



KARNATAKA ICSE SCHOOLS ASSOCIATION

ISC STD. XII Preparatory Examination 2024

Subject – Chemistry

Time Allowed : 3 Hrs

Maximum Marks : 70

Date: 12.01.2024

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 reading the paper.

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

This paper consists of 12 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:

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

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

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

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

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

SECTION A – 14 MARKS

Question 1

A. Fill in the blanks by choosing the appropriate word or words from those given in brackets: [4x1]

[Acetone, Ethanal, formaldehyde, two, zero, three, one, red, yellow, white, octahedral, decreases, tetrahedral, square planar, increases, ketones, carboxylic acids, aldehydes]

- i. The mixture of calcium acetate and calcium formate on dry distillation gives ----- which gives ----- precipitate on heating with Fehling's solution.
- ii. The complex $[\text{Ni}(\text{CN})_4]$ has ----- geometry and the oxidation number of nickel is --- ---.
- iii. The secondary alcohols are easily oxidized first to a ----- and then to a -----.
- iv. A catalytic promoter ----- the efficiency of the catalyst whereas a catalytic poison ----- the efficiency of catalyst.

B. Complete the following statements from the correct alternative from the choices given: **[7x1]**

i. Which of the following gives the carbylamine test?

- a) Triethyl amine
- b) Dimethyl amine
- c) Ethylamine
- d) Ethyl methyl amine

ii. The standard electrode potential of four electrodes P, Q, R and S are -3.05, -1.66, +0.80 and +2.95 respectively. The highest chemical reactivity will be shown by

- a) P
- b) Q
- c) R
- d) S

iii. The tendency of transition metals to form alloys among themselves is mainly due to

- a. Their similar atomic size.
- b. Their unfilled d orbitals.
- c. Their ability to adopt variable oxidation states
- d. Their chemical reactivity.

iv. Benzene diazonium chloride on reaction with phenol in weakly basic medium at 0-5 degree Celsius gives:

- a) Chlorobenzene
- b) Aniline
- c) Benzene
- d) P-Hydroxyazobenzene

v. The rate of a reaction is doubled as the initial concentration of the reactant is doubled. The order of the reaction is

- a) 0.5
- b) 1
- c) 1.5
- d) 2

vi. **Assertion:** Rusting of iron is slower in ordinary water than in saline water.

Reason: The presence of Na^+ and Cl^- ions increases the conductance

of the solution in contact with metal surface.

- 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.

vii. **Assertion:** Chloroform is kept in dark coloured bottles with small amount of 1% ethanol.

Reason: Chloroform is used as an anaesthetic.

- 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.

(C) Read the passage carefully and answer the following questions. **[3x1]**

Potassium dichromate is a very important compound used in the leather industry. It is used as an oxidant. It is also used in the production of many azo compounds. It is a crystalline ionic solid with a bright colour. It is not deliquescent in contrast to sodium dichromate. The conversion of chromate ions to dichromate ions and vice-versa is pH sensitive.

- a). Potassium dichromate is a powerful ----- in acidic medium.
- b). What is the oxidation state of Cr in $K_2Cr_2O_7$?
- c). Write balanced chemical equation for the reaction of acidified $K_2Cr_2O_7$ reaction with KI.

SECTION B – 20 MARKS

Question 2 **[2]**

A 2 molal solution of sodium chloride in water causes an elevation in the boiling point by 1.88K . What is the value of Vant Hoff factor? What does it signify?

$[K_b = 0.52 \text{ k kg /mol}]$.

Question 3 **[2]**

Give reasons for the following:

- i. Transition metals generally form coloured compounds.
- ii. Zn, Cd and Hg are not regarded as transition metals.

Question 4**[2]**

How will you convert the following? (Give chemical equation)

- i. Ethanoyl chloride to acetaldehyde.
- ii. Benzoic acid to benzaldehyde.

Question 5**[2]**

- i. Complete the following reactions:

373 K

- a. $C_6H_5OCH_3 + HI \xrightarrow{\hspace{1cm}}$
- b. $C_2H_5OH + I_2 + NaOH \xrightarrow{\hspace{1cm}}$

[OR]

- ii. a. Arrange the following alcohols in order of decreasing activity towards Lucas' reagent.
2-butanol, 2-methyl -2-propanol and 1-butanol.
- b. Ethanol has a higher boiling point than methoxymethane. Justify.

Question 6**[2]**

Write any two differences between metallic conduction and electrolytic conduction.

