



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

COURSE CODE : CHM 004
COURSE TITLE : Fundamentals in Chemistry III
LECTURER(S) : Merrie Laurencin
DATE : Tuesday, 6th May 2025
TIME : 1:00-3:00 p.m.
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.
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- 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		

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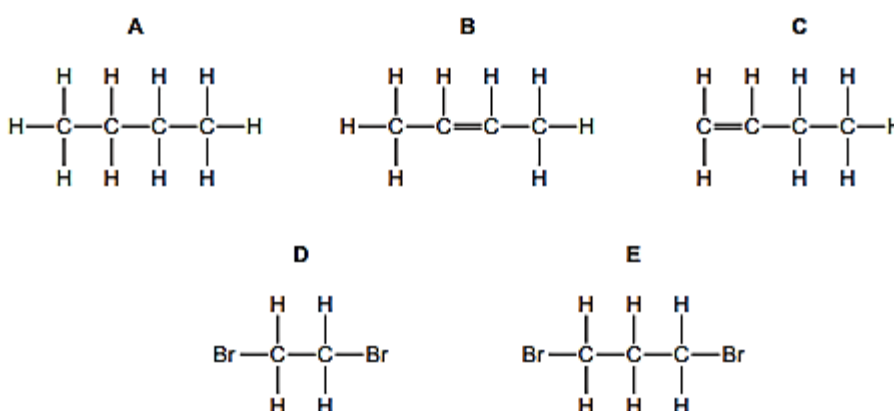
SECTION A

Instruction: 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.

1. Which compounds are alkanes?

compound	W	X	Y	Z
formula	C_4H_{10}	C_5H_{10}	C_6H_{12}	C_6H_{14}

- A. W and X B. W and Z C. X and Y D. Y and Z
2. Which two compounds are structural isomers of each other?



- A. Compound B and Compound C
 B. Compound D and Compound E
 C. Compound A and Compound E
 D. Compound C and Compound A
3. To which homologous series does this compound, C_3H_6 , belong to?
 A. Alkanols
 B. Alkenes
 C. Alkanes
 D. Esters
4. Members of a homologous series
 I. Have similar chemical properties
 II. Have the same molecular formula
 III. Have the same functional group
- A. I and II only
 B. I and III only
 C. II and III only
 D. I, II and III
5. Which two reagents are used to distinguish alkenes from alkanes?
 A. Bromine and potassium manganate (VII)
 B. Bromine and acidified potassium manganate (VII)
 C. Bromine, potassium manganate and heat
 D. Bromine, potassium manganate (VI) and heat
6. The general formula for an alkanoic acid is:
 A. $C_nH_{2n}COO$
 B. $C_nH_{2n+1}COO$
 C. $C_nH_{2m+2}COOH$
 D. $C_nH_{2n+1}COOH$

7. Why is sulphuric acid used during esterification?
- It acts as a catalyst and a dehydrating agent
 - It ensures that mixture boils smoothly
 - It acts as a dehydrating agent and helps to slow the reaction
 - It speeds up the reaction and adds moisture to the reaction
8. A compound has the formula C_3H_7COOH . The name of the compound is:
- Ethanoic acid
 - Propanoic acid
 - Propanol
 - Butanoic acid
9. Information about four hydrocarbons is shown.

Which statement is correct?

- Hydrocarbon W has the formula CH_4 and can be polymerised.
 - Hydrocarbon X has the formula C_2H_4 and can be polymerised.
 - Hydrocarbon Y has the formula C_3H_6 and can be polymerised.
 - Hydrocarbon Z has the formula C_4H_{10} and can be polymerised.
10. Which pair of compounds reacts to form a condensation polymer?
- CH_3COOH and $C_2H_5NH_2$
 - $HCOOH$ and HOC_2H_4OH
 - $HOC_6H_{12}OH$ and $HOCC_3H_6COOH$
 - $H_2NC_2H_4NH_2$ and HOC_3H_6OH

hydrocarbon	number of carbon atoms in the molecule	reaction with bromine water
W	1	no reaction
X	2	no reaction
Y	3	decolourises it
Z	4	decolourises it

