



# MASENO UNIVERSITY

## UNIVERSITY EXAMINATIONS 2012/2013

### SECOND YEAR TWO SEMESTER EXAMINATIONS FOR THE CERTIFICATE IN HOSPITALITY & TOURISM OPERATIONS (CITY CAMPUS)

#### SCH 0012: ORGANIC CHEMISTRY

*Date: 9<sup>th</sup> August, 2013*

*Time: 9.00 – 11.00 a.m.*

---

#### INSTRUCTIONS:

Answer ANY FIVE questions.

### QUESTION ONE

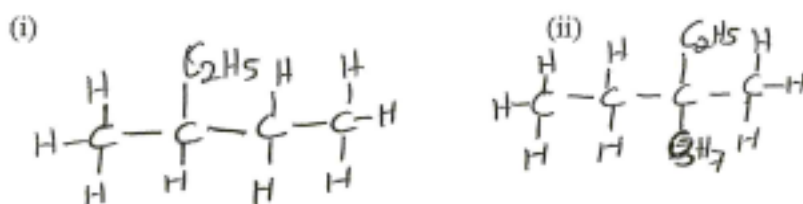
a) (i) Give the family name to which compounds with molecular formula  $C_nH_{2n+1}$  belong. [1mark]

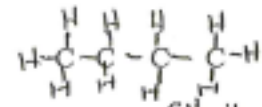
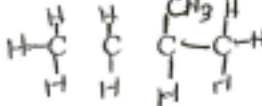
(ii). Write the formula and name of one compound that belongs to the family in (i) above. [2marks]

b) (i). What are isomers? [1mark]

(ii) Write structures for three isomers of the compound with the molecular formula  $C_6H_{14}$ . For each isomer, give a name [6marks]

c) Name the following compounds. [2marks]



d)  was found to have a higher melting point than . Explain the difference. [2marks]

### QUESTION TWO

a) (i) What is the principal difference between saturated and unsaturated hydrocarbons [2marks]

(ii) Classify the following as saturated or unsaturated.

I.  $CH_3CH(CH_3)CH_3$       II.  $CH_3CCCH_3$  [2marks]

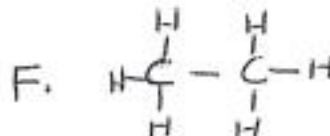
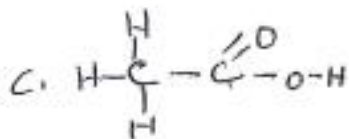
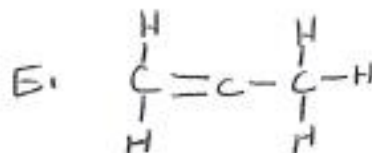
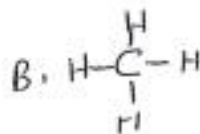
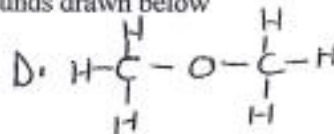
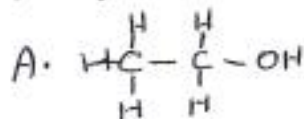
b) Study the information below for three compounds and answer the questions that follow.

Compound	Melting point(°C)	Boiling point (°C)
C <sub>4</sub> H <sub>8</sub>	-180	-6
C <sub>5</sub> H <sub>12</sub>	-130	36
C <sub>6</sub> H <sub>12</sub>	-140	63.5

- (i) Which two compounds belong to the same homologous series? [2marks]
- (ii) Explain the difference in the melting and boiling points of C<sub>4</sub>H<sub>8</sub> and C<sub>6</sub>H<sub>12</sub> [3marks]
- (iii) State and explain the effect of adding bromine water to C<sub>4</sub>H<sub>8</sub> and C<sub>5</sub>H<sub>12</sub> [3marks]
- c) 1 – butyne and 2 – butyne were separately reacted with potassium permanganate, an oxidizing agent. Name the products formed in each case [2marks]

### QUESTION THREE

a) Study the structures of the compounds drawn below



Using the letters A to F as appropriate, answer the following questions

- (i) Which compound is an unsaturated hydrocarbon? [2marks]
- (ii) Which compounds are members of the same homologous series? [2marks]
- (iii) Which compound reacts with sodium carbonate? [2marks]
- (iv) Which compounds are isomers of the same compound [2marks]
- (v) Give the IUPAC or systematic name of compound C [2marks]

b). Ethyne,  $C_2H_2$ , burns in oxygen to give a very hot flame.

