

Life Sci: 16/12/19
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[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7341

J

Unique Paper Code : 42174304

Name of the Paper : Solutions, Phase Equilibrium
& Functional Group Organic
Chemistry

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. Attempt **six** questions in all, **three** questions from each Sections.
3. Use of scientific calculator is allowed.

SECTION A

*Attempt **three** questions in all. Questions No. 1 is compulsory. All questions carry equal marks.*

1. Answer any **five** questions:

(a) State Nernst distribution law and give its limitations.

P.T.O.

- (b) If the molar conductivities at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 426.1 and $91.0 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively, what will be the molar conductivity of Acetic acid?
- (c) The role of salt bridge is to reduce the liquid junction potential. Comment.
- (d) What is azeotropic mixture? Is it possible to separate the components of an azeotropic system using distillation?
- (e) Can a solution of 1 M Copper Sulphate be stored in a vessel made of Nickel metal? Given that $E^\circ_{\text{Ni}^{+2}/\text{Ni}} = -0.25 \text{ V}$ and $E^\circ_{\text{Cu}^{+2}/\text{Cu}} = 0.34 \text{ V}$.
- (f) Effect of increasing the pressure and temperature on the triple point of water. Explain.
2. (a) Drive the integrated form of Clapeyron-Clausius equation for liquid-gas equilibria.
- (b) State and explain the phase rule. Explain that Sulphur system at any of its triple point is a non-variant system.
- (c) What is Critical Solution Temperature? Explain with reference to Phenol water system.

(4,4,4½)

3. (a) Define EMF of a cell. Give the method for its experimental determination.

(b) Between 0°C and 90°C , the potential of the cell

$\text{Pt} | \text{H}_2 (\text{g}, 1 \text{ atm}) | \text{HCl} (m = 0.1) | \text{AgCl} (\text{s}) | \text{Ag}$
is given by

$$E_{(\text{volts})} = 0.3551 - 0.3422 \times 10^{-4}t$$

Where t is the temperature in Celsius. Write the cell equation and calculate ΔG , ΔH and ΔS for the cell at 50°C .

- (c) State the principal underlying the potentiometric titrations. What are the advantages of potentiometric titrations over volumetric titrations. Draw the potentiometric titration curve involving strong acid and strong base.

(4,4,4½)

4. (a) Specific conductivity of a saturated solution of AgCl at 25°C was found to be $3.41 \times 10^{-5} \text{ ohm}^{-1} \text{ cm}^{-1}$. The specific conductivity for water used to make up the solution was $1.60 \times 10^{-6} \text{ ohm}^{-2} \text{ cm}^{-1}$. Determine the solubility of AgCl in water. Ionic conductances of Ag^+ and Cl^- at 25°C are $60.3 \text{ ohm}^{-2} \text{ cm}^{-1}$ and $78.0 \text{ ohm}^{-2} \text{ cm}^{-1}$ respectively.

P.T.O.

(b) Write short note on any **two** :

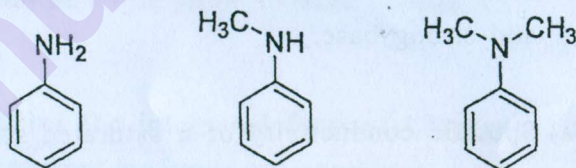
- (i) Hydrogen half Cell
- (ii) Congruent and incongruent meeting points
- (iii) Steam distillation
- (iv) Conductometric titration of CH_3COOH vs NaOH (4½,4,4)

SECTION B

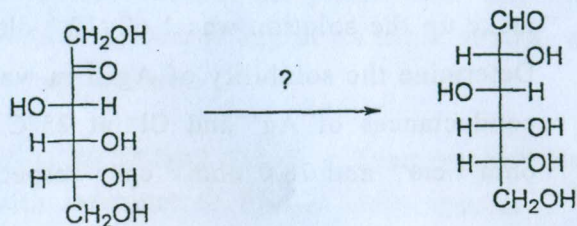
Attempt **three** questions in all. All questions carry equal marks.

5. Answer the following :

(a) How will you differentiate the following?

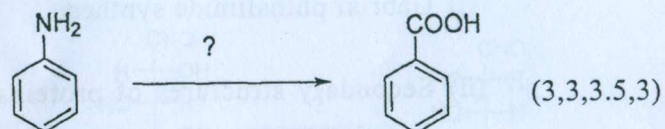


(b) Convert fructose to glucose.



(c) Explain Edmann degradation.

(d) Convert aniline to benzoic acid.



6. Answer the following :

(a) Write short note on any **two** of the following :

- (i) Hell-Volhard-Zelinsky reaction
- (ii) Electrophoresis
- (iii) Schotten-Baumann reaction

(b) What are essential and non-essential amino-acids?

(c) Name the components of starch.

(d) Give test to differentiate the following :

- (i) Sucrose and fructose
- (ii) Aniline and methylamine (6,1.5,1,4)

7. Answer the following :

(a) Write short note on the following:

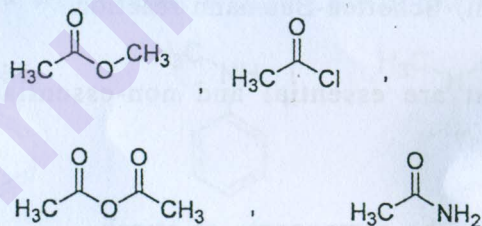
(i) Gabriel phthalimide synthesis

(ii) Secondary structures of proteins

(b) Write the structures of dipeptides abbreviated as follows :

Gly-Tyr

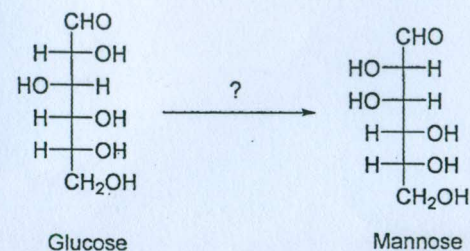
(c) Give and explain the relative reactivity order of the following derivatives of carboxylic acids towards nucleophilic substitution reaction :



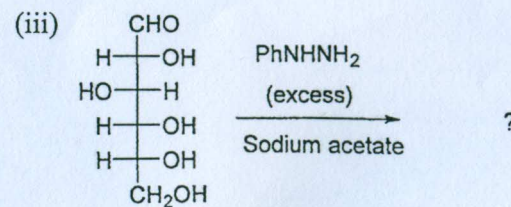
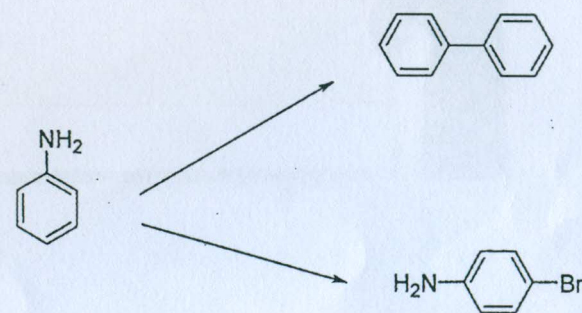
(d) Explain the miscibility of carboxylic acid in water. (6,1.5,3,2)

8. (a) Convert the following :

(i) Glucose to mannose



(ii) Aniline to biphenyl and 4-bromoaniline



(b) Outline the solid phase synthesis of Gly-Ala.

(3,3,3,3.5)

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