



OFFICE OF THE DEPUTY VICE CHANCELLOR
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER REGULAR

EXAMINATION

FOR THE DEGREE OF BACHELOR OF
EDUCATION SCIENCE

COURSE CODE: CHE 104

COURSE TITLE: ORGANIC CHEMISTRY I

DATE: 17/04/2024

TIME: 2.00 PM – 5.00 PM

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF 5 PRINTED PAGES

PLEASE TURN OVER

REGULAR – MAIN EXAM

CHE 104: ORGANIC CHEMISTRY I

STREAM: BED (Science)

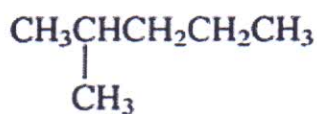
DURATION: 3 Hours

INSTRUCTIONS TO CANDIDATES

Answer ALL questions in section A and any other TWO questions in section B

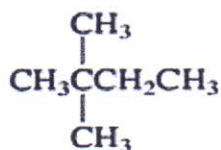
SECTION A (26 Marks)**Question One**

- a) Define the following terms
- i. Organic chemistry (1 Mark)
 - ii. Hydrocarbons (1 Mark)
 - iii. Catenation (1 Mark)
 - iv. Functional group (1 Mark)
 - v. Alkynes (1 Mark)
 - vi. Arenes (1 Mark)
- b) Give any three functional groups and their representative examples based on carbonyl group (3 Marks)
- c) Give the IUPAC names of the following alkanes
- i.



(1 Mark)

ii.

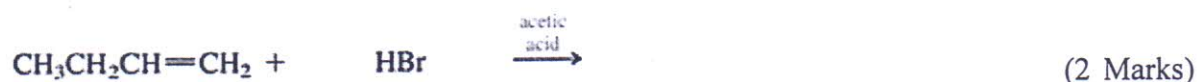


(1 Mark)

- d) Give the difference between primary, secondary and tertiary alkyl groups (3 Marks)

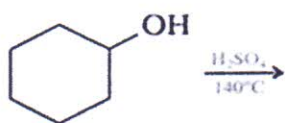
Question Two

- a) Show cis – trans isomerism in But – 2 – ene (2 Marks)
- b) Give the major product of the following reaction on the basis of Markovnikov's rule



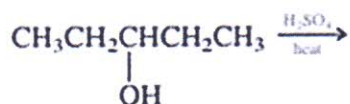
- c) Complete the following reactions

i.



(1 Mark)

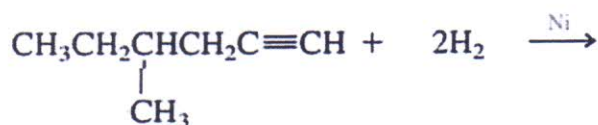
ii.



(2 Marks)

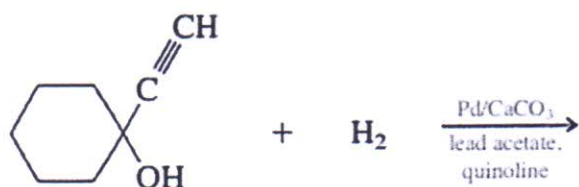
- d) With the aid of equations, show how ethyne can be prepared in the laboratory (2 Marks)
- e) Define the term constitutional isomer (1 Mark)
- f) Complete the following reactions of alkynes

i.



(1 Mark)

ii.



(1 Mark)

SECTION B (Answer any TWO questions in this section)

Question One (17 Marks)

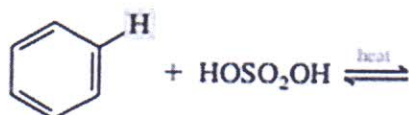
- a) Give the reaction mechanism for monohalogenation of methane (4 Marks)
- b) Show the reaction mechanism for dehydration of tert – Butyl alcohol (4 Marks)
- c) Complete the following reactions of benzene

i.



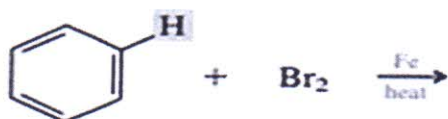
(1 Mark)

ii.



(1 Mark)

iii.



(1 Mark)

- d) State any two uses of alcohols (2 Marks)
- e) Differentiate between primary, secondary and tertiary amines, citing relevant examples in each case (3 Marks)
- f) Identify one test that can be used to test for the presence of alkenes (1 Mark)

Question Two (17 Marks)

- a) Define the term alkyl halide and give two examples (3 Marks)
- b) Explain the following trend in the boiling points of alkyl halides (2 Marks)

	CH_3Cl	CH_2Cl_2	CHCl_3	CCl_4
	Chloromethane (methyl chloride)	Dichloromethane (methylene dichloride)	Trichloromethane (chloroform)	Tetrachloromethane (carbon tetrachloride)
Boiling point:	-24°C	40°C	61°C	77°C

- c) Define the term esterification and give one example of such a reaction (2 Marks)
- d) Give the product of the following esterification reaction (2 Marks)

- e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} + \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \xrightarrow{\text{H}^+}$
- f) State any three methods that can be used to prepare aldehydes and ketones (3 Marks)
- g) Explain why aniline is a much weaker base than cyclohexylamine (2 Marks)
- h) What are ethers? Give two examples of ethers (3 Marks)

Question Three (17 Marks)

- a) Alkylhalides can be prepared through the reaction of alcohols and hydrogen halides. Show the reaction mechanism for the synthesis of tert – Butylchloride from tert – Butyl alcohol and hydrogen chloride (4 Marks)
- b) Citing relevant examples, state any three uses of hydrocarbons (3 Marks)
- c) State one method that can be used to obtain hydrocarbon fuels such as petrol and kerosene (1 Mark)
- d) Define the term amine (1 Mark)
- e) Explain why branched alkanes have lower boiling points than their unbranched isomers (2 Marks)
- f) Define the term stereoisomers and give two examples of stereoisomers (3 Marks)
- g) Define the term hydrogen bond and identify any two hydrocarbons with hydrogen bond in their structure (3 Marks)
