



Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICAL
LABORATORY SCIENCES

ACH 4118 : ORGANIC CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES

2 HOURS

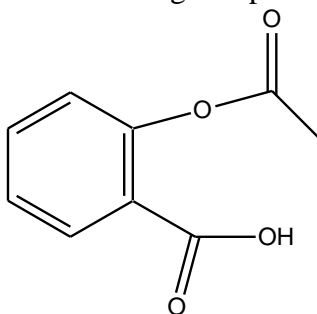
Instructions to candidates:

This paper consist of **TWO** sections **A** and **B**

Section A –Contains MCQS, any wrong response will be penalised. Answer **ALL** questions in **Section B**.

SECTION A – MCQs – (30marks)

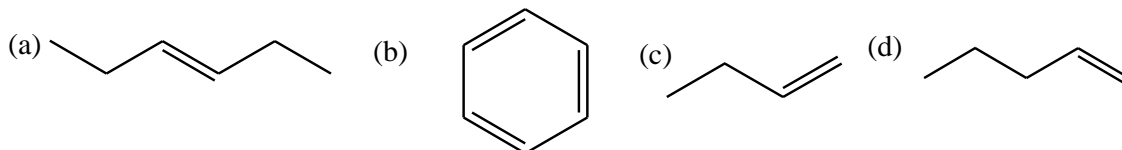
1. What is the molecular formular of the following compound



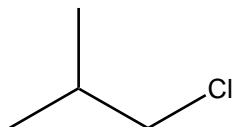
- a) $C_9H_8O_4$
 - b) $C_8H_9O_4$
 - c) $C_9H_{10}O_4$
 - d) $C_8H_8O_4$
2. How many SP^2 carbons are present in the compound in question (1) above?
- a) 5
 - b) 6
 - c) 7
 - d) 8

3. Which of the following compounds contain one or more polar covalent bonds?
- (i) & (ii)
 - (ii) & (iii)
 - (i) & (iii)
 - (i) & (iv)

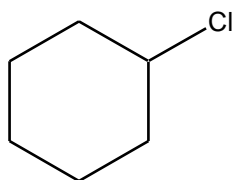
4. The Most likely structure for an unknown that yields only $\text{CH}_3\text{CH}_2\text{CH} = \text{O}$ on ozonolysis is



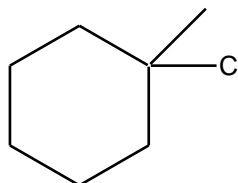
Use the compounds below to answer questions 5 & 6



(i)



(ii)



(iii)

5. Which compound is more reactive in an $\text{S}_{\text{N}}1$ reaction?

- (i)
- (ii)
- (iii)
- (i) & (ii)

6. Which compound is more reactive in an $\text{S}_{\text{N}}2$ reaction

- (i)
- (ii)
- (iii)
- (i) & (ii)

7. When primary alcohols react with PCC they always form

- Carboxylic acids
- Alkenes
- Aldehydes
- Ketones

8. Alkenes react with water to form

- Alcohols
- Carboxylic acids
- Esters
- Amines

9. When excess hydrogen gas reacts with alkynes they form

- Alkenes
- Alkanes
- Alkylhalides
- Alcohols

10. Which of the following group of compounds decolourises bromide water

- a) Carboxylic acids
- b) Alkanes
- c) Alkylhalides
- d) Alkanes & Alkynes

11. Hydrolysis of esters in acidic conditions yields

- a) Alcohols only
- b) Carboxylic acids only
- c) Carboxylic acid & alcohol
- d) Carboxylic acid and water

12. Which of the following is the most soluble in Hexane

- a) $\text{CH}_3\text{CH}_2\text{OH}$
- b) $\text{CH}_3\text{CH}_2\text{COOH}$
- c) $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$
- d) CH_3CHO

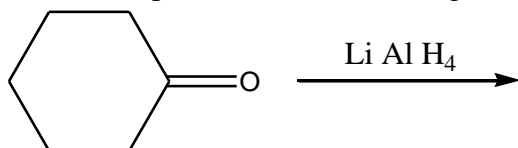
13. Which compound will react the fastest with NaOH

