



Organic Topic Test

Time allowed: 45 minutes

Instructions

Please ensure you enter your name and circle your teacher's initials below.
Scientific calculators only. Chemistry Data Sheet will be provided

Name:

Teacher: (circle)

CEM

NMO

JPT

KLW

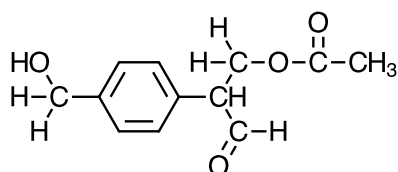
Mark: _____ / 48

Section 1: Multiple Choice

(Total 10 marks)

1. In how many positions can one chlorine atom be substituted in the straight chain alkane C_6H_{14} , to give rise to different compounds?
- A. 2
B. 3
C. 4
D. 6
2. When a hydrocarbon with the molecular formula C_6H_{12} is mixed with bromine water in the absence of UV light, the bromine water rapidly decolourises. From this observation, the name of the product of this reaction could be:
- A. 2,3-dibromo-1,3-dimethylbutane
B. 2,4-dibromohexane
C. 2,3-dibromo-2,3-dimethylbutane
D. bromocyclohexane

3. Which of the functional groups listed is NOT present in the molecule shown below?

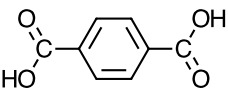


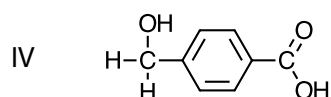
- A. alcohol
B. aldehyde
C. ketone
D. ester
4. An organic compound with the molecular formula, $C_5H_{10}O_2$ was hydrolysed to form two compounds X and Y. When Y was added to sodium carbonate solution, a colourless gas was produced. Oxidation of X with a stoichiometric quantity of acidified sodium dichromate produced one substance Z. What are X and Y?
- A. X: propan-2-ol Y: ethanoic acid
B. X: ethanal Y: propan-1-ol
C. X: propan-2-ol Y: propanoic acid
D. X: ethanol Y: propanoic acid

5. Which of the following is an isomer of methyl propanoate?

- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_3$
- B. $\text{HOCH}_2\text{CH}_2\text{CHO}$
- C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
- D. $\text{HOCH}_2\text{CH}_2\text{CHO}$

6. Which of the following substances could form condensation polymers?

- I $\text{HOCH}_2\text{CH}_2\text{CH}_2\text{OH}$ and $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$
- II $\text{CH}_3\text{CHOHCH}_2\text{OH}$ and 
- III $\text{NH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ and $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$



- A. I and II
- B. II and III
- C. II and IV
- D. II, III and IV

7. A pellet of sodium was placed in four alcohols W, X, Y and Z. Observations are given below.

	Observation
W	Vigorous production of gas
X	Very slow reaction
Y	Moderate production of gas
Z	Vigorous production gas

The identities of W, X, Y and Z respectively are:

- A. ethanol, pentan-3-ol, butan-1-ol and methanol
- B. propan-1-ol, cyclopropanol, butan-2-ol and ethanol
- C. methanol, 1-methylcyclopropanol, cyclopropanol and ethanol
- D. ethanol, pentan-3-ol, butan-2-ol and methanol

8. Which one of the following compounds would boil at the highest temperature?
- A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
 - B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CONH}_2$
 - C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
 - D. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
9. A compound with the empirical formula $\text{C}_2\text{H}_4\text{O}$ could be:
- A. a carboxylic acid only
 - B. a ketone or an aldehyde only
 - C. an alcohol only
 - D. an aldehyde, a carboxylic acid or an ester.
10. Soap is a useful substance. Which of the following statements about soap is FALSE?
- A. Sodium ethanoate is a soap.
 - B. Calcium salts of fatty acids are insoluble in water.
 - C. Soaps can form micelles.
 - D. Soaps are emulsifiers or surface active agents.

