EASTERN UNIVERSITY, SRI LANKA DEPARTMENT OF CHEMISTRY

FIRST YEAR SECOND SEMESTER EXTERNAL DEGREE EXAMINATION IN SCIENCE -2002/2003

(SEPT/OCT' 2005)

EXTCH 103 STEREOCHEMISTRY AND KINETIC MOLECULAR THEORY

Answer all questions

Time: 01 hour

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

i)
$$CH_3$$
 CH_2CH_3 CH_2CH_3 CH_2CH_3 CH_2CH_3 CH_2CH_3 CH_3 CH_3

- b) Explain how you could separate a racemic mixture of an alcohol into its pure forms.
- c) Giving reasons specify the configurations of the following molecules as R or S.

d) Specify the configuration of the double bonds of the following molecules as E or Z. Explain your answer.

i)
$$CH_3C$$
 $C=C$ CH_3 $CH_3CH_2CH_2$ CH_3 CH_3CH_3 CH_3CH_3 CH_3CH_3 CH_3 CH_3

Contd..

- e) Draw a curve, showing the variation of potential energy with dihedral angle as the two ends of butane is rotated with respect to the central C-C bond. Give the conformations of the molecule at the maxima and minima of this curve.
- 2) i) Write down the assumptions made in deriving the kinetic molecular theory of gas.
 - ii) Derive the equation $PV = \frac{1}{3} \text{ mNC}^2$. Where,

m = mass of a molecule of gas.

P = Pressure.

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

N = no. of molecules of the gas.

V = volume.

- iii) Write down the Vander waals equation for gases and identify all the terms in it.
- iv) Calculate the pressure exerted by 1.00 mole of methane (CH₄) in a 250 ml container at 300K using Vander waals equation. What pressure will be predicted by ideal gas equation? ($a = 2.253 \text{ l}^3 \text{ atm mol}^{-2}$, $b=0.04281 \text{ mol}^{-1}$, $R = 0.0821 \text{ atm l mol}^{-1}$ K⁻¹)

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