

DISTRICT LEVEL II PUC PREPARATORY EXAM, JANUARY – 2024

Time: 3 Hrs. 15 Mins.

Sub: CHEMISTRY (34)

Max. Marks: 70

General Instructions:

- The question paper has five parts. All parts are compulsory.
Part – A carries 20 marks, each question carries 1 mark.
Part – B carries 6 marks, each question carries 2 marks.
Part – C carries 15 marks, each question carries 3 marks.
Part – D carries 20 marks, each question carries 5 marks.
Part – E carries 09 marks, each question carries 3 marks.
- In Part – A questions, first attempted answer will be considered for avoiding marks.
- Write balanced chemical equations and draw diagrams wherever necessary.
- Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
- Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed).

PART – A

Select the correct option from the given choices:

15 × 1 = 15

- Van't Hoff factor (i) for aqueous solutions of electrolytes is
(A) Zero (B) Greater than 1
(C) Less than 1 (D) Depends on nature of electrolyte
- Which of the following is the example for inert electrode?
(A) Gold electrode (B) Copper electrode (C) Zinc electrode (D) Silver electrode
- How does molar conductivity vary with dilution?
(A) Decreases (B) Increases
(C) No change (D) Inversely proportional
- The rate law equation for the reaction: $A + 2B \rightarrow C + D$ is Rate $(r) = k[A]$, the order with respect to 'B' is
(A) Two (B) One (C) Zero (D) All of these
- Which of the following element is not regarded as transition element?
(A) Fe (B) Mn (C) Sc (D) Zn
- The oxidation state of Ni in $Ni(CO)_4$ is
(A) +2 (B) 0 (C) +3 (D) +4
- An example for vicinal dihalide is
(A) Dichloromethane (B) 1, 2 - dichloroethane (C) Vinyl chloride (D) Allyl chloride
- In the hydroboration – oxidation reaction of propene, with diborane, H_2O_2 and NaOH, the organic compound formed is
(A) Ethyl alcohol (B) Propan – 2 – ol (C) Propan – 1 – ol (D) Propanal
- When phenol is treated with bromine water, it forms
(A) m – bromophenol (B) o – and p – bromophenols
(C) 2, 4 – dibromophenol (D) 2, 4, 6 – tribromophenol
- The IUPAC name of $H - CHO$ is
(A) Formic acid (B) Formaldehyde (C) Methanal (D) Methanol
- The correct order of increasing acidic strength of carboxylic acids is
(A) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > HCOOH$
(B) $HCOOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$
(C) $CClCH_2COOH > FCH_2COOH > BrCH_2COOH > HCOOH$
(D) $BrCH_2COOH > CClCH_2COOH > FCH_2COOH > HCOOH$

12. Hinesburg's reagent is
 (A) Benzene sulphuryl chloride (B) Chlorobenzene
 (C) Benzene sulphonyl chloride (D) Benzene carbonyl chloride
13. Amongst the following amines, the strongest base in aqueous medium is
 (A) CH_3NH_2 (B) $(CH_3)_3N$ (C) $(CH_3)_2NH$ (D) $C_6H_5NH_2$
14. The main storage polysaccharide of plants is
 (A) Starch (B) Cellulose (C) Glycogen (D) Glucose
15. Amongst naturally occurring α -amino acids, the one which is not optically active is
 (A) Lysine (B) Glycine (C) Cysteine (D) Alanine

II. Fill in the blanks choosing the appropriate word from those given in the brackets: $5 \times 1 = 5$

(Isocyanides, lanthanoid, rate law, isotonic, Grignard)

16. The solutions having same osmotic pressure at a given temperature are called _____ solutions.
17. The representation of rate of reaction in terms of concentration of the reactants is known as _____.
18. Zr and Hf have almost equal atomic and ionic radii because of _____ contraction.
19. Alkyl magnesium halides are known as _____ reagents.
20. _____ are foul smelling substances.

PART - B

III. Answer any THREE of the following questions. Each question carries two marks: $3 \times 2 = 6$

21. State Henry's law. Write its mathematical form.
22. The conversion of molecules X to Y follows second order kinetics. If the concentration of X is increased to three times, how will it affect the rate of formation of Y?
23. Draw the energy level diagram for the crystal field splitting of d-orbitals in Octahedral complexes.
24. Explain Swarts reaction with an example.
25. How is benzamide obtained from benzoic acid? Write equation.
26. What is denaturation of proteins? Which level of structure remains intact during denaturation of globular proteins?

