Total No. of Printed Pages—9

3 SEM TDC CHMH (CBCS) C 6

2021

(Held in January/February, 2022)

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. Select the correct answer : 1×5=5

(a) S_N1 reaction undergoes in

(i) polar aprotic solvent

(ii) polar protic solvent

(iii) non-polar solvent

(iv) None of the above

(b) Aldol condensation between which of the following followed by dehydration gives mesityl oxide?

(i) Two moles of acetaldehyde

(ii) Two moles of acetone

(iii) CH_3CHO and HCHO

(iv) CH_3CHO and CH_3COCH_3

(c) An unknown compound gives a positive haloform test and positive Fehling's test. The compound is

(i) formaldehyde

(ii) acetone

(iii) benzaldehyde

(iv) acetaldehyde

(d) Which of the following phenols is most acidic?

(i) *o*-Nitrophenol

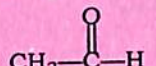
(ii) *p*-Nitrophenol

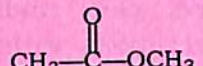
(iii) 2,4-Dinitrophenol

(iv) 2,4,6-Trinitrophenol

(e) Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is

(i) 

(ii) 

(iii) 

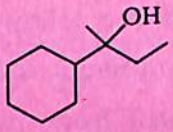
(iv) 

UNIT—I

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

(a) Giving a suitable example, show that in an S_N2 reaction inversion takes place.

(b) How would you synthesize the following alcohol from appropriate alkene?



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

(d) Complete the following organometallic reactions :

(i) $MeMgI + Ethylorthoformate \xrightarrow{H_3O^+} ?$

(ii) $R—CN \xrightarrow[(2)\ H_3O^+]{(1)\ RLi} ?$

(e) Benzyl chloride can undergo both S_N1 and S_N2 reactions with high rate. Explain.

(f) Synthesize the following :

(i) Ethyl bromide by Hunsdiecker reaction

(ii) Fluorobenzene through diazonium salt

UNIT—II

3. Answer any *three* of the following questions : $2\times3=6$

(a) Synthesize the following : $1+1=2$

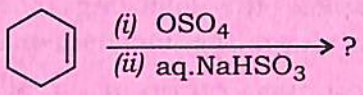
(i) *m*-Nitrophenol from benzene

(ii) *m*-Cresol from *p*-toluidine

(b) Dehydration of alcohols to form alkenes is always carried out with conc. H_2SO_4 and not with conc. HCl or HNO_3. Explain why.

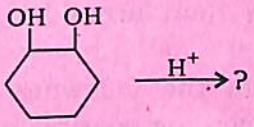
(c) Prepare glycerol from propene.

(d) Complete the following reaction :



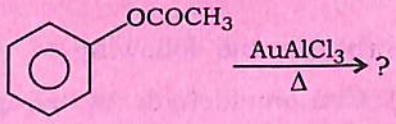
4. Answer any *two* of the following questions : 3×2=6

(a) Complete the following reaction and discuss the mechanism :



(b) Prepare 1°, 2° and 3° alcohols by using Grignard reagent and give the reactions.

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



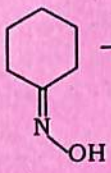
UNIT—III

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

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

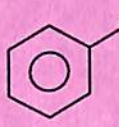
(i) $CH_3CHO + CH_3COCH_3 \xrightarrow[H_2O]{NaOH} ?$

(Aldol condensation)

(ii)  $\xrightarrow{PCl_5} ?$ (Beckmann rearrangement)

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

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

(i)  $+ Ac_2O \xrightarrow{AcONa} ?$

(Perkin reaction)

(ii)  $+$ Diethyl succinate $\longrightarrow ?$

(Stobbe condensation)

(b) Synthesize the following : 1+1=2

(i) Cinnamaldehyde by using Claisen-Schmidt condensation

(ii) Acrolein from glycerol

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

(a) Mention synthetic applications of the following reagents (any *two*) : 1×2=2

(i) PCC (Pyridinium chlorochromate)

(ii) HIO_4 (Periodic acid)

(iii) SeO_2 (Selenium dioxide)

(b) What is Clemmensen reduction? Explain with a suitable reaction. 1+1=2

(c) What is active methylene compound? Show the keto-enol tautomerism in ethylacetoacetate. 1+1=2

8. Mention a synthetic application of diethylmalonate. 1

Or

Synthesize methyl vinyl ketone from acetone.

UNIT—IV

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

9. (a) How will you convert a carboxylic acid into an ester without using an alcohol? 2

(b) Convert acetone to 3-methyl butanoic acid using Reformatsky reaction. 2

(c) Complete the following reaction and suggest the mechanism : 3

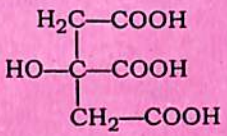
$$CH_3COOC_2H_5 \xrightarrow{C_2H_5ONa} ?$$

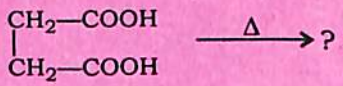
(Claisen ester condensation)

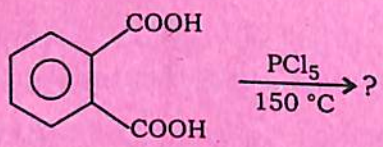
(d) Synthesize lactic acid from propene. 2

10. (a) The C—O bond length in RCOOH is shorter than in R—OH. Explain. 2

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

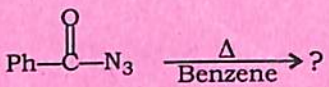
(i) 

(ii) 

(iii) 

(c) Convert butanoic acid to propanoic acid using Curtius rearrangement. 3

(d) Complete the following reaction and write down the mechanism : 2



UNIT—V

Answer *any* **two** questions

11. Give one method of preparation of thioether. What happens when a thiol reacts with an aldehyde in the presence of hydrochloric acid? 2

12. What are mercaptans? How will you prepare ethyl mercaptan from ethyl halide? 2

13. What are thioethers? How do you obtain diethyl thioether from ethyl marcaptan? What happens when a thioether is oxidized with H_2O_2? ½+½+1=2

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