



SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
ALTERNATE END OF SEMESTER EXAMINATION

COURSE CODE : CHM 004
COURSE TITLE : Fundamentals in Chemistry III
LECTURER(S) : Merrie Laurencin
DATE :
TIME :
DURATION : 2 HOURS
STUDENT ID # : _____

GENERAL INFORMATION AND INSTRUCTIONS

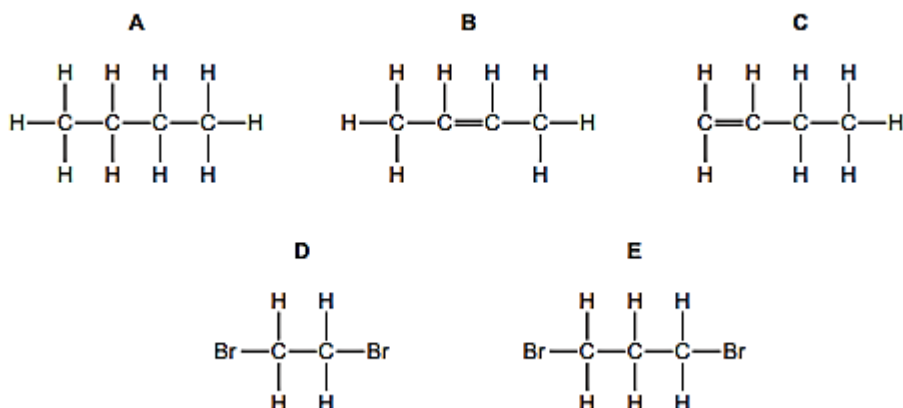
- Students must sign **IN** and **OUT** on the examination class list.
- Write your **ID number** on the question paper.
- This exam consists of **TWO sections**.
- Section A consists of **25 multiple choice questions** and is worth **25 marks**.
- Section B consists of **3 structured questions** and is worth **27 marks**.
- Write your answer to **ALL** questions in the spaces provided.
- The use of a pocket electronic calculator is permitted.

Question	Student's Mark	Moderated Mark
Section A 1 - 25		
Section B		
1		
2		
3		
Total		

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

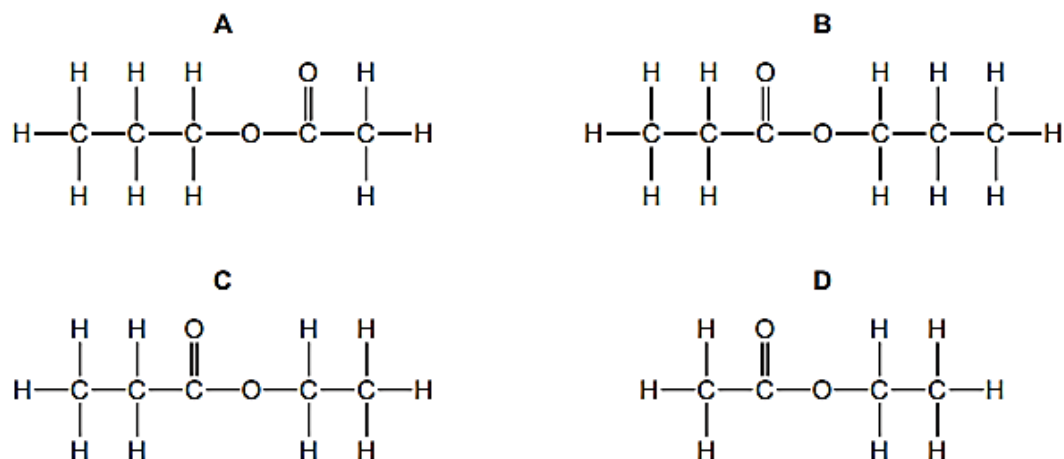
SECTION A

Each item in this section has four suggested answers lettered A, B, C, D. Read each item carefully and circle the best answer. EACH question is worth ONE mark.



