PRE-BOARD EXAMINATION – 2080 (2024)

Grade: XII **F.M.: 75**

Time: 3:00 hrs. **CHEMISTRY (CHE. 3021)** **P.M.: 30**

Candidates are required to give their answer in their own words as far as practicable. The figures is the margin indicate full marks.
Attempt all questions.

GROUP A

Multiple Choice Questions. **(11×1=11)**

Tick the correct answer.

1. The exact pH of 10^{-7} M of HCl solution is
   a) 7 b) 1 c) 6.9 d) 7.9
2. If the enthalpy of vaporization of water is 186.5 J/mol the entropy of its vaporization will be
   a) 0.5 $JK^{-1}mol^{-1}$ b) 1.0 $JK^{-1}mol^{-1}$
   c) 1.5$JK^{-1}mol^{-1}$ d) 2.0 $JK^{-1}mol^{-1}$
3. A catalyst accelerates the reaction because
   a) it brings reactant closer b) it increases the activation energy
   c) it helps to concentrate reactant d) it lowers the activation energy
4. For the reaction 2A + B → C + D, the following data are obtained.

Expt. No.	[A]	[B]	R(mol $L^{-1}S^{-1}$)
1	0.010	0.010	2.5
2	0.010	0.020	5.0
3	0.030	0.020	45.0

   The rate law is
   a. $R = K[A]^2[B]$ b. $R = K[A][B]^2$
   c. $R= K[A]^3$ d. $R = K[A][B]$
5. Formic acid and acetic acid may be distinguish by reaction with
   a) Sodium metal b) acidified $KMnO_4$
   c) 2, 4 DNP d) sodium bicarbonate
6. Benzene reacts with acetyl chloride in presence of $AlCl_3$gives
   a) C_6H_5COCl b) $C_6H_5COCH_3$
   c) C_6H_5Cl d) $C_6H_5CH_3$
7. An alkyl isocyanide on reduction with hydrogen in presence of Pt gives
   a) Amide b) 1° amine c) 2° amine d) alcohol
8. Which is correct order of acidity of the given acids:
   a) $HCOOH>CH_3COOH>C_6H_5COOH$ b) $HCOOH>C_6H_5COOH>CH_3COOH$
   c) $C_6H_5COOH>CH_3COOH>HCOOH$ d) $C_6H_5COOH>HCOOH>CH_3COOH$
9. Inner layer of blast furnace is made up
   a) Graphite bricks b) Silica bricks
   c) Fire-clay bricks d) basic bricks
10. When a lead storage battery is charged,
    a. Lead oxide dissolves
    b. Sulphuric acid is regenerated
    c. Lead electrode becomes coated with lead sulphate
    d. Amount of sulphuric acid is decreased
11. Tailing of mercury is due to formation of
    a) HgO b) Hg_2O c) HgO_2 d) Hg

Group: B:

Short Answer Questions. **(8×5=40)**

12. The term concentration or strength refers to amount of solute in solution. On the basis of different units of solute and solution the concentration of solution is expressed in different terms. Normality is also a concentration terms which indicates number of grams equivalent of solute present in one litre of solution;
    i) What is the important of calculating normality factor during titration? [1]
    ii) Define redox titration with suitable example. [1]
    iii) 1 gram of a divalent metal was dissolved in 25ml of 1M H_2SO_4. The unreacted acid further required 15cc of 1N NaOH (F = 0.8) for complete neutralization. Calculate the atomic weight of metal. [3]
13. Alcohols are hydroxyl derivatives of aliphatic hydrocarbons in which one or more hydrogen atom of aliphatic hydrocarbons are replaced by hydroxyl group(s).
    i) How would you apply Victor Meyer's method for the distinction of Propan-1-ol, Propan-2-ol and 2-methyl, Propan-2-ol [3]
    ii) Write the example of:
    a) oxo- process b) hydroboration oxidation reaction. [2]

    OR

    i) Convert benzene to m-bromophenol. [2]
    ii) Identify A,B,C and D in the following reaction. [3]

    $A \xrightarrow[\Delta]{Zn} B \xrightarrow[\Delta]{CH_3Cl} C \xrightarrow[\Delta]{CeO_2/H^+} D$

    Compound D gives Cinnamic acid when heated with acetic anhydride in the presence of sodium acetate.
14. Mercury is extracted by its important ore.
    i) Write the two important ore of mercury. [1]
    ii) How to change metal ore into its oxide. [1]
    iii) What is mercury poisoning? [1]
    iv) What is calomel and how it is prepared? [2]

