This Question Paper contains 20 printed pages.
(Part-A & Part-B)

Sl. No.

Set no. of Question Paper, circle against which is to be darken in OMR sheet

01

052(E)

(FEBRUARY, 2026)
SCIENCE STREAM
(CLASS - XII)

Part – A : Time : 1 Hour / Marks : 50

Part – B : Time : 2 Hours / Marks : 50

(PART – A)

Time : 1 Hour **Maximum Marks : 50**

Instructions :

1) **There are 50 objective type (M.C.Q.) question in Part-A and all questions are compulsory.**
2) **The questions are serially numbered from 1 to 50 and each carries 1 marks.**
3) **Read each question carefully, select proper alternative and answer in the O.M.R. sheet.**
4) **The OMR sheet is given for answering the questions. The answer of each question is represented by (A) ○, (B) ○, (C) ○, (D) ○. Darken the circle ● of the correct answer with ball-pen.**
5) **Rough work is to be done in the space provided for this purpose in the Test Booklet only.**
6) **Set No. of Questions paper on the upper-most right side of the Question paper is to be written in the column provided in the OMR sheet.**
7) **Use of simple calculator and log table is allowed, if required.**
8) **Signs used in question paper have usual meaning.**

Rough work

1) The system that forms maximum boiling azeotrope is

(A) acetone - chloroform

(B) ethanol - acetone

(C) n-hexane - n-heptane

(D) carbon disulphide - acetone

2) 3 moles of P and 2 moles of Q are mixed, what will be their total vapour pressure in the solution if their partial vapour pressures are 80 and 60 torr respectively?

(A) 80 torr

(B) 140 torr

(C) 72 torr

(D) 70 torr

3) The elevation in boiling point of the solution prepared by dissolving 0.6 gram urea to 200 gram water is 0.50°C. What will be the molal elevation constant? (molecular weight of urea = 60 g/mol)

(A) 10 K kg mol

(B) 10 K kg mol^{-1}

(C) 1.0 K kg mol

(D) 100 K kg mol^{-1}

4) What is the correct order of freezing points for the given solutions?

(i) 0.1 M $CH_3COOH_{(aq)}$

(ii) 0.1 M $CH_3COOH_{(C_6H_6)}$

(iii) 0.1 M $CF_3COOH_{(aq)}$

(iv) 0.1 M $CH_3COONa_{(aq)}$

(A) (i) < (iii) < (iv) < (ii)

(B) (iv) > (iii) > (i) > (ii)

(C) (iii) < (iv) < (i) < (ii)

(D) (iv) < (iii) < (i) < (ii)

5) The value of Henry's law constant for some gases at 293 K is given below. Arrange the gases in the increasing order of their solubility.(He : 144.97 kbar, H_2: 69.16 kbar, N_2: 76.48 kbar, O_2: 34.86 kbar)

(A) $He < N_2 < H_2 < O_2$

(B) $O_2 < H_2 < N_2 < He$

(C) $H_2 < N_2 < O_2 < He$

(D) $He < O_2 < N_2 < H_2$

6) Which of the following is an example of a solution where the solute and solvent both are solid?

(A) Copper dissolved in gold

(B) Amalgam of mercury with sodium

(C) Solution of hydrogen in palladium

(D) Camphor in nitrogen gas

7) If we use pentane as fuel in a fuel cell, what relationship will represent the change in Gibbs free energy? ($E^\circ = 1.23$ V)

(A) $\Delta G^\circ = -32F\ (1.23)$

(B) $\Delta G^\circ = 8F/1.23$

(C) $\Delta G^\circ = -4F + 1.23$

(D) $\Delta G^\circ = -8F\ (1.23)$

8) When dilute H_2SO_4 is electrolyzed between platinum electrodes, what will be the ratio of moles of gaseous products obtained at the cathode and anode respectively?

(A) 1 : 3

(B) 2 : 3

(C) 2 : 1

(D) 3 : 2

9) Which of the following cells functions in basic medium?