- Which two compounds are structural isomers of each other?
 - Compound B and Compound C
 - Compound D and Compound E
 - Compound A and Compound E
 - Compound C and Compound A
- To which homologous series does this compound, C_2H_4 , belong to?
 - Alkanols
 - Alkenes
 - Alkanes
 - Esters
- Members of a homologous series
 - Have similar chemical properties
 - Have the same molecular formula
 - Have the same functional group
 - I and II only
 - I and III only
 - II and III only
 - I, II and III
- The general formula for an alkene is:
 - C_nH_{1n}
 - C_nH_{2n+1}
 - C_nH_{n+1}
 - C_nH_{2n}
- A compound has the formula C_4H_9COOH . The name of the compound is:
 - Ethanoic acid
 - Pentanoic acid
 - Propanol
 - Butanoic acid

6. Which structure represents the ester made from ethanoic acid and propanol?

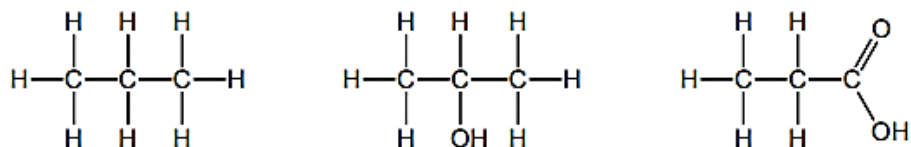


7. Pentane is an alkane and pentene is an alkene.

	pentane	pentene
A	becomes colourless	becomes colourless
B	becomes colourless	remains unchanged
C	remains unchanged	becomes colourless
D	remains unchanged	remains unchanged

What is observed when bromine water is added to sample of each compound?

8. The structures of three molecules are shown.



- A** alcohols
- B** alkanes
- C** alkenes
- D** carboxylic acids

Which homologous series is not represented?

9. What two organic compounds react with each other to produce an ester?
- A.** Carboxylic acids and Amides
 - B.** Carboxylic acids and Alkanes
 - C.** Alcohols and Carboxylic acids
 - D.** Alcohols and Methyl alcohols

10. What is the general formula for alkanes?

- A. $C_n H_{2n}$
- B. $C_n H_{2n+2}$
- C. $C_n H_{2n+1}$
- D. $C_n H_{2n+3}$

11. Which metal carbonate does not produce carbon dioxide when it is heated?

- A. Copper (II) carbonate
- B. Iron (II) carbonate
- C. Potassium carbonate
- D. Zinc carbonate

12. Which process removes carbon dioxide from the Earth's atmosphere?

- A. Combustion
- B. Heating limestone
- C. Photosynthesis
- D. Respiration

13. Sulfur dioxide, carbon monoxide and oxides of nitrogen are common gaseous pollutants found in the air. Which pollutants contribute to acid rain?

- A. Carbon monoxide and sulfur dioxide
- B. Oxides of nitrogen and sulfur dioxide
- C. Oxides of nitrogen only
- D. Sulfur dioxide only

14. When aqueous sodium hydroxide is added to a solution of a metal ion, a grey-green precipitate forms, which dissolved in excess to form a dark green solution.

What is the identity of the metal?

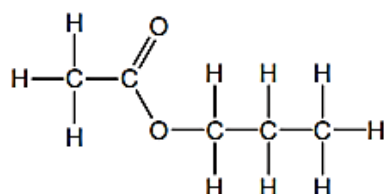
- A. Chromium (III)
- B. Iron (II)
- C. Iron (III)
- D. Copper (II)

