2025-26 II PUC PREPARATORY EXAMINATION

Subject: 34 – CHEMISTRY   Maximum Marks: 70

Time: 3.00 Hours   Number of Questions: 46

Instructions

1. Question paper has FIVE parts. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.
   b. Part-B carries 06 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 20 marks. Each question carries 5 marks.
   e. Part-E carries 09 marks. Each question carries 3 marks.
3. In **Part-A** questions, **first attempted answer** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary. (Use of scientific calculator is not allowed).
7. For a question having circuit diagram/figure/ graph/ diagram, alternate questions are given at the end of question paper in a separate section for visually challenged students.

PART-A

I.   **Select the correct option from the given choices.**   15 ×1 = 15

1. Among the following cells, the cell used in the apollo space program for providing electric power is
   (a) SHE   (b) $H_2 - O_2$ fuel cell   (c) Daniel cell   (d) Mercury cell

2. Which of the following elements is liquid at room temperature?
   (a) Zinc   (b) Mercury   (c) Aluminium   (d) Water

3. According to IUPAC nomenclature, the suffix used for naming open-chain aldehydes is
   (a) -ol   (b) –one   (c) -al   (d) -oic acid

4. The mixture which shows positive deviation from Raoult's Law is
   (a) n-hexane and n-heptane   (b) Bromoethane and chloroethane
   (c) Ethanol and Acetone   (d) Chloroform and Acetone

5. Which of the following groups when present at para position increases the basic strength of aniline?
   (a) $-NO_2$ (b) $-Br$ (c) $-NH_2$ (d) $-COOH$

6. The correct name of the reaction $R - X + NaI \xrightarrow{\text{Dry acetone}} R - I + NaX$ is
   (a) Finkelstein reaction   (b) Wurtz reaction
   (c) Swarts reaction   (d) Friedel-Crafts reaction

7. The van't Hoff factor i for a compound which undergoes dissociation in one solvent (ethanoic acid in water) and association in other solvent (ethanoic acid in benzene) is respectively
   (a) Greater than one and greater than one
   (b) Less than one and greater than one
   (c) Less than one and less than one
   (d) Greater than one and less than one

8. Number of carbon atom/s does formaldehyde has
   (a) 0   (b) 1   (c) 2   (d) 3

9. Phenol is approximately how much times acidic than ethanol?
   (a) 10   (b) 1000   (c) 100000   (d) 1000000

10. $\left[Mn(CN)_6 \right]^{3-}$ and $\left[FeF_6 \right]^{3-}$ are
    (a) Inner orbital and outer orbital complexes respectively.
    (b) Both inner orbital complexes.
    (c) Outer orbital and inner orbital complexes respectively.
    (d) Both outer orbital complexes

11. Chlorine containing antibiotic, produced by microorganisms which is very effective for the treatment of typhoid fever is
(a) Chloramphenicol   (b) Thyroxine   (c) Chloroquine   (d) Halothane.

12. In black and white photography, the developed film is fixed by washing with hypo solution which dissolves the undecomposed AgBr to form a complex ion, the formed complex ion is:

(a) $\left[Ag(S_2O_3)_2\right]^{3-}$ (b) $\left[Ag(SO_4)_2\right]^{3-}$ (c) $\left[Ag(S_2O_8)_2\right]^{3-}$ (d) $\left[Ag(S_2O_4)_2\right]^{3-}$

13. For the reaction $2A + 3B + \frac{1}{2}C \longrightarrow P$, the correct rate of the reaction is

a) $\frac{-d[A]}{dt} = \frac{-2}{3}\frac{d[B]}{dt} = -4\frac{d[C]}{dt}$

b) $\frac{-d[A]}{dt} = \frac{-3}{2}\frac{d[B]}{dt} = \frac{-1}{4}\frac{d[C]}{dt}$

c) $\frac{+d[A]}{dt} = \frac{+3}{2}\frac{d[B]}{dt} = \frac{+1}{2}\frac{d[C]}{dt}$

d) $\frac{+d[A]}{dt} = \frac{+2}{3}\frac{d[B]}{dt} = +4\frac{d[C]}{dt}$

14. **Statement-I:** In benzylic alcohols, the –OH groups is attached to sp^3 carbon atom next to aromatic ring.

