

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE-UNIVERSITY CHEMISTRY

COURSE CODE: PCHEM 021

**COURSE TITLE: INTRODUCTION TO BASIC ORGANIC
CHEMISTRY**

STREAM: SEMESTER TWO

DAY: WEDNESDAY

TIME: 9.00 – 11.00 A.M.

DATE: 23/03/2011

INSTRUCTIONS:

Attempt all questions

PLEASE TURN OVER

QUESTION ONE 17 ½ MKS

(a) Define the following terms;

- i. Aromatic hydrocarbons
- ii. Isomers
- iii. Substitution reaction
- iv. Unsaturated hydrocarbons.
- v. Homologous series

(5 mks)

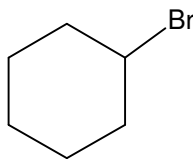
(b) Write all the possible isomers for a molecule whose molecular formula is C_5H_{12} give their IUPAC names.

(5 mks)

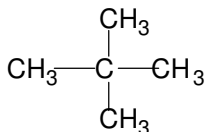
(c) Arrange the isomers in (b) above in order of increasing boiling points. Give a reason for your answer.

(2½ mks)

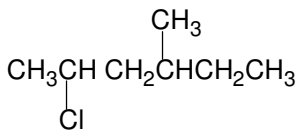
(d) Give the IUPAC names for the following alkanes



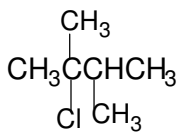
i.



ii.



iii.



iv.

(4 mks)

(e) Write a balanced equation for the reaction of monosubstitution of ethane with chlorine gas in the presence of UV light.

(1 mk)

QUESTION TWO 17 ½ MKS

(a) i) What are geometric isomers? Give examples

(2mks)

ii) Draw the structure of 'cis' and 'trans'-2, 3-Dibromo-2-butene.

(2mks)

(b) Give one simple chemical test that distinguishes between C₃H₈ and C₃H₆

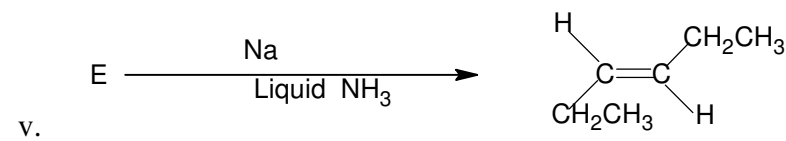
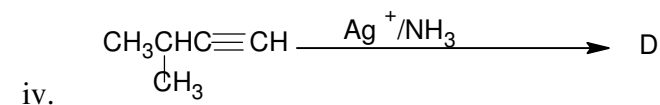
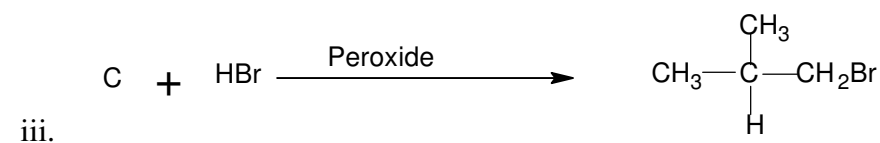
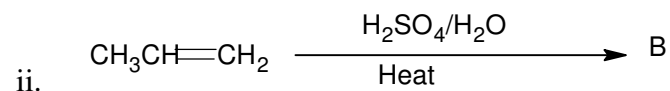
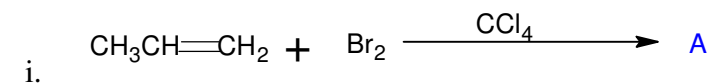
(2mks)

(c) Draw the structures of the following alkenes

- i. 2-Bromo-3-methylbut-1-ene
- ii. 3-Methylcyclohexene
- iii. (Z)-5-Ethyl-4-methyl-4-nonene
- iv. 3-Methylhex-1,4-diene

(4mks)

(d) Give the structures of the missing reactants/products of the following reactions.