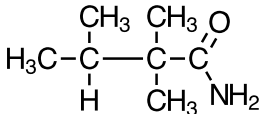
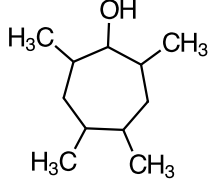
END OF SECTION ONE

Section 2: Short Answer

(Total 36 marks)

Question 11

4 marks

IUPAC Name	Full structural formula
butanone	
	
2-propylmethanoate	
	

Question 12**4 marks**

a) Draw three repeating units for polypropene in the box below.

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(3 marks)

b) State a use for polypropene.

(1 mark)

Question 13**6 marks**Give the name of a suitable **chemical reagent** that could be used to distinguish between the following two substances and what you would observe.

a) Benzene and cyclohexene

Chemical reagent: _____

Observations:

Benzene	Cyclohexene

b) Butanone and butanoic acid

Chemical reagent: _____

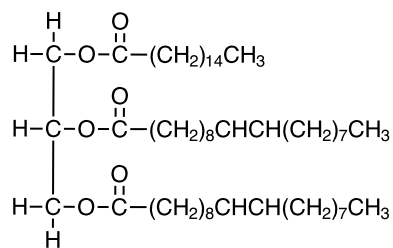
Observations:

Butanone	Butanoic acid

Question 14

9 marks

a) Given the following triglyceride, complete the reaction to produce soap.



(4 marks)

b) Purified soap would have a pH:

< 7	= 7	> 7
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Provide brief reasoning, including a chemical equation, justifying your choice:

(3 marks)

- c) Dry cleaners use the solvent tetrachloroethene to clean clothes that are sensitive to being washed solely in water. Small amounts of water and a surfactant are added to the cleaning cycle to enable water soluble material to be removed from clothing.

Draw a diagram below showing the interactions between:

- Water droplets
- The dry cleaning solvent
- A micelle

You may represent a surfactant molecule as:



Label your diagram clearly.

2 marks

Question 15

9 marks

A section of a protein has the amino acid residue sequence:

--- Cys-Glu-Gly ---

- a) This section is part of the protein's structure. The complete sequence would represent what type of structure?

(1 mark)

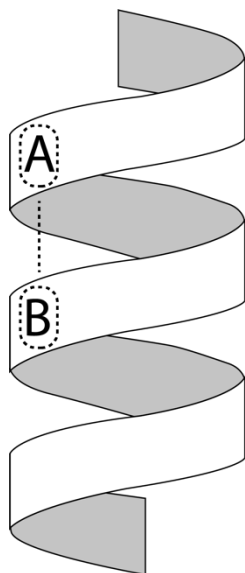
- b) A tripeptide formed by the amino acid sequence above is called glutathione. Draw the tripeptide below, showing the position of a peptide bond.

(3 marks)

- c) A polypeptide contains 100 amino acid residues with the repeating sequence Gly-Ala. Given this, calculate the molar mass of this polypeptide.

(2 marks)

- d) The following diagram shows the structure of part of a protein.



- i) What is the name of the structure shown?

(1 mark)

- ii) Draw the interaction shown by the letters **A** and **B** in the diagram above, clearly showing all atoms involved.

(2 marks)

Question 16

6 marks

Assign the following boiling points to the correct substance below.

78°C

117°C

233°C

$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>butan-1-ol (74.121 gmol⁻¹)</p>	$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{NH}_2 \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>butan-1-amine (73.14 gmol⁻¹)</p>	$\begin{array}{cc} \text{H} & \text{O} \\ & \\ \text{H}_2\text{N}-\text{C}-\text{C}-\text{OH} \\ & \\ \text{H} & \end{array}$ <p>glycine (75.07 gmol⁻¹)</p>
Boiling Point: _____	Boiling Point: _____	Boiling Point: _____

(2 marks)

Justify your answer.

(4 marks)

END OF TEST