RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.Sc. FOURTH SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 19/03/2015 **CHEMISTRY (General)**

Time : 12 noon – 1 pm Paper : IV Full Marks : 25

Group – A

Attempt <u>any one</u> question :

1. a) Write down and explain 'Clausius Inequality'. [2]
   b) Show from the above that the entropy of universe is increasing with time. [2]

2. a) Starting with Clausius Inequality show that under constant T & V,
   $\Delta A = W_{available}$ [$W_{available}$ = work other than P-V work] [3]
   b) What will be the criterion for a process to be spontaneous under the above condition.
   (i.e, constant T, V) [1]

Attempt <u>any one</u> question :

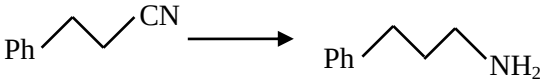
3. a) Write short notes on (**<u>any one</u>**) :
   i) Tyndall Effect
   ii) Gold Number
   iii) Micelle [2]
   b) Give two differences between lyophobic and lyophilic sols. [2]

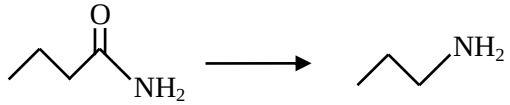
4. a) Define Schulze – Hardy Valency rule and explain it. [2]
   b) Give an example of peptizing agent and explain its mechanism. [2]

Group – B

Attempt <u>any one</u> question :

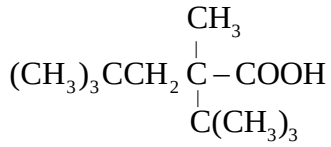
5. a) Prepare the following acids from alkyl halides of fewer C's.
   i) $(CH_3)_3CCOOH$
   ii) $HOCH_2CH_2CH_2COOH$ [2]
   b) Use the concept of charge delocalization by extended π bonding (resonance) to explain why RCOOH ($pK_a = 5$) is more acidic than ROH ($pK_a = 15$) [2]
   c) Outline the synthesis of methylamine by Gabriel's method. [2]
   d) Mention the reagents required in the following transformations : [2]

   i) 

   ii) 

6. a) Use the inductive effect to account for the following differences in acidity : [2]
   i) $ClCH_2COOH > CH_3COOH$ ii) $FCH_2COOH > ClCH_2COOH$

b) Explain why highly branched carboxylic acids such as



are less acidic than unbranched acids. [2]

c) Outline Hinsberg method for the separation of Ethylamine, Diethylamine and Triethylamine from their mixture. [4]

Group – C

Attempt <u>any one</u> question :

7. a) How does chromium occur in nature? How will you obtain, pure chromium from its chief natural source? [1·5+5·5]

b) What happens when a dilute solution of sodium cyanide is added to a suspension of argentite and horn silver? Give equations. [2]

8. a) How do you prepare 250 ml $\left(\frac{N}{10}\right)K_2Cr_2O_7$ solution?[1]

b) Why $KMnO_4$ cannot be used as a primary standard substance. [1]

c) What is complexometry? Why complexometric titration are carried out in buffer solution? Name one reagent which is used as the secondary standard substance in complexometric titration. Write down its structure. [4×0·5]

d) What are metal indicators? Give two examples with structure. [1+1]

e) Write down the name of the indictor used in [0·5+0·5]

i) Acid base titration

ii) Redox Titration

f) i) Write down the principle of estimation of iron through Redox titration. [1·5]

ii) Give an example of an Adsorption indicator. [0·5]

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