



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: SCH 124

COURSE TITLE: ORGANIC CHEMISTRY II


DURATION: 2 HOURS

DATE: 18/7/2022

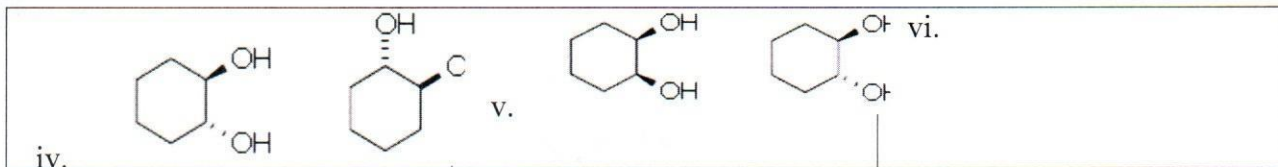
TIME: 8:00AM-10:00AM

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 

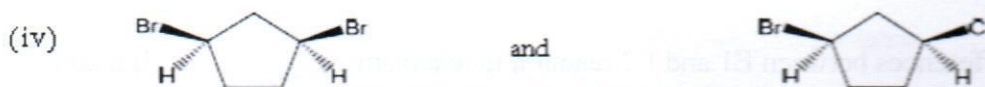
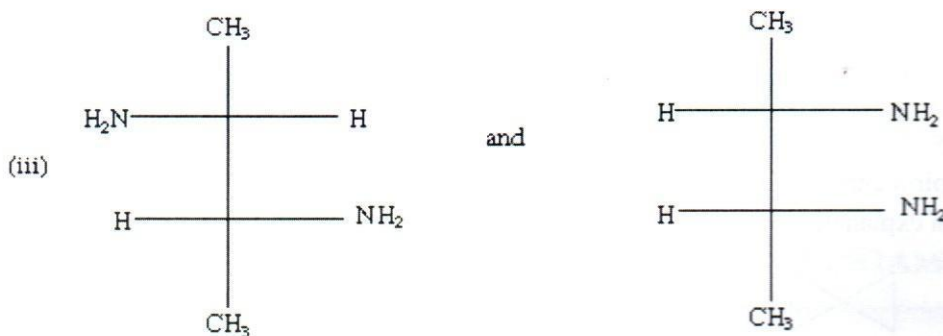
KIBU observes ZERO tolerance to examination cheating



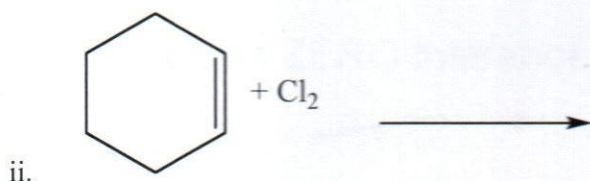
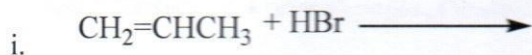
b) Discuss three methods for the resolution of enantiomers from their racemic mixture [10marks]

Question 3

a) In each of the following pairs of compounds, one is chiral and the other is achiral. Identify each compound as chiral or achiral, as appropriate [8 marks]



b) Complete each of the following equations and name the main organic product. [8marks]



Question 1

a) Define the following terms and provide examples in each case;

i. Constitutional isomers

[2 marks]

ii. Stereoisomers

[2 marks]

b) Give the other three names for a stereogenic centre

[3 marks]

c) Consider the structure below



i. Label the stereogenic centres in the structure above using asterisk(*)

[3marks]

ii. How many possible stereoisomers can be generated for this structure?

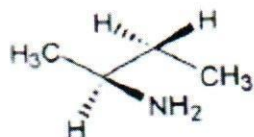
[3marks]

d) Calculate the specific rotation of the sample, if solution of the sample containing 0.75 g/10 mL is placed in 10 m polarimeter tube and its observed rotation at 25°C (D-line) is +1.2°. What would be the specific rotation and percentage optical purity of its enantiomer?

[4marks]

e) Consider the chemical structure of 2-aminobutane shown below. Citing down the C2-C3 bond, draw a Newman projection specifically for this structure.

[3marks]



f) Classify the following as either nucleophile or electrophile; water, Ethanoate ion, Aluminium chloride, ammonia and Carbonium ion

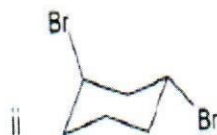
[5marks]

g) What is meant by hydroboration-oxidation reaction? Illustrate it with an example.

[3marks]

h) State whether the molecule below is a cis or trans.

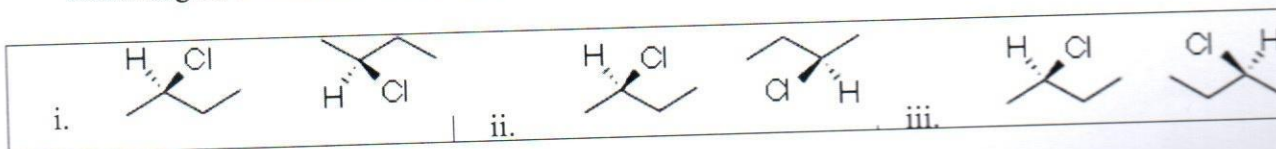
[2marks]

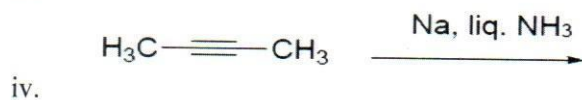


Question 2

a) By assigning R/S configuration to stereogenic centres, give the relationships between the following structures as either "same", "enantiomers", or "diastereomers".

[10marks]

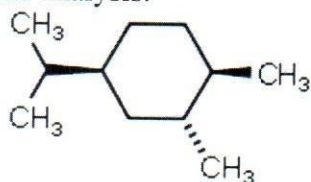




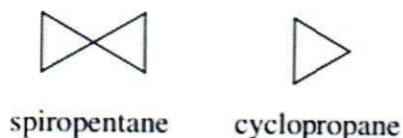
c) Provide a detailed, step-by-step mechanism for the reaction in b (iv) above. [4 marks]

Question 4

- a) Draw all conformers for 3-methylpentane by viewing along C2-C3 bond, and order them from the most stable to least stable. [8marks]
 b) For the following molecule, perform a complete conformational analysis using the data provided in tables in the course packet (or in the book). Follow the steps below to complete the analysis.



- i. Draw the two chair conformations possible for the compound. [4marks]
 ii. Calculate the energy difference between the two chair conformations. [3marks]
 iii. Estimate the ratio of most stable to least stable conformation for a sample of this compound at 25 °C. [1mark]
 C) The strain energy of spiro[3.3]heptane (62.5 kcal/mol) is more than twice that of cyclopropane (27.3 kcal/mol). Suggest an explanation. [4marks]



Question 4

- a) State four differences between E1 and E2 reaction mechanisms [4marks]
 b) Explain two processes by which rearrangement of carbocations occur [4marks]
 c) Predict the major product for each of the following reactions if carbocation occurs rearrangement and suggest the mechanism in each. [12marks]

