



**EASTERN UNIVERSITY, SRI LANKA**  
**FIRST EXAMINATION IN SCIENCE 2005/2006 & 2006/2007**  
**SECOND SEMESTER (March/April 2008) -PROPER**  
**CH 103 STEREOCHEMISTRY AND KINETIC MOLECULAR THEORY**

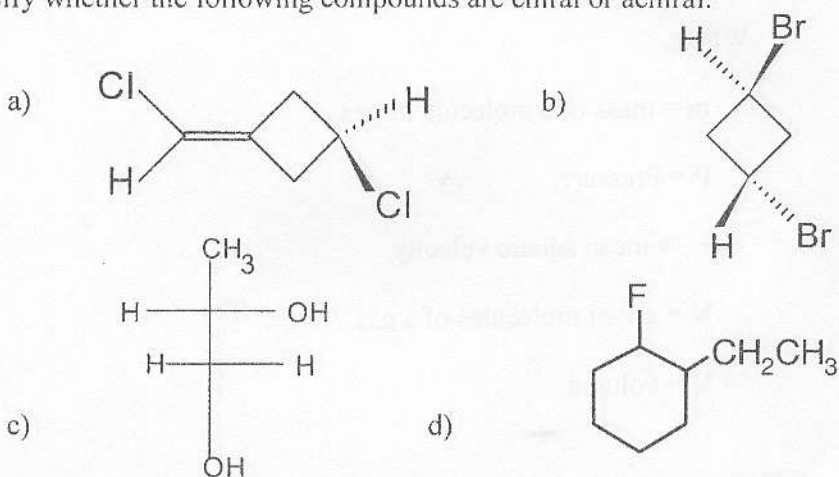
Time allowed: **ONE Hour**

Answer all questions

The use of a non-programmable calculator is permitted

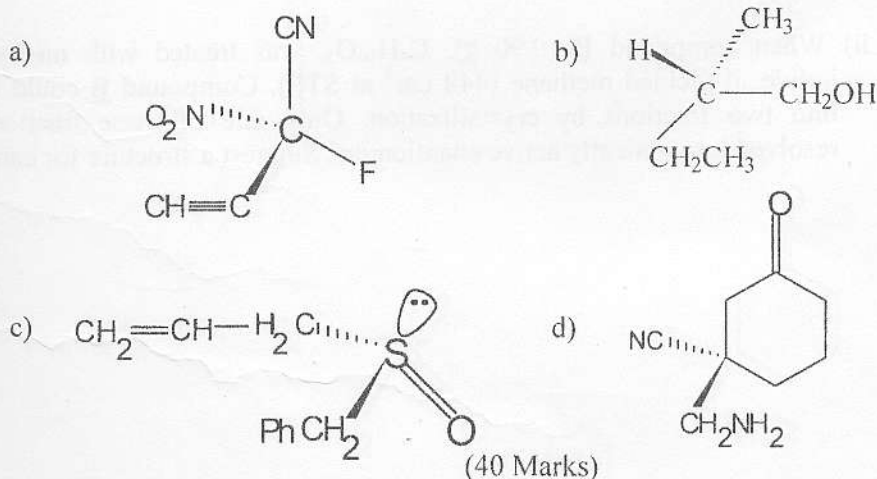


1. i) Specify whether the following compounds are chiral or achiral.



(20 Marks)

ii) By giving reasons, specify the configurations of the following molecules as R or S.



(40 Marks)

Cont.

iii) Suggest a chemical/physical method to separate each of the following mixtures.

- D-2-octylamine & L-2-octylamine
- Maleic acid ( $C_4H_4O_4$ ) & fumaric acid ( $C_4H_4O_4$ )
- D-2-octanol & L-2-octanol

(40 Marks)

2) a. i) Write down the assumptions made in deriving the kinetic molecular theory of gas.

(20 Marks)

ii) 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 a gas.

$V$  = volume.

(30 Marks)

b. i) Compound **A**,  $C_5H_6O_2$ , liberated  $CO_2$  from  $NaHCO_3$  and was optically active. On hydrogenation, it yielded  $C_5H_{10}O_2$ , which was optically inactive. Suggest a structure for **A** and explain the above reactions.

(25 Marks)

ii) When compound **B** (0.90 g),  $C_4H_{10}O_2$ , was treated with methylmagnesium iodide, it yielded methane ( $448 \text{ cm}^3$  at STP). Compound **B** could be separated into two fractions by crystallization. Only one of these fractions could be resolved into optically active enantiomers. Suggest a structure for compound **B**.

(25 Marks)

End