Total No. of Printed Pages—11

3 SEM TDC CHMH (CBCS) C 6

2022

(Nov/Dec)

CHEMISTRY

(Core)

Paper : C–6

(Organic Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following : 1×5=5

(a) Addition of HBr to 2-methylpropene in the presence of benzoyl peroxide mainly forms

(i) 1-bromobutane

(ii) 2-bromopropane

(iii) 2-bromo-2-methylpropane

(iv) 1-bromo-2-methylpropane

(b) The intermediate in the acid-catalyzed dehydration of alcohol is

(i) carbene

(ii) carbanion

(iii) carbocation

(iv) free radical

(c) The electrophile involved in the Reimer-Tiemann reaction is

(i) $:CCl_2$

(ii) $\overset{\oplus}{C}HCl_2$

(iii) $\overset{\oplus}{C}HO$

(iv) $\overset{\ominus}{C}Cl_3$

(d) Malaprade reagent used to detect vicinal diol is

(i) OsO_4

(ii) H_5IO_6

(iii) $Pb(OAc)_4$

(iv) peracetic acid

(e) Which of the following compounds has the highest acid strength?

(i) C_6H_5OH

(ii) HCOOH

(iii) CH_3COOH

(iv) $ClCH_2COOH$

UNIT—I

2. Answer any *five* of the following questions : 2×5=10

(a) What is S_Ni mechanism? Explain with the help of an example.

(b) Discuss the benzyne mechanism for nucleophilic aromatic substitution reaction. Give evidences in support of the proposed mechanism.

(c) Synthesize the following : 1×2=2

(i) Ethyl bromide by Hunsdiecker reaction

(ii) Fluorobenzene through diazonium salt

(d) Using organometallic compound, how would you prepare a 3°-alcohol from an ethyl ester?

(e) Why are the aryl halides less reactive towards nucleophilic substitution reactions than alkyl halides?

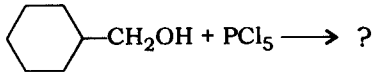
(f) Discuss the relative reactivity of alkyl, allyl and aryl halides towards nucleophilic substitution reactions.

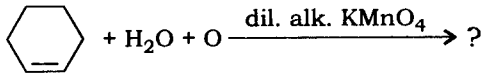
UNIT—II

3. Answer any *three* of the following questions : 2×3=6

(a) How will you distinguish between 1°-, 2°- and 3°-alcohols by Victor-Meyer method?

(b) Complete the following reactions :

(i) 

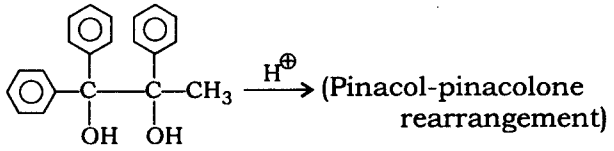
(ii) 

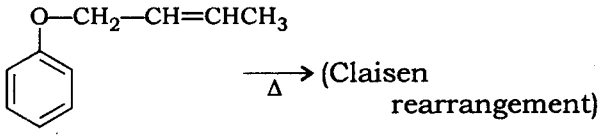
(c) How would you synthesize α,β-unsaturated alcohol and aldehyde from glycerol?

(d) Prepare acrolein from glycerol.

4. Answer any *two* of the following questions : 3×2=6

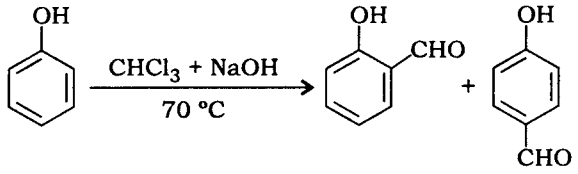
(a) Complete the following reactions with mechanisms :

(i)  (Pinacol-pinacolone rearrangement)

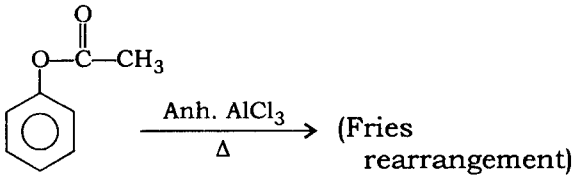
(ii)  (Claisen rearrangement)

(b) *(i)* How can you prepare phenol from cumene? Give mechanism.

(ii) Give the mechanism of the following reaction :

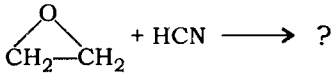


(c) (i) Complete the following rearrangement and suggest the mechanism :

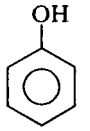


(Fries rearrangement)

(ii) Complete the following reactions :

(1)  + HCN ⟶ ?