Question 7

Give one chemical test to distinguish between the following pair of compounds. **[2]**

- i. Acetaldehyde and Formaldehyde
- ii. Acetaldehyde and Acetone

Question 8**[2]**

John used ethylene glycol as an antifreeze agent. Calculate the amount of ethylene glycol to be added to 4 kg of water to prevent it from freezing at 6 degree Celsius. [K_f of water = $1.85 \text{ K mol}^{-1} \text{ kg}$] [At.mass of C = 12, H= 1, O = 16]

Question 9**[2]**

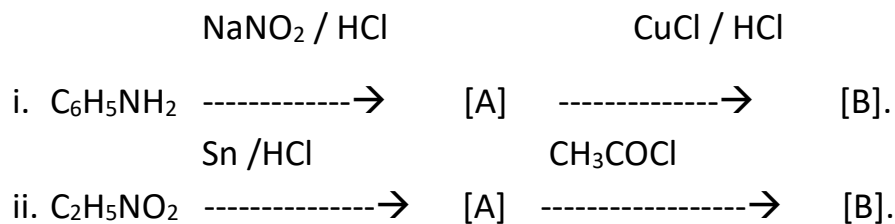
Complete the following chemical equations.

**Question 10****[2]**

Write the cell representation of Daniel cell. How is standard hydrogen electrode represented?

Question 11

Identify A and B in the following reactions.

[2]**SECTION C - 21 MARKS****Question 12****[3]**

For the reaction, $2\text{H}_2 + 2\text{NO} \text{ -----} \rightarrow 2\text{H}_2\text{O} + \text{N}_2$, the following data was obtained:

Sl.No	[NO] mol /L	[H2] mol/ L	Rate mol/L/Sec
1	0.40	0.40	4.6×10^{-3}
2.	0.80	0.40	18.4×10^{-3}
3	0.40	0.80	9.2×10^{-3}

Calculate the following:

- i. The overall order of the reaction.
- ii. The rate law.
- iii. The value of the rate constant(k).

Question 13

[3]

Answer the following questions.

- i. What is isoelectric point ? Write the Zwitter ion structure of glycine.
- ii. What do you mean by denaturation of protein? What is the effect of denaturation on the structure of proteins?

Question 14

[3]

Write the chemical equation for the following named reactions.

- i. Hunsdiecker reaction
- ii. Wurtz – Fittig reaction.
- iii. Finkelstein reaction.

Question 15

[3]

- i. A 10 % aqueous solution of cane sugar (mol.wt – 342) is isotonic with 1.754% aqueous solution of urea. Find the molecular mass of urea.
- ii. Define isotonic solution.

[OR]

A solution containing 2 g of anhydrous barium chloride in 400 cm^3 of water has a conductivity of 0.0058 S/cm. Calculate the molar conductivity of this solution.

(Ba = 137).

Question 16

[3]

How will you carry out the following conversions?

- i. Phenol to salicylic acid
- ii. Ethanol to acetic acid
- iii. Ethanol to methane.

Question 17

[3]

For a certain reaction, variation in the concentration, $\ln [A]$ vs time plot is shown.

For this reaction,

- i. What is the order of the reaction?
- ii. What is the unit of rate constant, for this reaction?
- iii. What does the slope of this line indicate?



Question 18

[3]

Account for the following.

- i. Aniline does not undergo Friedel Crafts reaction.
- ii. It is difficult to prepare the pure amines by ammonolysis of alkyl halides.
- iii. Electrophilic substitution in aromatic amines takes place more readily than benzene.

SECTION D – 15 MARKS

Question 19

[5]

- i. Explain the following.
 - a. Acetaldehyde undergoes aldol condensation, but formaldehyde does not.
 - b. Acetic acid is a weaker acid than formic acid.
- ii. Write chemical equations to illustrate the following name reactions.
 - a. HVZ reaction
 - b. Benzoin condensation
 - c. Cannizaro's reaction.

Question 20**[5]**

- i. $[\text{Fe}(\text{CN})_6]^{3-}$ is a coordination complex ion.
- What is the oxidation number of iron in this complex?
 - State the magnetic behavior of the complex.
 - State the hybridization exhibited by the central metal ion.
 - Predict the shape of the complex.
- ii. Identify the type of isomerism exhibited by the following complex.
 $[\text{Co} \text{NO}_2(\text{NH}_3)_5] \text{Br}_2$ and $[\text{Co}(\text{ONO})(\text{NH}_3)_5] \text{Br}_2$
- iii. Write the formula of the following compounds.
- tetraamminesulphatocobalt(III)nitrate
 - tetraamminediaquacopper(II)sulphate.

Question 21**[5]**

- i. 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
 $\text{Cr} / \text{Cr}^{3+} (0.1 \text{ M}) // \text{Fe}^{2+} (0.01 \text{ M}) / \text{Fe}$.
- ii. State Faraday's II law of electrolysis.
- iii. The values of λ_m^∞ for HCl, NaCl and CH_3COONa are 426.1, 126.5 and $91.0 \text{ } \Omega^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively. Calculate the value of λ^∞ for acetic acid.

[OR]

- i. Define the following terms.
 - a. Corrosion of metals
 - b. Equivalent conductivity
- ii. What is a fuel cell? Give the electrode reactions. Also write any two advantages of the same.

*****END OF PAPER*****