

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE**

**DEGREE OF BACHELOR OF SCIENCE IN PUBLIC HEALTH**

 **SCH 2103: ORGANIC CHEMISTRY**

**DATE: APRIL, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**SECTION I (COMPULSORY) (30 MARKS)**

1. a) Distinguish between hybrid and molecular orbitals. [2 marks]

b) By use of bounds and the no of rings explain whether the

 following compounds are saturated or unsaturated: [3 marks]

 i) ii)

c) Explain the structure of methane with the aid of orbital

 hybridization theory. [2 marks]

d) Lemonene is an organic compound whose structure is shown.

 Explain one important role played by limonene as an organic

 compound. [1 mark]

e) Explain the meaning of the following terms: [2 marks]

 i) Catenation

 ii) Octet rule

f) Draw the structures of the following organic compounds: [2 marks]

 i) 1, 1- dibromo-5-fluro-3-butylcyclohexane

 ii) Cyclopentane-1, 3; 5-triol

g) Give the systematic (IUPAC) names of the following compounds:

 i)

 ii)

 iii)

h) An organic compound consist of 84.9% . Carbon and the rest

 is hydrogen if its vapour density is 35. Determine the molecular

 formula of the compound. [3 marks]

i) Give the structures of the major products A, B, and C: [3 marks]

 H2

  A

 (i) Nickel catalyst

 (ii) Temp 1500C

 [HSO4]

 + HNO3 B

H2SO4

 C

j) Show the reaction mechanism of the following reaction: [3 marks]

 Cl2

 Fe(5)

k) What is double bond equivalent? [1mark]

l) What is the importance of double bond equivalent. [2 marks]

n) i) Define the term isomerism [1 mark]

 ii) Identify any two structural somers of pentane [2 marks]

**SECTION II: ANSWER ANY TWO QUESTIONS**

1. a) A 1.037g sample of substance containing only hydrogen,

 carbon and oxygen is burnet in a stream of excess oxygen to

 yield 1.90g of carbon (IV) oxide and 0.52/g of water.

 Describe what is the empirical formula of the compound?

 If the molecular mass of the compound is 288, what is its

 molecular formula. [8 marks]

b) A compound is made up of boron, carbon and hydrogen.

 The compound was found to contain 32.77% carbon, and

 59% boron.

 Determine the empirical formula of the compound.

 If the molecular weight of the compound is 145.

 What is its molecular formula. [6 marks]

c) Discuss how the infrared spectroscope (IR) can be used

 in structural elucidation of the following compound. [6 marks]

1. a) Calculate the degree of unsaturation in the following

 compounds: [12 marks]

 i) ii)

 iii) iv)

 v) C3 H4 Cl2 vi) C4 H9 NO

b) Predict whether the following compounds are unsaturated.

 If so, determine the no. of rings and $π $bonds present. [8 marks]

1. a) Give the systematic (IUPAC) names of the following

 organic compounds: [10 marks]

 i) ii)

 iii) CH3 CH2 CH CH2 iv)

 v) vi)

 vii) viii)

 ix) x)

b) Draw the structures of the following organic compounds: [10 marks]

1. 1, 1- dibromo-5-flourohexane
2. 2-methylcyclpentanone
3. 3, 5-dimethylcyclohexane
4. Cyclohecx-1, 2-diol
5. 2, 4, 6-trinitroaniline
6. 2, 4 -dinitrobenzaldehyde
7. 3, 4- 5-trichlorobenzoic acid
8. (E) -2-phenylbut-2-2ene
9. 3-cyclohexyltolnene
10. 2, 3, 5-trichlorophenol