(i) Dry cell

(ii) Mercury cell

(iii) Lead storage cell

(iv) Ni–Cd cell

(A) (i), (ii), (iii)

(B) (ii) & (iv)

(C) (i) & (iii)

(D) only (ii)

10) An electrochemical cell can behave like an electrolytic cell when _____.

(A) $E_{cell} = 0$

(B) $E_{cell} > E_{ext}$

(C) $E_{ext} > E_{cell}$

(D) $E_{cell} = E_{ext}$

11) Which of the following reaction is true at 25°C for given cell?

Cell: $Pt \mid Br^-_{(aq)} \mid Br_{2(l)} \parallel Cl^-_{(aq)} \mid Cl_{2(g)} \mid Pt$

(A) $2Br^-_{(aq)} + Cl_{2(aq)} \rightarrow 2Cl^-_{(aq)} + Br_{2(l)}$

(B) $Br_{2(l)} + 2Cl^-_{(aq)} \rightarrow Cl_{2(g)} + 2Br^-_{(aq)}$

(C) $Br_{2(l)} + Cl_{2(g)} \rightarrow 2Br^-_{(aq)} + 2Cl^-_{(aq)}$

(D) $2Br^-_{(aq)} + 2Cl^-_{(aq)} \rightarrow Br_{2(l)} + Cl_{2(g)}$

12) A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be?

(A) 0.118 V

(B) 1.18 V

(C) 0.059 V

(D) 0.59 V

13) For a given reaction:

$KClO_3 + 6FeSO_4 + 3H_2SO_4 \rightarrow KCl + 3Fe_2(SO_4)_3 + 3H_2O$

The order of reaction is _____.

(A) First

(B) Second

(C) Zero

(D) Pseudo First Order Reaction

14) Reaction $3ClO^- \rightarrow ClO_3^- + 2Cl^-$ occurs in following two steps.

(i) $ClO^- + ClO^- \xrightarrow{K_1} ClO_2^- + Cl^-$ (Slow step)

(ii) $ClO_2^- + ClO^- \xrightarrow{K_2} ClO_3^- + Cl^-$ (Fast step)

then the rate of given reaction = _____

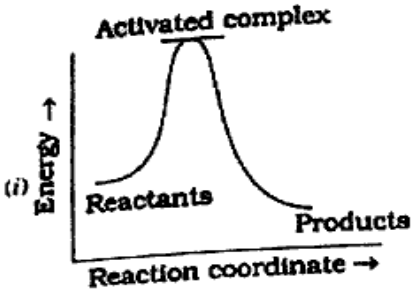
(A) $K_1[ClO^-]^2$

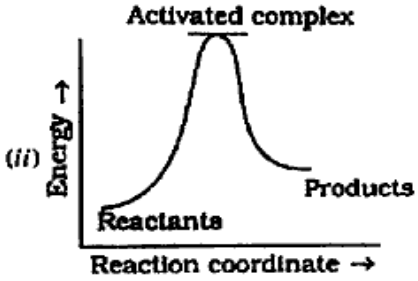
(B) $K_1[ClO^-]$

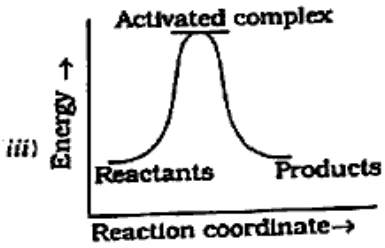
(C) $K_2[ClO_2^-][ClO^-]$

(D) $K_2[ClO^-]^3$

15) Which of the following graphs represents exothermic reaction?

(i) 

(ii) 

(iii) 

(A) (i) only

(B) (ii) only

(C) (iii) only

(D) (i) and (ii)

16) In a reaction $2HI \rightarrow H_2 + I_2$, the concentration of HI decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. What is the rate of reaction during this interval?

(A) 5×10^{-3} M min^{-1}

(B) 2.5×10^{-3} M min^{-1}

(C) 5×10^{-2} M min^{-1}

(D) 2.5×10^{-2} M min^{-1}

17) Which of the following statements is not correct for the catalyst?

(A) It catalyses the forward and backward reaction to the same extent.

(B) It alters ΔG of the reaction.

