(i) C_6H_5COOH, CH_3COOH, $p\text{-}NO_2C_6H_4COOH$

(ii) CH_3COOH, $ClCH_2COOH$, $BrCH_2COOH$

(c) How will you prepare the following :

(i) Alanine using Strecker synthesis

(ii) Ethyl amine using Gabriel-Phthalimide synthesis (4.5,2×2,2×2)

22 DEC

[This question paper contains 8 printed pages.]

22 DEC 2022

Your Roll No.....

Sr. No. of Question Paper : 1705

Unique Paper Code : 42174304

Name of the Paper : Solutions, Phase Equilibria, Conductance, Electrochemistry & Functional Group Organic Chemistry-II

Name of the Course : **B.Sc. Prog.**

Semester : III

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** and **Section B** carry equal marks
3. Use separate answer sheets for **Section A** and **Section B**.
4. Use of simple calculator is allowed.

SECTION A

(Attempt any **three** *questions in all.)*

1. Explain Why?

(a) (i) Metallic conductance decreases while electrolytic conductance increases with rise of temperature.

(ii) A DC current cannot be used for conductance measurements.

(iii) H^+ and OH^- ions have exceptionally high ionic conductivities.

(b) State and explain Kohlrausch's law of independent migration of ions. How this law is useful to obtain, $\Lambda°$, molar Conductance of weak electrolyte at infinite dilution?

(c) The conductance of a cell containing an aqueous 0.0560 M KCl solution is 0.0239 Ω^{-1}. when the same cell is filled with an aqueous 0.0836 M NaCl solution, its conductance is 0.0285 Ω^{-1}. Given that

7. (a) How can D-aldopentose be converted into D-aldohexose? Give name of the reaction involved.

(b) Convert :

(i) Aniline to p-Nitro aniline

(ii) o-Toluidine to o-Cresol

(c) An aliphatic amine with molecular formula C_2H_7N exists in two isomeric forms 'A' and 'B'. When warmed with chloroform and KOH only 'A' reacts resulting into foul smell. What are the structures and names of 'A' and 'B'? Give name of the reaction and chemical equation involved in it. Compare the basicity of 'A' and 'B'.

(4.5,2×2,4)

8. (a) Discuss the Hinsberg test used for identification of 1°, 2°, 3° amines. Outline the chemistry involved.

(b) Arrange the following in the order of increasing acidic strength and justify your answer:

(c) Explain the methods to determine N-terminal and C-terminal ends in proteins. (4.5,4,4)

6. (a) Give the products and the name of the reaction when :

(i) Aniline reacts with Benzoyl Chloride in basic medium

(ii) Fructose reacts with excess of phenyl hydrazine.

(iii) Benzene diazonium chloride reacts with Aniline at low temperature (0°C-5°C).

(b) Draw the Haworth projections formula for (i) α-D-Glucopyranose (ii) β-D- Fructofuranose.

(c) Giving suitable explanation arrange the acid derivatives (ester, acid chloride, acid anhydride and amide) in increasing order of reactivity towards nucleophilic acyl substitution reaction.

(3×1.5,2×2,4)

the equivalent conductance of KCl is 134.5 Ω^{-1} $equiv^{-1}$ cm^2, calculate the equivalent conductance of NaCl solution. (3+1.5,4,4)

2. (a) Find :

(i) F(degree of freedom) for a system consisting of solid sucrose in equilibrium with aqueous sucrose solution.

(ii) F(degree of freedom) for an aqueous solution of weak acid HCN.

(b) State Nernst Distribution law. Also discuss the preconditions of its validity.

(c) Draw and label Phase diagram of Sulphur.

(d) Define CST (taking example of Phenol – Water system). How is it different from MST. Draw temperature – composition curve for Phenol-Water system and label appropriately.

(2+1.5,3,3,3.5)

P.T.O.

3. (a) Write the Anodic, Cathodic and overall cell reaction for the following electrochemical cell

$Zn(s) + ZnSO_4(0.1M) \rightarrow ZnSO_4(1.0\ M) + Zn(s)$

What is the term used for this type of cells.

(b) Consider the following cell:

$Ag(s)|AgCl(s)|NaCl(aq)|Hg_2Cl_2(s)|Hg(l)|Pt$

The standard emfs of the cell at several temperatures are as follows :

T/K	291	298	303	311
E^0/mV	43.0	45.4	47.1	50.1

Calculate the values of $\Delta G°$, $\Delta S°$ and $\Delta H°$ for the reaction at 298 K.

(c) Discuss briefly the principle underlying the potentiometric titrations, explaining schematic curve for the potentiometric titrations of strong acid vs strong base. Name one reference and an indicator electrode which can be used in laboratory for acid-base titration. (4,4,4.5)

4. Write short notes on any five of the following. Draw labeled diagram where ever required

(a) Steam Distillation

(b) Azeotropes

(c) Gibb's phase rule

(d) Conductometric titrations (acid – base)

(e) Simple Eutectic system (Pb – Ag)

(f) Calomel electrode (5×2.5=12.5)

SECTION B

(*Attempt any* **three** *questions in all.*)

5. (a) Synthesize Ala-Gly by using Merrifield Solid phase peptide synthesis.

(b) What is Perkin Condensation? Explain its mechanism.