15. Which pollutants are responsible for the erosion of buildings and statues?

- 1. Carbon monoxide
- 2. Oxides of nitrogen
- 3. Sulfur dioxide

- A. 1,2 and 3 B. 1 and 2 only C. 2 and 3 only D. 3 only

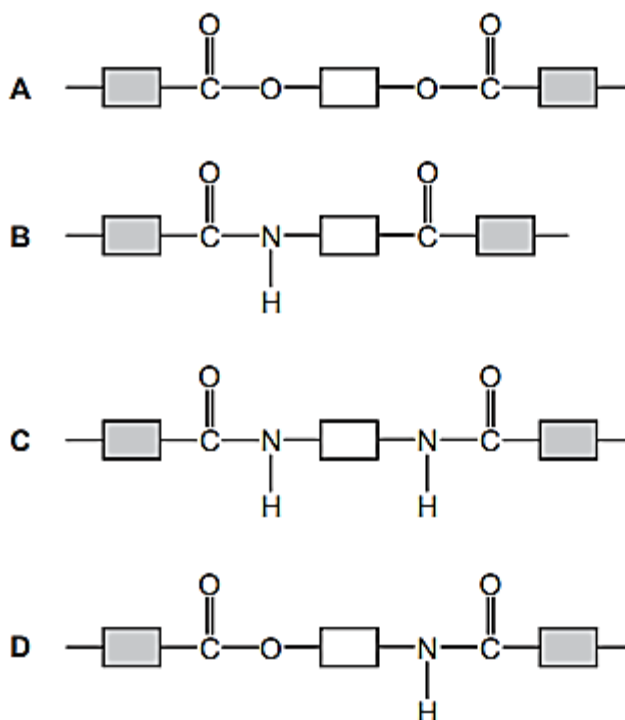
16. The structure of an ester is shown.



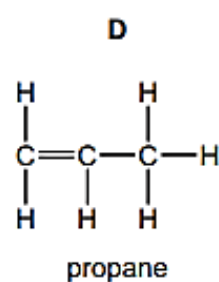
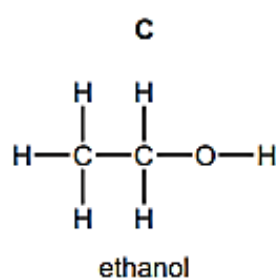
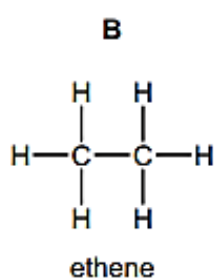
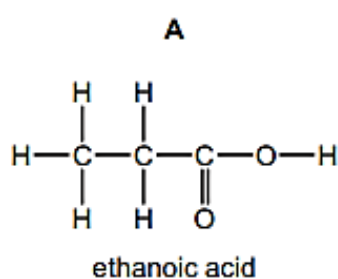
What are the names of carboxylic acid and the alcohol that react together to form this ester?

	carboxylic acid	alcohol
A	ethanoic acid	ethanol
B	ethanoic acid	propan-1-ol
C	propanoic acid	ethanol
D	propanoic acid	propan-1-ol

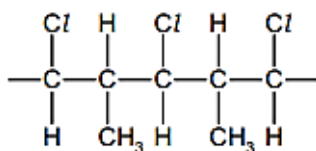
17. Which diagram represents the structure of nylon?



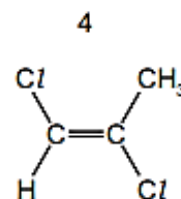
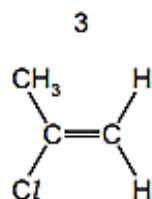
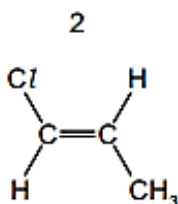
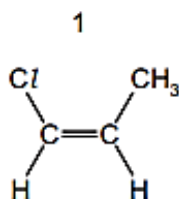
18. Which structure is correctly named?



19. The structure of part of a polymer is shown.



Which monomers can be used to make this polymer?



