



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
(SCIENCE)
1ST YEAR 2ND SEMESTER 2021/2022
SIAYA CAMPUS

COURSE CODE: SPB 9114

COURSE TITLE: BASIC ORGANIC CHEMISTRY

EXAM VENUE: STREAM: (BED SCI)

DATE: EXAM SESSION:

TIME: 2:00HRS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE (Compulsory) (30 marks)

1. Question 1

a) : Differentiate between the following

[8 marks]

- i. Structural formula and condensed formula.
- ii. Saturated and Unsaturated compounds
- iii. Trans and Cis Isomers
- iv. Alkyl groups and Ethyl groups

b) Define the following terms:

[6 marks]

- i. Alkanes and Alkenes
- ii. Structural and geometrical isomers
- iii. Aldehyde and ketone

c) Describe the importance of synthesis of new organic compound.

[3

marks]

d) Draw the structures of the following compounds:

[4

marks]

- i. 2-methylpropane
- ii. 2,2-dimethylbutane
- iii. 2,2,4-trimethyl pentane
- iv. Naphthalene

e) Predict the product of the following reactions:

[4

marks]

- i. Passing ethanol (C_2H_5OH) over concentrated sulphuric acid $453K$
- ii. Primary alcohol being oxidized
- iii. Secondary alcohol in presence of PCC and $KMnO_4$
- iv. Tertiary alcohol in presence of oxidizing agent

f) Name at least two aromatic compounds,.

[3 marks]

g) What happens when Glycerine is added to nitric acid?

[2 marks]

QUESTION TWO (20 marks)

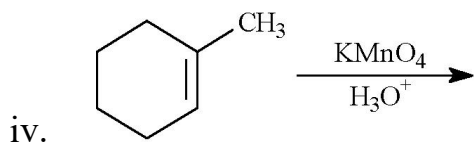
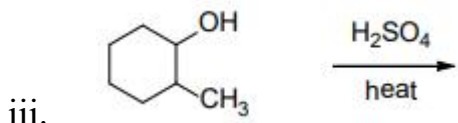
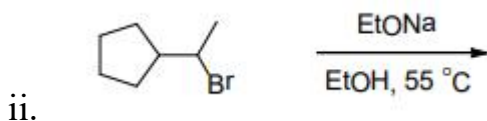
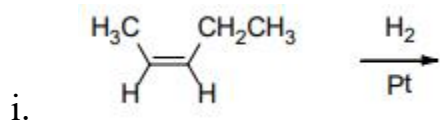
2. Question 2

a) What is hybridization ?.

[3 marks]

b) Complete the following reactions (2 marks each).

[8 marks]



c) Name any two chemical and two physical properties of alkenes.

[4

marks]

d) Draw the structure of the following alkenes.

[3 marks]

i. 2,3-dimethylcyclopentene

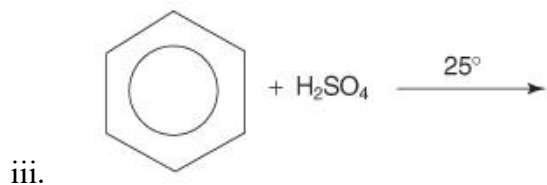
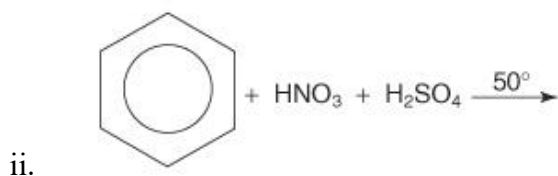
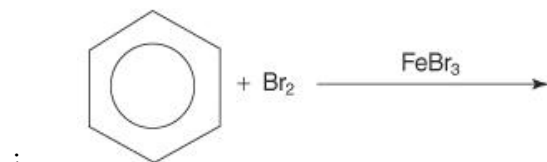
ii. 4-ethyl-2-methyl-3-hexene

- iii. 2,5-dimethyl-4-octene
- e) Draw the *cis* and *trans* isomers of but-2-ene. [2 marks]

QUESTION THREE (20 marks)

3. Question 3

- a) What are aromatic compounds? [3 marks]
- b) Draw the Kekule structure of benzene. [2 marks]
- c) Draw the structure of following aromatic compounds. [6 marks]
- Nitrobenzene
 - Toluene
 - Bromobenzene
- d) Name the three steps in the mechanism of aromatic electrophilic substitution. [3 marks]
- e) Complete the following reactions. [6 marks]

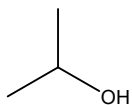


QUESTION FOUR (20 marks)

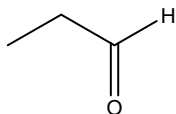
4. Question 4

a) Name the class of each of the compounds below (A-D).

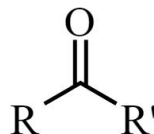
[4 marks]



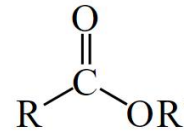
A



B



C



D

b) Draw the structure of the following compounds:

[8 marks]

i. 4-ethyl-1-propyloctanoic acid

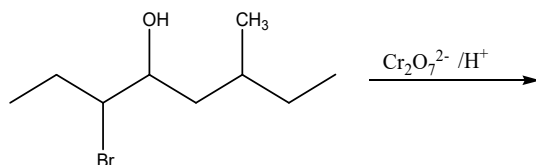
ii. 4-isopropyl-3-octanol

iii. Methyl butylamine

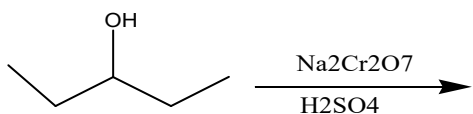
iv. 4-methyl-3-nitroheptan-2-one

c) Predict the product of following reactions,

[4 marks]



i.



ii.

d) Briefly describe the following functional groups.

[4 marks]

i. Carbonyl group

ii. Methyl group

iii. Esters

iv. Amines

QUESTION Five (20 marks)

5. Question 5

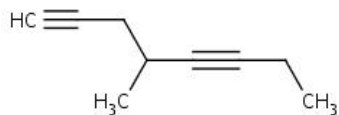
a) Alkynes are more reactive than alkanes, explain.

[2 marks]

b) Arrange the following alkynes in the order of decreasing boiling points; 1-heptyne, 1-hexyne, 2-methyl-1-hexyne. *[2 marks]*

c) Name **two** physical properties of alkynes. *[4 marks]*

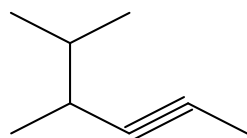
d) Give the IUPAC names of the following alkynes. *[6 marks]*



i.



ii.



iii.

e) What is hydrogenation? *[6 marks]*

i. What happens to an alkene during hydrogenation

ii. What happens to an alkene in presences of halides

iii. What happens to reagent of type HY is added to unsymmetric alkene.