

 W1-2-60-1-6

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

 **UNIVERSITY EXAMINATIONS 2016/2017**

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

**SCH 2108: ORGANIC CHEMISTRY**

**DATE: JULY 2017 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND ANY ONE QUESTION IN SECTION B**

**SECTION A (48 MARKS)**

1. Using structures of isomers from the molecular formula C4H9OH describe;
2. Functional group isomerism. [3 marks]
3. Position isomerism [3 marks]
4. Explain the following terms as used in organic chemistry;
5. Molecular orbital [2 marks]
6. Hybridization [2 marks]
7. Tantomerism [2 marks]
8. Provide the IUPAC names of the following compounds including stereochemistry where appropriate.
9. Draw any FOUR arrows used in organic chemistry and explain their meaning. [6 marks]
10. Tobacco smoking is injurious to health. Nicotine is one of the health hazardous chemicals found in tobacco;
11. Calculate the double bond equivalence of nicotine C10H14N2 (Valency C= 4, H = 1,

 N = 3) [3 marks]

1. Account for the double bond equivalence number in ‘a’ above given that the structure of nicotine is as shown below (I). [3 marks]

6(a) State THREE types of hybridization exhibited by Carbon in organic compounds. [3 marks]

(b) Draw the structure of propane and indicate the type of hybridization exhibited by each

 carbon in the molecule. [3 marks]

7(a) Explain the terms;

1. Localized bond [2 marks]
2. Plarized bond [2 marks]

(b) Explain why carbon tetrachloride is a non-popular compound. [2 marks]

8. The structure of one of the active ingredients in most sunscreen is shown below (II)

1. Provide the IUPAC name and the functional groups in II. [3 marks]
2. State TWO heteroatoms in the molecule II and a reason for your answer. [3 mark]

**SECTION B (22 MARKS)**

9. (a) Explain the following terms;

 (i) Olectrophile [2 marks]

 (ii) Nucleophile [2 marks]

(b) Write the meaning of the following abbreviations;

1. E1 [1 mark]
2. SN1 [1 mark]
3. SN2 [1 mark]
4. State the common occurrences of E1, SN1 and SN2 in alkylhalides. [3 marks]
5. With the help of structures explain the solubility of ethanoic acid in water form vinegar. [3 marks]
6. Presence of large quantities of glucose in urine is associated with diabetes mellitus. Describe the oxidation reactions involved in each of the following glucose tests;
7. Benedicts tests [2 marks]
8. Fehling’s test [2 marks]
9. Tollens test [3 marks]

10(a) Acidified KMnO4 can be used to differentiate between butane and butane gases.

 Explain this observation. [4 marks]

(b) State any FOUR derivatives of carboxylic acids. [4 marks]

(c) Bacrofen (III) is used as a muscle relaxant.

1. Indicate the chiral centre by \* [1 mark]
2. Provide the IUPAC name for III [2 marks]
3. Draw the structure of the compound formed when bacrofen reacts with ethanol and name the type of compound. [3 marks]

(d) Using equations describe the preparation of;

 (i) 1o, 2o and 3o amines from iodo-methane and ammonia. [6 marks]

 (ii) 3o alcohols from ketones and Grignard reagents. [2 marks]

11(a) Analysis of a sample of an organic compound gave 54.5% C, 9.1% H and 36.4% O by

 mass (C = 12, H = 1, O = 16 and RFM = 44). Work out the;

1. Empirical formula [4 marks]
2. Molecular formula [2 marks]

(b) Halothane CF3CHclBr is an unaesthetic in minor surgery;

 (i) State the homologous series and functional group the compound belongs. [2 marks]

 (ii) Draw the structure and name the compound using IUPAC [3 marks]

(c) Classify alcohols based on;

 (i) The number of OH groups in a molecule [3 marks]

 (ii) The number of alkyl groups attached to the C – OH group. [3 marks]

(d) Describe the mechanism for the following reaction;

 CH4 + Cl2 $→$ CH3Cl + HCl [3 marks]