Eastern University, Sri Lanka

First Year Second Semester Examination in Science

2013/2014(April /May 2016)
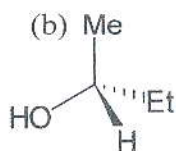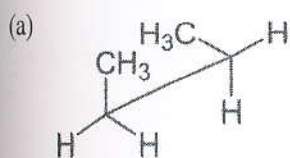
CH 103 Stereochemistry and Kinetic Molecular Theory of Gases
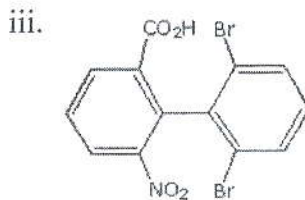
(Proper)

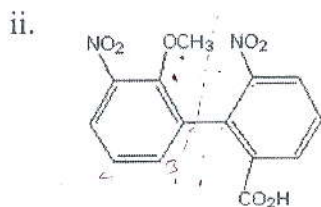Answer **All** questions   Time Allowed: **ONE HOUR**

(i) Draw the Fischer projection formulae of the following molecules.

(a)

(b) Me

(18 marks)

(ii) Giving reason determine whether each of the following molecules is chiral or achiral.

i.

ii.

iii.
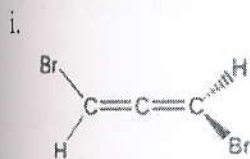
(21 marks)

(iii) Draw the two possible chair conformations of cis-1-*tert*-butyl-4-chlorocyclohexane
and give reasons which one is the most stable chair form.

(21 marks)

(iv) Determine whether each of the following pairs are enantiomers.

a.

b.

(22 marks)

Contd.

1

(v) Determine whether the following molecules are E or Z.

a)

b)

c)

2.

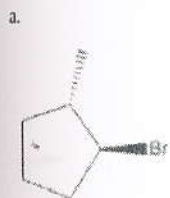(a) (i) Write down the kinetic gas equation and ideal gas equation and explain all involved in them.

(1

(ii) Derive an expression for the kinetic energy of a gas of one mole $E = \frac{3}{2} RT$

and the mean square velocity $\overline{c^2} = \frac{3\,RT}{M}$

(2

(b) During a synthesis of (S)-(-)-mandelic acid, a sample of mandelic acid was with specific rotation of -134°. $[\alpha]_D$ of pure (S)-(-)-mandelic acid is -158°. the following.

i) Percentage optical purity of the sample.

ii) Percentage of (S)-(-)-mandelic acid and (R)-(+)-mandelic acid in the sample

(The percentage of purity $=[\alpha]_D$ of the sample X $100/[\alpha]_D$ of the pure enant

(40

(c) Describe a method to resolve a racemic mixture containing R and S lactic acid.

Structures of R and S-lactic acid is given below.

R-isomer   S-isomer

(20

&&&&&&&&

2