

Physical Sci

16/12/19

[This question paper contains 8 printed pages.]

M

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:

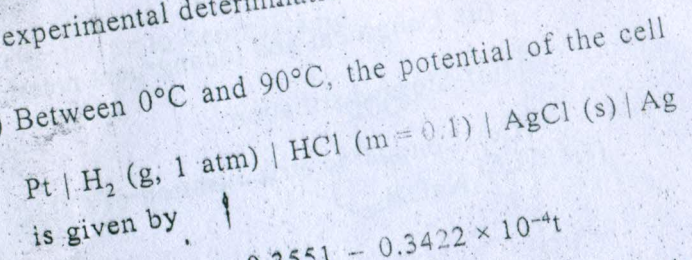
(a) State Nernst distribution law and give its limitations.

P.T.O.

- (b) If the molar conductivities at infinite dilution of NaCl, HCl and  $\text{CH}_3\text{COONa}$  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.
- (2½×5=12½)
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  $0^\circ\text{C}$  and  $90^\circ\text{C}$ , the potential of the cell



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

Where  $t$  is the temperature in Celsius. Write the cell equation and calculate  $\Delta G$ ,  $\Delta H$  and  $\Delta S$  for the cell at  $50^\circ\text{C}$ .

- (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  $25^\circ\text{C}$  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  $\text{Ag}^+$  and  $\text{Cl}^-$  at  $25^\circ\text{C}$  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 :

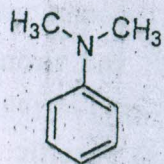
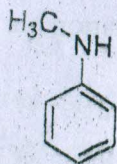
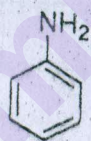
- (i) Hydrogen half Cell
- (ii) Congruent and incongruent meeting points
- (iii) Steam distillation
- (iv) Conductometric titration of  $\text{CH}_3\text{COOH}$  vs  $\text{NaOH}$  (4½, 4, 4)

### SECTION B

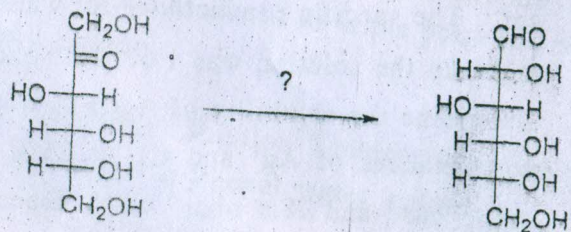
Attempt three questions in all. All questions carry equal marks.

5. Answer the following :

(a) How will you differentiate the following?

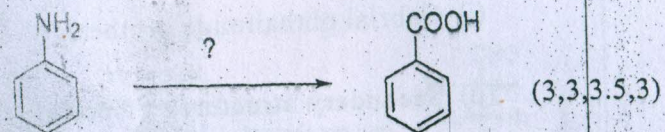


(b) Convert fructose to glucose.



(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.

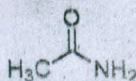
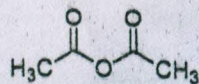
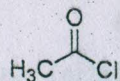
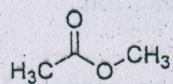
(i) Gabriel phthalimide synthesis

(ii) Secondary structures of proteins

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

Gly-Tyr

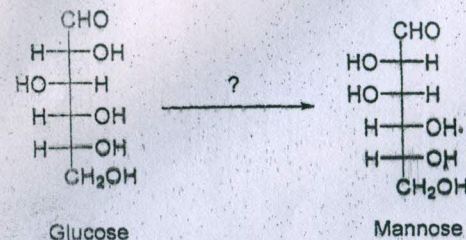
(c) Give and explain the relative reactivity order of the following derivatives of carboxylic acids towards nucleophilic substitution reaction :



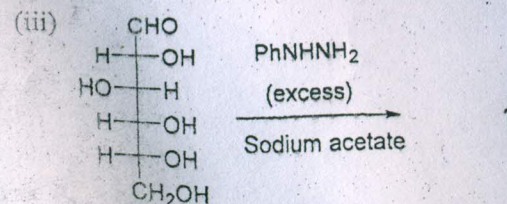
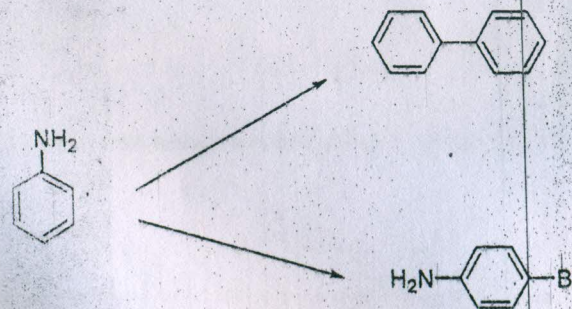
(d) Explain the miscibility of carboxylic acid in water. (6,1,5,3,2)

8. (a) Convert the following :

(i) Glucose to mannose



(ii) Aniline to biphenyl and 4-bromoaniline



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

(3,3,3,3.5)

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