

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

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR 1 SEMESTER I SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN PUBLIC HEALTH**

**SCH 2108: ORGANIC CHEMISTRY**

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

**INSTRUCTIONS:** Answer all questions in section A and one from section B.

**SECTION A (48 MARKS)**

**QUESTION ONE**

a. Draw arrows that can be used in organic chemistry to show

i. Ripole moment

ii. Movement of an electron

iii. Equilibrium (3 marks)

b. Differentiate between localized and delocalized covalent bonds using methane and benzene. (3 marks)

QUESTION TWO

Explain the following terms used in organic chemistry.

a. Hybridisation

b. Antibonding molecular orbital.

c. Resonance. (6 marks)

QUESTION THREE

The bond angles in methane are 109.50 and not 900. Explain. (3 marks)

b. Among the most common over the counter drugs are mild pain relievers such as ibuprofen whose structure (I) is as shown below:

i. Identify the function group in (I)

ii. How many SP and SP3 carbons are in (I)

QUESTION FOUR

a. Using IUPAC system name the following compounds.

b. In electrophilic ?? of nitrobenzene using chlorine 3,5-dichloro nitrobenzene was formed not 2,4 dichloro nitrobenzene. Explain. (3 marks)

QUESTION FIVE

a. Explain why carboxylic acids have higher building points than alcohols of comparable molecular mass. (3 marks)

b. Para-Amino benzoic acid (PABA) is the active ingredient in many suns screens

i. Draw the line angle structure of the compound

ii. Name the two functional groups of PABA. (3 marks)

QUESTION SIX

Consider the following reaction for preparation of ester.

CH3OH + CH3 COOH ⇌ 

a. Suggest a catalyst for the reaction (2 marks)

b. Outline two ways of increasing the yield of the organic product above.

(2 marks)

c. Explain the formation of water in the reaction above. (2 marks)

QUESTION SEVEN

Describe the preparation ethanol by fermentation method. (6 marks)

QUESTION EIGHT

Draw the structure and name the major products A-C.

(2 marks)

i.

ii. (2 marks)

iii. (2 marks)

SECTION B (22 MARKS)

a. Distinguish between primary, secondary and tertiary amines using general structures. (3 marks)

b. Nitrites are considered as derivatives of carboxylic acids. Explain with the help of equations. (5 marks)

c. Methanol undergoes cannizzaro reaction as shown



i. What is a cannizzaro reaction. (2 marks)

ii. Suggest a reaction mechanism for the reaction. (4 marks)

d. i. Arrange the following amines in order of increasing basis properties.

CH3 CH2 NH2 ; CH3 CH2 N (CH3)2;(CH3 CH2)2 NH. (3 marks)

ii. Explain the order in 9 (i) above. (3 marks)

iii. Write the equilibrium equation for CH3 CH2 NH2 in water. (2 marks)

QUESTION TEN

a. State the two major subdivisions of stereoisomerism. (2 marks)

b. i. Draw the structures of D- and L- glyceraldehydes. (3 marks)

ii. Explain the term chirality. (2 marks)

c. 2-Nitrophenol is more acids than phenol.

i. Draw the structures of the two compounds. (3 marks)

ii. Explain the statement in c above. (3 marks)

d. Sodium hydroxide reacts with chloro ethane as shown.

NaOH+CH3 CH2 CL→CH3CH2 OH + NaCL

i. State and explain this type of reaction. (3 marks)

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

iii. Which type of reaction competes with this type of reaction. (2 marks)

QUESTION ELEVEN

a. An organic compound contains 70.8% carbon 6.2% hydrogen, 4.1% nitrogen and the rest oxygen.

i. Calculate the percentage of oxygen in the compound. (2 marks)

ii. Work out the empirical and molecular formula given the molecular mass is 323. (6 marks)

b. Give simple visual chemical test to differentiate between the following pairs of compounds.

i. (2 marks)

ii. (2 marks)

iii. (2 marks)

c. Ethanol undergoes several types of reactions as shown (1-4) in each case state the type and give an example of the product formed.

i. CH3 CH2 OH  Ackene

ii. CH3 CH2 OH  Carboxylic acid

iii. CH3 CH2 OH Alkylbromide

iv. CH3CH2OHAlkane. (8 marks)

