

Uva Wellassa University, Sri Lanka
 B.Tech. Degree Programme - 2006/07
 End Semester Examination- Semester 2
 June -2008

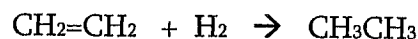
CHE 261-2 Organic Chemistry

Answer four (04) questions only

Time: Two (02) hours

- 1) (i) State whether the entropy changes, ΔS in each of the following conversions is positive, negative or zero

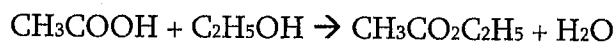
a. Hydrogenation of ethylene to ethane



b. Dehydrogenation of ethylene to acetylene



c. Esterification of acetic acid



(6 marks)

- (ii) Compare $\text{S}_{\text{N}}1$ reactions with $\text{S}_{\text{N}}2$ reactions in terms of their rate expressions, order of the reaction, rate determining step, transition state/ intermediates, entropy, stereochemistry of the product, effect of substrate, leaving group and nucleophilic reagent. (Use diagrams where necessary)

(19 marks)

- 2) (i) Answer questions a-d giving the reason for your answer

a. Which is more basic: CH_3O^- or CH_3CO_2^- ?

b. Which is less solvated/ hydrated in water; I^- or Cl^- ?

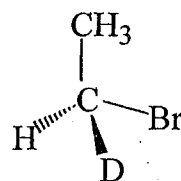
c. Which reacts faster with aqueous alkali towards $\text{S}_{\text{N}}1$ reaction; $\text{CH}_2=\text{CHCl}$ or $\text{CH}_3\text{CH}=\text{CHCH}_2\text{Cl}$?

d. Which shows a fast reaction towards $\text{S}_{\text{N}}2$ alkaline hydrolysis; CH_3Br or CH_3OTs ?

(12 marks)

- (ii) Draw the configuration of the product of $\text{S}_{\text{N}}2$ alkaline hydrolysis of the compound A. Label the configuration of A and the product according to the R/S nomenclature.

Compound A



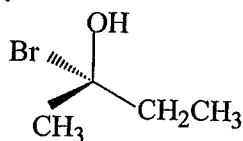
(5 marks)

(iii) Comment on the following statements, whether it is true or false giving explanations.

a. The rate of hydrolysis of $(\text{CH}_3)_3\text{CBr}$ in 5M NaOH is higher than the hydrolysis rate in 1M NaOH.

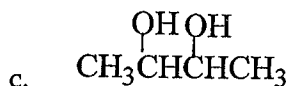
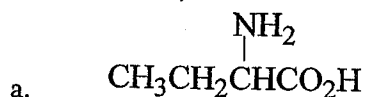
b. $(\text{C}_2\text{H}_5)_3\text{CCl}$ is inert to $\text{S}_\text{N}2$ alkaline (OH^-) hydrolysis. (8 marks)

3) (i) Draw the Fischer projection corresponding to the following molecule. Indicate the stereochemistry of the chiral centre.



(3 marks)

(ii) State whether following compounds are optically active or inactive. Give the reason for your answer in each case.

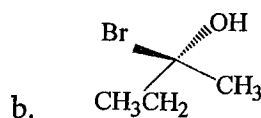
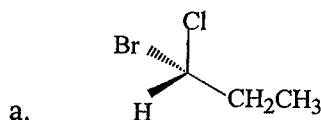


b. 1-Chloro-2-methylcyclohexane

d. 1-Bromo-4-methylcyclohexane

(8 marks)

(iii) Assign R or S configuration to the following molecules and name them according to the IUPAC nomenclature.

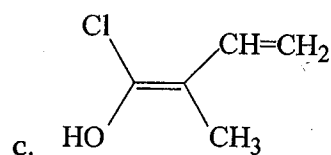
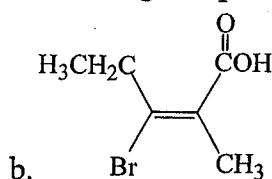
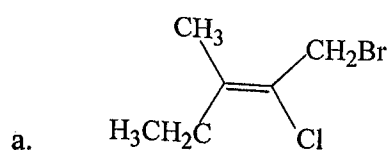


(8 marks)

(iv) Calculate the specific rotation for compound P at 25°C, whose observed rotation was (+) 35.0 for a solution made from 0.200 g dissolved in 2 ml of chloroform. The cell path length is 10 cm. Express your answer in the standard format.

(6 marks)

4) (i) Assign the *E*, *Z* configuration to following compounds



(6 marks)

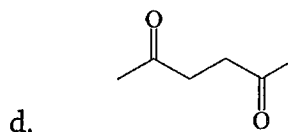
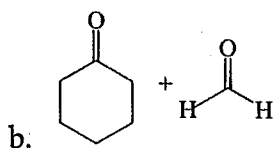
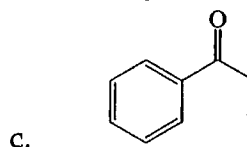
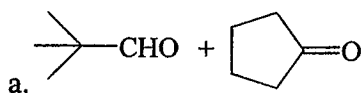
(ii) What are the three physical properties of configurational isomers that can be used to differentiate their *cis* and *trans* isomer.

(6 marks)

(iii) Draw Newman projections for the rotation around C₂-C₃ (from 60°) bond in butane. Construct the potential energy diagram for the above rotation. Indicate the conformation corresponding to the maximum and minimum energy in your potential energy diagram

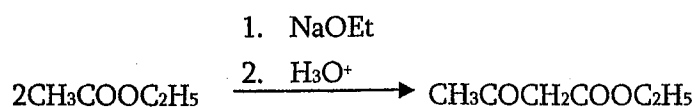
(13 marks)

5) (i) Draw the structural formula for the product of the aldol reaction of each of the following. Out line mechanism for two of the following reactions.



(20 marks)

(ii) Outline a mechanism for the following reaction. Give the structures of the intermediates leading to product.



(5 marks)