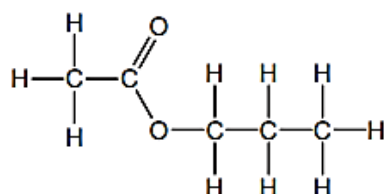
11. Which metal carbonate does not produce carbon dioxide when it is heated?
- Copper (II) carbonate
 - Iron (II) carbonate
 - Potassium carbonate
 - Zinc carbonate
12. Which process removes carbon dioxide from the Earth's atmosphere?
- Combustion
 - Heating limestone
 - Photosynthesis
 - Respiration
13. Sulfur dioxide, carbon monoxide and oxides of nitrogen are common gaseous pollutants found in the air. Which pollutants contribute to acid rain?
- Carbon monoxide and sulfur dioxide
 - Oxides of nitrogen and sulfur dioxide
 - Oxides of nitrogen only
 - 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?
- Chromium (III)
 - Iron (II)
 - Iron (III)
 - Copper (II)

15. Which pollutants are responsible for the erosion of buildings and statues?
- Carbon monoxide
 - Oxides of nitrogen
 - Sulfur dioxide

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

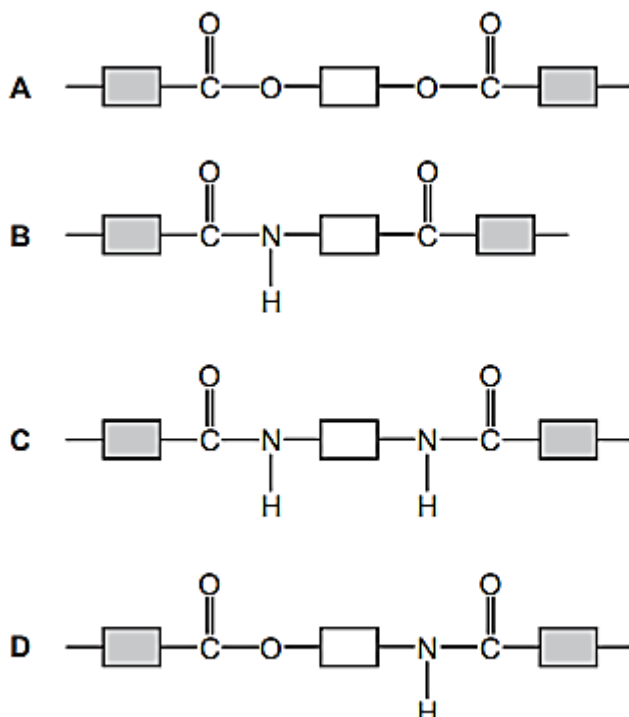
16. The structure of an ester is shown.



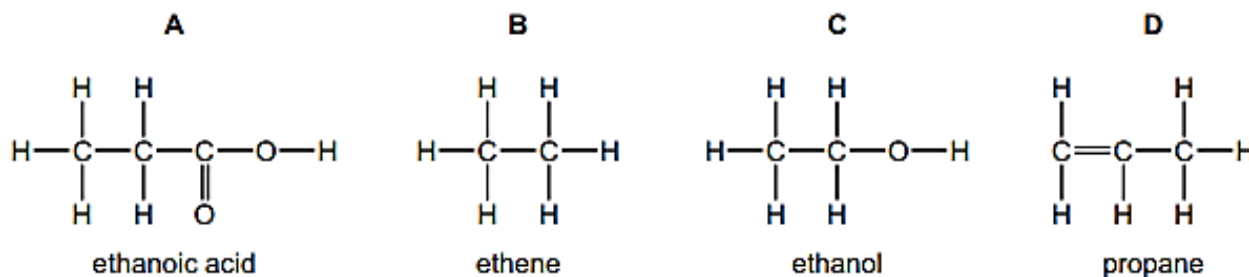
What are the names of carboxylic acid and the alcohol that react together to form this ester?

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

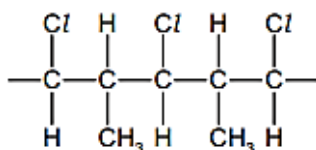
17. Which diagram represents the structure of nylon?



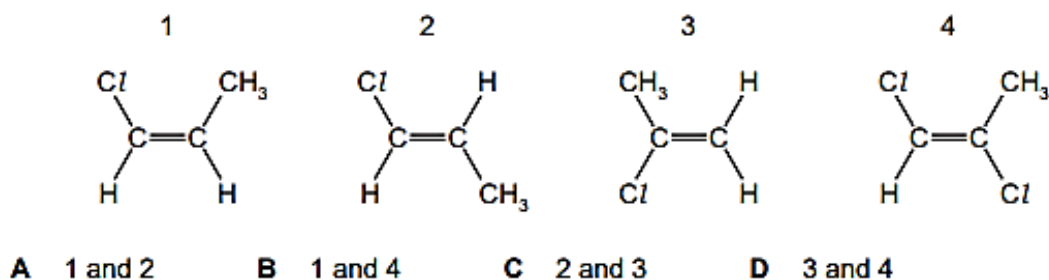
18. Which structure is correctly named?



