



KARNATAKA ICSE SCHOOLS ASSOCIATION

ISC STD. XII Preparatory Examination 2023

Subject -Chemistry

Time: 2.00 p.m.

Duration : 3 Hrs

Date: 16.01.2023

Answers to this paper must be handwritten and not typed.

You will **not** be allowed to write during the first **15 minutes**.

This time is to be spent in reading the paper.

The time given at the head of the paper is the time allowed for writing the answers.

This paper consists of 8 printed pages.

The intended marks for the questions or parts of questions are given in [].

This paper is divided into four sections A,B,C and D.

Answer **all** questions.

Section A consists of one question having subparts of one mark each.

Section B consists of ten questions of two marks each.

Section C consists of seven questions of three marks each.

Section D consists of three questions of five marks each.

Internal choices have been provided in one question in Section B, Section C and Section D.

All working, including rough work, should be done on the same sheet as, and adjacent to the rest of the answer.

Balanced equations must be given wherever possible and diagrams where they are helpful.

When solving numerical problems, all essential working must be shown.

In working out problems, use the following data:

Gas constant $R = 1.987 \text{ cal deg}^{-1} \text{ mol}^{-1} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$

$= 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$

$1 \text{ l atm} = 1 \text{ dm}^3 \text{ atm} = 101.3 \text{ J}$.

$1 \text{ Faraday} = 96500 \text{ coulombs}$.

Avogadro's number $= 6.023 \times 10^{23}$

Question 1

A. Fill in the blanks by choosing the appropriate word or words from those given in brackets:

[4x1]

[Acetaldehyde, benzaldehyde, aldol, benzoin, hydrogen bonding, insoluble, lt/mol/sec, increases, decreases, remains the same, metallic bonding, sec^{-1} , Primary, Soluble, Secondary]

1. The ----- valencies in coordination compound are directional whereas ----- valencies are non-directional.
2. Alcohols are ----- in water due to -----.
3. The unit of rate constant for a first order reaction is ---- and the rate of a reaction ----- with increase in temperature.
4. ----- on treatment with dilute NaOH undergo self-condensation to form β -hydroxy aldehyde called -----.

B. Complete the following statements from the correct alternative from the choices given:

[4x1]

1. The cell reaction is spontaneous or feasible when Gibbs free energy of the cell is
 - i. negative
 - ii. Zero
 - iii. Positive
 - iv. either positive or negative
2. Which one of the following transition elements does not exhibit a stable +2 oxidation state?
 - i. Nickel
 - ii. Copper
 - iii. Scandium
 - iv. Vanadium
3. The reduction of cyanides to primary amine is called
 - i. Mendius reaction
 - ii. Kolbe's reaction
 - iii. Riemer-Tiemann reaction
 - iv. Fittig reaction

4. Which of the following does not react with Hinsberg's reagent

- i. Methyl amine
- ii. Ethyl amine
- iii. Trimethyl amine
- iv. Dimethyl amine

C) Match the following

[4x1]

- | | |
|-------------------------|------------------------|
| i. Chelates | a. Non ideal solutions |
| ii. Amino acids | b. Stable complex |
| iii. Azeotropic mixture | c. Tertiary alcohol |
| iv. Turbidity | d. Amphoteric |

D) i. Assertion: The order of reactivity of alkyl halides for SN1 reactions follows the order **3>2>1**.
[Tertiary > Secondary > Primary]

[2x1]

Reason: The order of reactivity of carbocations follows the order **3>2>1**.

- a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
- b. Assertion and reason both are correct statements and reason is not correct explanation for assertion.
- c. Assertion is correct statement, but reason is wrong statement.
- d. Assertion is wrong statement, but reason is correct statement.

ii. Assertion: Copper can displace zinc from the solution of zinc sulphate.

Reason: Copper is placed below zinc in the electrochemical series.

- a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
- b. Assertion and reason both are correct statements and reason is not correct explanation for assertion.
- c. Assertion is correct statement, but reason is wrong statement.
- d. Assertion is wrong statement, but reason is correct statement.

SECTION B

Question 2

[2]

10g of non-volatile solute when dissolved in 100 grams of benzene raise its boiling point by 1 degree Celsius. What is the molecular mass of the solute? (K_b for benzene = $2.53 \text{ K kg mol}^{-1}$).

Question 3

[2]

Give reasons for the following:

- Zn, Cd and Hg are not regarded as transition elements.
- Transition metals are good catalysts.

Question 4

[2]

How will the following be obtained? (Give chemical equation)

- Chloroethane from ethanol.
- Butane from bromoethane.

Question 5

[2]

State the reasons for the following.

- Why primary amines have higher boiling points than those of secondary amines of comparable molecular mass.
- Aliphatic amines having low molecular mass are very soluble in water.

Question 6

[2]

The specific conductivity of $0.1\text{M NH}_4\text{OH}$ is $3.6 \times 10^{-4} \text{ ohm}^{-1} \text{ Cm}^{-1}$. The molar ionic conductances at infinite dilution for NH_4^+ ion and OH^- ion are 53.0 and $198.0 \text{ ohm}^{-1}\text{Cm}^2 \text{ mol}^{-1}$ respectively. Calculate molar conductance of the solution.

Question 7

Complete and balance the following equations.

