



Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF
TECHNOLOGY IN APPLIED CHEMISTRY (ANALYTICAL OPTION)
BTAC13S

ACH 4105 ORGANIC CHEMISTRY I

SEMESTER EXAMINATION

DECEMBER 2013 SERIES

2 HOURS

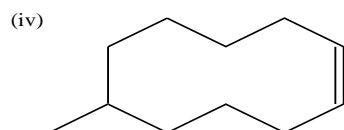
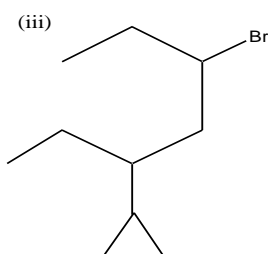
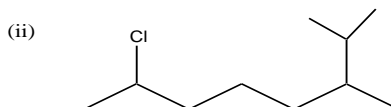
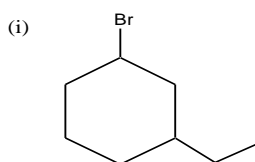
Instructions to candidates:

This paper consist of **FIVE** questions

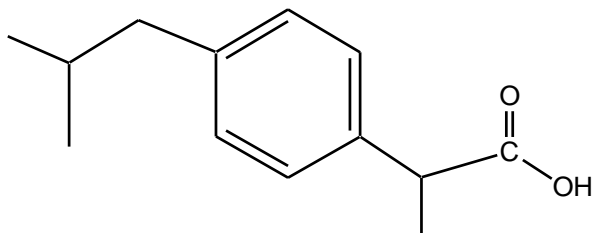
Answer question **ONE** (compulsory) and any other **TWO** questions

QUESTION ONE

a) Give the IUPAC name for each of the following compounds : (2marks) each, 8 total)

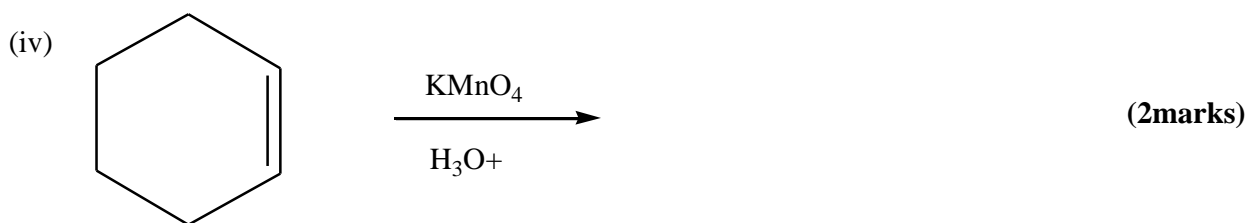
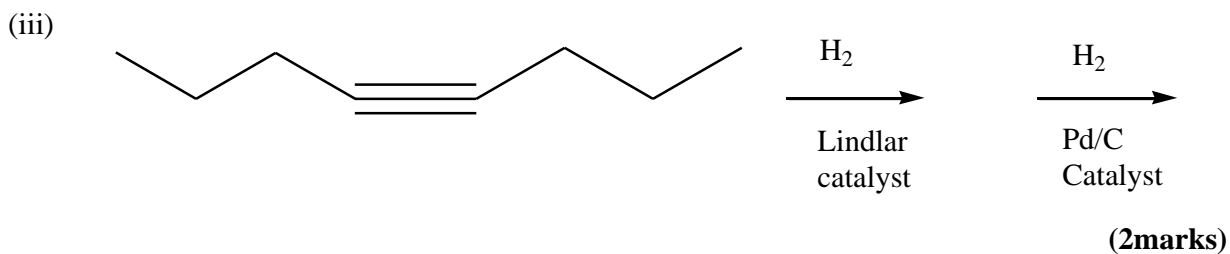
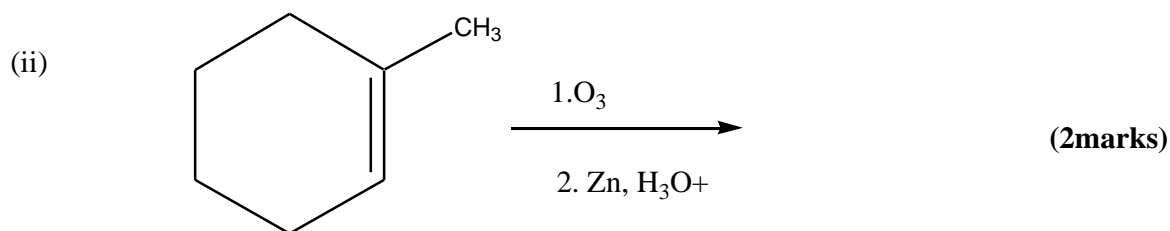
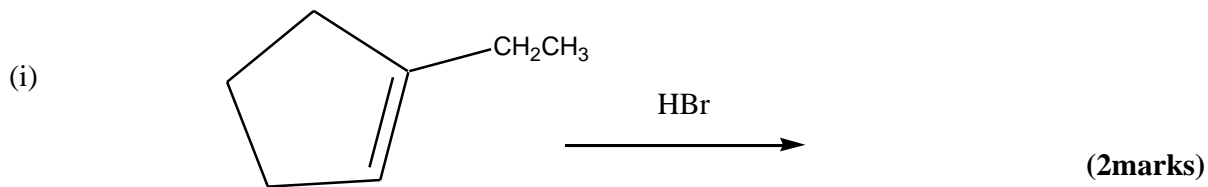