(C) It is a substance that does not change the equilibrium constant of a reaction.

(D) It provides an alternate mechanism by reducing activation energy between reactants and products.

18) Which of the following ion has the maximum theoretical magnetic moment?
[Fe (Z=26), Cr (Z=24), Ti (Z=22), Co (Z=27)]

(a) Fe^{3+}

(b) Cr^{3+}

(c) Ti^{3+}

(d) Co^{3+}

19) The second and third row elements of transition metals resemble each other much more than they resemble the first row because of

(A) lanthanoid contraction which results in almost same radii of second and third row metals

(B) diagonal relationship between second and third row elements

(C) similar ionisation enthalpy of second and third row elements

(D) similar oxidation states of second and third row metals.

20) Which compound is manufactured by using $TiCl_4$ with $Al(CH_3)_3$

(A) Ethanol

(B) Polyethylene

(C) Ethanal

(D) Hydrogenation of fat

21) What products of Mn are obtained by heating $KMnO_4$ at 513 K?

(A) K_2MnO_4, Mn_2O_3

(B) K_2MnO_4, MnO_2

(C) Mn_2O_3, MnO

(D) Mn_3O_4, MnO_2

22) The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ is:

(A) 7

(B) 8

(C) 9

(D) 6

23) Which of the following pair is an example of linkage isomerism?

(A) $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

(B) $[Co(NH_3)_6]^{3+}[Cr(CN)_6]^{3-}$ and $[Cr(NH_3)_6]^{3+}[Co(CN)_6]^{3-}$

(C) $[Co(NH_3)_5(NO_3)]Cl_2$ and $[Co(NH_3)_5Cl](NO_3)_2$

(D) $[Co(NO_2)(NH_3)_5]Cl_2$ and $[Co(ONO)(NH_3)_5]Cl_2$

24) The crystal field splitting energy for octahedral (Δ_o) and tetrahedral (Δ_t) complexes is related as

(A) $\Delta_t = \frac{1}{2}\Delta_o$

(B) $\Delta_t = \frac{4}{9}\Delta_o$

(C) $\Delta_t = \frac{3}{9}\Delta_o$

(D) $\Delta_t = \frac{3}{2}\Delta_o$

25) What is the hybridisation involved in $[Co(C_2O_4)_3]^{3-}$? [Co (Z=27)]

(A) sp^3d^2

(B) sp^3d^3

(C) dsp^3

(D) d^2sp^3

26) Among the following select the most stable complex

(A) $[Fe(H_2O)_6]^{3+}$

(B) $[Fe(C_2O_4)_3]^{3-}$

(C) $[Fe(NH_3)_6]^{3+}$

(D) $[FeCl_6]^{3-}$

27) Which of the following compounds, when released into the atmosphere, is responsible for depletion of the ozone layer?

(A) $CHCl_3$

(B) CH_2Cl_2

(C) CCl_4

(D) CH_3

28) For the following compounds, what is the correct increasing order of reactivity towards S_N1 displacement?

(I) 2-Bromo-2-methylbutane

(II) 1-Bromopentane

(III) 2-Bromopentane

(A) I < III < II

(B) II < III < I

(C) III < II < I

(D) I < II < III

29) Which is the IUPAC name of final product of Kolbe's reaction?

(A) 2-Hydroxybenzaldehyde

(B) 2-Hydroxybenzoic acid

(C) Aspirin

(D) Salicylic acid

30) Compound A, on reaction with CH_3MgBr followed by hydrolysis, gives a secondary (2°) alcohol. Compound A is:

(A) HCHO

(B) CH_3COCH_3

(C) CH_3COOH

(D) CH_3CHO

31) Which of the following ethers can be prepared efficiently by Williamson ether synthesis?

