

EMBU UNIVERSITY COLLEGE
(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

FIRST SEMESTER EXAMINATIONS 2013/2014

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE AND
BACHELOR OF SCIENCE (BIOLOGY)

SCH 102: ORGANIC CHEMISTRY

DATE: DECEMBER 3, 2013

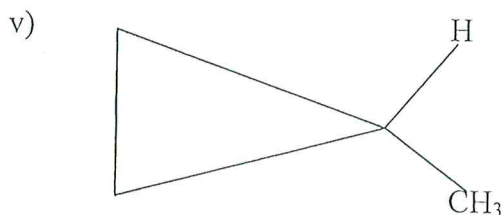
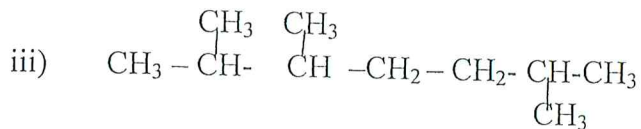
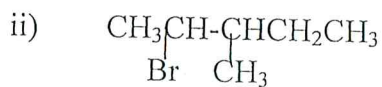
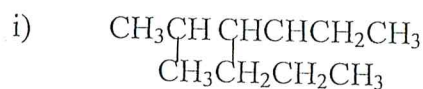
TIME: 2.00 – 4.00PM

INSTRUCTIONS:

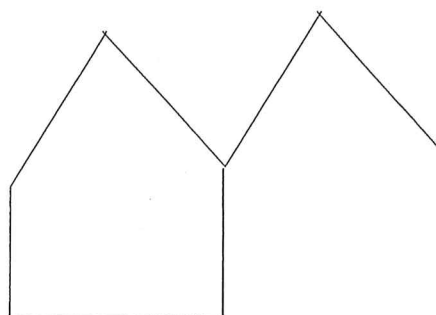
Answer Question ONE and any other TWO

a) Name the following alkanes

(12 MKS)



vi)



- b) Write molecular and draw structural formula for the following alkanes (10 MKS)
- Ethylcyclohexane
 - 1,2-Dimethylcyclopentane
 - 2,2,3-Trimethyl butane
 - 2,2-Dimethyl-3,4, diethylheptane
 - cis-1,2-Dimethylcyclopentane
- c) Explain why 1,3-dichlorobutane is a correct IUPAC name but 1,3-dimethylbutane is NOT. (2 MKS)
- d) Draw and name all the structural isomers of the molecule C_5H_{12} (6 MKS)

QUESTION TWO

- a) With the aid of a diagram explain the sp^3 hybridised orbitals in carbon. (4 MKS)
- b) Draw the structure of (R)-2-bromobutane (4 MKS)
- c) Draw the staggered and eclipsed projection of propane. Suggest the most stable conformation and explain your answer. (4 MKS)
- d) Using relevant examples differentiate the following terms .
- Dipole-dipole interaction (2 MKS)
 - Hydrogen bond (2 MKS)
 - Homolytic cleavage (2 MKS)
 - Heterolytic cleavage (2 MKS)

QUESTION THREE

- a) If few drops of bromine are added to hexane a deep red solution is formed. No reaction occurs if the mixture is kept in dark, but in sunlight the red colour slowly disappears and a misty gas is given off.

- i) Identify the misty gas formed in the reaction (1 MK)
- ii) Write an overall equation of one mole of bromine with one mole of hexane under these conditions (2 MKS)
- iii) Why does the reaction occur only in sunlight? (2 MKS)
- iv) This is a free radical chain. Write down the mechanism for monobromination indicating clearly
- a. Initiation stage. (2 MKS)
 - b. Propagation. (2 MKS)
 - c. Termination stage. (2 MKS)
 - d. By-products that you would expect to be formed as a consequence of chain terminating step. (4 MKS)
- b) Without referring to tables arrange the following five hydrocarbons in order of increasing boiling point and explain your answer. (5 MKS)
- i.) 2-Methylhexane,
 - ii.) Heptane
 - iii.) 3,3 – dimethylpentane
 - iv.) Hexane
 - v.) 2 – Methylpentane