Statement-II: In vinylic alcohols, the –OH group is bonded to a carbon atom of carbon–carbon double bond.

In the light of the above statements, choose the appropriate answer from the options given below:

(a) Both Statement I and Statement II are correct.

(b) Statement I is incorrect but Statement II is correct.

(c) Both Statement I and Statement II are incorrect.

(d) Statement I is correct but Statement II is incorrect.

15. Match the following

LIST-I	LIST-II
(i) Phosphodiester Linkage	(A) Amino Acids
(ii) Glycosidic Linkage	(B) Nucleotides
(iii) Peptide Linkage	(C) Monosaccharides
	(D) Phenols

(a) i – C, ii – D, iii – B   (b) i – C, ii – A, iii – B

(c) i – B, ii – C, iii – D   (d) i – B, ii – C, iii – A

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:
(saturated solution, 2-Methylaniline, three, reducing, tin, zinc)   5 ×1 = 5

16. The number of hydroxyl groups present in glycerol is _____.

17. Brass is an alloy of copper and _____.

18. The IUPAC name of o-Toluidine is _____.

19. A solution in which no more solute can be dissolved at the same temperature and pressure is called _____.

20. The carbohydrates which reduce Fehling's solution and Tollens' reagent are called as _____ sugars.

PART – B

III. Answer any THREE of the following. Each question carries 2 marks.   3 × 2 = 6

21. Write any two differences between order and molecularity of a reaction.

22. Transition elements forms colour compounds. Give two reasons.

23. Write the S_N2 mechanism for conversion of chloromethane to methanol.

24. Name the enzyme involved in fermentation of glucose into ethanol and write its chemical equation.

25. Shown structure is the sugar in the milk:
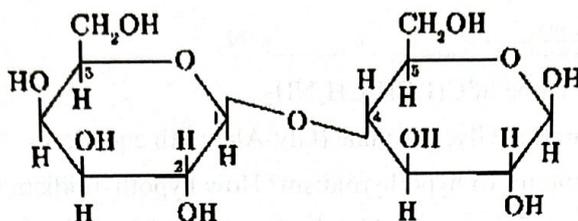
   i) Name the sugar.

   ii) Name the hydrolytic products of the sugar.

PART – C

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

26. Calculate the magnetic moment of Ti^{3+}. [Given: Atomic number of Ti is 22]

27. Using Valence Bond Theory [VBT] explain geometry, hybridisation and magnetic property of $[CoF_6]^{3-}$ ion. [Given: Atomic mass of cobalt is 27]

28. Write the formula of the three different types of compounds formed when lanthanoids reacts with carbon or heated with carbon?

29. On treating $CoCl_3.4NH_3$ with excess of $AgNO_3$ solution, 1 mole of AgCl is formed. Formulate the complex and write its geometrical isomers.

30. With the help of structure, explain synergic effect in metal carbonyls?

V. Answer any TWO of the following. Each question carries 3 marks. $2 \times 3 = 6$

31. What is collision Frequency? According to collision theory give any two criteria for effective collision.

32. What are electrochemical cells? Name the two types of cells.

33. State Henry's law, Write its mathematical statement and one of its applications.

34. The diagram shows that when iron is exposed to atmospheric air
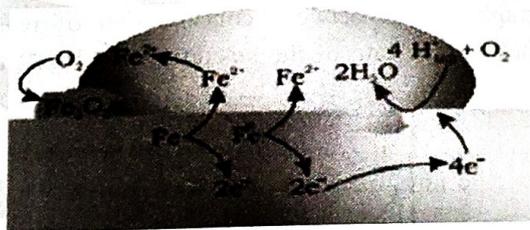
   (i)   Name the phenomenon involved in this diagram.

   (ii) Write the atmospheric oxidation reaction of iron.