PART - C

V. Answer any THREE of the following. Each question carries three marks: $3 \times 3 = 9$

27. Explain the preparation of potassium permanganate from MnO_2 with equations.
28. Calculate the spin only magnetic moment of ferric ion. [Given: atomic number of iron is 26].
29. What is actinoid contraction? Give any two general characteristics of actinoids.
30. Explain hybridization, geometry and magnetic property of $[Ni(CN)_4]^{2-}$ ion using Valence Bond Theory (VBT). [atomic number of Ni is 28].
31. Give the IUPAC name of $[CoCl_2(NH_3)_4]Cl$. Draw cis and trans isomers of $[CoCl_2(NH_3)_4]^+$ ion.
32. Write any three postulates of Werners theory of co-ordination compounds.

V. Answer any **TWO** of the following. Each question carries three marks:

2 × 3 = 6

33. Write any three differences between ideal and non-ideal solutions.
34. Draw a neat, labelled diagram of Standard Hydrogen Electrode (SHE). Write the balanced equation for the reaction taking place at cathode during rusting of iron.
35. State Kohlrausch's law of independent migration of ions. Mention two applications of it.
36. Derive an integrated rate equation for the rate constant of a zero – order reaction.

PART – D

V. Answer any **FOUR** of the following. Each question carries **FIVE** marks:

4 × 5 = 20

37. (a) Explain S_N1 mechanism of conversion of tert – butyl bromide to tert – butyl alcohol. [3M]
(b) Give any two reasons for the less reactivity of aryl halides towards nucleophilic substitution reactions. [2M]
38. (a) Write three steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. [3M]
(b) Explain Kolbe's reaction with equation. [2M]
39. (a) Explain Williamson's synthesis of ethers. Give equation. [2M]
(b) How does anisole react with acetyl chloride in the presence of anhydrous aluminium chloride? Write the chemical equation for the reaction. [2M]
(c) Name the enzyme which catalyses the hydrolysis of sucrose into glucose and fructose. [1M]
40. (a) How an aldehydes prepared from nitriles? Write equation. What is the name of the reaction? [3M]
(b) Explain Hell – Volhard – Zelinsky reaction with equation. [2M]
41. (a) How is ketone prepared from Grignard reagent and nitrile? Give an example. [2M]
(b) Explain Cannizzaro reaction with an example. [2M]
(c) Write the IUPAC name of CH_3COCH_3 . [1M]
- 42: (a) Complete the following reactions by giving major products: [2M]
(i) $C_6H_5NH_2 \xrightarrow[273K - 278K]{NaNO_2 + HCl}$
(ii) $R - CO - NH_2 + Br_2 + 4NaOH \rightarrow$
(b) Why diazonium salt is generally not stored and is used immediately after its preparation? [1M]
(c) Explain Sadmeyer reaction with equation. [2M]
43. (a) Write the Haworth's structure of Lactose. [2M]
(b) What is fibrous protein? Name the protein present in hair. [2M]
(c) Write the name of the nitrogenous base present only in DNA but not in RNA. [1M]

PART – E

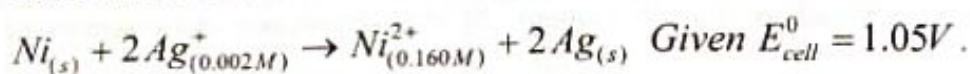
I. Answer any **THREE** of the following. Each question carries **THREE** marks:

3 × 3 = 9

44. On dissolving 3.46g of non-volatile solute in 100g of water, the boiling point of solution was raised to that of pure water by 0.12K. Calculate the molar mass of non-volatile solute. (Given: K_b of water = 0.15Kkgmol^{-1})

45. 100g of liquid 'A' (molar mass 140gmol^{-1}) was dissolved in 1000g of liquid 'B' (molar mass 180gmol^{-1}). The vapour pressure of liquid 'B' was found to be 500 torr. Calculate the vapour pressure of pure liquid 'A' if the total vapour pressure of the solution is 475 torr.

46. Calculate the e.m.f. of the cell in which the following reaction takes place.



47. The resistance of 0.1M solution is found to be $2.5 \times 10^3 \Omega$. Calculate the molar conductance. Given cell constant = 1.15cm^{-1} .

48. The rate constants of a reaction is doubled when the temperature increased from 400K to 410K. Calculate the activation energy (E_a). [$R = 8.314\text{JK}^{-1}\text{mol}^{-1}$].

49. For a first order reaction, the half – life period is 120 min. Calculate the time required to complete 90% of the reaction.