Chemistry Department
Christ Church Grammar School

Year 12
2021

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

Nam

_____

Teacher: (circle)

DG JPT NM

Mark: _____ **/ 45**

Section 1: Multiple Choice **(Total 10 marks)**

1. How many isomers are there for a saturated hydrocarbon with molecular formula C_5H_{10}?

   A. 2
   B. 3
   C. 4
   D. 5

2. Cyclobutanol can be oxidised by acidified potassium dichromate solution to form

   A. cyclobutanoic acid
   B. cyclobutanal
   C. cyclobutanone
   D. cyclobutanol is resistant to oxidation

Questions 3 and 4 refer to the compounds, numbered I to IV, below.

I. $CH_3CH_2CH_2CH_2COOH$
II. $CH_3CH_2CH_2CH_2CH_2OH$
III. $CH_3CH_2CH_2CH_2CHO$
IV. $CH_3CH_2CH_2CH_2CH_3$

3. Which one of the following lists the compounds in order of decreasing solubility in water?

   A IV>III>II>I
   B I>II>III>IV
   C I>III>II>IV
   D II>I>III>IV

4. Which two compounds can react to form an ester?

   A I and II
   B I and III
   C II and III
   D I and IV

5. Which of the following has an empirical formula different to the other three substances?

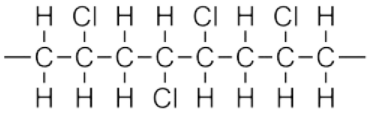
A. glucose, $C_6H_{12}O_6$

B. ethanoic acid

C. methyl ethanoate

D. methanal

6. Choose the monomer that could form the polymer, part of which is shown below:



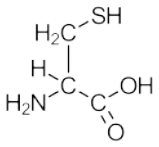
A. $CHClCH_2$

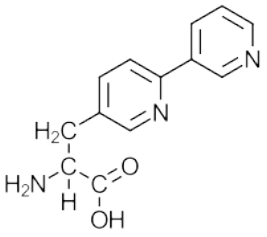
B. $CH_2ClCHCH_2$

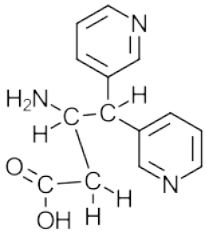
C. CCl_2CH_2

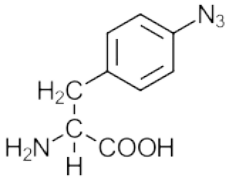
D. CH_2CH_2CHCl

7. Which of the following is not an α-amino acid:

A. 

B. 

C. 

D. 

8. Which of the following statements about soap and the soap making process (saponification) is FALSE?

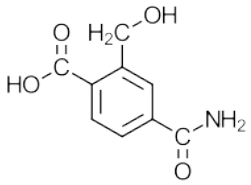
A. The starting material that soap is made from is a triester.

B. The unadjusted pH of soap is greater than 7.

C. Magnesium propanoate is a soap.

D. Glycerol is a product of saponification.

9. Which functional group listed does not appear in the molecule below?



A. alcohol

B. amide

C. carboxylic acid

D. ketone

10. Which of the following are possible oxidation products of propan-1-ol?

I. C_3H_7OH
II. CH_3CH_2CHO
III. CH_3CH_2COOH
IV. CO_2 and H_2O

A. I and II

B. II and III

C. I and III

D. II, III and IV

Section 2: Short Answer **35 marks**

Question 11 **10 marks**

Name and **draw** full structural formula to represent the following substances;

The product of reacting methanol with an **excess** of acidified potassium dichromate	Name _____
An isomer of propanal that is resistant to oxidation	Name _____
A cyclic isomer of methylpropene	Name _____
The organic product of reacting 1 mole of benzene with 1 mole of bromine with a suitable catalyst	Name _____
A tertiary alcohol which is a structural isomer of butan-1-ol	Name _____

Question 12 **4 marks**

a) Draw the tripeptide formed by the α-amino acids Gly-Ala-Ser in the space below.

(3 marks)

b) Clearly label the peptide bond between Ala and Ser on the structure you have drawn above.

(1 mark)

Question 13 **6 marks**

When oils and fats are not metabolized by the body, the body stores these as triglycerides. One component of a food oil is shown below:

$$CH_3(CH_2)_4CHCHCH_2CHCH(CH_2)_7COOH$$

a) The substance above would be referred to as a _____.

(1 mark)

b) Write a reaction showing the formation of the triglyceride formed in the body from the substance above

(2 marks)

c) Triglycerides can be used to make soaps. Draw the full structure of the soap that is formed from the substance found in the food oil. (1 mark)

d) Provide two disadvantages of using soap in hard water areas.

(2 marks)

1. _____

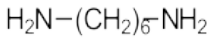
_____

2. _____

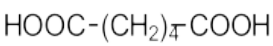
_____

Question 14 **(5 marks)**

The monomers for nylon-6,6 are given below.



(hexamethylenediamine)



(adipic acid)

a) Draw two repeating units for the polymer that would be produced by the reaction of these two monomers. Draw any new bonds formed in full.

polymer chain continues

polymer chain continues

(3 marks)

b) Nylon-6,6 is classified as a condensation polymer. Other polymers like polyethene are addition polymers. Give two features that distinguish between the monomers used in each. (2 marks)

_____

_____

_____

_____

Question 15 **(10 marks)**

An excess of a substance **W** with the molecular formula C_3H_8O was added to an acidified solution of sodium dichromate. Two new organic substances **X** and **Y** were isolated from the resulting mixture.

When **W** and **X** were added to each other and acidified, a new substance **Z** was produced. The boiling points of **W**, **X** and **Y** were also measured.

a) Write a fully balanced redox equation for the reaction of **W** with acidified dichromate to produce **X**. (3 marks)

Oxidation	
Reduction	
Overall	

b) Write the equation for the reaction of **W** with **X**, showing full structures for all organic substances and provide the name of the organic product.

(3 marks)

Name:_____

c) Explain why the boiling point of ethanol would be higher than that of ethanal.

(4 marks)

END OF TEST