Uva Wellassa University, Sri Lanka
Btech. Science and Technology
End Semester Examination- Semester 1
December –2008

SCT 232-1 Organic Chemistry

Answer four (04) questions only | Time: One (01) hour

1. a. Looking along C_2-C_3 bond of butane draw the Newman projections for the rotations from 60^0 and construct the energy diagram. Indicate the followings in the energy diagram:
   i. Most stable conformation
   ii. Least stable conformation

   (15 marks)

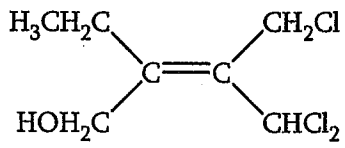
   b. Draw *trans*-1,2-dimethylcyclohexane in its most stable chair conformation.

   (4 marks)

   c. Draw structure corresponding to the following:
   i. 3,5-Dinitrobenzaldehyde
   ii. N-Methylcyclohexylamine

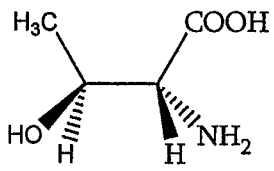
   (6 marks)

2. a. Assign E or Z configuration for the following compound.



   (5 marks)

   b. Draw the Fisher projection corresponding to the following structure and assign R or S configuration for the chiral center(s).



   (10 marks)

   c. A 1.20 g sample of cocaine (an optically active compound) was dissolved in 7.50 mL of chloroform and placed in a sample tube with a path length of 5.00 cm. The observed rotation at the sodium D line at 25 ^{0}C was -1.3^0. Calculate the specific rotation for cocaine and express it in standard notation.

   (10 marks)

3. a. Classify the following reactions as addition, elimination, substitution and rearrangement.

   i. $CH_3Br + KOH \rightarrow CH_3OH + KBr$

   ii. $CH_3CH_2OH \rightarrow CH_2{=}CH_2 + H_2O$

   iii. $CH_2{=}CH_2 + H_2 \rightarrow CH_3CH_3$

(6 marks)

b. Arrange the following in order of decreasing nucleophilicity.

CH_3O^-, H_2O, CH_3OH, HO^-

(4 marks)

c. Give the mechanism for bromination of benzene with $FeBr_3/Br_2$

(9 marks)

d. What are the products expected from the bromination of

   i. $C_6H_5NH_2$

   ii. $C_6H_5NO_2$

(6 marks)

4. a. Describe the effect of the following variables on both S_N2, S_N1 reactions:

   i. Substrate structure

   ii. Leaving group

(10 marks)

b. "Optically active starting materials give racemization of stereochemistry at the reaction centre by S_N1 reactions but S_N2 reactions give inversion of stereochemistry at the reaction centre". Explain. Use illustrations where necessary.

(15 marks)

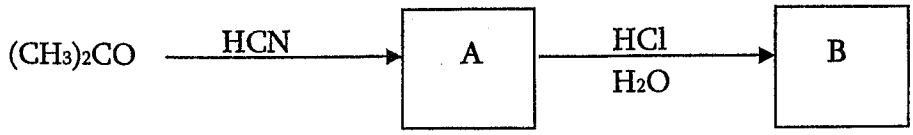
5. a. Draw a fully labeled reaction energy diagram for a two step reaction whose second step is faster than it's first step.

(7 marks)

b. Give the mechanism fo the aldol reaction of CH_3CHO in the presence of NaOH.

(10 marks)

c.. Give the structures of compounds A and B



(8 marks)