TDC Even Semester Exam., 2019

CHEMISTRY

(Honours)

(2nd Semester)

Course No. : CHMH–202

(Organic Chemistry)

Full Marks : 35

Pass Marks : 12

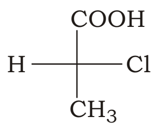
Time : 2 hours

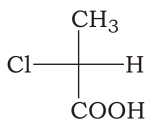
The figures in the margin indicate full marks for the questions

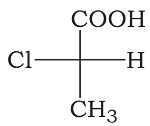
Answer **five** questions, selecting **one** from each Unit

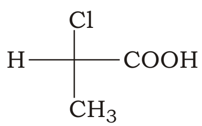
UNIT—I

1. *(a)* Which of the Fischer projections of 2-chloropropanoic acid represent the same enantiomer? 1½×2=3

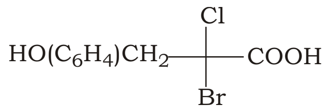
(i) 

(ii) 

(iii) 

(iv) 

(b) Applying the sequence rules, find priority orders in determining *R*-, *S*-configurations of the following : 1×2=2



(c) Distinguish between absolute configuration and relative configuration. 2

2. *(a)* Write the configurations of the following (in Fischer projection) : 1½×2=3

(i) (*S*)-Lactic acid

(ii) (*R*)-Glyceraldehyde

(b) Explain the following terms with suitable examples : 1+1=2

(i) Enantiomers

(ii) Diastereomers

(c) With 1,2-dichlorocyclohexane, write the possible conformers of *cis*- and *trans*-forms. Which one is energetically more stable? 2

UNIT—II

3. *(a)* Complete the following reaction with mechanism : 3

$$CH_3CH{=}CHCOOC_2H_5 + CH_3NO_2 \xrightarrow{C_2H_5\overset{\ominus}{O}} ?$$

(b) Why do alkenes not normally undergo nucleophilic addition reactions? When does an alkene undergo nucleophilic addition reaction? Give an example. 3

(c) Why are additions to carbon-carbon double bond mostly electrophilic in nature? 1

4. (a) Write a short note on neighbouring group participation. 2

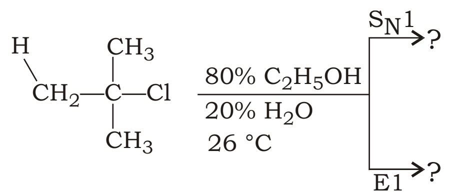
(b) Discuss hydrolysis of allyl halide (3° RX) with S_N1-mechanism. 2

(c) With a suitable example, discuss S_N1-mechanism. 2

(d) How does polarity of solvent affect S_N1? Discuss. 1

UNIT—III

5. (a) *t*-butyl chloride (3° RX) when heated with alcohol (aq.), competition between E1 and S_N1 sets in. Complete the following reactions with mechanism : $1\frac{1}{2}+1\frac{1}{2}=3$



(b) E1cB is a second-order kinetics, show mechanistic pathways of the above reaction [Q. No. **5** (a)]. 2

(c) How do solvent polarity and temperature affect E1 or E2 over S_N reaction? 1+1=2

6. (a) Nucleophilic attack of ethoxy ion to 3° RX gives purely E2 product at higher temperature. Show reaction and write the mechanism. 3

(b) Give the methods of synthesis of DDT and BHC. $1\frac{1}{2}+1\frac{1}{2}=3$

(c) Give the preparations of vinyl chloride and allyl chloride. 1

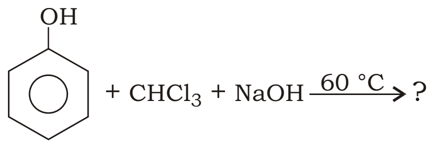
UNIT—IV

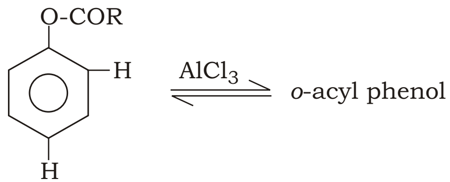
7. (a) Explain the following : $1\frac{1}{2}+1\frac{1}{2}=3$

(i) *o*-nitrophenol is volatile while *p*-nitrophenol has high b.p.

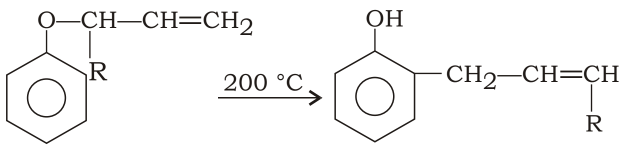
(ii) Acidity of phenol

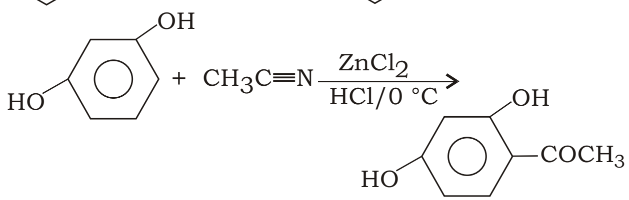
(b) Complete the following with possible mechanisms : 2+2=4

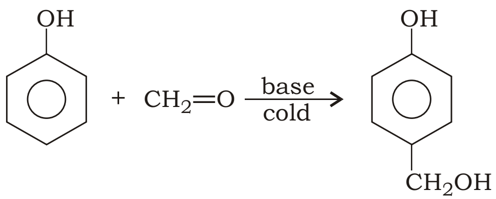
(i) 

(ii) 

8. *(a)* Write the mechanisms of the following : 2+2+2=6

(i) 

(ii) 

(iii) 

(b) Give the preparation of quinol from aniline. 1

UNIT—V

9. *(a)* Why is ethyl acetoacetate called active methylene compound? 1

(b) Synthesize the following from ethyl cyanoacetate : 1½×3=4½

(i) Succinic acid

(ii) Glutaric acid

(iii) -methyl butyric acid

(c) Give examples (with structures) of the following prototropic tautomeric systems : ½×3=1½

(i) Keto-enol tautomerism

(ii) Nitroso-oximino tautomerism

(iii) Nitro-acinitro tautomerism

10. *(a)* Synthesize the following from diethyl malonate : 1½×3=4½

(i) $(CH_2)_4\left\langle\begin{matrix}COOH\\COOH\end{matrix}\right.$

(ii) $H_2N—CH_2—COOH$

(iii) $C_6H_5CH{=}CH—COOH$

(b) Complete the following reaction and write the mechanism : 2½

$$R-\overset{\overset{\Large O}{\|}}{C}-\ddot{N}H_2 + Br_2 + 4NaOH \longrightarrow ?$$

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