The temperature is so high that the flame can be used to cut metal.

- (i) Name the two products of the complete combustion of ethyne [2marks]
- (ii) Describe a chemical test for one of these products [2marks]

#### QUESTION FOUR

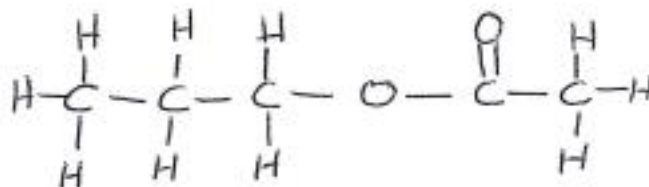
- a) The following terms are used in the description of organic compounds  
**alcohol, amide, alkane, saturated hydrocarbon, alkene, polymer, alkyne, unsaturated hydrocarbon.**

Each of the compounds below can be described by two of the above terms, Choose the appropriate two terms for the following

- (i) Methane [2marks]
  - (ii) Hexyne [2marks]
  - (iii) Polythene [2marks]
  - (iv) Nylon [2marks]
- b) One of the general characteristics of homologous series is that all the members can be represented by a general formula.
- (i) What is the general formula of alkyne series [2marks]
  - (ii) Give one other general characteristics of the homologous series [2marks]
  - (iii) What is the functional group for alcohols (alkanols) [2marks]

### QUESTION FIVE

- a) This is a structure of an ester made in a reversible reaction between a carboxylic acid and an alcohol



- (i) State the conditions for this reaction [2marks]
- (ii) Draw the structure of the carboxylic acid used in the reaction [2marks]
- b) Explain the following
- (i) Hexane has a boiling point of  $68.7^{\circ}\text{C}$  while 2-methyl pentane which has the same molecular formula has a boiling point of  $60.3^{\circ}\text{C}$  [2marks]
- (ii) Methane is a gas at room temperature while pentane is a liquid at room temperature [2marks]
- (iii) Methane is insoluble in water but methanol is soluble in water [2marks]
- c) The compound  $\text{CH}_3\text{CHCH}_2$  reacts with  $\text{HBR}$  to give two products A and B
- (i) Write the formulae of A and B [2marks]
- (ii) Which of the products in (i) above is the major product of the reaction. Explain [2marks]

### QUESTION SIX

- a) Ethene is made by the cracking of long chain hydrocarbon molecules such as  $\text{C}_{16}\text{H}_{34}$
- (i) Construct an equation to illustrate the cracking of  $\text{C}_{16}\text{H}_{34}$  to make ethene and another

hydrocarbon as the only products

[2marks]

- (ii) Ethene is bubbled through aqueous bromine.  
What would you observe during the reaction?

Explain the reaction

[2marks]

- b) The following is a list of formulae of organic compounds

**CH<sub>3</sub>COOH, C<sub>5</sub>H<sub>12</sub>, C<sub>2</sub>H<sub>5</sub>OH, C<sub>3</sub>H<sub>6</sub>, C<sub>7</sub>H<sub>14</sub>**

Which of the formulae fit the following descriptions?

- (i) compound which dissolves in water to form an acidic solution

[2marks]

- (ii) two compounds which are from the same homologous series

[2marks]

- (iii) a compound which is oxidized by acidified potassium dichromate(VI) to give ethanoic acid

[2marks]

- c) Complete the reaction below by giving the missing product

[2marks]

