

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATION

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
CHEMISTRY**

CHEM 130: ORGANIC CHEMISTRY I

STREAMS: BSC CHEMISTRY

TIME: 2 HOURS

DAY/DATE: FRIDAY 17/04/2020

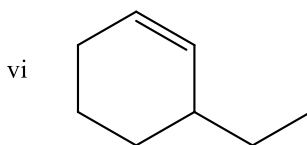
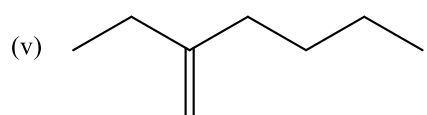
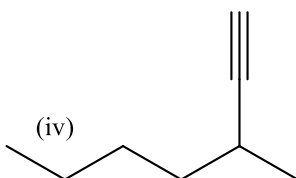
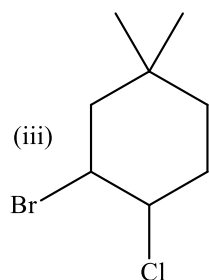
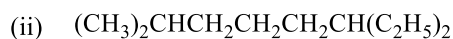
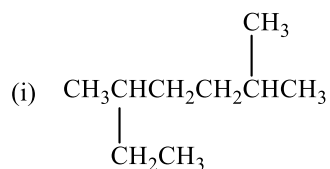
2.30 P.M. – 4.30 P.M.

INSTRUCTIONS

- Answer question **One** (Compulsory) and any other **Two** questions.

QUESTION ONE [30 MARKS]

(a) Write the IUPAC name of each of the following organic compound (**6 Marks**)



(b) Write equations for the preparation of butane from each of the following reagents (**3 marks**)

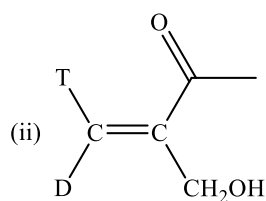
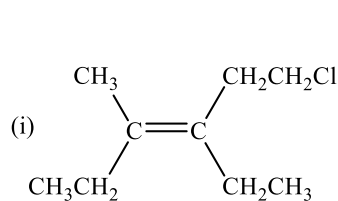
(i) But-2-ene

(ii) 2-Bromobutane

(iii) Chloroethane

(c) Discuss the physical properties of alkenes (**5 marks**)

(d) Determine the E/Z configuration of the following alkenes (**4 marks**)



(e) Determine the hybridization of carbon atoms in the following molecule (**3 marks**)



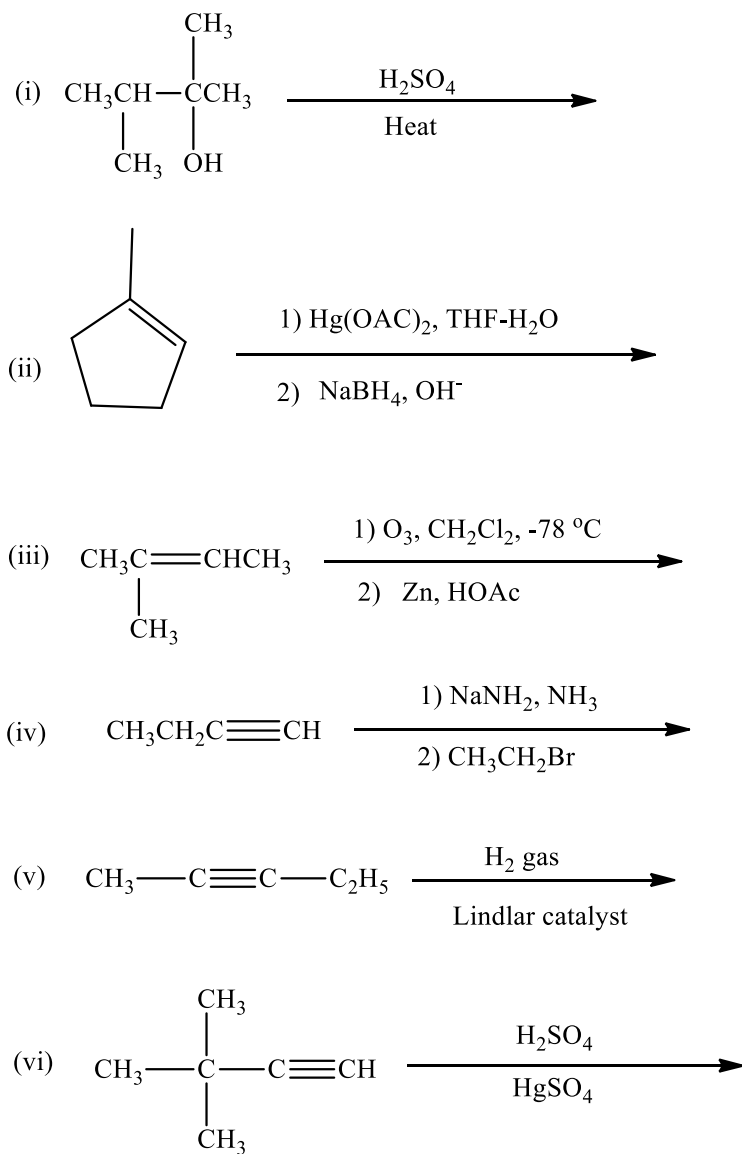
(f) Explain the following observations (**3 marks**)

