

II PUC PREPARATORY EXAMINATION, JANUARY-2024

Time : 3 Hrs. 15 Mins.

SUBJECT : CHEMISTRY (34)

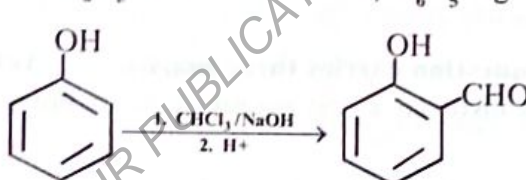
Max Marks : 70

Instructions :

- 1) The 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 diagram 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 calculators if necessary. (Use of Scientific Calculator is not allowed)

PART - A

1x15=15

- I Select the correct option from the given choices.
- 1) Relative lowering of vapour pressure is equal to the
 - a) Mole fraction of the solute
 - b) Mole fraction of the solvent
 - c) Molarity of the solution
 - d) Molality of the solution
 - 2) When the Daniel cell is in use
 - a) Zn^{2+} are reduced to Zn
 - b) Zn is oxidized to Zn^{2+}
 - c) Cu is oxidized to Cu^{+2}
 - d) Copper goes on dissolving
 - 3) The SI unit of molar conductivity is
 - a) S
 - b) m^{-1}
 - c) $S m^{-1}$
 - d) $S m^2 mol^{-1}$
 - 4) Order of a reaction is determined by
 - a) balanced chemical equation
 - b) unbalanced chemical equation
 - c) experimental rate expression
 - d) Thermo-Chemical equation
 - 5) Which of the following elements are not regarded as transition metals
 - a) Zn, V and Cd
 - b) Zn, Co and Mn
 - c) Cd, Ti and Mn
 - d) Zn, Cd and Hg
 - 6) The denticity of the ethylene diamine tetra acetate ligand is
 - a) 2
 - b) 3
 - c) 1
 - d) 6
 - 7) Chlorobenzene reacts with magnesium in dry ether to give a compound A, A is
 - a) C_6H_5OH
 - b) C_6H_5MgCl
 - c) $C_6H_5CH_2MgCl$
 - d) $MgCl_2$
 - 8) 

This reaction is known as
 - a) Reimer-Tiemann reaction
 - b) Kolbe's reaction
 - c) Cumene process
 - d) Wurtz reaction
 - 9) Which one of the following on oxidation gives a ketone
 - a) Primary alcohol
 - b) Secondary alcohol
 - c) Tertiary alcohol
 - d) All of these
 - 10) Oxidising agent used in Etards reaction is
 - a) $H_2 - Pd$
 - b) CrO_3
 - c) CrO_2Cl_2
 - d) $KMnO_4$
 - 11) Sodium salt of carboxylic acids are converted into hydrocarbons by
 - a) Dehydration
 - b) Dehydrohalogenation
 - c) Decarboxylation
 - d) Dehalogenation
 - 12) Which of the following amines cannot be prepared by Gabriel Synthesis.
 - a) Methanamine
 - b) Ethanamine
 - c) Propanamine
 - d) Aniline

(P.T.O.)

13) During diazotization, the nitrous acid is produced in the reaction mixture by the reaction of
a) NaNO_2 & HCl b) NaNO_3 & HCl c) NaNO_2 & HNO_3 d) NaNO_3 & HNO_3

14) Lysine is
a) Basic amino acid b) Acidic amino acid
c) Amino acid synthesised in body d) Non-essential amino acid

15) In DNA, complementary bases are
a) $A = T$ and $G \equiv C$ b) $A = T$ and $G \equiv U$ c) $A = G$ and $T \equiv U$ d) $A \equiv U$ and $T = G$

II Fill in the blanks by choosing the appropriate word from those given in the brackets: **5x1=5**

- (Effective nuclear charge, ppm, nitrogen, Instantaneous rate, molarity, freons)
- 16) If solute is present in trace amounts, then conc is expressed in _____.
- 17) The rate of reaction at a particular moment of time is called _____.
- 18) Lanthanoid contraction is due to increase in _____.
- 19) The chlorofluorocarbon compounds of methane and ethane are called _____.
- 20) The gas liberated when ethyl amine reacted with HNO_2 at low temperature is _____.

PART-B

III Answer any THREE of the following. Each question carries two marks. **3x2=6**

- 21) Mention any two application of Henry's law.
- 22) Define order of a reaction. For which order reaction the unit of rate of reaction and rate constant is same ?
- 23) What is an ambidentate ligand ? Name the type of structural isomerism that arise in the co-ordination compound containing such a ligand.
- 24) Explain the Swart's reaction with an example.
- 25) How do you prepare an aldehyde from acid chloride ? Name the reaction.
- 26) Which hormone
a) Decreases blood sugar level
b) Responsible for preparing the uterus for implementation of fertilized egg ?