- b) Ibuprofen is a common over-the-counter drug used as a mild pain reliever. The structure of ibuprofen is shown below:



From the structure of ibuprofen, determine

- (i) The number of SP^3 hybridized carbons **(2marks)**
(ii) The number of SP^2 hybridized carbons **(2marks)**
- c) Which the following pairs of compounds has:
- (i) The higher boiling point : 1- bromopertane or 1-bromohexane? Explain.
(ii) The higher melting point: hexane or isohexane? Explain. **(2marks)**
(iii) The highest solubility in water: pentanol or actanol? Explain. **(2marks)**
- d) An organic compound X contains 40.0% carbon, 6.67% hydrogen and the rest oxygen. If the molecular weight of X is 90g/mol, determine its molecular formula?
(C = 12, H =1 and O = 16). **(4marks)**
- e) Complete the following reactions. Where multiple products are possible, indicate the major and minor product and the stereochemistry.



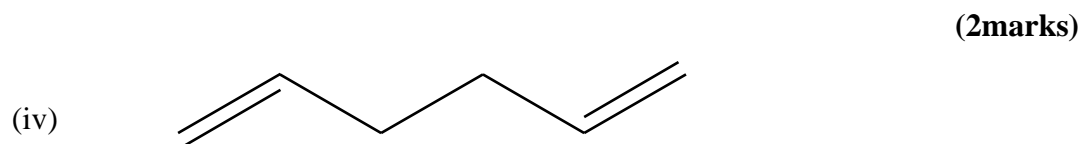
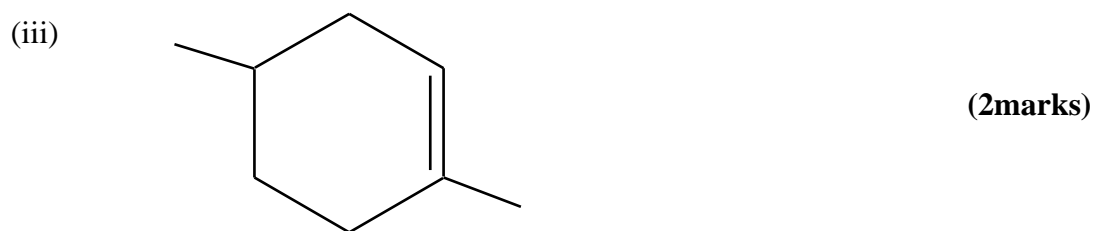
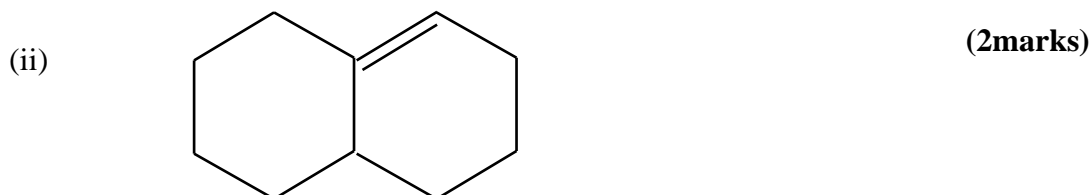
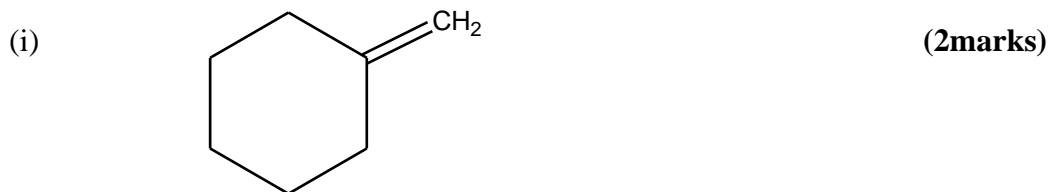
QUESTION TWO

a) Draw structures corresponding to the following IUPAC names

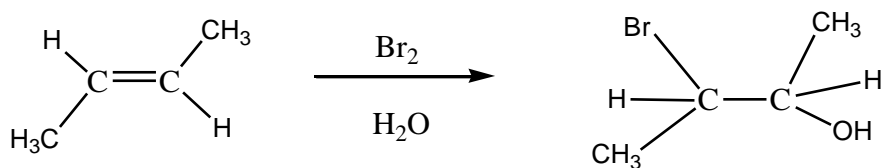
- (i) 3,4-dimethylnonane
- (ii) 3-ethyl-4,4-dimethylheptane
- (iii) 1-bromo-3-ethyl-5-methylcyclohexane
- (iv) 3-cyclobutylhexane

(2marks each, 8 total)

b) Predict the major product from addition of HBr to each of the following alkenes:



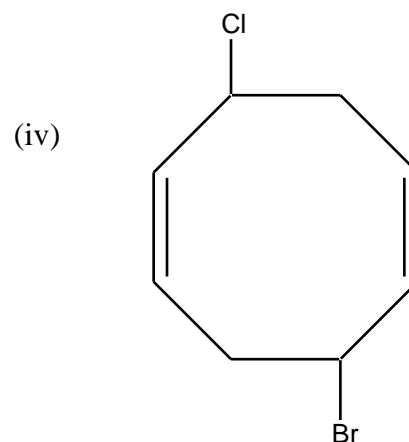
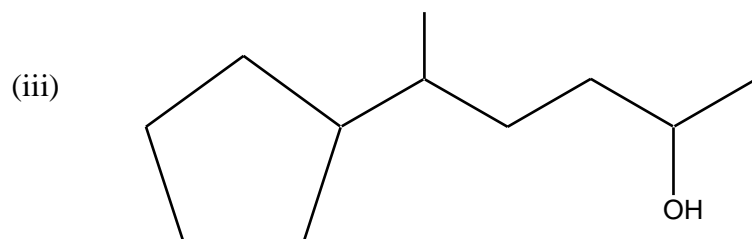
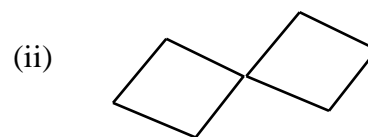
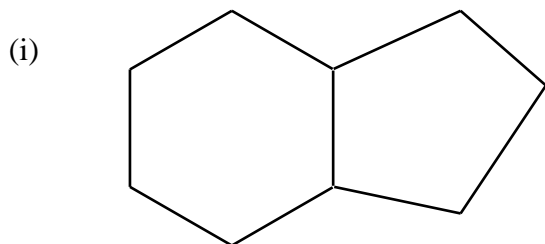
c) Propose a suitable mechanism for the following reaction