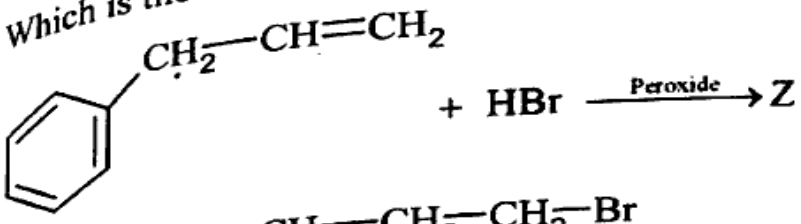
(A) tert-Butyl methyl ether using tert-butyl bromide

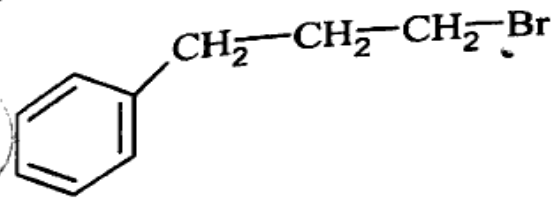
(B) Di-tert-butyl ether using tert-butoxide and tert-Butyl bromide

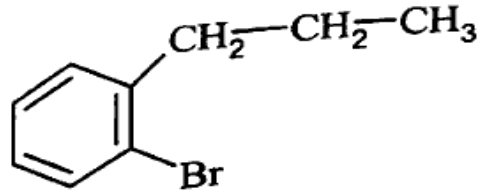
(C) Diphenyl ether using phenoxide and chlorobenzene

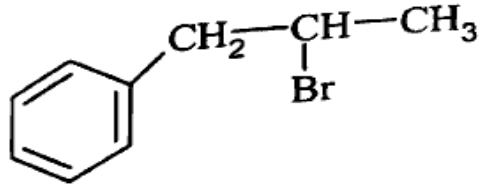
(D) tert-Butyl ethyl ether using tert-butoxide and ethyl bromide

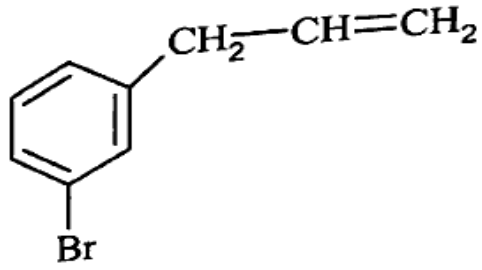
32) Which is the major product Z in the following reaction?



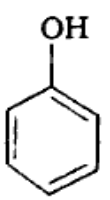
(A) 

(B) 

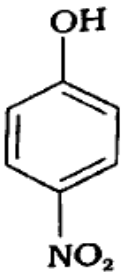
(C) 

(D) 

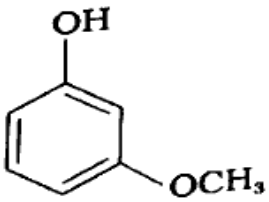
33) Mark the correct order of decreasing acid strength of the following compounds.



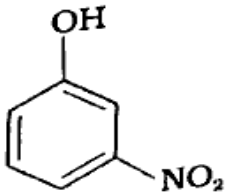
(a)



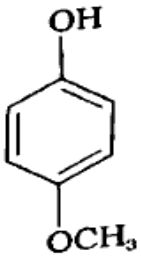
(b)



(c)



(d)



(e)

(A) (e) > (d) > (b) > (a) > (c)

(B) (b) > (d) > (a) > (c) > (e)

(C) (d) > (e) > (c) > (b) > (a)

(D) (e) > (d) > (c) > (b) > (a)

34) In $CH_3 - O - CH_3$, the bond angle in C–O–C and hybridization of carbon atom is _____ and _____ respectively.

(A) 109°, sp^2

(B) 111.7°, sp^2

(C) 108.9°, sp^3

(D) 111.7°, sp^3

35) Which compound is used in the manufacture of nylon-6,6?

(A) Malonic acid

(B) Succinic acid

(C) Adipic acid

(D) Glutaric acid

36) How many H and O atoms are presents in vanillin respectively?

(A) 8 and 4

(B) 9 and 3

(C) 9 and 4

(D) 8 and 3

37) The major product formed when propanoic acid reacts with Red P + Br_2 followed by hydrolysis is:

(A) 3-Bromopropanoic acid

(B) 2-Bromopropanoic acid

(C) Bromobenzene

(D) Propanal

38) Which acid has lowest pK_a?

