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KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

**SECOND YEAR SECOND SEMESTER
MAIN EXAMINATIONS**

FOR THE DEGREE OF B.ED (SCIENCE)

COURSE CODE: SCH 212

COURSE TITLE: BASIC ORGANIC CHEMISTRY

DURATION: 2 HOURS

DATE: 1/8/2018

TIME: 9-11AM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 4 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

QUESTION ONE (30 MARKS)

Question One

a) Calculate the formal charge of each atom in the ions/molecules below:

i) NO_3^- (2 marks)

ii) NH_3 (1 mark)

iii) H_2O (1 mark)

iv) CH_4 (1 mark)

b) Draw the structures of the following compounds. (4 marks)

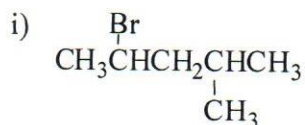
i) 3-methyl-3-heptene

ii) 6-bromo-4-ethyl-2-heptanol

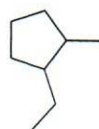
iii) 4-methyl-2-hexyne

iv) 1,3-dimethylcyclohexane

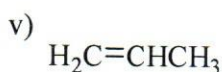
c) Give the IUPAC names of the following (5 marks)



ii)



iii)



d) Name and draw the geometrical isomers of C_4H_8 (4 marks)

e) Carbon atoms are classified according to their degree of substitution by other carbons- primary (1°), secondary (2°), and tertiary (3°). Using R- to represent alkyl groups, draw 1° , 2° , 3° carbons. (3 marks)

f) Define the following (5 marks)

i. Electrophile

ii. Nucleophile

iii. Isomers

iv. Carbonyl carbon

v. chiral center

g) Give four uses of methanol (4 marks)

QUESTION TWO (20 MARKS)

a) Label and show the steps involved in the monochlorination of methane in the presence of light (9 marks)

ii) Name the type of cleavage that occurs to bromine molecule in presence of light. (1 mark)

b) Draw the resonance structure can be generated for each of these ions. (10 marks)

i) NO_3^- ii) CO_3^{2-} iii) BO_3^- iv) $[\text{CH}_2\text{NH}_2]^+$

QUESTION THREE (20 MARKS)

a) Determine the degree of unsaturation, and then draw possible structures, for compounds with the following molecular formulas. (4 marks)

i) C_3H_6

ii) C_3H_4

iii) C_4H_7

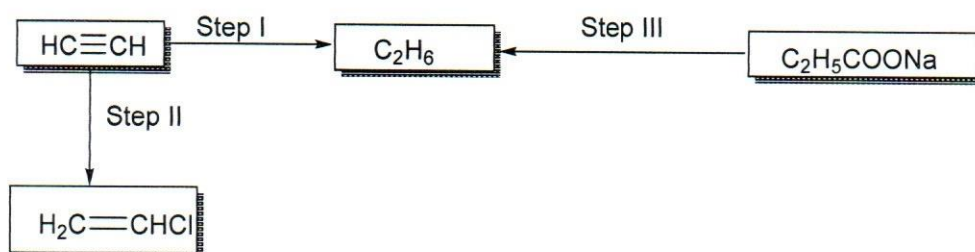
b) Give characteristic of covalent bond.

(5 marks)

c) Use δ^- or δ^+ symbols to indicate polarity in these covalent bonds

(6 marks)

d) Study the scheme below and answer the questions that follow.



i) Name the reagents in:

(3 marks)

Step I

Step II

Step III

ii) Write an equation for the complete combustion of $\text{HC}\equiv\text{CH}$

(2 marks)

QUESTION FOUR (20 MARKS)

a) The following are shapes that some molecules form. In each case give draw of a molecule that forms the shape and approximate the bond angles. (10 marks)

i) Bent

ii) trigonal planer

iii) trigonal pyramidal

iv) tetrahedral

v) linear

b) Give the functional groups for each of the following

(6 marks)

i) Thiols

ii) Amines

iii) Esters

iv) Carboxylic acids

v) Ketones

vi) Aldehydes

c) Neutral phosphorus compound is a good nucleophile toward alkyl halides. Explain (**4 marks**)