PART-C

IV Answer any THREE of the following. Each question carries three marks. **3x3=9**

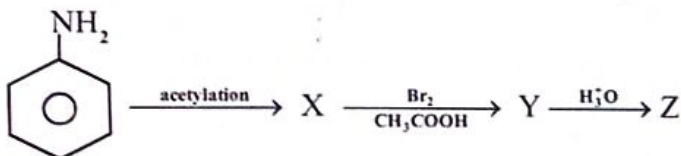
- 27) Write the chemical equations for the reactions involved in the manufacture of Potassium dichromate from chromite ore.
- 28) Write the differences between lanthanoides and actinoides with reference to
i) Structural variability ii) Chemical reactivity iii) Electronic configuration
- 29) Calculate the Magnetic moment of Mn^{+2} ion. (atomic number of Mn = 25)
- 30) Explain hybridization, geometry and Magnetic Property of $[\text{Ni}(\text{CN})_4]^{-2}$ ion using valence bond theory (atomic number of Ni is 28)
- 31) a) Write the IUPAC nomenclature of the complex $[\text{Cr}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3$
b) Define ionization isomerism. Give an example. **(1+2)**
- 32) a) What is Spectrochemical Series ?
b) Differentiate between strong field ligands and weak field ligands. **(1+2)**

(P.T.O.)

- V Answer any TWO of the following. Each question carries three marks. 2x3=6
- 33) a) What is reverse osmosis ? Give one application of its practical utility. (2+1)
 b) What is the SI unit of molality.
- 34) Draw the schematic diagram of Hydrogen-oxygen Fuel cell and write the overall cell reaction.
- 35) a) Name any two methods to prevent corrosion. (2+1)
 b) State Faraday's First law of electrolysis.
- 36) Derive an integrated rate equation for a first order reaction.

PART-D

- VI Answer any FOUR of the following. Each question carries Five marks. 4x5=20
- 37) a) Explain : SN² mechanism with an example. (2+1+2)
 b) Give one reason : Aryl halides are less reactive towards nucleophilic substitution reaction.
 c) Explain Fittig reaction with an equation.
- 38) a) How is phenol manufactured by Cumene process ? (3+2)
 b) Explain Kolbe's reaction with equation.
- 39) a) Explain the mechanism of acid catalyzed dehydration of ethanol to ethene.
 b) Name the main product formed in the following reactions
 i) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2\text{OH} \xrightarrow[\text{(O)}]{\text{PCC}}$
 ii) $\text{CH}_3 - \text{CH}_2 - \text{OH} \xrightarrow[573\text{K}]{\text{Cu/Ag}}$ (3+2)
- 40) a) How does propanone reacts with hydrazine ? Give equation.
 b) Name the reagent used in the Clemmensen reduction.
 c) Explain Cannizzaro's reaction taking benzaldehyde as an example write equation. (2+1+2)
- 41) a) pKa values of three Carboxylic acids A, B and C are 12.3, 14.6, 9.8 respectively. Arrange them in the increasing order of their acidic strength.
 b) Explain esterification reaction and write the Chemical equation for the same.
 c) What is the effect of electron releasing group on the acidity of carboxylic acids ?(2+2+1)
- 42) a) Give reason
 In the isomeric amines Butanamine has more boiling point than N, N - dimethylmethanamine
 b) What is Hinsberg reagent ?
 c) Identify the products X, Y and Z in the following conversion



(1+1+3)

- 43) a) Write the Haworth's structure of "Lactose".
 b) What are non-essential amino acids ? Give one example.
 c) Name the disease caused by the deficiency of vitamin D. (2+2+1)

(P.T.O.)

PART-E (Problems)

3x3=9

- VII Answer any THREE of the following. Each question carries three marks.**
- 44) Vapour pressure of dichloromethane (molar Mass = 119.5g/mol) and chloroform (molar Mass 85g/mol) at 298K are 200 and 415 mm Hg respectively. Calculate the Vapour pressure of the solution prepared by mixing 25.5g dichloromethane and 40g of chloroform at 298 K.
- 45) The boiling point of benzene is 353.23 K. When 1.80g of a non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. K_b for benzene is 2.53 K kg mol⁻¹.
- 46) The resistance of 0.1 MKCl solution is found to be 520Ω and shows a conductivity value of 0.248 S cm⁻¹. Find the value of cell constant.
- 47) The molar conductivity at infinite dilution of Al₂(SO₄)₃ is 858 S cm² mol⁻¹, Calculate the molar ionic conductivity of Al³⁺ ion, Given that $\lambda^\circ \text{SO}_4^{2-} = 160 \text{ S cm}^2 \text{ mol}^{-1}$
- 48) For the first order reaction, half-life period of the reaction is 120 minutes, calculate the time taken to complete 90% of the reaction.
- 49) The specific reaction rate of a reaction triples when the temperature changes from 30°C to 50°C. Calculate the energy of activation of the reaction ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)

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