5. An inorganic Compound A also called blue vitriol can be used as fungicide. Give its chemistry. [5]

6. Enthalpy is defined as the change in heat energy involved i.e. energy absorbed or released when one mole of substance undergoes change in its physical state of during chemical change.

   i) The decrease of enthalpy is not the sole criteria for the feasibility of the process. Comment the statement. [2]

   ii) How is feasibility of exothermic and endothermic reaction predicted term of free energy and entropy change. [3]

Or

Hess's law is applied to calculate different type of enthalpy of reaction.

   i) Illustrate the Hess law of constant heat of summation.

   ii) Standard enthalpy of combustion of C (g), H_2 (g) and C_2H_2(g) are – 394 KJ mol^{-1}, –286 KJ mol^{-1} and –1300 KJ mol^{-1} respectively. Calculate the enthalpy of formation of acetylene. [2+3]

17. Organometallic compounds is defined as a compound which contains direct carbon-metal bond.

   i) What is Grignard's reagent? How is it prepared? [1+1]

   ii) How do you synthesis [1+1+1]

   a) ethanol

   b) propan-2-ol and

   c) 2-methylpropan-2-ol by the use of suitable Grignard's reagent.

18. Ethers are a class of organic compounds containing an oxygen atom bonded to two alkyl groups.

   i) What is Williamsons' etherification reaction? [1]

   ii) An ether A ($C_5H_{12}O$) when heated with excess of hot conc. HI produced two alkyl halides which on hydrolysis form compounds B and C. Oxidation of B gives an acid while C gives ketone E. Deduce the structures of A, B, C, D and E with proper reactions.

19. A primary alkyl halide A (C_4H_9Br), when reacts with alc. KOH gives B which when reacted with HBr gave C which is an isomer of A. When A is reacted with Na metal it gives compound D (C_8H_{18}) which is different from the compound when n-butyl bromide is reacted with Na. Give the structure of A, B, C and D. Write the equations for all the reactions. [5]

Group: C

Long Answer Questions. (3×8=24)

20. A. Give an example of each reaction: [6]

   i) Cannizarro's reaction
   ii) Fittig reaction
   iii) Kolbe's reaction
   iv) Mendius reaction
   v) Sandmeyer reaction
   vi) Claisen condensation

   B. Nitrobenzene to benzoic acid. [2]

OR

What are the possible isomers of C_2H_7N?

   a) Give their IUPAC name. [1]

   b) How do you distinguish these isomers in lab? Write the reaction involved [2]

   c) Arrange these isomers according to their increasing boiling point with reason. [1]

   d) You are supplied a mixture of these isomers. How would you separate the isomers From the mixture by Hoffann's method. [3]

   e) Convert ethanamine to propanoic acid. [1]

21. Electrochemistry is a branch of chemistry that deals with chemical reaction which takes place in chemical solution at the interference of electron conductor and ionic conductor and involves electron transfer between electrode and electrolyte

   i) What is meant by standard electrode potential? You are given standard reduction potential of Cu^{++}/Cu and Fe^{++} /Fe as +0.34V and -0.44V respectively. [1]

   a) Construct a galvanic cell indicating cathode and anode. [2]

   b) Write the cell reaction and calculate the standard Emf of the cell? [2]

   ii) What is salt bridge? Mention its significances. [3]

OR

   a) What amount of $Zn(OH)_2$ will be precipitated out at 25°C if 100 ml of 0.22g NaOH is added to 1 litre of a saturated solution of $Zn(OH)_2$? Precipitate is obtained in this reaction, why? [K_{SP} for $Zn(OH)_2$ is at 25°C is 1.8×10^{-14}] [3+1]

   b) The expressions of ostwald's dilution law is $\alpha = \sqrt{\frac{Ka}{c}}$.

   i) Derive it. [2]

   ii) 0.1M ethanoic acid is 1.34% ionized. Find its dissociation constant [2]

22. A. Dyes are colored substance capable of imparting colors to the foodstuffs, fibres, etc, and are fast to water, light. What are natural and synthetic dyes? Give one examples of each. [2]

   B. Differentiate between:

   i) paper and PULP: [2]

   ii) artificial and natural radio activity [2]

   iii) addition and condensation polymer. [2]

*****ALL THE BEST *****