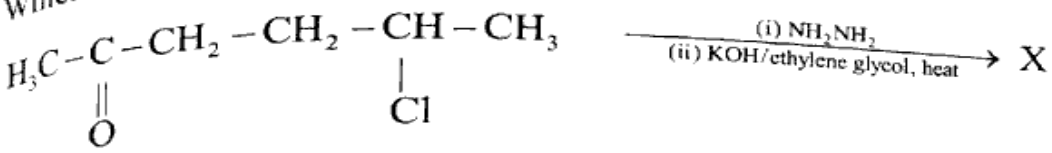
(A) C_6H_5COOH

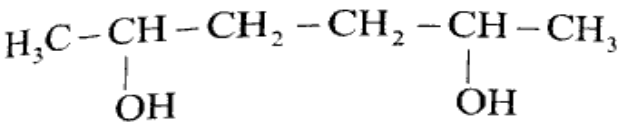
(B) HCOOH

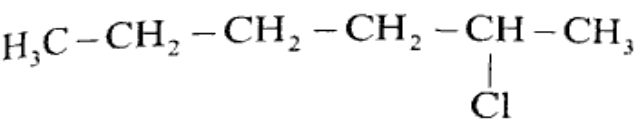
(C) $C_6H_5CH_2COOH$

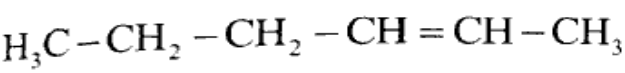
(D) CH_3CH_2COOH

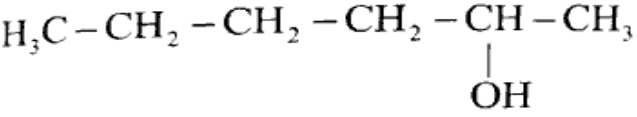
39) Which is the major product X in the following reaction?



(A) 

(B) 

(C) 

(D) 

40) The increasing order of reactivity towards nucleophilic addition is:

(A) Acetophenone < Benzaldehyde < p-Tolualdehyde < p-Nitrobenzaldehyde

(B) Benzaldehyde < Acetophenone < p-Nitrobenzaldehyde < p-Tolualdehyde

(C) p-Tolualdehyde < Benzaldehyde < p-Nitrobenzaldehyde < Acetophenone

(D) Acetophenone < p-Tolualdehyde < Benzaldehyde < p-Nitrobenzaldehyde

41) Which of the following shows the correct increasing order of basic strength in aqueous solution?

(A) $NH_3 < C_2H_5NH_2 < (C_2H_5)_2NH < (C_2H_5)_3N <$ Aniline

(B) Aniline $< NH_3 < (C_2H_5)_3N < C_2H_5NH_2 < (C_2H_5)_2NH$

(C) Aniline $< NH_3 < C_2H_5NH_2 < (C_2H_5)_3N < (C_2H_5)_2NH$

(D) $NH_3 < (C_2H_5)_2NH < C_2H_5NH_2 < (C_2H_5)_3N <$ Aniline

42) Benzene diazonium chloride is water _____ and _____ at room temperature.

(A) Insoluble, Unstable

(B) Soluble, Stable

(C) Insoluble, Stable

(D) Soluble, Unstable

Rough work

43) Which reagent can be used to distinguish between aniline and benzylamine?

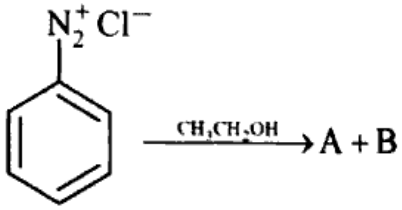
(A) $CHCl_3$ / KOH

(B) $NaNO_2$ + HCl

(C) $C_6H_5SO_2Cl$

(D) CH_3COCl / Base

44) Identify compounds A and B, and the reducing agent respectively used in the reaction.



(A) A = C_6H_6, B = CH_3COOH, CH_3COOH

(B) A = C_6H_6, B = CH_3CHO, CH_3CH_2OH

(C) A = C_6H_6, B = CH_3CHO, C_6H_6

(D) A = C_6H_5OH, B = CH_3, CHO, C_6H_5OH

45) Which order of boiling points of the following compounds is correct?

