

2023

CHEMISTRY

Paper : CHMHC3066

( Organic Chemistry—II )

Full Marks : 60

Pass Marks : 24

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Choose the correct answer from the following (any five) : 1×5=5

(a) In the hydrolysis of haloalkane, on changing the solvent from polar hydroxylic to polar non-hydroxylic, the mechanistic pathway of the reaction will change from

- (i)  $S_N1$  to  $S_N2$
- (ii)  $S_N2$  to  $S_N1$
- (iii)  $S_N1$  to  $S_N^i$
- (iv)  $S_N2$  to  $S_N^i$

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(b) The benzyne intermediate can be trapped by

- (i) cooling
- (ii) aldol condensation
- (iii) Diels-Alder reaction
- (iv) Cannizzaro reaction

(c) Vapours of 1°, 2° and 3° alcohols on passing over Cu at 300 °C, the products obtained respectively are

- (i) alkene, ketone and aldehyde
- (ii) aldehyde, ketone and alkene
- (iii) ketone, aldehyde and alkene
- (iv) aldehyde, alkene and ketone

(d) Carboxylic acid on reduction forms

- (i) only aldehyde
- (ii) only alcohol
- (iii) both aldehyde and alcohol
- (iv) ketone

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(e) Acyl azides on pyrolysis, decomposition takes place to form isocyanate. The reaction is known as

- (i) Curtius rearrangement
- (ii) Reformatsky reaction
- (iii) Claisen condensation
- (iv) aldol condensation

(f) Ethyl magnesium bromide on treatment with CO<sub>2</sub> followed by hydrolysis results

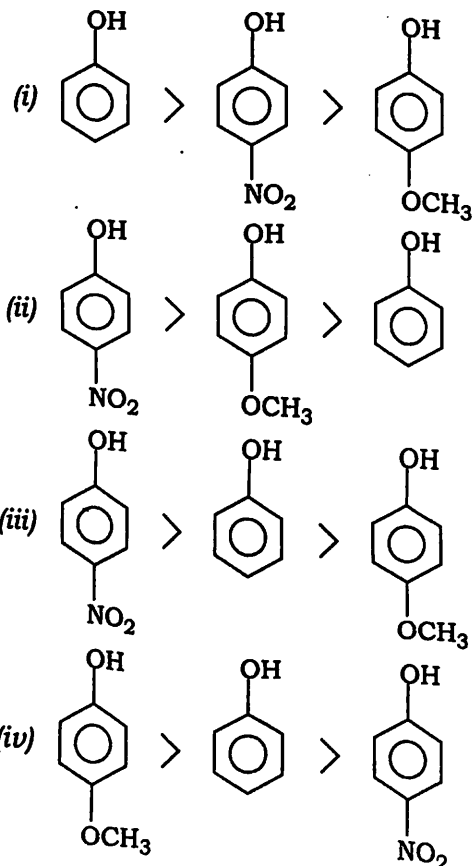
- (i) ethanoic acid
- (ii) ethanal
- (iii) propanoic acid
- (iv) propanal

(g) Phenol on treatment with NaOH and CO<sub>2</sub> followed by HCl, the product obtained is

- (i) benzoic acid
- (ii) succinic acid
- (iii) salicylic acid
- (iv) benzaldehyde

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(h) Identify the correct order in terms of acidity.



(i) Ethanol is an isomer of

- (i) diethyl ether
- (ii) propanone
- (iii) acetaldehyde
- (iv) dimethyl ether

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(j) The reaction of a sodium alkoxide with an alkyl halide is known as

- (i) Perkin reaction
- (ii) aldol condensation
- (iii) Williamson's synthesis
- (iv) Wurtz-Fittig reaction

2. Answer the following questions (any five) :  
2×5=10

- (a) What is anti-Markovnikov rule? Give example. 1+1=2
- (b) Explain Fries rearrangement with example.
- (c) Phenol on treatment with chloroform and sodium hydroxide salicylaldehyde is obtained as major product. Write the mechanism of the reaction.
- (d) What is Knoevenagel reaction?
- (e) What are active methylene compounds? Write one method of preparation of diethylmalonate. 1+1=2
- (f) Write any one method of preparation of  $\alpha$ -hydroxy carboxylic acid. Give reaction.
- (g) How can acid chlorides be reduced to alcohols? Give reaction.

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3. Answer any *five* of the following questions :

5×5=25

- (a) What is nucleophilic substitution reaction? Explain  $S_Ni$  mechanism of nucleophilic substitution with suitable example. 1+4=5
- (b) State Claisen rearrangement with example. What is pinacol-pinacolone rearrangement? 3+2=5
- (c) Define Baeyer-Villiger oxidation. Explain its mechanism with example. 1+4=5
- (d) State and explain Hofmann bromamide degradation.
- (e) What is Cannizzaro's reaction? Explain with example. 1+4=5
- (f) Explain the factors affecting the acidity of substituted phenol. 5
- (g) Write the mechanism of Mannich reaction with carbonyl compound as an example. 5
- (h) What is Grignard reagent? How is it prepared? Write the preparation of 1°, 2° and 3° alcohols by using Grignard reagent. 1+1+3=5
- (i) What is Lucas reagent? How will you distinguish 1°, 2° and 3° alcohols by Lucas reagent? 1+4=5

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( Continued )

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4. Answer any *two* of the following questions :

10×2=20

- (a) What is  $S_NAr$  mechanism? Explain with example. Write any two evidences of  $S_NAr$  mechanism in aromatic nucleophilic substitution reaction. 1+4+5=10
- (b) Write notes on any *four* of the following :  $1\frac{1}{2} \times 4 = 10$
- (i) Kolbe-Schmitt reaction
- (ii) Wittig reaction
- (iii) Wolff-Kishner reduction
- (iv) Benzoin condensation
- (v) Beckmann rearrangement
- (vi) Dieckmann reaction
- (c) (i) What are thiols? Write one method of preparation of thiols. 1+1=2
- (ii) How would you prepare propanoic acid from ethanoic acid? Give reactions. 3
- (iii) Write one method of preparation of each of acid chlorides, acid amides and anhydrides. Give reactions only. 3
- (iv) Give one example of reduction reaction using  $LiAlH_4$ . 2

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( Turn Over )

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(d) (i) Define  $S_N2$  reaction. Write the mechanism of  $S_N2$  reaction. What is the stereochemical aspect of this reaction?  
1+3+1=5

(ii) Write one preparation of acetoacetic ester. Write the syntheses of—

(1) glutaric acid;

(2) crotonic acid;

with the help of acetoacetic ester.  
1+2+2=5

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