Total No. of Printed Pages—19

3 SEM TDC CHM M 3 (N/O)

2018

(November)

CHEMISTRY

(Major)

Course : 303

(Organic Chemistry—I)

The figures in the margin indicate full marks for the questions

(New Course)

Full Marks : 48

Pass Marks : 14

Time : 2 hours

1. Select the correct answers from the following : $1 \times 5 = 5$

(a) The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is

(i) benzyl alcohol

(ii) benzophenone

(iii) acetophenone

(iv) benzoic acid

(b) The intermediate involved in the Reimer-Tiemann reaction is

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

(ii) $:CCl_2$

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

(iv) $\overset{+}{C}HO$

(c) Which of the following is a Michael acceptor?

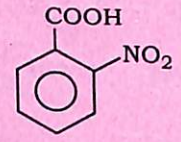
(i) Acrolein

(ii) Acetone

(iii) Cyclohexene

(iv) Formaldehyde

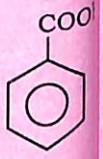
(d) The correct order of acid strength of the following acids



(A)

(B)

(C)



(D)

is

(i) A < B < C < D

(ii) B < C < A < D

(iii) C < B < D < A

(iv) C < D < B < A

(Continued

(e) An organic compound with MF C_8H_8O forms 2,4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzene dicarboxylic acid. The compound is

(i) 2-ethyl benzaldehyde

(ii) 2-methyl benzaldehyde

(iii) 3-methyl benzaldehyde

(iv) acetophenone

2. Answer any *four* of the following questions : $1\frac{1}{2}\times4=6$

(a) A haloalkane reacts with KCN to form alkyl nitrile while with AgCN forms alkyl isonitrile as major product. Explain.

(b) How will you prepare MVK from vinyl acetylene?

(c) Define S_N1 reaction. Explain with the help of an example.

(d) How does Lucas reagent help in the distinction of primary, secondary and tertiary alcohols? Discuss the reactions involved.

(Turn Over)

(e) Arrange the following acids in increasing order of their acid strengths with appropriate reasoning :

CH_3COOH, CH_3CH_2COOH,

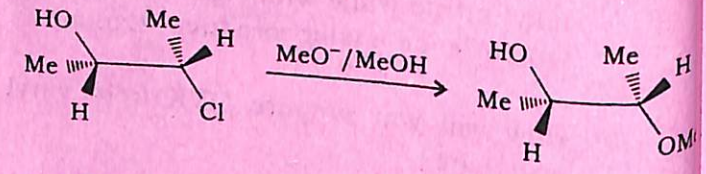
$ClCH_2COOH$, $BrCH_2COOH$

UNIT—I

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

3. (a) Discuss how the nature of the solvent influences the relative reactivity in nucleophilic substitution reactions.

(b) Write the mechanism of the following reaction showing the participation of a neighbouring group :



4. (a) The rate of S_N1 reactions increases with increasing polarity of the solvents. Explain.

(b) Using organometallic compound, how would you prepare 3° alcohol from ethyl acetate?

(Continued)

5. (a) Synthesize the following : 1+1=2

(i) Ethyl bromide by Hundsiecker reaction

(ii) Fluorobenzene through diazonium salt

(b) Complete the following reaction and predict the mechanism : ½+1½=2

$$RCOCH_3 + X_2 \xrightarrow{OH^-} ?$$

(X = halogen)

UNIT—II

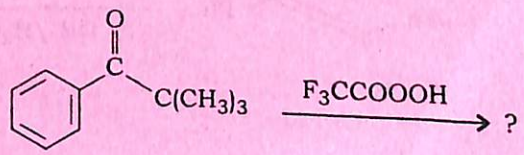
Answer any *two* of the following questions : 5×2=10

6. (a) Synthesize the following : 1+1=2

(i) Picric acid from phenol

(ii) *m*-nitrophenol from *m*-dinitrobenzene

(b) Complete the following reaction and write the mechanism : 3

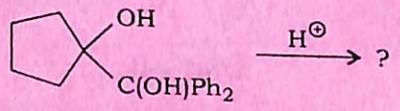


(Turn Over)

