



EASTERN UNIVERSITY, SRI LANKA
FIRST EXAMINATION IN SCIENCE - EXTERNAL DEGREE
1998/99 (Term System) Re-Repeat
June - 2008

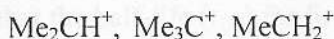
EXCH102 STEREO CHEMISTRY, ORGANIC REACTION MECHANISM
AND CHEMICAL KINETICS

TIME : 02 HOURS

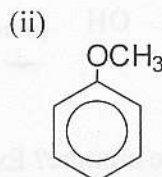
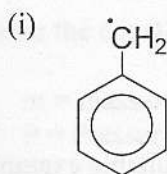
ANSWER FOUR QUESTIONS ONLY. SELECTING AT LEAST ONE QUESTION FROM PART B.

PART A

- 1 (a) (i) What are the factors that determine the stability of the carbonium ions
- (ii) Arrange the following carbonium ions in the order of increasing stability. Explain your answer.

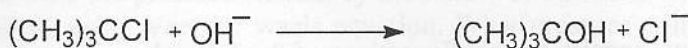


- (b) Compare the stability of phenol and phenoxide ion.
- (c) Draw all the resonance structures for the following compounds



2. a) (i) What is meant by S_{N}^1 and S_{N}^2 reactions.

(ii) The following reaction was considered to be first order.

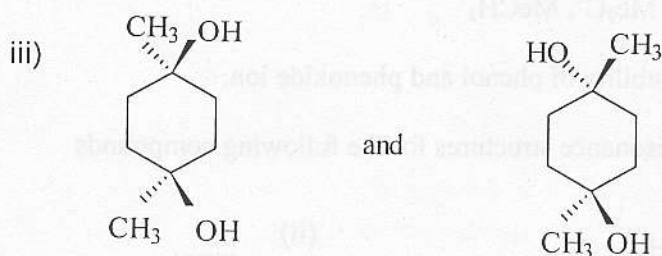
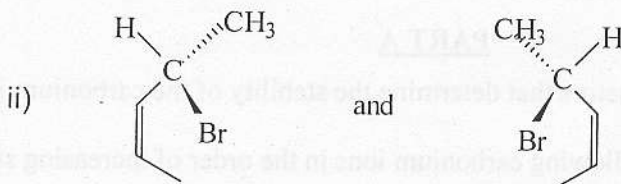
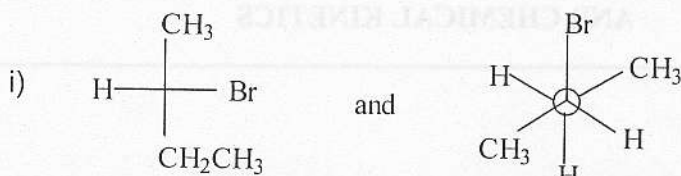


- (I) Give the mechanism involved in it.
- (II) Draw a fully labelled energy profile diagram for the above reaction. Indicate clearly the transition state and intermediate (if any).

3. a) Define the following terms.

- i) Diastereo isomers.
ii) Enantiomers.

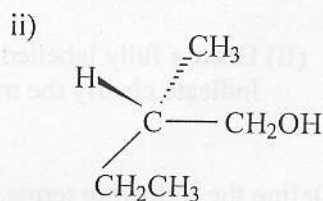
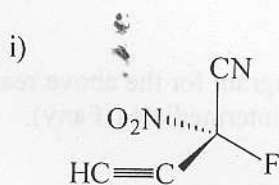
b) Indicate whether each of the following pairs of compounds is enantiomers, diastereo isomers, geometrical isomers or identical compounds.



c) What is a racemic mixture? Explain with the help of a suitable example.

d) Explain how you would separate a racemic mixture of CH_3OH into its pure form.

4. a) Giving reasons, specify the configurations of the following molecules as **R** or **S**.



b) Draw the chair conformations of trans 1,4 – dimethylcyclohexane and indicate with reasons which conformation would be the most stable.

c) 0.3g of a compound is dissolved in ethanol to make a solution of 10 ml. When this solution is placed in a 20 cm tube it showed an optical rotation of -4.12° at the sodium $-D$ line at 25°C .

i) Calculate the specific rotation of this compound in ethanol at 25°C .

ii) If the concentration of this solution is doubled what would be the,

i) Optical rotation?

ii) Specific rotation?

PART B

5) (a) Define the rate law and order of the chemical reaction.

(b) Derive the first order rate equation to the reaction,



(c) Show that the half-life ($t_{1/2}$) for first order reaction is independent of the initial concentration.

6) a) Write down the assumptions made in deriving the equation for the kinetic molecular theory of gas.

b) Derive the equation $PV = \frac{1}{3} mNC^2$. Where,

m = mass of a molecule of gas.

P = Pressure.

$\overline{C^2}$ = mean square velocity.

N = no. of molecules of the gas.

V = volume.

c) Calculate the pressure exerted by 2.00 mole of ethane in a 200 ml container at 300K using Van der waals equation. What pressure will be predicted by the ideal gas equation? ($a = 2.253 \text{ l}^3 \text{ atm mol}^{-2}$, $b = 0.04281 \text{ mol}^{-1}$, $R = 0.0821 \text{ atm l mol}^{-1} \text{ K}^{-1}$)
