MD

II PUC PREPARATORY EXAMINATION, JANUARY - 2024

II

Time : 3:15 Hours | **CHEMISTRY - 34** | Max. Marks : 70

Instructions : 1) Question paper have 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 3 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 labelled 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]

PART - A

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

1) Negative deviation from Raoult's law is observed in which of the following binary liquid mixture.
a) Ethanol and acetone
b) Benzene and toluene
c) Acetone and chloroform
d) Acetone and carbon disulphide

2) How much electricity interms of Faraday is required to reduce one mole of $Cr_2O_7^{2-}$ to Cr^{3+}
a) 3F
b) 6F
c) 4F
d) 2F

3) If $E_{ext} > 1.1V$ is applied in the galvanic cell
a) Electrons flow from Cu to Zn rod
b) Electrons flow from Zn to Cu rod
c) Current flows from Cu to Zn rod
d) No flow of electrons or current

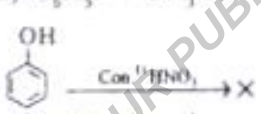
4) In a reaction when the concentration of reactant is increased by nine times, the rate increases by 3 times. The order of the reaction is
a) 3
b) 2
c) 1
d) $\frac{1}{2}$

5) The magnetic moment of divalent ion in aqueous solution if its atomic number is 25 is
a) 5.92 BM
b) 4.89 BM
c) 3.87 BM
d) 2.82 BM

6) The co-ordination number of cobalt in the complex $\left[Co(en)_2(H_2O)_2\right]Cl$ is
a) 4
b) 5
c) 6
d) 2

7) Ethylidiene chloride is an
a) Vicinal dihalide
b) geminal dihalide
c) Allylic halide
d) Vinylic halide

8) Anisole reacts with HI at 373 K gives a mixture of
a) $C_6H_5I + CH_3OH$
b) $C_6H_5OH + CH_3I$
c) $C_6H_5CH_2OH + CH_3I$
d) $C_6H_5OH + CH_3CH_2I$

9)  . In this reaction the product 'x' is
a) O-nitrophenol
b) P-nitrophenol
c) The mixture of O-nitro and P-nitrophenol
d) 2, 4, 6-trinitrophenol

10) Which of the following cannot reduce Tollen's reagent
a) CH_3COCH_3
b) HCHO
c) CH_3CHO
d) C_6H_5CHO

11) $R-CN \xrightarrow[2)\ H_3O^+]{1)\ SnCl_2+HCl} R-CHO$ The name of the reaction is
a) Rosenmund
b) Stephen
c) Etard
d) gatterman-koch

12) Amongst the following the strongest base in aqueous medium is
a) CH_3NH_2
b) $(CH_3)_3N$
c) $(CH_3)_2NH$
d) NH_3

13) Benzene diazonium chloride when warmed with water gives
a) Phenol
b) chlorobenzene
c) Benzene
d) aniline

(P.T.O.)

14) The non-reducing sugar is
a) maltose b) sucrose c) Lactose d) Glucose

15) Which of the following 'B' group vitamin can be stored in the body
a) B_1 b) B_2 c) B_6 d) B_{12}

II Fill in the blanks by choosing the appropriate word from those given in the bracket. 1×5=5

[Primary alcohol, slowest step, Hydrogen, Nitrogen, Oxygen, less than one]

16) The Van't Hoff factor for acetic acid in benzene is _____.

17) In a complex reaction, the rate of reaction depends on _____.

18) The gas liberated when $KMnO_4$ is heated at 513K is _____.

19) Grignard reagent reacts with Formaldehyde followed by hydrolysis gives _____.

20) The gas liberated when ethyl amine reacts with HNO_2 is _____.

PART - B

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

21) What happens to the solubility of a gas in a liquid with increase in temperature? Give reason.

22) Define rate of a reaction. What is the unit of rate of reaction?

23) What are Homoleptic complexes? Give an example.

24) Name the reagents in the following conversions.
i) Alkyl halide into alkene ii) Chlorobenzene into diphenyl

25) Complete the following reactions

i) $CH_3 - CHO \xrightarrow[Con.HCl]{Zn-Hg} -$ ii) $\xrightarrow[Anhydrous\ AlCl_3]{CO,HCl}$ _____

26) a) Name the monomer of nucleic acids.
b) Give an example for amino acid derivative Hormone.