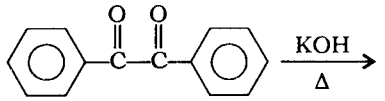
(2) $\begin{matrix} CH_2—OH \\ | \\ CH_2—OH \end{matrix}$ $\xrightarrow[AcOH]{Pb(OAc)_4}$?

(3)  + HCN + HCl $\xrightarrow[2)\ H_2O]{1)\ ZnCl_2}$?

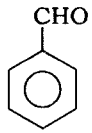
UNIT—III

Answer *either* Q. No. **5** *or* Q. No. **6**

5. (a) Complete the following reactions and write down the mechanisms : 3×2=6

(i) 

(Benzil-benzilic acid rearrangement)

(ii)  + Ac_2O $\xrightarrow{AcONa}$ (Perkin reaction)

(b) Trichloroacetaldehyde is more reactive towards the nucleophilic addition reaction than acetaldehyde. Explain. 2

6. (a) Explain with example the mechanism involved in Wittig reaction. 3

(b) Write one synthetic application of each of the following reagents (any *three*) : 1×3=3

(i) $LiAlH_4$

(ii) $Pb(OAc)_4$

(iii) $NaBH_4$

(iv) PCC

(c) Write the Rosenmund's reaction for synthesis of acid chlorides. 2

7. Answer any *two* of the following questions : 2×2=4

(a) Synthesize the following (any *one*) : 2

(i) Methylvinyl ketone from acetone

(ii) Crotonaldehyde from acetaldehyde

(b) Write a short note on keto-enol tautomerism. 2

(c) What is Michael reaction? Explain with a suitable reaction. 2

8. How is barbituric acid prepared using malonic ester? 1

Or

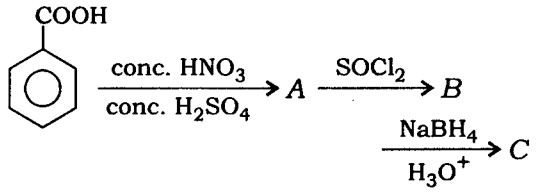
Write any one preparation method of acetoacetic ester.

UNIT—IV

Answer *either* Q. No. **9** *or* Q. No. **10**

9. *(a)* "Acetic acid is much weaker acid than formic acid." Explain. 2

(b) Identify *A*, *B* and *C* in the following reaction : 3



(c) Synthesize the following : 2×2=4

(i) Propanoic acid to ethanoic acid by Hoffmann degradation

(ii) Butanoyl chloride to propanoic acid by Curtius rearrangement

10. *(a)* Arrange the following acids in increasing order of their relative acid strength with proper explanation : 2

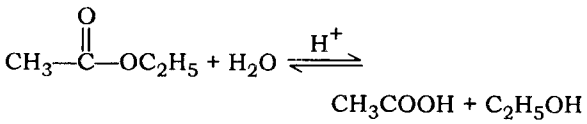
(i) $CH_3—CH_2—CH(Br)COOH$

(ii) $CH_3—CH(Br)—CH_2—COOH$

(iii) $CH_2(Br)—CH_2—CH_2—COOH$

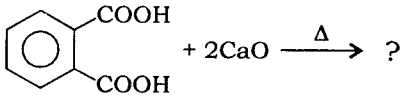
(iv) $CH_3—CH_2—CH_2—COOH$

(b) Show the mechanistic steps of the following reaction : 3

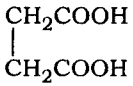


$$CH_3-\overset{\overset{O}{\|}}{C}-OC_2H_5 + H_2O \overset{H^+}{\rightleftharpoons} CH_3COOH + C_2H_5OH$$

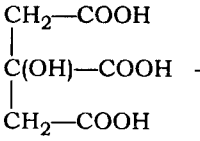
(c) Complete the following reactions (any *two*) : 1×2=2

(i) 

$$+ 2CaO \xrightarrow{\Delta} ?$$

(ii) 

$$+ SOCl_2 \longrightarrow ?$$

(iii) 

$$\xrightarrow[\Delta]{H_2SO_4} ?$$

(d) Account for the fact that maleic acid is a stronger acid than fumeric acid but maleate monoanion is a weaker acid than fumarate monoanion. 2

(Continued)

UNIT—V

Answer the following questions : 2×2=4

11. What are mercaptans? How will you prepare ethyl mercaptan from ethyl halide? 1+1=2

12. Give one method of preparation of thio-ether. What happens when a thiol reacts with an aldehyde in the presence of HCl? 1+1=2

★ ★ ★