[2]

- $\text{KMnO}_4 + \text{H}_2\text{C}_2\text{O}_4 + \text{H}_2\text{SO}_4 \rightarrow$
- $\text{KMnO}_4 + \text{H}_2\text{S}$ (in neutral medium) \rightarrow

Question 8**[2]**

How will the following be obtained? (Give chemical equation)

- i. Sodium phenoxide from phenol.
- ii. Ethene from ethanol.

[OR]

Write chemical equation for the following.

- i. Esterification reaction.
- ii. Reaction of phenol with Zinc dust.

Question 9**[2]**

46 g of ethanol is dissolved in 18 g of water. Calculate the mole fraction of ethyl alcohol.

Question 10

2

[2]

Write one chemical test to distinguish

- i. Acetaldehyde and acetone
- ii. Acetaldehyde and benzaldehyde.

Question 11**[2]**

Account for the exceptional electronic configuration of chromium and copper.

SECTION C**Question 12****[3]**

- i. The decomposition of hydrocarbon follows the equation $k = (4.5 \times 10^{11} \text{ sec}^{-1}) e^{-28000K/T}$. Calculate the activation energy.
- ii. Define rate constant.

Question 13**[3]**

An aliphatic compound (A) which is a calcium salt of carboxylic acid on dry distillation gives (B). Two molecules of B on heating in presence of conc. NaOH solution produces C and D. Identify A, B, C and D. Write chemical reactions for the conversion of B to C and D.

Question 14**[3]**

- i. How do you explain the presence of straight chain in glucose molecule?
- ii. What is iso electric point?
- iii. Name the disease caused by the deficiency of the following vitamins
 - a. Vitamin A
 - b. Vitamin B₂

Question 15**[3]**

- i. The osmotic pressure of 0.01 molar solution of an electrolyte is found to be 0.65 atm at 27 degrees Celsius. Calculate the vant Hoff factor. What conclusion can you draw about the molecular state of the solute in the solution?
- ii. What are isotonic solutions?

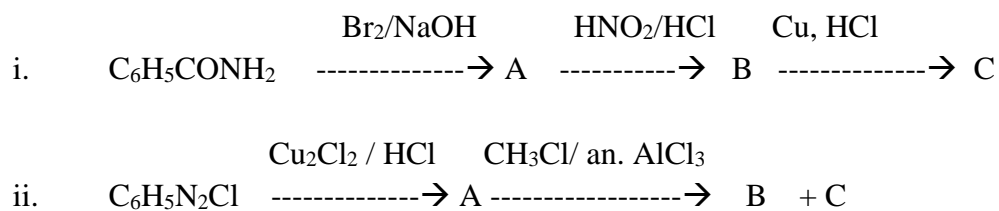
Question 16**[3]**

Write balanced chemical equation for the following named organic reactions.

- i. Williamson synthesis
- ii. Dow's Process.
- iii. Schotten- Baumann reaction.

Question 17**[3]**

Identify the compounds A, B and C in the following reactions.



OR

How will the following be converted? (Give chemical equations)

- Methyl isocyanide from methyl bromide.
- Benzene from Benzene diazonium chloride.
- Phenol from benzene diazonium chloride.

Question 18**[3]**

A first order reaction is 50% completed in 30 minutes at 300K and in 10minutes at 320K. Calculate the activation energy of the reaction. ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$).

SECTION D**Question 19****[5]**

- How will you obtain the following from Grignard reagent?
 - Acetaldehyde
 - Acetone
 - Acetic acid.
- Explain the following:
 - Why alcohols are much weaker acids than carboxylic acids.
 - Formic acid is a stronger acid as compared to acetic acid.

Question 20**[5]**

- a. $[\text{Co}(\text{NH}_3)_6]^{3+}$ is a coordination complex ion.
- What is the oxidation number of cobalt in this complex?
 - State the magnetic behavior of the complex.
 - State the hybridization exhibited by the above complex.
 - Predict the shape of the complex.
- b. Identify the type of isomerism exhibited by the following complex.
 $[\text{PtCl}_2(\text{NH}_3)_4] \text{Br}_2$ and $[\text{PtBr}_2(\text{NH}_3)_4] \text{Cl}_2$
- c. Write the formula of the following compound.
- diamminedichloridoplatinum(II)
 - hexaamminecopper(II)sulphate

Question 21**[5]**

- Given $E^\circ_{\text{Cr}^{3+}/\text{Cr}} = -0.72 \text{ V}$, $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.42 \text{ V}$. Calculate the potential for the cell
 $\text{Cr} / \text{Cr}^{3+} (0.1 \text{ M}) // \text{Fe}^{2+} (0.01 \text{ M}) / \text{Fe}$.
- State Faraday's second law of electrolysis.
- The values of λ_m^∞ for HCl, NaCl and CH_3COONa are 426.1, 126.5 and $91.0 \Omega^{-1} \text{ Cm}^2 \text{ mol}^{-1}$ respectively. Calculate the value of λ^∞ for acetic acid.

[OR]

- Calculate the number of coulombs required to deposit 6.75 g of Al when electrode reaction is
 $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$. (Given: Atomic mass of Al = 27 g/mol, $F = 96,500 \text{ C}$).
- Define molar conductance.
- The resistance of 1N solution of an electrolyte in a conductivity cell was found to be 50 ohms. Calculate the conductance, specific conductivity and equivalent conductivity of the solution if the electrodes in the cell are 1.6 cm apart and have an area of 3.2 Cm^2 .