(4marks)

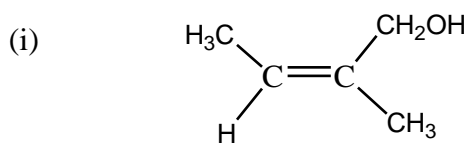
QUESTION THREE

a) Provide the systematic name for each of the following compounds:

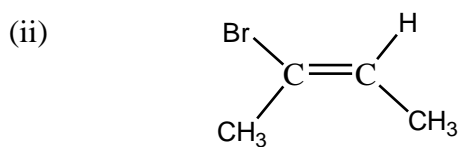


(2marks each, 8 total)

b) Determine the configuration of each of the following alkenes as E or Z as appropriate :

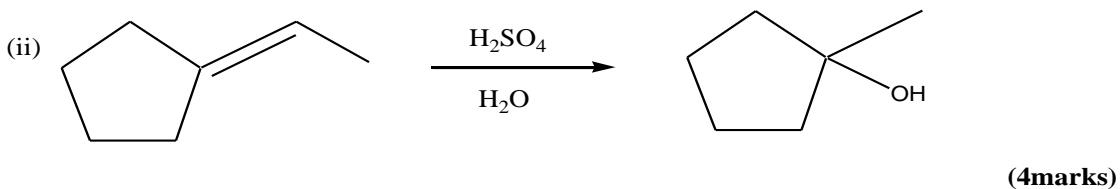
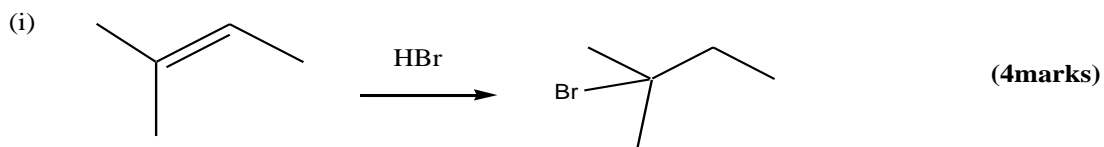


(2marks)



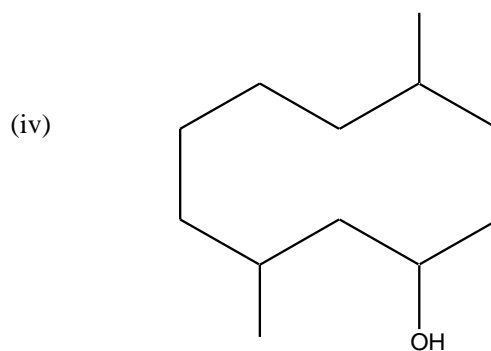
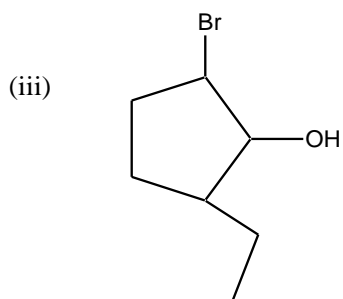
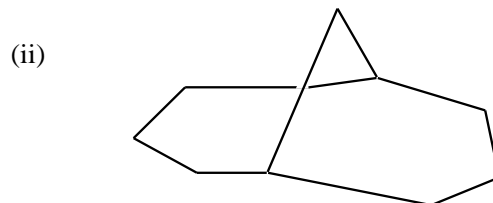
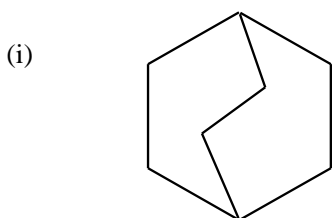
(2marks)