QUESTION FOUR

- a) Using examples explain the following reaction types.
- i) Addition reaction (2 MKS)
 - ii) Substitution reaction (2 MKS)
 - iii) Elimination reaction (2 MKS)
 - iv) Rearrangement (2 MKS)
- b) Write down a complete reaction mechanism for the addition of HCl to 1– butene. (4 MKS)
- c) Draw the formula for the preferred conformation of
- i) Ethylcyclohexane (2 MKS)
 - ii) Trans-1-4- dimethylcyclohexane (2 MKS)
 - iii) Cis-1-Methyl-3-Isopropylcyclohexane (2 MKS)

iv) 1,1-dichlorocyclohexane

(2 MKS)

QUESTION FIVE

a) Briefly explain the following terms

i) Chiral molecules

(2 MKS)

ii) Diastereomers

(2 MKS)

iii) Enantiomers

(2 MKS)

iv) Racemic mixture

(2 MKS)

v) Meso compounds

(2 MKS)

b) Which of the following substances can exist in optically active form? Explain

(4 MKS)

i) 2,2-dichloropropane

ii) 1,2-dichloropropane

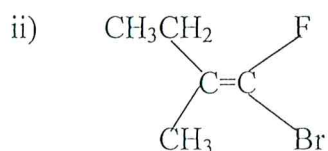
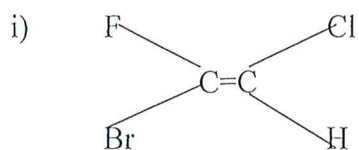
iii) 2-chloro-2-Methylpentane

iv) 2,3-dimethylhexane

v) methylcyclobutane

c) Name the following compounds using E-Z notation.

(4 MKS)

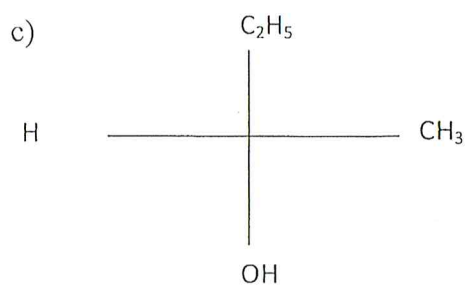
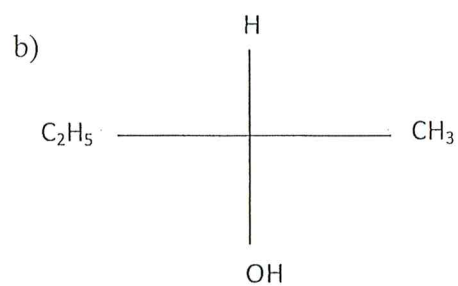
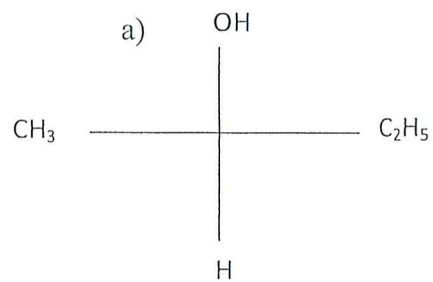
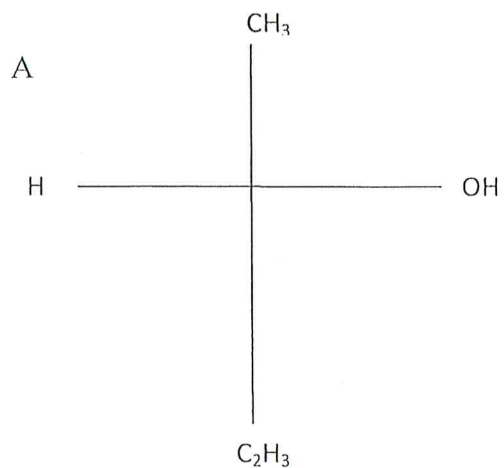


d) The axial methylcyclohexane is found to be 5% while equatorial methylcyclohexane is found to be 95% Explain

(2 MKS)

e) Which of the following fischer projections have the same configurations as A.

(2 MKS)



---END---