PART - C

IV Answer any THREE of the following. Each question carries three marks. 3×3=9

27a) Why do transition elements form complex compounds?
b) Name the transition element which does not exhibit +2, oxidation state.

28) Write the balanced chemical equation for the manufacture of $K_2Cr_2O_7$ from chromite ore.

29) Give reasons for the followings
a) Actinoids show variable oxidation states.
b) Cerium (Ce) exhibits +4 oxidation state.
c) The study of actinoid element is difficult

30) What is spectrochemical series? Explain the differences between a weakfield ligand and a strong field ligand.

31) Explain the hybridisation, Geometry and magnetic property of $[CoF_6]^{3-}$ ion using V.B.T.

32) a) How many ions are produced from the complex $[Cr(NH_3)_6]Cl_3$ in solution
b) Give the IUPAC name of the complex $[Co(NH_3)_4\ Cl(NO_2)]Cl$
c) Draw the structure of cis isomer of $[CoCl_2(en)_2]^+$

V Answer any TWO of the following. Each question carries three marks. 2×3=6

33) Define azeotropes. What type of azeotrope is formed by negative deviation from Raoult's law? Give an example.

34) What is a secondary battery? Write the reactions occuring at anode and cathode in lead storage battery.

35) Describe the construction and working of standard hydrogen electrode.

36) Derive an integrated equation for the rate constant of a first order reaction.

PART - D

VI Answer any FOUR of the following. Each question carries five marks. 4×5=20

37) a) Explain the mechanism involved in the conversion of t-butyl bromide into t-butyl alcohol.
b) What is Grignard reagent? Why it is necessary to avoid even traces of moisture from a grignard reagent?

38) a) Write the steps involved in the mechanism of acid catalysed hydration of alkene to alcohol.
b) What is lucas reagent? Which class of alcohols produce immidiate turbidity with it at room temperature.

39) a) Explain Kolbe's reaction with equation.
b) How does anisole reacts with methyl chloride? Write the equation.
c) Write the general equation of williamson ether synthesis.

40) a) Complete the following reactions

i) $\overset{\diagdown}{\underset{\diagup}{C}}=O + NaHSO_3 \rightleftharpoons$ _____

ii) $2CH_3-CHO \xrightleftharpoons{\text{dil NaOH}}$ _____

iii) $R-\overset{O}{\overset{||}{C}}-CH_3 \xrightarrow{NaOX} R-\overset{O}{\overset{||}{C}}-ONa +$ _____

b) How does formaldehyde reacts with concentrated alkalin on heating? Name the reaction.

41a) Explain the preparation of carboxylic acids from Grignard reagent.
b) What is the effect of $-CH_3$ and $-NO_2$ Substituents on acidity of carboxylic acids?
c) What type of carboxylic acids undergo HVZ reaction.

42a) How do you prepare methanamine from Hoffmann bromamide degradation reaction.
b) What is diazotisation? Write the equation.
c) Give the IUPAC name of trimethyl amine.

43a) How do you confirm the presence of aldehydic and 5 -OH groups in the glucose molecule.
b) What is peptide bond? How many peptide linkages are present in a pentapeptide.
c) Name the disease caused by the deficiency of vitamin B_6.

PART - E

VII Answer any THREE of the following. Each question carries three marks. **3×3=9**

44) A solution containing 8g of a non-electrolyte substance in 100g of diethyl ether boils at 36.86°c. Where as pure ether boils at 35.60°c. Determine the molecular mass of solute
[For diethyl ether $K_b = 2.02$ K Kg.mol^{-1}]

45) Calculate the mass of a solute [molar.mass 256 g/mol) to be dissolved in 75g of benzene to lower its freezing point by 0.48 K [Kf = 5.12 K Kgmol^{-1}]

46) Calculate the equilibrium constant for the reaction

$Cu_{(s)} + 2Ag^{+}_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + 2Ag_{(s)}$ $\left[\text{Given} E^{\ominus}_{cell} = 0.46V\right]$

47) The resistance of 0.1M KCl solution is found to be 520Ω and shows a conductivity value of 0.248S cm^{-1}. Find the value of cell constant.

48) A first order reaction has a rate constant 1.15×10^{-3} S^{-1}. How long will 5 gm of this reactant take to reduce to 3g?

49) The rate constant of a first order reaction at 600k is 1.60×10^{-5} S^{-1}. Its energy of activation is 209 KJ/mol. calculate the rate constant of the reaction at 700K [R=8.314 J K^{-1}mol^{-1}]