

Code: A-C337123-M

I Semester Exam – 2022-23**4 x 840**

Std.: XII

Sub: **CHEMISTRY**

Marks: 70

Date: 25/11/2022

Roll No.: _____

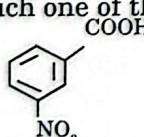
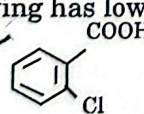
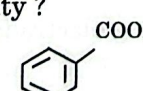
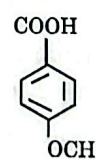
Time: 3 hrs.

General Instructions :-**The question paper divided into 4 sections.**

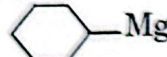
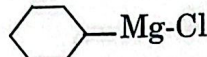
1. **Section-A** : Q.No. 1 contains **Ten multiple choice** type of questions carrying **one mark** each.
Q.No. 2 contains **Eight very short answer** type of questions carrying **one mark** each.
2. **Section-B** : Q.No. 3 to Q.No. 14 are **Twelve short answer** type of questions carrying **Two marks** each. (Attempt any Eight).
3. **Section-C** : Q.No.15 to Q.No. 26 are **Twelve short answer** type of questions carrying **Three marks** each. (Attempt any Eight).
4. **Section-D** : Q.No. 27 to Q.No.31 are **Five long answer** type of questions carrying **Four marks** each. (Attempt any Three).
5. Use of log table is allowed. Use of calculator is not allowed.
6. Figures to the right indicate full marks.
7. For each Multiple Choice type Question, it is mandatory to write the correct answer along with its alphabet.
e.g. (a)/ (b)/ (c)/ (d), etc.
No marks shall be given, if **ONLY** the correct answer or the alphabet of the correct answer is written.
Only the first attempt will be considered for evaluation.

Section - A**Q.1 Select and write the correct answer for the following multiple choice type of questions. 10**

- i) Which of the following is NOT a state function ?
 a) Work ☒ b) Enthalpy
 c) Temperature d) Pressure
- ii) The standard potential of the cell in which the following reaction occurs

$$\text{H}_2 (\text{g}, 1\text{atm}) + \text{Cu}^{+2} (1\text{M}) \rightarrow 2\text{H}^+ (1\text{M}) + \text{Cu} (\text{s}), (E^\circ_{\text{Cu}} = 0.34 \text{ V})$$
 is _____
 a) - 0.34 V ☒ b) 0.34 V
 c) 0.17 V d) - 0.17 V
- iii) Pressure cooker reduces cooking time for food because _____
 a) ☒ boiling point of water involved in cooking is increased.
 b) heat is more evenly distributed in the cooking space.
 c) the higher pressure inside the cooker crushes the food material.
 d) cooking involves chemical changes helped by a rise in temperature.
- iv) Which one of the following has lowest acidity ?
 a)  ☒ b)  c)  d) 
- v) Butane nitrile may be prepared by heating _____
 a) Propanol with KCN
 b) Butanol with KCN
 c) ☒ n-butyl chloride with KCN
 d) n-propyl chloride with KCN

P.T.O

- vi) Which of the following is a buffer solution?
- $\text{CH}_3\text{COONa} + \text{NaCl}$ in water
 - $\text{CH}_3\text{COOH} + \text{HCl}$ in water
 - $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$ in water
 - $\text{HCl} + \text{NH}_4\text{Cl}$ in water
- vii) A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 bar from an initial volume of 2.5 L to a final volume of 4.5 L. The change in internal energy, Δu of the gas will be _____.
- 500 J
 - + 500 J
 - 1013 J
 - + 1013 J
- viii) Benzaldehyde does NOT show positive test with _____.
- Schiff reagent
 - Tollen's Reagent
 - Sodium bisulphite solution
 - Fehling solution
- ix)  $\text{Cl} + \text{Mg} \xrightarrow[\text{ether}]{\text{dry}}$ 'A' $\xrightarrow{\text{H}_2\text{O}}$ 'B' The product 'B' in the above reaction sequence is,
- 
 - 
 - 
 - 
- x) The compound incapable of hydrogen bonding with water is _____.
- $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_3$
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
 - 
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$

Q.2 Answer the following questions.

8

- A system absorbs 520J of heat and performs work of 210J. Calculate the change in internal energy.
- Which of the following solutions will exert higher osmotic pressure.
 - 0.1 m NaCl
 - 0.05 m $\text{Al}_2(\text{SO}_4)_3$
- Write complete balanced chemical reaction for characteristic test for phenols.
- Write the structure of cumene.
- Write the name of product obtained when cyclohexene is heated with KMnO_4 and dil. H_2SO_4 solution.
- Write the IUPAC name of the following compound.

$$\begin{array}{c} \text{H}_3\text{C} - \text{CH} = \text{CH} - \text{CH} - \text{Br} \\ | \\ \text{CH}_3 \end{array}$$
- Formulate a cell from the following electrode reactions.

$$\begin{array}{l} \text{Au}^{+3}_{(\text{aq})} + 3\text{e}^- \longrightarrow \text{Au}_{(\text{s})} \\ \text{Mg}_{(\text{s})} \longrightarrow \text{Mg}^{+2}_{(\text{aq})} + 2\text{e}^- \end{array}$$
- The dissociation of H_2S is suppressed in the presence of HCl. Name the phenomenon.

Section - B

Attempt any **EIGHT** of the following questions.