(A) $(C_2H_5)_2NH < (C_2H_5)_3N < C_2H_5NH_2$

(B) $C_2H_5NH_2 < (C_2H_5)_2NH < (C_2H_5)_3N$

(C) $(C_2H_5)_3N < C_2H_5NH_2 < (C_2H_5)_2NH$

(D) $(C_2H_5)_3N < (C_2H_5)_2NH < C_2H_5NH_2$

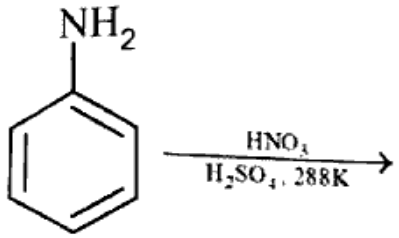
46) By which linkage are nucleotides joined together between 5′ and 3′ carbon atoms of pentose sugar?

(A) Glycosidic

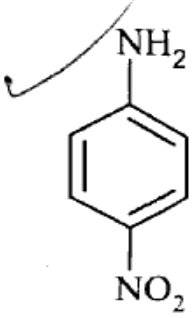
(B) Polypeptide

(C) Phosphodiester

(D) Hydrogen bond

47) 

_____ is a major product.

(A)


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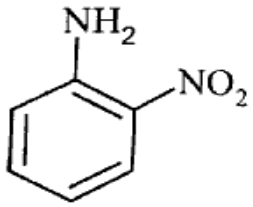

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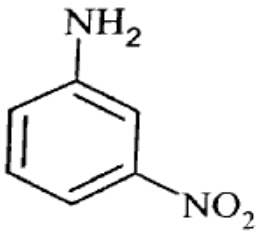

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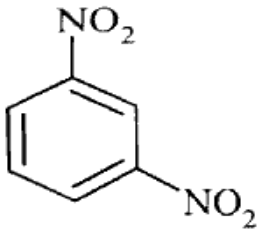


48) Insulin is a protein hormone consisting of:

(A) 21 amino acids

(B) 30 amino acids

(C) 51 amino acids

(D) 100 amino acids

49) Which reagent does not react with glucose?

(A) HCN

(B) $NaHSO_3$

(C) NH_2OH

(D) $(CH_3CO)_2O$

50) Which of the following two hormones together regulate the glucose level in the blood?

(A) Insulin, Androgen

(B) Insulin, Glucagon

(C) Glucagon, Androgen

(D) Androgen, Estrogen

Rough work

052(E)

(FEBRUARY, 2026)
SCIENCE STREAM
(CLASS-XII)

(PART - B)

Time : 2 Hours **Maximum Marks : 50**

Instructions :

1) **Write in a clear legible hand writing.**
2) **There are three sections in Part - B of the questions paper and total 1 to 27 question are there.**
3) **All the questions are compulsory. Internal options are given.**
4) **The numbers at the right side represent the marks of the questions.**
5) **Start new section on new page.**
6) **Maintain Sequence.**
7) **Use of simple calculator and log table is allowed, if required.**

SECTION - A

- **Answer any 8 questions from given question number 1 to 12. (Each of 2 marks)** **[16]**

1) Explain the nature of bonding in metal carbonyls.

2) Give one example of each for Swarts reaction and Finkelstein reaction of alkyl halide.

3) Write the mechanism of acid dehydration of ethanol to yield ethene.

4) A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode ? (Atomic mass of Ni = 58.7u)

5) What is meant by pseudo first order reaction ? Explain giving example.

6) What are alloys? Name an important alloy which contains some of the lanthanoid metals. Mention its uses.

7) Predict which of the following will be coloured in aqueous solution?
Ti^{3+}, V^{3+}, Cu^{+}, Sc^{3+}, Mn^{2+}, Fe^{3+} and Co^{2+}. Give reasons for each.
[Ti (Z=22), V (Z=23), Cu (Z=29), Sc (Z=21), Mn (Z=25), Fe (Z=26), Co (Z=27)]

8) Draw all the isomers (geometrical and optical) of $[CoCl_2(en)_2]^+$

9) Arrange each set of compounds in order of increasing boiling points.
(i) Bromomethane, Bromoform, Chloromethane, Dibromomethane.
(ii) 1-Chloropropane, Isopropyl chloride, 1-Chlorobutane.

