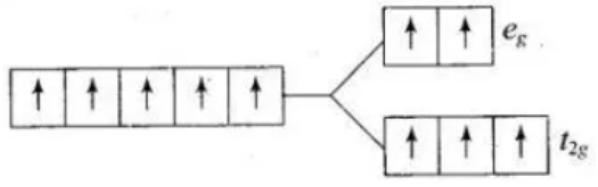


$Co^{3+} = 3d^6$

Number of unpaired electrons = 0

Diamagnetic in nature.

ii. FeF_6^{3-} :



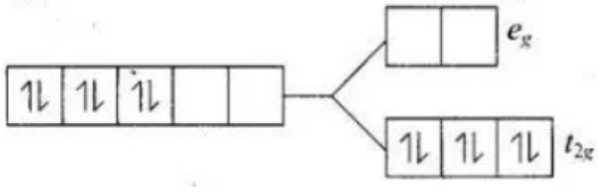
$Fe^{2+} = 3d^6$

$[Fe(H_2O)_6]^{2+} : t^4_{2g}\ e_g^2$

Number of unpaired electrons = 4

Magnetic moment = $\sqrt{4(4+2)}$ = 4.9 B.M

$[Fe(CN)_6]^{4-}$:



$Fe^{2+} = 3d^6$

Diamagnetic in nature.