

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

**JOMO KENYATTA UNIVERSITY**

 **OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR I SEMESTER I EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN PUBLIC HEALTH**

**SCH 2108: ORGANIC CHEMISTRY**

**DATE:DECEMBER 2014 TIME: 2 HOURS**

**INSTRUCTIONS** Answer question one and any other two questions.

**QUESTION ONE (30 MARKS)**

i. Explain by the term hybridization? (1 mark)

ii. For each of the following molecules, indicate the hybridization of each carbon atom.

 a. CHCH (1 mark)

 b. CH3CH2CHCH2 (1 mark)

 c. CH3 CH2 CH2 CH3 (1 mark)

iii. Provide the IUPAC names of the three molecules in part a (ii) above.

 (3 marks)

b. Briefly explain the meanings of the following terms;

 i. Isomerism. (1 mark)

 ii. Tautomerism. (1 mark)

 iii. Pairing. (1 mark)

c. i. Describe a functional group? (1 mark)

 ii. In the following molecule, identify at least four functional groups.

 (2 marks)

d. i Differentiate between qualitative and quantitative chemical analysis.

 (1 mark)

 ii. Sucrose (C12 H22 O11) the refined commercial sugar is a disaccharide that is economically derived from sugar cane and sugar beets. Calculate the percent composition of each element in a sucrose molecule.

 {c=12; H=1.0 O=16} (2 marks)

 iii. Briefly outline how the elemental composition of an alkane say C2H4, can be quantitatively determined. (2 marks)

e. Account for the following observations;

 i. Cycloalkanes are less flexible than their open chain counterparts.

 (2 marks)

 ii Hexane boils at 68.80C. Whereas 2,2-dimethylbutane boils at 49.70C.

 (2 marks)

f. i. Provide the IUPAC names of the following organic compounds.

 i. (1 mark)

 ii. CH3 CH2 C (CH3)2 CH2 CH3 (1 mark)

 iii. CH2 CH2 OH. (1 mark)

 ii. Draw structures for the following organic compounds.

 i. 4-penten-2-one (1 mark)

 ii. 3-hydroxybutanal (1 mark)

 iii. z-5-ethy-4mehtylnon-e-ene. (1 mark)

g. Outline a simple test that can be used to distinguish between;

**QUESTION TWO (20 MARKS)**

Suggest the conditions reagents or the major organic products.

a.  (2 marks)

c.

d.  (D) (2 marks)

e. CH2 CH2 CH2 Br + KOH→(E) (2 marks)

f. CH3C=CH  (4 marks)

g. H (2 marks)

i.

**QUESTION THREE (20 MARKS)**

a. Using chemical equations, clearly describe all the steps/reactions involved in the chlorination process to form 1-chloroethane starting with C2 H6 and Cl2 in the presence of ultra violet light. (6 marks)

b. Rank the following compounds in order of increasing boiling point (lowest first). Provide an explanation of your chosen order.

c i. Classify the following compounds as primary, secondary and tertiary alcohols.

 ii. Arrange the compounds in part c (i) above in order of their reactivity toward acid catalyzed dehydration (with the most reactive first)

 (3 marks)

 iii. Provide the systematic names of the compounds in part c (i) above.

 (3 marks)

d. Draw the structure of a saturated alkane or cycloakane with the formula C6H12 and has only secondary hydrogen atoms. (2 marks)

**QUESTION FOUR (20 YEARS)**

a. Under appropriate reaction conditions, 2-bromo-methylbutane can be converted into an alcohol;

 i. Explain the type of reaction taking place. (1 mark)

 ii. Describe the mechanism for the reaction. (4 marks)

 iii. Explain the alcohol formed. (1 mark)

b. Explain the structures and systematic names of the four isomeric compounds that have the molecular formula C4H9I. (8 marks)

c. Two compounds n-octane and 2,2,4-trimethelpentane were contained in two separate unlabelled test tubes.

 i. Describe the two common characteristics/ properties shared by the two compounds? (3 marks)

 ii. Explain how the two compounds could be distinguished from one another in a laboratory. (3 marks)