'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2023

GE2-P1-CHEMISTRY

NEW AND OLD SYLLABUS

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.

Use separate answer scripts for SECTION-A and SECTION-B

SECTION-A

PHYSICAL CHEMISTRY [Marks-22]

GROUP-A

1. Answer any ***two*** questions: 1×2 = 2

   (a) The unit of specific conductance is:
   (i) $ohm^{-1}\ cm^{-1}$ (ii) $ohm\ cm^{-1}$ (iii) $mho^{-1}\ cm^{-1}$ (iv) $ohm^{-1}\ cm$

   (b) What is meant by dilute solution?

   (c) Saturated solution of KNO_3 is used to make a salt bridge because:
   (i) Velocity of K^+ is greater than that of NO_3^-
   (ii) Velocity of NO_3^- is greater than that of K^+
   (iii) Velocity of K^+ and NO_3^- both are nearly same
   (iv) None of the above.

GROUP-B

2. Answer any ***two*** questions: 10×2 = 20

   (a) (i) Differentiate between ideal and non-ideal solution. 3+3+4
   (ii) Specific conductance decreases with dilution whereas equivalent conductance increases. Explain.
   (iii) Consider the following cell

   $$Zn\,|\,Zn^{2+}(0.01\,M)\,||\,Cu^{2+}(0.1\,M)\,|\,Cu$$

   Calculate the emf of the cell at 298 K

   Given: $E^0_{Zn^{2+}/Zn} = -0.763\ V$

   $E^0_{Cu^{2+}/Cu} = +0.337\ V$

(b) (i) What is meant by triple point in a phase diagram? 2+2+4+2

(ii) What is the difference between triple point and melting point?

(iii) Derive Clausius-Clapeyron equation.

(iv) What is meant by ionic product of water?

(c) (i) State and explain Raoult's law. 3+2+3+2

(ii) What is meant by positive and negative deviation from Raoult's law?

(iii) Vapour pressure of water at 373.6 K and 372.6 K is 1.018 and 0.982 atm respectively. Calculate the heat of vapourisation.

(iv) What is eutectic temperature?

SECTION-B

ORGANIC CHEMISTRY [Marks-18]

GROUP-A

3. Answer any ***three*** questions from the following: 1×3 = 3

(a) Which reagent is used in HVZ reaction?

(b) What products are formed when acetamide is hydrolysed?

(c) How do you convert acetic acid to glycine?

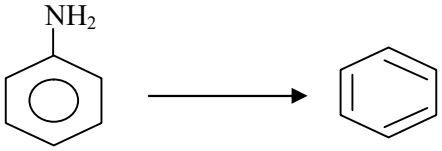
(d) What do you mean by anomers?

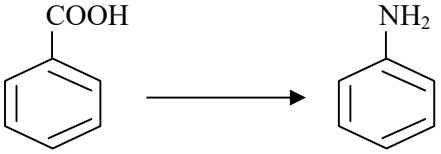
GROUP-B

4. Answer any ***one*** question from the following: 5×1 = 5

(a) (i) How do you separate 1°, 2° and 3° amines by Hinsberg method? 3

(ii) How do you carry out the following conversions? 1×2 = 2

A. 

B. 

(b) (i) Write a short note on Hoffmann vs Saytzeff elimination. 3

(ii) Complete the following reaction: 2

$$C_6H_{12}O_6 \xrightarrow{5HIO_4} ?$$

GROUP-C

5. Answer any ***one*** question from the following: 10×1 = 10

(a) (i) Name four essential α-amino acids and write down their structure. 2

(ii) What is Ninhydrin test of α-amino acids? 2

(iii) Write short notes on the following: 2×3 = 6

A. Perkin condensation

B. Claisen condensation

C. Esterification reaction.

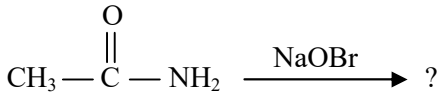
(b) (i) How do you convert the following? 2×3 = 6

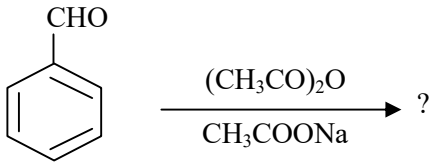
A. Glucose ⟶ Fructose

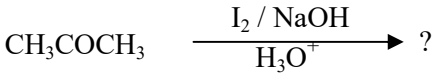
B. Aldo-pentose ⟶ Aldohexose

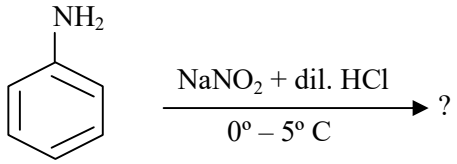
C. Methyl Iodide ⟶ Acetic acid.

(ii) Predict the products: 1×4 = 4

A. 

B. 

C. 

D. 

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