(i) The boiling points of unbranched alkanes increases with increase in molecular weight

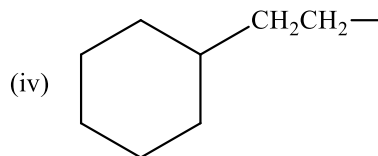
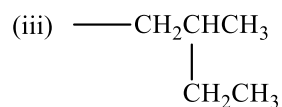
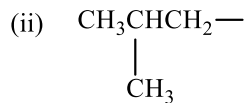
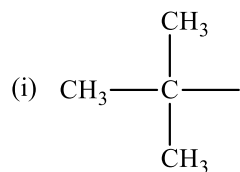
(ii) The melting points of isomeric alkanes increases on branching

(iii) Alkanes are virtually insoluble in water

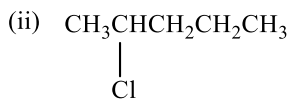
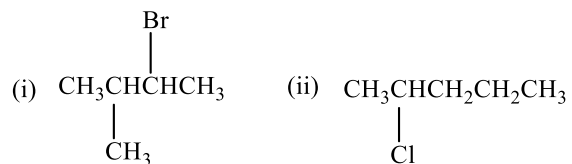
(g) Write the major organic product of each of the following reactions (**6 marks**)

**QUESTION TWO [20 MARKS]**

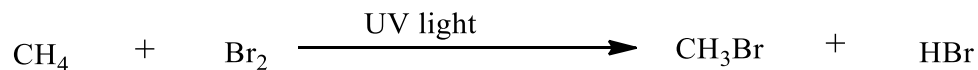
(a) Write the IUPAC name of each of the following alkyl groups (4 marks)