10) Predict the products formed when cyclohexanecarbaldehyde reacts with following reagents.
(i) PhMgBr and then H_3O^+
(ii) Tollens' reagent

11) The melting points and solubility in water of amino acids are generally higher than that of the corresponding halo acids. Explain.

12) How are vitamins classified? Name the vitamin responsible for the coagulation of blood.

SECTION – B

- **Answer any 6 questions from the following Q.No. 13 to 21 in detail.** |18|
(3-Marks for each question)

13) Write Van't Hoff law of osmotic pressure and explain its mathematical formation and also derive the formula to calculate osmotic pressure.

14) Write the Nernst equation and calculate potential of the following cell at 298 K.
$Mg(s) \mid Mg^{2+}(0.001\ M) \parallel Cu^{2+}(0.0001\ M) \mid Cu(s)$
$\left[E^{\circ}_{Mg^{2+}/Mg} = -2.36\ V \text{ and } E^{\circ}_{Cu^{2+}/Cu} = +0.34\ V\right]$

15) Derive the formula of first order reaction for,
(i) Rate constant K,
(ii) Half life period $t_{\frac{1}{2}}$ (graph is not required)

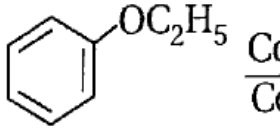
16) Describe the preparation of potassium dichromate from iron chromite ore. What is the effect of increasing pH on a solution of potassium dichromate?

17) How the following conversions can be carried out?
(i) Isopropyl alcohol to Iodoform
(ii) Benzyl alcohol to 2-phenylethanoic acid
(iii) Chlorobenzene to p-nitrophenol

18) Write the major product of the following reactions:

(a) $CH_3 - CH = CH_2 \xrightarrow{H_2O/H^+}$

(b) $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}} - CHO \xrightarrow{NaBH_4}$

(c)  $\xrightarrow[\text{Conc. } HNO_3]{\text{Conc. } H_2SO_4}$

19) Write structural formulas and names of four possible aldol condensation products from propanal and butanal.

20) How will you convert 4-nitrotoluene to 2-bromobenzoic acid ?

21) Write only chemical equations of the following reactions
(i) Carbylamine reaction
(ii) Hoffmann's bromamide reaction
(iii) Coupling reaction

SECTION - C

- **Answer any 4 questions from given question number 22 to 27. (Each of 4 marks)** [16]

22) 0.6 mL of CH_3COOH having density 1.06 g mL^{-1} is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.0205°C. Calculate the Van't Hoff factor and the dissociation constant of acid
(K_f = 1.86 K kg mol^{-1} and molecular mass of CH_3COOH = 60 g mol^{-1})

23) Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

24) The time required for 10% completion of a first order reaction at 298K is equal to that required for its 25% completion at 308K. If the value of A is $4 \times 10^{10}\ s^{-1}$. Calculate rate constant at 318K and E_a assuming E_a does not change with temperature

25) Answer the following questions for co-ordination complex
$K[Cr(H_2O)_2(C_2O_4)_2] \cdot 3H_2O$
(i) Give IUPAC name of complex
(ii) Give oxidation number & coordination number of central metal ion
(iii) Give d-orbital electronic configuration as per CFT
(iv) Give the shape of complex and calculate its magnetic moment [Cr (Z = 24)]

26) Give equations of the following reactions:
(i) Oxidation of propan-1-ol with alkaline $KMnO_4$ solution.
(ii) Bromine in CS_2 with phenol.
(iii) Dilute HNO_3 with phenol.
(iv) Treating phenol with chloroform in presence of aqueous NaOH.

27) An organic compound with the molecular formula $C_8H_{10}O$ forms 2, 4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1, 2-benzenedicarboxylic acid. Identify the compound and write down it's above chemical reactions