(7½ mks)

QUESTION THREE 17 ½ MKS

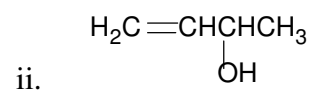
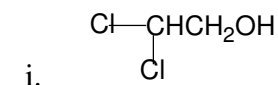
(a) i) Name the three classes of alcohols and give examples

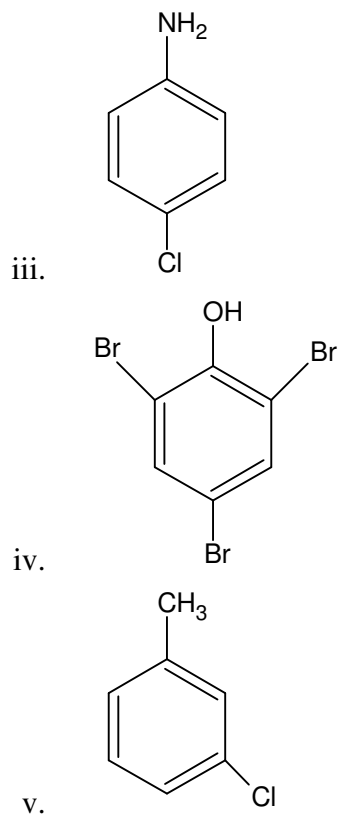
(3 mks)

ii) Explain why alcohols have higher boiling points than the hydrocarbons of the same molecular mass.

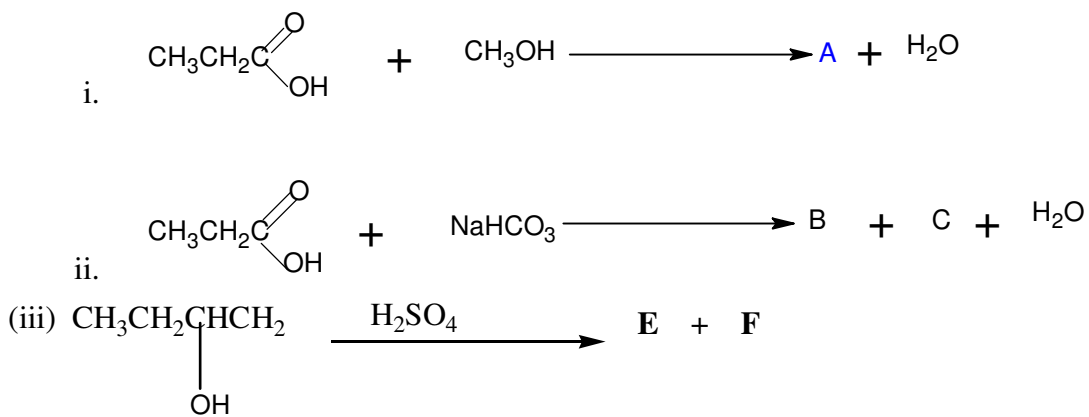
(1½ mks)

(b) Name the following molecules





(c) Complete the following reactions by giving the structure of the missing product



(8 mks)

QUESTION FOUR 17 ½ MKS

- (a) i) Explain the difference between an aldehyde and a ketone . (2 mks)
- ii) Why do aldehydes and ketones have boiling points that are lower than those of their corresponding alcohols with the same number of carbon atoms? (2mks)

(b) Give a chemical test that can distinguish between;

- i. An aldehyde and a ketone
- ii. 1-Butyne and 2-Butyne (4 mks)

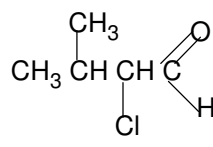
(c) i) Ethanoic acid boils at 118°C which is higher than 1-propanol which boils at 98°C.

Explain the high boiling point of ethanoic acid. (2 mks)

ii) Explain why carboxylic acids are classified as weak acids (2mks)

(d) Give the IUPAC names of the following compounds

i. $\text{CH}_3\text{—O—CH}_2\text{CH}_3$ (1 mk)

ii.  (1 mk)

iii.  (1 mk)

iv. $\text{CH}_3\text{CH}_2\text{—C(=O)—CH}_2\text{CH}_3$ (1 mk)

v.  (1½ mk)