



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

PURE AND APPLIED SCIENCES DEPARTMENT

SUPPLEMENTARY / SPECIAL UNIVERSITY EXAMINATION FOR

BTIMB BSFQ BSFM BMLS

ACH 4118: ORGANIC CHEMISTRY

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Sep 2018

Instructions to Candidates

You should have the following for this examination

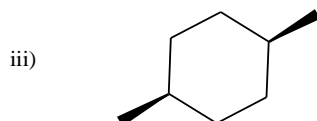
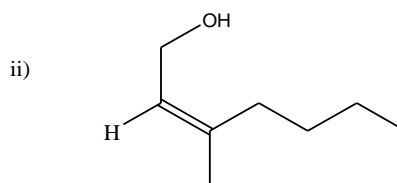
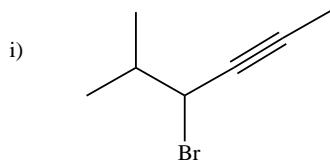
-Answer Booklet, examination pass and student ID

This paper consists of five questions. Attempt question one compulsory and any other two.

Do not write on the question paper.

Question ONE

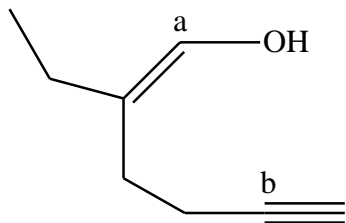
- a) Give the IUPAC names of the following compounds indicating stereochemistry where appropriate.



(6marks)

- b) Draw the Lewis structures (sticks for bonds, and dots for lone pairs) of the following compounds.
- i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_3$ (3marks)
- ii) $\text{CH}_3\text{CH}_2\text{Br}$ (3marks)

- c) Name the compound below and explain the type of hybridization adopted by carbons labelled a and b.



(6marks)

- d) Use the molecular formula of penicillin G given below to answer questions that follow.

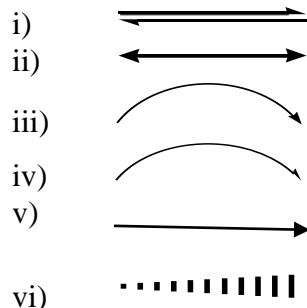


- i) Give the three heteroatoms in Penicillin G. (3marks)
 - ii) Calculate the double bond equivalence of Penicillin G. (3marks)
- Take valency of C=4; H=1; N=3; O=2; S=2.
- e) The ring opening reactions of cycloalkanes is due to their ring strain. Show using equations, the products formed when cyclopropane reacts with following reagents.
- i) Cl_2
 - ii) HBr
 - iii) conc H_2SO_4 and H_2O
 - iv) $Ni-H_2$ at $80^\circ C$

(6marks)

Question TWO

- a) Explain what the following arrows used in organic chemistry represent



(6marks)

- b) Describe the uniqueness of carbon in terms of compounds formed and valency

(4marks)

- c) i) Differentiate between sigma and pi bonds

(3marks)

- ii) List three uses of esters

(3marks)

- d) Explain the preparation of alkanes using

- i) Wultz reaction

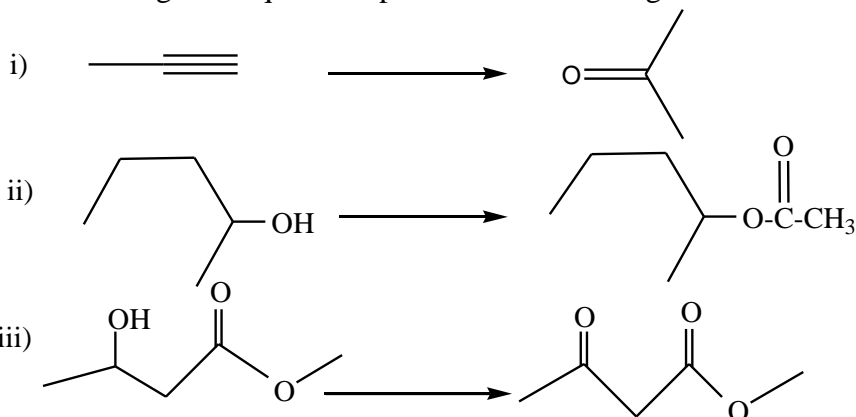
(2marks)

- ii) Grignard reagent

(2marks)

Question THREE

a) Give the reagents required to perform the following transformations.



(6marks)

b) Give the IUPAC names of the products in 3a above. (3marks)

c) Analysis of a sample of an organic compound gave 52.14% C, 13.13% H and 34.73% O by mass. (C=12, H=1, O=16. RFM = 46) .

i) Work out the empirical formula and molecular formula of the organic compound. (6mks)

ii Draw two possible isomeric structures for the compound above. (2marks)

d) Phenyl acetic acid $C_6H_5CH_2COOH$ is one of the substances in blood of people with phenyl ketonuria. Draw the bond line structure of the compound and state the functional group. (3marks)

Question FOUR

a) Explain the following terms used in organic chemistry

i) Dehydrohalogenation

ii) Friedel Craft acylation

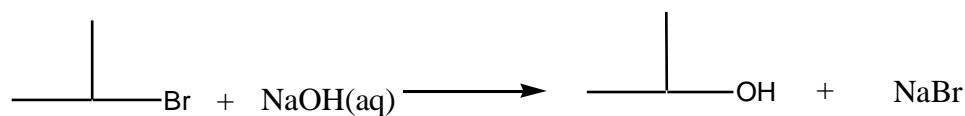
(4marks)

b) i) Describe the fermentation of cane sugar in preparation of alcohol. (5marks)

ii) Explain the solubility of ethanol in water (2marks)

c) i) Explain the term nucleophile (2marks)

ii) Provide a detailed mechanistic explanation for the observed product in the following S_N2 reaction.

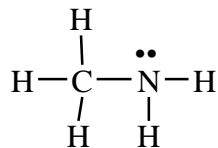


(5marks)

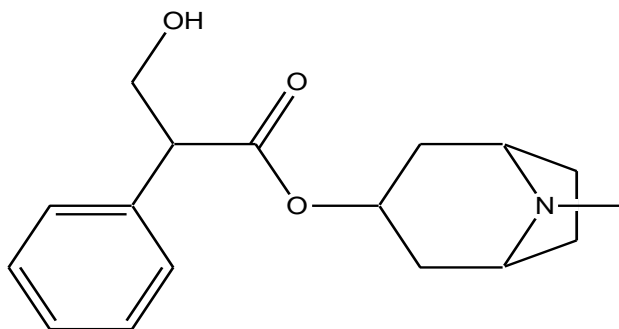
d) Draw two geometrical isomers from the compound $C_2H_2Cl_2$ commonly used to make cling films. (2marks)

Question FIVE

- a) Explain the basic properties of amines with reference to the compound below



- b) i) Identify any two functional groups in atropine $\text{C}_{17}\text{H}_{23}\text{NO}_3$ shown below. (3marks)
(2marks)



- ii) Work out the double bond equivalence of atropine and account for the value. (3marks)
- c) Differentiate between the terms tautomerism and enantiomerism (2mks)
- d) Describe the mechanism for bromination of methane in u.v. light. (6marks)
- e) Cyclohexene and cyclohexane can be differentiated using acidified potassium permanganate. Explain. (4marks)