- a) 1-bromopentane
- b) 1-Iodopentane
- c) 1-chloropentane
- d) 1-fluoropentane

14. Which compound is the most acidic

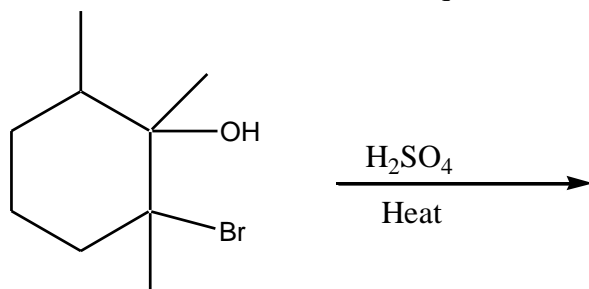
- a) Pentanol
- b) Pentanone
- c) Pentanoic acid
- d) Pentanal

15. What is the product of the following reaction?



- a) Cyclonexane
- b) Cyclohexanol
- c) Cyclonexanal
- d) Cyclonoxane carboxylic acid

Use the reaction below to answer questions 16 -18



16. Name the type of reaction above

- a) Addition
- b) Elimination
- c) Oxidation
- d) Reduction

17. How many product are expected to be produced in the reaction above ?

- a) 1
- b) 2
- c) 3
- d) 4

18. Name the major product

- a) 3-bromo-1,2,3-trimethylhexene
- b) 1-bromo-1,2,3-trimethylcyclohexene
- c) 3-bromo-1, 2, & 3-trimethylcyclohexene
- d) 1-bromo-1, 2, 3-trimethylhexane

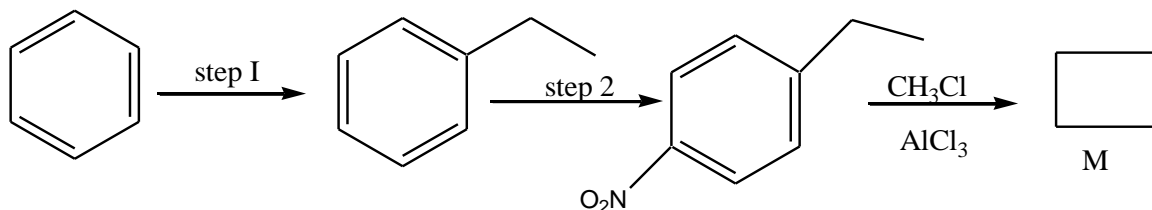
19. Arrange the following compounds in order of decreasing acidity

- (i) $\text{BrCH}_2\text{CH}_2\text{CO}_2\text{H}$
- (ii) CH_3CHCOOH
I
Br

(iii) $\text{CH}_3\text{C}(\text{Br})_2\text{COOH}$

- a) (iii) > (ii) > (i)
- b) (i) > (ii) > (iii)
- c) (ii) > (i) > (iii)
- d) (i) > (iii) > (ii)

Use the reaction scheme below to answer questions 20 – 23



20. What is the name of reaction step I

- a) Friedel crafts acylation
- b) Alkylation
- c) Markovnikovs
- d) Friedel crafts alkylation

21. What are the reagents for step I

- a) $\text{CH}_3\text{CH}_2\text{Cl}$, AlCl_3
- b) CH_3COCl , AlCl_3
- c) CH_3Cl , AlCl_3
- d) CHOCl , AlCl_3

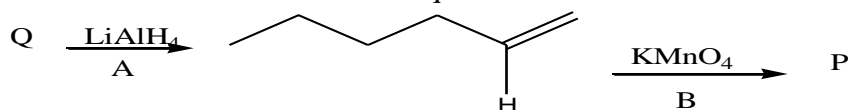
22. What are the reagents for step 2

- a) NaNO_2
- b) $\text{HNO}_3, \text{H}_2\text{SO}_4$
- c) $\text{HNO}_2, \text{H}_2\text{SO}_3$
- d) $\text{NaNO}_3, \text{H}_2\text{O}$

23. Name M

- a) 5-ethyl-2-Nitroaniline
- b) 5-ethyl – 2-Nitrotoluene
- c) 3-ethyl-6-Nitroaniline
- d) 2-ethyl-5-nitrotoluene