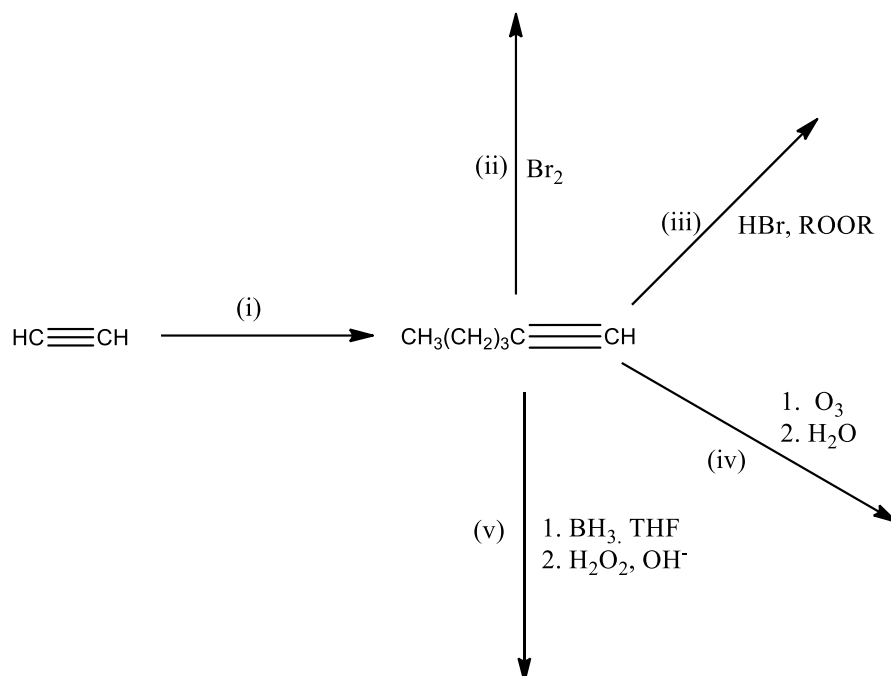
(b) Draw the structures of the major and minor product(s) that are formed when each of the following alkyl halides is dehydrogenated using sodium ethoxide in ethanol (**5 marks**)



(c) Write the stepwise mechanism of the following reaction (**6 marks**)



(d) Write the organic product or reagents of the following reactions (**5 marks**)

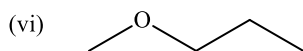
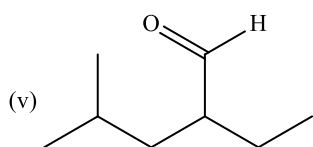
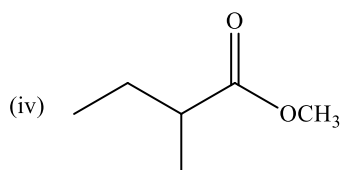
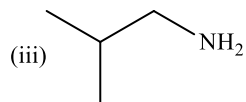
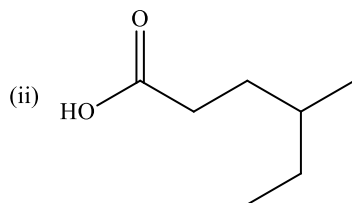
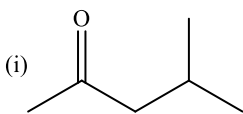


QUESTION THREE [20 MARKS]

- (a) State two sources of alkanes (2 Marks)
- (b) State four major uses of alkanes and cycloalkanes (2 Marks)
- (c) Draw the structure of:
- (i) the alkyne that can be used to prepare 3-Propanone [2 Mark]
- (ii) the alkene that can be used to prepare 2-Methylhexan-2-ol [2 Mark]
- (iii) the alkene that yield a mixture of cyclopentanone and propanal on treatment with ozone followed by reduction with zinc [2 Mark]
- (d) Write the stepwise mechanism of the free radical polymerization of ethene [6 Marks]
- (e) Design a plausible laboratory synthesis of the following organic compounds (4 marks)
- (i) Oct-1-yne using a vicinal dihalide
- (ii) 3-Methylpent-2-ene using an alkyl halide

QUESTION FOUR [20 MARKS]

(a) Write the IUPAC name of each of the following compounds (**6 marks**)



(b) Draw the structures of the products (if any) obtained when 2-methylbut-2-ene is reacted with the following reagents (**6 marks**)

(i) Ni, H₂ (ii) HBr, peroxides (iii) H₂O, H⁺ (iv) Br₂, H₂O

(v) OsO₄, pyridine then NaHSO₄, H₂O (vi) Cold alkaline KMnO₄

(c) Write the structural formulas of the C₆H₁₄ isomeric alkanes (**5 Marks**)

(d) Write the systematic names of the following polymers [**3 Marks**]

