RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, AUGUST 2021

FIRST YEAR (BATCH 2020-23)

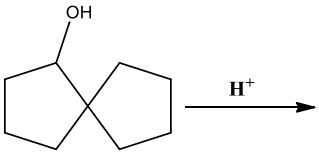
Date : 10/08/2021 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11.00 am – 1.00 pm **Paper : III [CC 3]** Full Marks : 50

Unit – I

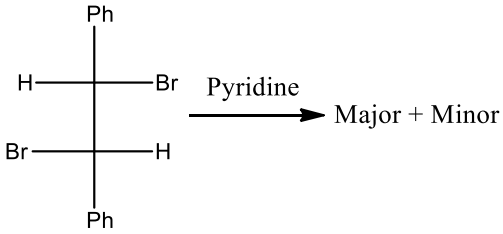
Answer **any five** questions from Question Nos 1 to 8 : [5×5]

1. a) β-Chlorodiethyl sulphide $EtSCH_2CH_2Cl$ undergoes hydrolysis very much faster than β-chlorodiethyl ether $EtOCH_2CH_2Cl$. Explain.
   b) Explain the product with Mechanism

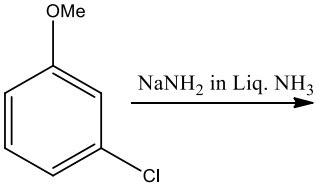


[3+2]

2. a) Identify Major and Minor product with proper mechanism



   b) Explain the products



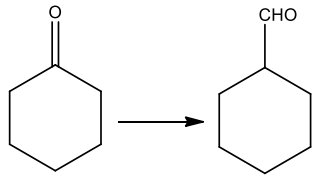
[3+2]

3. a) Complete the reaction with mechanism, indicating the product, stereochemistry in each case when cis and trans 2-butene are separately treated with alkaline $KMnO_4$.
   b) Write the ozonolysis product of benzene. [4+1]

4. a) Why gem-diol are not stable? Give two example of stable gem-diol.
   b) Reaction of $Cl_2C=CHCl$ with NaOD in D_2O affords $ClC=CCl$. What happen when reaction is stopped before completion of reaction? Suggest a mechanism of the reaction with this observation. [2+3]

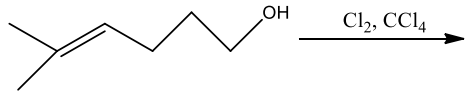
5. a) The reaction rate of CH_3I with N_3^- at 0oC is increased 10^4 fold on change of solvent from methanol to DMF. Explain.

b) Write down the steps for following conversion:

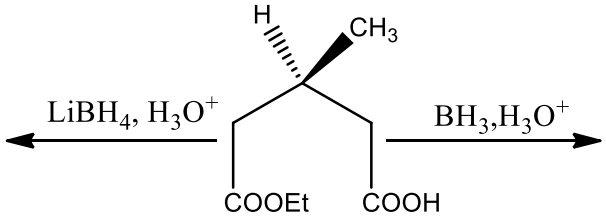


[3+2]

6. a) Predict the product with mechanism:

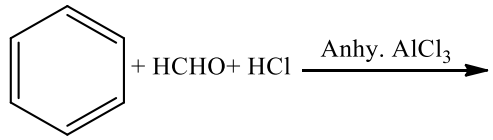


b) Predict the products:



[3+2]

7. a) Predict the product with plausible mechanism:



b) For the following reaction predict the product formed along with the stereochemistry of the product.

(R)-PhCH(OH)CH_3 $\xrightarrow{SOCl_2}$

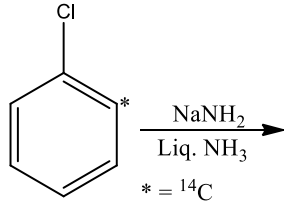
[2+3]

8. a) Predict the regioselectivity of the reaction of HBr with

(i) F_3C-CH=CH_2

(ii) $H_3COCH=CH_2$

b) Identify the products and explain their formation



[2+3]

Unit – II

Answer **any five** questions from Question Nos 9 to 16 : [5×5]

9. a) Write & explain the correct acidity order of H_3PO_2, H_3PO_3 and H_3PO_4.

b) Which is a stronger base and why? Explain.

I) NH_3 & PH_3 II) NH_3 & NF_3 [2+(1.5 + 1.5)]

10. a) PhCOOH is weak acid in water but strong acid in liquid NH_3 - justify.

b) The pOH of a solution is 9.60. Calculate the hydrogen ion concentration in this solution. [3+2]

11. a) State the characteristic features of 'Hard Acids' and 'Hard Bases' with suitable examples.

b) Arrange and explain according to Lewis acid character: BF_3, BCl_3, BBr_3 and BI_3. [2+3]

12. a) Balance the reaction using ion-electron method.

$Mn^{2+} + BiO_3^- + H_2O \longrightarrow MnO_4^- + Bi^{3+} + H^+$

b) Define standard electrode potential and formal potential of a redox couple. [3+2]

13. Calculate oxidation state and coordination number of Fe in $[Fe(CN)_6]^{4-}$ and $[Fe(C_2O_4)_3]^{3-}$.
Define primary valency and secondary valency. [3+2]

14. Define EAN and calculate EAN for following complexes :

$[Cr(NH_3)_6]^{3+}$, $[Cr(CO)_6]$, $[Mn(CN)_6]^{4-}$, $[Fe(H_2O)_6]^{2+}$. [1+4]

15. Define masking and demasking agents in complexometric titration with example. What is chelate effect and how chelates are useful? Explain with proper example. [2+3]

16. a) Name of the following coordination compounds.

$Na_3[Co(NO_2)_6]$, $K_4[Ni(CN)_4]$, $K_3[Fe(CN)_6]$

b) Write down the formula of hexamminecobalt(III) Chloride and tetracarbonyl nickel(0). [3+2]

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