[This question paper contains 6 printed pages.]

Sr. No. of Question Paper : 732 **G** **Your Roll No.....**

Unique Paper Code : 217303

Name of the Paper : CHHT-306 : Organic Chemistry – II

Name of the Course : **B.Sc. (H) Chemistry**

Semester : III

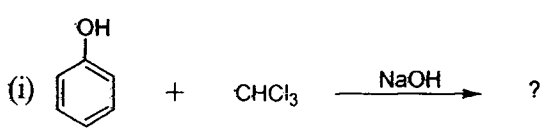
Duration : 3 Hours Maximum Marks : 75

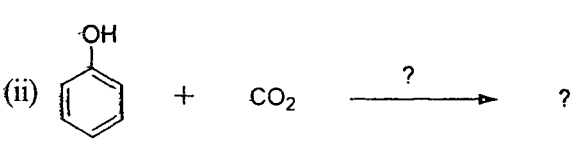
Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **six** questions.
3. **All** questions carry equal marks.

1. (a) Compound (A) C_8H_8O on treatment with $NH_2OH.HCl$ gives (B) and (C). B and C rearrange to give D and E respectively on treatment with acid. B, C, D and E are all isomers of molecular formula C_8H_9NO. Identify A to E. Write the complete reaction sequence mentioning important name reaction involved. (8)

(b) Complete and name the following reactions :

(i) 

(ii) 

(4.5)

P.T.O.

2. (a) Carry out the following conversions using necessary reagents.

(i) Isopropyl alcohol to tert-butyl alcohol

(ii) Acetic acid to 2-butanol

(iii) Propionic acid to lactic acid (1,1.5,1)

(b) Name a test to distinguish between the following pairs of compounds with relevant reactions.

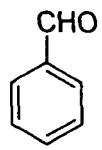
(i) Methanol and ethanol

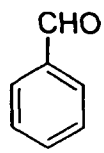
(ii) Isobutanol, 2-butanol and tert-butanol

(iii) Benzaldehyde and cyclohexanone (1.5×3)

(c) Complete the following reactions and mention the name of the reaction.

(i) $CH_3CH_2CHO \xrightarrow{\text{dil. NaOH}}$

(ii)  + $CH_3COONa \xrightarrow{(CH_3CO)_2O}$

(iii)  + $CH_2(COOC_2H_5)_2 \xrightarrow[\text{ii) } H^+, \text{ heat}]{\text{i) piperidine}}$ (1.5×3)

3. (a) Explain the following :

(i) Ketones cannot be prepared from RCOCl and Grignard reagent (RMgX) although they can be prepared from RCOCl and R_2Cd.

(ii) S_N2 reactions of alkyl halides proceed with complete stereochemical inversion. Explain with mechanism.

(iii) Aldehydes and ketones undergo nucleophilic addition reactions whereas acid derivatives undergo nucleophilic substitution reaction. (3×3)

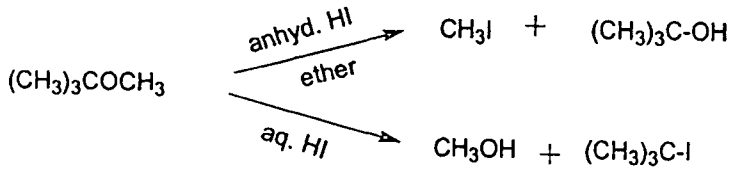
(b) Outline the mechanism for acid catalysed additions to ethylene oxide and give the products on addition of

(i) H_2O

(ii) CH_3NH_2 (3.5)

4. (a) The rate of addition of HCN to ketones to form a cyanohydrin is increased by adding a trace of NaCN. Expalin. (2.5)

(b) Account for the following observations :



(3)

(c) When a 1° alkyl halide reacts with KNO_2 and $AgNO_2$ different products are formed, respectively. Explain. (2)

(d) Write the products and give their mechanisms when benzaldehyde is treated with

(i) aqueous alcoholic KCN

(ii) hydroxylamine hydrochloride (2.5×2)

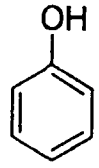
5. (a) Arrange the following compounds in decreasing order of reactivity towards nucleophilic substitution reactions and explain the order.

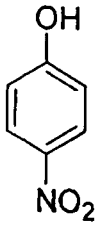
(i) $C_6H_5CH_2Cl$

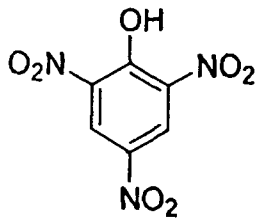
(ii) C_6H_5Cl

(iii) CH_3CH_2Cl (3.5)

(b) Arrange the following in order of their decreasing acidity. Explain the order.

(i) 

(ii) 

(iii) 

(3)

(c) Both 2,2-dimethyl-1-propanol and 3-methyl-2-butanol give the same product on treatment with HCl. Comment and give the product with mechanism. (3)

(d) What is the effect of heat on α-, β- and γ- hydroxy acids ? Give the relevant reactions. (3)

6. (a) Synthesise the following using diethyl malonate :

(i) Cinnamic acid

(ii) Glycine

(iii) Ethylmethyl ketone

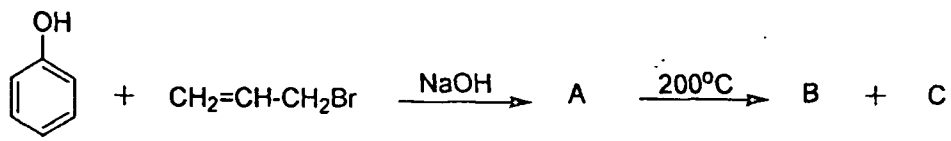
(iv) Barbituric acid (2×4)

(b) Give the major products and the type of mechanism involved in the following reactions :

(i) $(CH_3)_3C\text{-}Br + CH_3OH \longrightarrow$

(ii) $CH_3\text{-}\underset{\underset{Br}{|}}{CH}\text{-}CH_3 + \overset{\ominus}{O}H \xrightarrow{H_2O}$ (3)

(c) What are A, B and C in the following reaction :



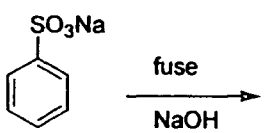
(1.5)

7. (a) Give the relative reactivity order of derivatives of carboxylic acids towards hydrolysis and explain the order. (4)

(b) Maleic acid is a stronger acid than fumaric acid. Explain. (2)

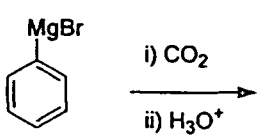
(c) How is tartaric acid synthesised from ethylene ? (2.5)

(d) Complete the following reactions :

(i) 

(ii) $RSH \xrightarrow{HNO_3}$

(iii) $\underset{\underset{CH_2OH}{|}}{CH_2OH} \xrightarrow{HIO_4}$

(iv) 

(4)

8. Write short notes on any **three** of the following with emphasis on (i) reaction involved (ii) mechanism with explanation

   (a) Claisen Condensation

   (b) Cannizarro reaction

   (c) Wittig reaction

   (d) Benzyne mechanism (4,4,4,4.5)