RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2019

SECOND YEAR (BATCH 2017-20)

Date : 21/05/2019 **CHEMISTRY (Honours)**

Time : 11.00 am – 1.00 pm Paper : IV [Gr-B] Full Marks : 35

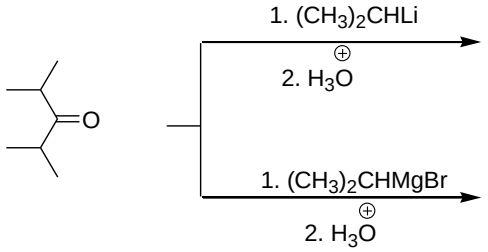
[Use one Answer Book for Unit I and another Answer Book for Unit II, III & IV]

(Attempt one question from each Unit)

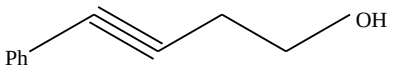
Unit I

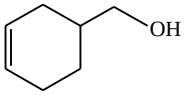
[10 marks]

1. a) Predict the product of the following reaction with plausible mechanism. [3]

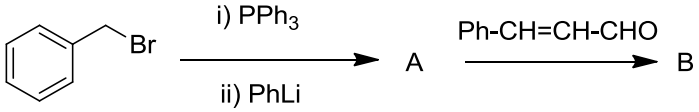


b) Give retrosynthetic analysis and an efficient synthesis of the following molecules from RASM. [2×2]

(i) 

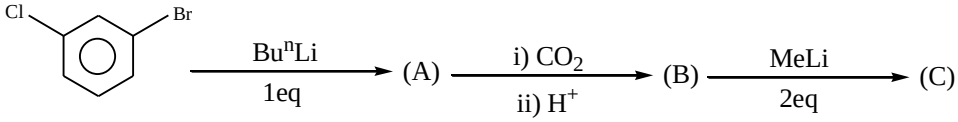
; (ii) 

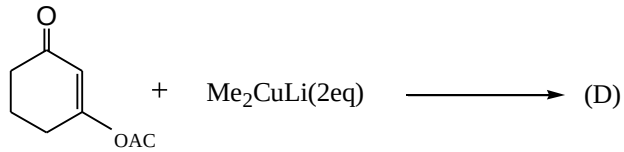
c) Identify the product A and B of the following reactions with plausible mechanism. [2]



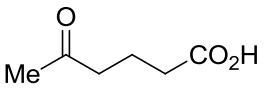
d) Why magnesium cannot replace zinc in Reformatsky reaction? [1]

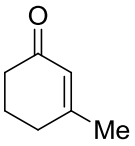
2. a) Predict the product (A) to (D) in the following reaction sequence. [4]

(i) 

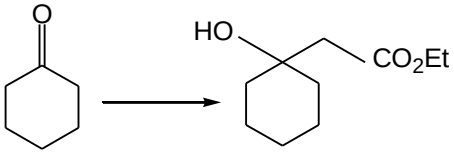
(ii) 

b) Give retrosynthetic analysis and an efficient synthesis of the following compounds. [2×2]

i) 

ii) 

c) Carry out the following conversion. Give mechanism. [2]

(i) 

UNIT-II **[9 marks]**

3. a) "Trisilylamine and trimethylamine are structurally different and behave differently in reaction with hydrochloric acid" — explain with reason. [3]

   b) Identify compound A,B, and C

   i) $B_3N_3H_3Cl_3 + 3HCl \rightarrow A$ [1]

   ii) $B_2H_6 + 2NH_3 \rightarrow B + C$ [1+1]

   c) What are condensed phosphates? Mention three different units of condensed phosphates. [3]

4. a) PCl_5 is well known but PH_5 cannot be isolated — explain with reason. [2]

   b) Indium can show oxidation states of I and III but never II, yet a chloride with the empirical formula $InCl_2$ exists. How can you explain this? Also comment on the magnetic properties of the compound. [3]

   c) Aryl compounds of As is generally more stable than their alkyl compounds. Explain. [2]

   d) Write an equation for the reaction of B_2H_6 with propene in ether solvent and another equation with NH_4Cl in THF. [2]

UNIT-III **[8 marks]**

5. a) SF_4 reacts with BF_3 to form $[SF_3][BF_4]$. Use VSEPR theory to predict the shapes of the cation and anion. [2]

   b) Predict the shapes of SiH_3^- [2]

   c) Discuss the structure of thiosulphate ion. [2]

   d) Discuss the impact of chlorofluro carbons on the ozone layer of stratosphere. [2]

6. a) Explain why CH_4 burns in air whereas CF_4 does not. [2]

   b) Which hydrogen bond would be stronger : $S-H\cdots O$ or $O-H\cdots S$? [2]

   c) Sulphuric acid and telluric acid are differently formulated. why? [2]

   d) Predict the geometrical structures of : SF_6, $TeCl_4$, $SOCl_2$, SO_2Cl_2 [2]

UNIT-IV **[8 marks]**

7. a) What are the equivalent weights of potassium biiodate as i) an oxidant ii) an acid. (M.W. of potassium biiodate = 390) [2]

   b) A solution of XeF_6 in HF conducts electricity. Why? [2]

   c) Thermal decomposition of $Bu_4N[ClHI]$ yeilds Bu_4NI and HCl. Comment. [2]

   d) Describe a suitable synthesis of XeO_3. [2]

8. a) Give a short account on i) polyhalides and ii) interhalogens. [2+2]

   b) What happens when xenon is allowed to react with red vapours of platinum(VI) fluoride? Write the compositor of the product. [2]

   c) Why water has the higher boiling point than HF(*l*) through the hydrogen bounding trends is reversed in them. [2]

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