Use the reactor below to answer question 24 – 26



24. Classify reaction A

- a) Oxidation
- b) Reduction
- c) Addition
- d) Elimination

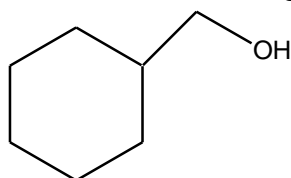
25. Name product P

- a) Pentanoic acid
- b) Pentane
- c) Pentan-1-ol
- d) Pentanone

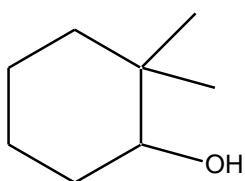
26. Identify the functional group of product Q

- a) Alkene
- b) Aldehyde
- c) Alcohol
- d) Carboxylic acid

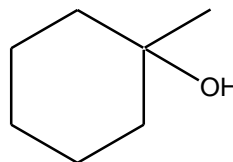
27. Which of the following alcohols cannot be dehydrated



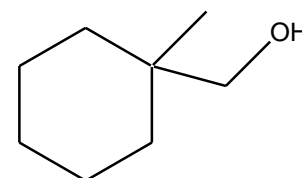
(i)



(ii)



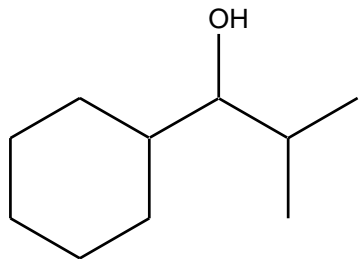
(iii)



(iv)

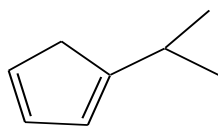
- a) (i)
- b) (ii)
- c) (iii)
- d) (iv)

28. Give the IUPAC name for the following compound



- a) 3-ethyl-5-methylhexan-4-ol
- b) 4-ethyl-2-methylhexan-3-ol
- c) 4,4-diethyl-2-methylhexan-3-ol
- d) 2-methyl-4-ethyl hexan-3-ol

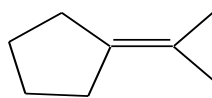
29. Rank the following compounds from least to most stable



(i)



(ii)



(iii)

- a) i < ii < iii
- b) ii < iii < i
- c) iii < i < ii
- d) ii < i < iii

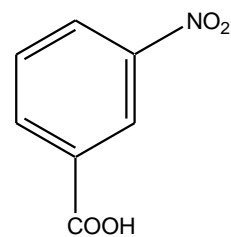
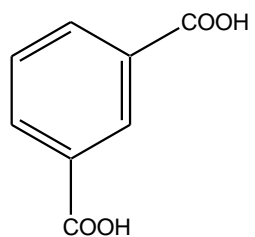
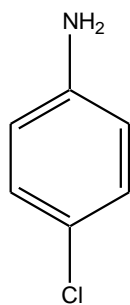
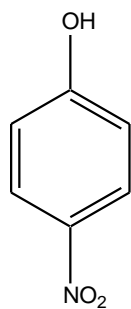
30. What is the IUPAC name for the following compound.

- a) 4-methylcyclohexene
- b) 5-methylcyclohexene
- c) 1-methyl-4-cyclohexene
- d) 1-methyl-3-cyclohexene

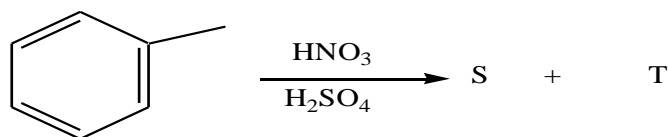
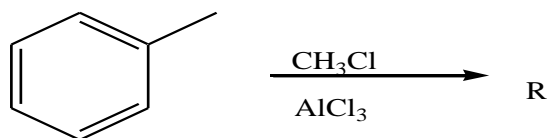
SECTION B – (40marks) Answer ALL questions

1. A hydrocarbon is made up of 86% by mass carbon and the rest hydrogen. If the molecular mass is 70,
 - a) Calculate its empirical and molecular formula **(6marks)**
 - b) Draw the likely structure of the hydrocarbon and name it. **(2marks)**
 - c) Draw any TWO isomers of the hydrocarbon **(2marks)**
2.
 - (a) Describe the sequential chlorination of methane in UV light **(4marks)**
 - (b) With a reason identify the most reactive compound towards electrophilic aromatic substitution: phenyl ethanoate or Ethylbenzoate (draw the compounds) **(6marks)**
3.
 - a) Indicate with an arrow where a 3rd electrophile would add to the following

substituted benzenes



b) Draw and name the product of the following reaction (6marks)



4. Complete the following reactions and name the products (10marks)