c) Propose mechanisms consistent with the following reactions



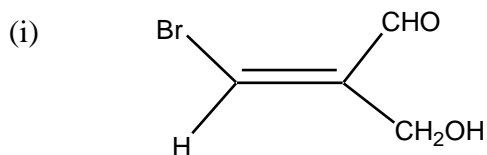
QUESTION FOUR

a) Provide IUPAC names for each of the following compounds

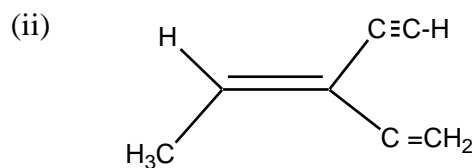


(2marks each, 8 total)

b) Designate the stereochemistry of each of the following compounds as E or Z

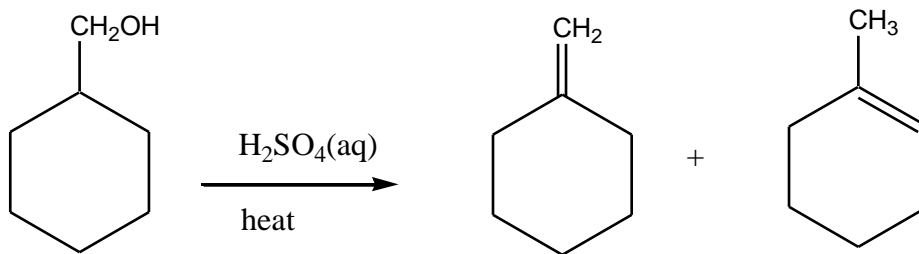


(2marks)



(2marks)

c) Propose a mechanism for the formation of each of the following products shown:



(8marks)

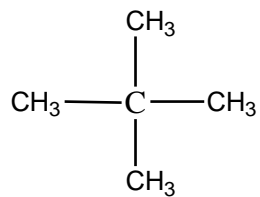
QUESTION FIVE

a) Draw structures corresponding to the following IUPAC names

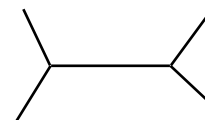
- (i) 3-methyl-1-pentene
- (ii) Cis-3-methyl - 3 - hexane
- (iii) Bicyclo-[2.2.2]- Detane
- (iv) Spiro-[3.2] hexane

(2marks each, 8 total)

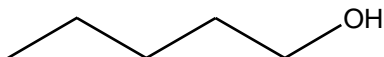
b) Rank the following compounds in order of increasing boiling points. Explain.



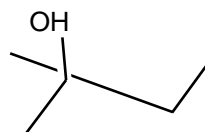
n-hexane



2 is-dimethylbutane



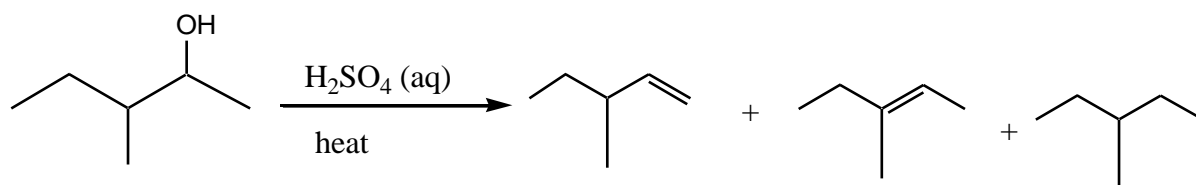
Pentan-1-ol



2-methylbutan-2-ol

(4marks)

c) Propose a suitable mechanism for the formation of each of the products shown.



(8marks)