

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, SEPTEMBER 2020

SECOND YEAR (BATCH 2018-21)

CHEMISTRY (General)

Date : 29/09/2020

Time : 11.00 am – 3.00 pm

Paper : IV

Full Marks : 40

[Attempt any eight questions of the following]

[8×5]

1. a) Give chemical test to distinguish the following pair

[2×1]

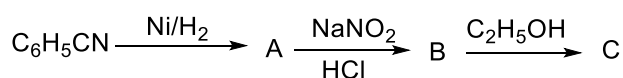
- i) ethylamine and aniline
- ii) methylamine and dimethylamine

b) Write down the use of Grignard reagents for preparation of 1°, 2° and 3° alcohols.

[3]

2. a) Identify A, B and C in the following

[2]



b) Write down the following chemical reactions with examples:

[1.5×2]

- i) Sandmeyer's reaction
- ii) hydrolysis of esters by A_{AC}2 mechanism

3. a) Define the following terms with examples of each:

[2×2]

- i) Glycosylation reaction
- ii) Mutarotation

b) Write the reaction which shows that the D-glucose can exist in open chain structure.

[1]

4. a) Write down short notes on:

[2×2]

- i) Ruff's method in aldoses
- ii) Heinsberg's method of amine separation

b) Arrange the following molecules with increasing order of acidity: Formic acid, acetic acid, benzoic acid

[1]

5. a) Auride ion is very common but the cuprites ion is not commonly formed, explain.

[2]

b) Comment on the stable oxidation state of Cu, Ag and Au.

[3]

6. a) Give a comparative study for the stability of Zn^{2+} , Cd^{2+} and Hg_2^{2+} .

[2.5]

b) Give a brief introduction on Nessler's reagent.

[2.5]

7. a) Write down Clausius Inequality.

[2]

b) From Clausius inequality prove that the condition for spontaneity at constant T, P ,

$$dG < 0$$

[3]

8. a) Write down the expression for efficiency of a Carnot engine in terms of temperatures of the source (T_h) and sink (T_l). [1]
- b) State Carnot's theorem. [2]
- c) With the help of (a) and (b) explain what would be the maximum possible efficiency of an engine working between T_h and T_l . [2]
9. a) An aqueous solution is made by dissolving 10 g of glucose ($C_6H_{12}O_6$ MW-180 g mol⁻¹) in 90 g of water at 300 K. If the vapor pressure of pure water at 300 K is 32.8 mm Hg, what would be the vapor pressure of the solution? [2]
- b) At what temperature will a solution containing 5.60 g of glucose ($C_6H_{12}O_6$) per kg of water will boil? Given the latent enthalpy of vaporization of water is 40.585 kJ/mol. [3]
- 10.a) Why $MgCl_2$ is a better coagulant than NaCl for As_2S_3 colloid? [2]
- b) How are the gold number and protective power of a colloid related? [2]
- c) Arrange the following solutions in increasing order of their boiling point - 0.001 M NaCl, 0.001 M glucose, 0.001 M $MgCl_2$. [1]

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