   (iii) Mention any one method to avoid this phenomenon

PART – D

VI. Answer any FOUR of the following. Each question carries 5 marks. $4 \times 5 = 20$

35. (a) Write the reaction for the conversion of toluene to benzaldehyde using chromyl chloride. Name the reaction.

   (b) Explain Hell-Volhard-Zelinsky reaction with a general chemical equation.   (3+2)

36. (a) Write the three steps involved in the acid catalysed dehydration of ethanol to ethoxy ethane at 413 K.

   (b) Explain Kolbe's reaction with a chemical equation   (3+2)

37. (a) Haloarenes are least reactive towards nucleophilic substitution reactions. Mention three reasons.

   (b) Write the structures of different dihalogen derivatives of ethane.   (3+2)

38. (a) Explain Carbylamine reaction by taking methanamine as an amine. Write the chemical equation.

(b) Complete the following reaction :

$C_6H_5N_2Cl \xrightarrow[\text{(ii) NaNO}_2/\text{Cu, }\Delta]{\text{(i) HBF}_4}$ _____ + _____ + N_2 (2+2+1)

(c) Write the IUPAC name of $CH_3CH_2CH_2NH_2$.

39. (a) Explain the preparation Glycylalanine (Gly-Ala) with equation.

(b) What are the symptoms of hypothyroidism? How hypothyroidism is controlled?

(c) Name the vitamin deficiency of which leads to convulsions.   (2+2+1)

40. The compound "A" has molecular formula C_7H_8 is heated with alkaline $KMnO_4$ followed by acidification gives compound "B" of the molecular formula $C_7H_6O_2$. This compound "B" turns blue litmus to red. The sodium salt of compound "B" is heated with reagent "X" gives hydrocarbon "C" of molecular mass 78 $gmol^{-1}$.

(i) Write the structure of compounds "A", "B" and "C".

(ii) Identify "X" and mention its role in the reaction.

PART – E (PROBLEMS)

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

41. The boiling point of benzene is 353.23 K. When 1.80g of a non-volatile solute was dissolved in 90 gram of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. [Given: $K_b = 2.53$ K Kg mol^{-1}].

42. A first order reaction is found to have a rate constant, $k = 5.5 \times 10^{-14}$ s^{-1}. Find the half-life of the reaction.

43. The cell in which the reaction occurs $2Fe^{3+}_{(aq)} + 2I^-_{(aq)} \rightleftharpoons 2Fe^{2+}_{(aq)} + I_{2(s)}$; $E^o_{cell} = 0.236V$ at 298 K. Calculate the value of log Kc (Kc = equilibrium constant) of the cell reaction.

44. A column containing 0.05 M NaOH has an area of cross section 0.785 cm^2 and length of 1m shows a resistance of 1.11×10^4 Ω. Calculate the molar conductivity of the solution.

45. Calculate the mole fraction of the solute in aqueous solution containing 3.0 g of urea (molar mass = 60 g mol^{-1}) per 250 g of water.

46. Analyse the given graph, drawn between concentration of reactant in $molL^{-1}$ v/s time in minute, calculate the average rate of the reaction between 10 to 20 minutes in terms of seconds.
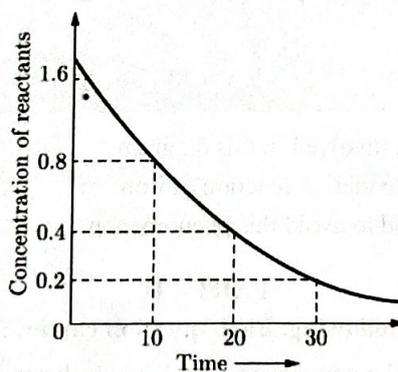
PART - F
(For visually challenged students only)

34. Define the term corrosion. Suggest two methods to prevent corrosion of metal.

46. At 318 K, for the reaction $2N_2O_{5(g)} \rightarrow 4NO_{(g)} + O_{2(g)}$ in CCl_4, the initial concentration of N_2O_5 is 2.33 $molL^{-1}$ in reduced to 2.08 $molL^{-1}$ in 100 minutes. Calculate the average rate of reaction in terms of seconds

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