7. *(a)* Discuss the solubility in water and b.pt. of 1°, 2° and 3° alcohols. 3

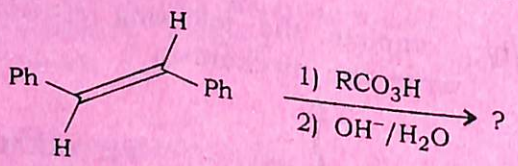
(b) Hydroxylation by OSO_4 of an alkene gives a *cis*-diol whereas hydroxylation via epoxidation of the same alkene gives a *trans*-diol. Explain. 2

8. *(a)* Complete the following reactions : 1+1=2

(i) 

(ii) $HOCH_2CH(OH)CH_2OH \xrightarrow{HI\ (excess)} ?$

(b) Predict the product and write the mechanism of the following reaction : 3



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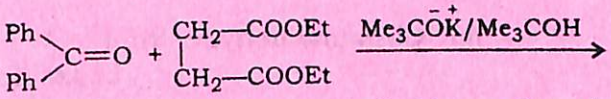
UNIT—III

Answer any *one* of the following questions : 8

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

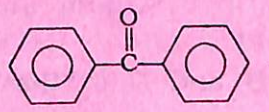
(i) $CH_3CHO \xrightarrow[H_2O]{NaOH}$ (Aldol condensation)

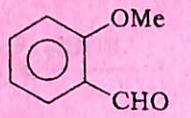
(ii) 

(Stobbe condensation)

(b) How would you distinguish between 2-pentanone and 3-pentanone? 2

10. *(a)* Complete the following reactions and write down the probable mechanisms (any *two*) : 3×2=6

(i) 

(ii) 

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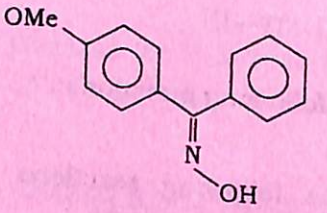
(iii) 

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

(i) MVK from 2-butanone

(ii) Cinnamaldehyde from benzaldehyde

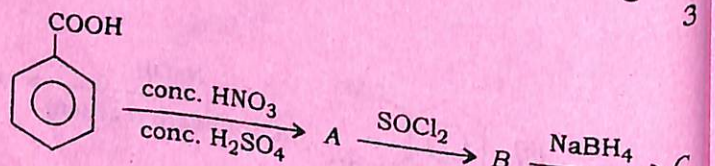
(iii) Acrolein from glycerol

UNIT—IV

Answer any *one* of the following questions : 9

11. (a) Why do carboxylic acids not give the characteristic reactions of carbonyl group? 2

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



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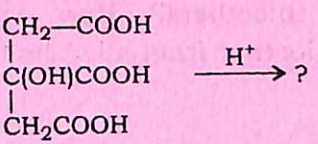
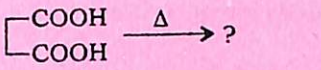
(c) Synthesize the following : 2+2=4

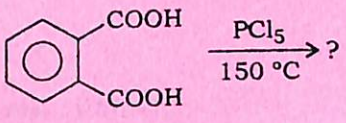
(i) Succinic acid from ethylene bromide

(ii) Propanoic acid to ethanoic acid by Hoffmann degradation

12. (a) Complete the following reactions : 1×3=3

(i) 

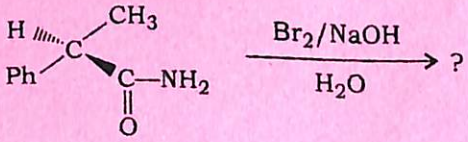
(ii) 

(iii) 

(b) Convert benzoic acid to phenyl acetic acid by using Arndt-Eistert reaction. 2

(c) Prepare propanoic acid from butanoyl chloride by using Curtius rearrangement. 2

(d) Complete the following reaction and discuss the mechanism of the reaction : 2



(Turn Over)

UNIT—V

Answer any *one* of the following questions :

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

14. What are thioethers? How would you prepare a thioether from alkyl halide by S_N2 reaction? ½+1½=

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