A 1 and 2

B 1 and 4

C 2 and 3

D 3 and 4

20. Carbon dioxide is used in all of the following **EXCEPT**:

- A. Fire extinguishers
- B. Soft drinks
- C. Hospitals
- D. Aerosol sprays

21. Which of the following pairs of reactants would be the least suitable to prepare a sample of carbon dioxide in the laboratory:

- A. Calcium carbonate and dilute nitric acid
- B. Magnesium carbonate and dilute sulfuric acid
- C. Copper (II) carbonate and dilute hydrochloric acid
- D. Calcium carbonate and dilute sulfuric acid

22. The increase in carbon dioxide levels in the atmosphere are predicted to cause all the following **EXCEPT**:

- A. Depletion of the ozone layer
- B. Changes in global weather patterns
- C. Melting of polar ice caps
- D. Flooding of low-lying coastal areas

23. When sodium nitrate crystals are heated:

- A. They do not decompose
- B. They form a brown, acidic gas
- C. They form a gas which relights a glowing splint
- D. They evolve a gas which causes a lighted splint to be extinguished with a squeaky pop

24. Which of the following is true of non-metals?

- A. Most have high densities
- B. They are all non-conductors of electricity
- C. They are usually solid at room temperature
- D. Most have low melting points

25. Oxygen can be prepared in the laboratory by the decomposition of hydrogen peroxide. Manganese (IV) oxide is also usually used in the preparation as:

- A. A source of the oxygen
- B. A catalyst
- C. An oxidising agent
- D. A reducing agent

[SECTION A TOTAL: 25 MARKS]

SECTION B

Instruction: Answer ALL questions in the spaces provided.

1.

The table shows the names or structures of organic compounds **P** to **U**.

P	Q	R
$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $	propanoic acid	but-1-ene
S	T	U
propan-1-ol	methyl butanoate	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \diagdown \quad \quad \\ \text{C}=\text{C}-\text{C}-\text{H} \\ \diagup \quad \quad \\ \text{H} \quad \quad \text{H} \end{array} $

(a) Give the letters of the organic compounds, **P** to **U**, that are unsaturated hydrocarbons.

..... [2]

(b) Describe the test for an unsaturated hydrocarbon.

test

observations

[2]

(c) But-1-ene is an unbranched molecule.

(i) Name the unbranched isomer of but-1-ene.

..... [1]

(ii) Name the following organic compounds:

$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ _____ [1]	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \quad \quad \\ \text{C}=\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____ [1]
$\begin{array}{c} \text{H} \quad \quad \text{O} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ \\ \text{H} \end{array}$ _____ [1]	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{O} \end{array}$ _____ [1]
$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \\ \quad \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \quad \text{H} \end{array}$ _____ [1]	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$ _____ [1]

[TOTAL:11 MARKS]

2

Alcohols are a 'family' of organic molecules which have the same general formula.

(a) What is the name given to any 'family' of organic molecules which have the same general formula and similar chemical properties?

..... [1]

(b) Give the general formula of alcohols.

..... [1]

(c) Propan-1-ol can be made from propene.

(i) Name the reagent and give the conditions needed to convert propene into propan-1-ol.

reagent

conditions

[2]

(ii) Write a chemical equation for the complete combustion of propan-1-ol.

..... [2]

(d) Bacteria in the soil are able to convert ammonium compounds into oxides of nitrogen. The oxides of nitrogen can escape into the atmosphere.

(i) State **one** other source of oxides of nitrogen in the atmosphere.

..... [1]

(ii) State **one** effect of oxides of nitrogen on health.

..... [1]

(iii) Oxides of nitrogen are greenhouse gases which contribute to climate change.

Give the name of **one** other greenhouse gas which makes a major contribution to climate change.

..... [1]

[TOTAL:9 MARKS]

3 This question is about metals.

(a) State **three** general physical properties common to most metals.

1

2

3

[3]

(b) Metals are often used in the form of alloys.

(i) State the meaning of the term *alloy*.

.....

..... [1]

(ii) Explain in terms of their properties why alloys are used instead of pure metals.

..... [1]

(c) Place these metals in order of their reactivity with oxygen.

copper
magnesium
potassium
zinc

Put the least reactive metal first.

least reactive → most reactive

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[2]

[TOTAL:7 MARKS]

[SECTION B TOTAL: 27 MARKS]

