RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2017-20]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2019

Mid-Semester Examination, March 2019

Date : 26/03/2019 **CHEMISTRY (General)**

Time : 1 pm – 2 pm Paper : IV Full Marks : 25

Answer <u>any five</u> questions : [5×5]

1. Draw the phase diagram (in T-P space) for (i) water and for (ii) CO_2. In the diagram mention which phase is stable in which region; show the melting, boiling and the sublimation lines; also point out the triple point and the critical point. [1+4]

2. a) Show graphically how the boiling point of solvent in a solution varies with the molality of solute in (i) an ideal and (ii) a real solution.

   b) Apply phase rule to calculate the degrees of freedom of a sugar solution at the boiling point. [3+2]

3. a) State the 2nd law of thermodynamics in terms of entropy. Also show that entropy change of an isolated system is always zero.

   b) Calculate the entropy of vaporisation accompanying the vaporisation of 1 mol of benzene (B.P. = 80°C), if the latent heat of vaporisation is 407.6 J/g. [M of benzene is 78] [3+2]

4. a) Starting from $TdS > \partial q$, show that for an irreversible process, (dG) under constant T and P is less than zero.

   b) 1 mol of an ideal gas at 300K and P is compressed to a final pressure 10P under reversible isothermal conditions. Calculate change of entropy for the gaseous system. [3+2]

5. a) Give the electronic configuration and stable oxidation state of Cu, Ag and Au. [2]

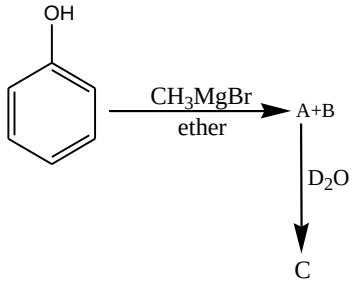
   What is fulminating gold? [1]

   $CuSO_4$ and $CdSO_4$ gives different product when treated separately with KCN. [2]

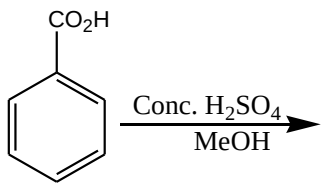
6. a) Describe hydrolysis of ester by AAC2 mechanism. [2]

   b) Give an example of each for preparation of Ketone and Carboxylic acid using Grignard reagents. [3]

7. a) Predict the structure of the molecules A, B and C. [3]



   b) Predict the product for the reaction and explain with mechanism. [2]



8. Write short notes on [2.5×2]

   i) Mutarotation

   ii) Killiani-Fischer synthesis.

9. a) Predict the structure of the product for the following reactions [2×2]

(i) D- glucose + Ph—N(Me)—NH_2 (exess) $\longrightarrow$

(ii) D- glucose $\xrightarrow{\text{dil } HNO_3}$

b) Draw the structure of D-fructose (open chain) in Fischer projection. [1]

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