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- Q.3** Derive the relationship between degree of dissociation of an electrolyte and Van't Hoff factor.
- Q.4** Determine whether the following reaction is spontaneous under standard conditions.
 $2\text{H}_2\text{O}_{(l)} + \text{O}_{2(g)} \longrightarrow 2\text{H}_2\text{O}_{(l)}, \Delta H^\circ = +196 \text{ kJ} \quad \Delta S^\circ = -126 \text{ JK}^{-1}$
- Q.5** Arrange the following in the increasing order of boiling points.
 a) 1 - Bromo propane b) 2 - Bromo propane
 c) 1 - Bromo butane d) 1 - Bromo 2 - methyl propane
- Q.6** Write the IUPAC name of the following structures.
 a)  CHO b) 
- Q.7** Ammonia serves as a lewis base whereas AlCl_3 is a lewis acid. Explain.
- Q.8** State Kohlrausch's law of independent migration of ions & write mathematical expression for molar conductivity of a given solution at infinite dilution.
- Q.9** Complete the following reactions giving major product.

$$\text{H}_3\text{C}-\underset{\text{OH}}{\underset{|}{\text{CH}}}-\text{CH}_3 \xrightarrow{\text{Red i / Br}_2} \text{'A'} \xrightarrow{\text{Ag}_2\text{O / H}_2\text{O}} \text{'B'}$$
- Q.10** Write the product obtained by heating
 a) Primary alcohol with Cu at 573 K.
 b) Secondary alcohol with Cu at 573 K.
- Q.11** Define molar solubility.
 Write expression showing relationship between solubility and solubility product for the sparingly soluble compound $\text{Al}(\text{OH})_3$.
- Q.12** The standard potential of the electrode $\text{Zn}^{+2} (0.02 \text{ M}) / \text{Zn} (\text{s})$ is -0.76 V . Calculate its potential.
- Q.13** Write a note on Dow process for preparation of phenol.
- Q.14** Write a note on Clemmensen Reduction with the help of acetone.

Section - C

Attempt any **EIGHT** of the following questions.

24

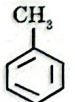
- Q.15** State Raoult's law for a solution containing a non-volatile solute. The normal boiling point of ethylacetate is 77.06°C . A solution of 50 g of a non-volatile solute in 150 g of ethylacetate boils at 84.27°C . Evaluate the molar mass of solute if K_b for ethylacetate is $2.77 \text{ K kg mol}^{-1}$.
- Q.16** Calculate the standard enthalpy of formation of $\text{CH}_3\text{OH}_{(l)}$ from the following data.
 i) $\text{CH}_3\text{OH}_{(l)} + 3/2 \text{ O}_{2(g)} \longrightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}, \Delta H^\circ = -726 \text{ kJ mol}^{-1}$
 ii) $\text{C} (\text{graphite}) + \text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)}, \Delta_c H^\circ = -393 \text{ kJ mol}^{-1}$
 iii) $\text{H}_{2(g)} + 1/2 \text{ O}_{2(g)} \longrightarrow \text{H}_2\text{O}_{(l)}, \Delta_f H^\circ = -286 \text{ kJ mol}^{-1}$
- Q.17** Write the chemical reaction for preparation of acetone using Nitriles.
 Write a balanced chemical reaction of Rosenmund reduction.

- Q.18 Define Ionic product of water. Derive the relationship between pH and pOH.
- Q.19 What is cell constant ?
Write the electrode reactions during electrolysis of molten NaCl.
- Q.20 Derive the expression for maximum work.
Comment on the statement :
No work is involved in an expansion of a gas in vacuum.
- Q.21 Write any 2 functions of salt bridge. Draw a neat labelled diagram of SHE.
- Q.22 Identify the structural formulae of the organic compounds 'A' 'B' and 'C'.
2 - Bromobutane $\xrightarrow{\text{alc.KOH}}$ 'A' $\xrightarrow{\text{Br}_2}$ 'B' $\xrightarrow{\text{NaNH}_2}$ 'C'
- Q.23 Distinguished between $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ mechanism of substitution reaction.
(Any four points). Define Enantiomers.
- Q.24 Write a note on Aldol Condensation.
- Q.25 Write a balanced chemical reaction.
a) Bromination of Anisole
b) Nitration of Anisole
- Q.26 Write chemical reaction of Reimer-Tiemann reaction.

Section - D

Attempt any Three of the following questions.

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- Q.27 State & explain Henry's law. Obtain the relationship between freezing point depression of a solution containing non-volatile nonelectrolyte and its molar mass.
- Q.28 What is enthalpy of atomization? State second law of thermodynamics in terms of entropy.
Obtain the relationship between ΔH and Δu for gas phase reactions.
- Q.29 Dissociation constant of acetic acid is 1.8×10^{-5} . Calculate percent dissociation of acetic acid in 0.01 M solution. Write a note on Haloform reaction.
- Q.30 Write structure and IUPAC name of the major product in each of the following reaction.
a) $\text{CH}_3 - \text{CH}_2 - \text{Br} + \text{SbF}_3 \longrightarrow$
b)  + $\text{SOCl}_2 \longrightarrow$
c)  + $\text{Cl}_2 \xrightarrow[\text{Fe}]{\text{dark}}$

Write any two uses of Ethers.

- Q. 31 Write a balanced chemical reactions of the following.
a) Propanoic acid is heated with PCl_3 .
b) Benzene is treated under high pressure with CO and HCl in presence of anhydrous AlCl_3 .
c) Acetone reacts with ethane - 1, 2-diol in presence of dry HCl.
d) Acetaldehyde treated with Hydrazine.