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



Which monomers can be used to make this polymer?



20. 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

21. 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

22. 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

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

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

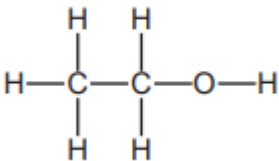
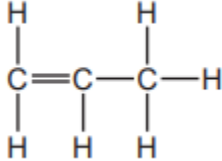
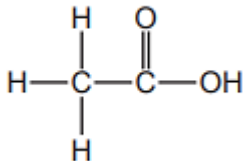
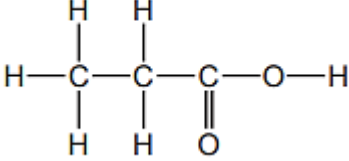
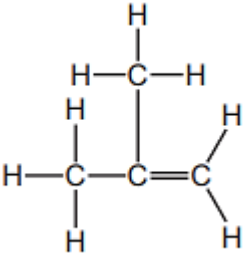
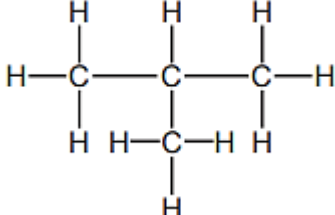
24. Which of the following pairs of reactants would be the least suitable to prepare a sample of carbon dioxide in the laboratory:
- Calcium carbonate and dilute nitric acid
 - Magnesium carbonate and dilute sulfuric acid
 - Copper (II) carbonate and dilute hydrochloric acid
 - Calcium carbonate and dilute sulfuric acid
25. The increase in carbon dioxide levels in the atmosphere are predicted to cause all the following **EXCEPT**:
- Depletion of the ozone layer
 - Changes in global weather patterns
 - Melting of polar ice caps
 - Flooding of low-lying coastal areas

[SECTION A TOTAL: 25 MARKS]

SECTION B

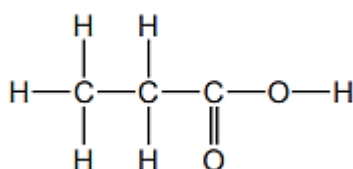
Instruction: Answer ALL questions in the spaces provided.

1. (a) Name the following organic compounds:

 _____	 _____
 _____	 _____
 _____	 _____

[6]

(b) The structure of compound A is shown.



(i) On the structure of compound A, draw a circle around the carboxylic acid functional Group [1]

(ii) State the name of the carboxylic acid that has only one carbon atom.

..... [1]

(iii) Deduce the molecular formula of compound A to show the number of carbon, hydrogen and oxygen atoms.

..... [1]

(c) Ethanol can be manufactured from ethene. Complete the word equation for this reaction:

Ethene + → ethanol [1]

(d) Ethene can be polymerised. Complete these sentences about the polymerisation of ethene using words from the list:

addition decomposition neutralisation poly(ethene)

poly(ethane) reduction Terylene

(i) When ethene polymerises, it produces a molecule called [1]

(ii) The type of reaction which occurs is [1]

[TOTAL: 12 MARKS]

2. (a) (i) Name the acid manufactured from sulfur.

..... [1]

(ii) When fossil fuels containing sulfur are burned, sulfur dioxide is formed.

Sulfur dioxide contributes to acid rain. Give **one** harmful effect of acid rain on buildings.

.....
..... [1]

(iii) Sulfur dioxide is used to bleach paper. Give one **other** use of sulfur dioxide.

..... [1]

(b) Sulfur is a non-metal.

Describe **three** physical properties which are typical of non-metals.

- 1.....
- 2.....
- 3.....[3]

(c) Name **one** source of sulfur.

.....[1]

[TOTAL: 7 MARKS]

3. (a) Describe the reactions, if any, of zinc and copper (II) ions with an excess of aqueous sodium hydroxide.

(i) **zinc ions**

addition of aqueous sodium hydroxide
.....[1]

excess sodium hydroxide
.....[1]

(ii) **copper (II) ions**

addition of aqueous sodium hydroxide
.....[1]

excess sodium hydroxide
.....[1]

(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 in the boxes below.

Copper
Magnesium
Potassium
Zinc

Put the least reactive metal first.

least reactive

most reactive

[2]

[TOTAL: 8 MARKS]

[SECTION B TOTAL: 27 MARKS]

END OF EXAMINATION

