

Name: _____

Mark = _____ / 55

Part 1: Multiple Choice Section**5 marks**

1. How many hydrogen atoms are there in a molecule of 3,3-dimethyl octanoic acid?
 - A. 20
 - B. 16
 - C. 18
 - D. 19

2. Which of the following is least likely to be an oxidation product of propan-1-ol?
 - A. CH_3COCH_3
 - B. $\text{CH}_3\text{CH}_2\text{CHO}$
 - C. $\text{CH}_3\text{CH}_2\text{COOH}$
 - D. CO_2

3. A sweet smelling organic compound X of formula $\text{C}_5\text{H}_{10}\text{O}_2$ forms an alcohol and an acid when boiled with hydrochloric acid. One of these compounds forms a ketone when treated with acidified potassium dichromate solution.

Which of the following could be compound X?

 - A. $(\text{CH}_3)_2\text{CHCOOCH}_3$
 - B. $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_3$
 - C. $\text{CH}_3(\text{CH}_2)_3\text{COOH}$
 - D. $\text{CH}_3\text{COOCH}(\text{CH}_3)_2$

4. Which one of the following procedures would enable you to distinguish between butanoic acid and 2-methylbutan-2-ol?
 - A. Shaking the compound with bromine water and observing a colour change.
 - B. Warming the compound with an acidified solution of sodium dichromate and observing a colour change.
 - C. Shaking the compound with ethanol and observing whether the two liquids mix.
 - D. Add sodium carbonate crystals and observe a gas given off

5. A student determined the following properties of an organic compound, X.
- X contains carbon, hydrogen and oxygen
 - X is neutral to moist litmus paper
 - On reaction with acidified potassium permanganate solution, the product turned moist litmus paper red.

Which of the following could be compound X?

- A. propanone
- B. propan-1-ol
- C. propan-2-ol
- D. propanoic acid

End of Part 1

Part 2: Short Answer Section

50 marks

1. Write fully balanced equations for any reactions that occur in the following procedures. If no reaction occurs, write 'no reaction'. Write the name of any organic product formed.

(a) The combustion of octane in excess oxygen.

Equation: _____

(b) Propan-1-ol is added to methanoic acid in the presence of concentrated sulfuric acid.

Equation: _____

Name of organic product: _____

(2+2+1 = 5 marks)

2. Complete the table below by naming a reactant that will react with the reactant in column 1 to give the product in column 3.

<i>Reactant 1</i>	<i>Reactant 2</i>	<i>Product formed</i>
ethene		ethanol
propene		2-chloropropane
ethanol		ethyl propanoate
butanoic acid		1-propylbutanoate

(4 marks)

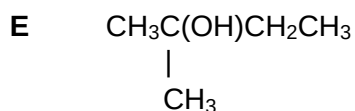
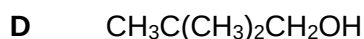
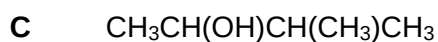
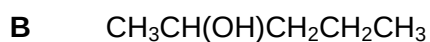
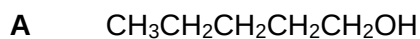
3. Give the order of the boiling points of these chemicals, numbering them 1 to 6, with 6 being the highest value.

<i>Compounds</i>	<i>Order of boiling points (1 – 6)</i>
butan-1-ol	
methylpropane	
butanoic acid	
butan-2-ol	
butane	
butanal	

(6

marks)

4. Use the following condensed structural formulae to answer the questions that follow:



Choose which compounds (**A**, **B**, **C**, **D** or **E**) which will give each of the following reactions (there may be more than one answer in each case)

(a) Which compound(s) react with a warm solution containing sulfuric acid and potassium dichromate to produce a carboxylic acid. _____

(b) Which compound(s) react with a warm solution containing sulfuric acid and potassium dichromate to produce a ketone. _____

(c) Which compound(s) would show no visible signs of a reaction with a warm solution containing sulfuric acid and potassium dichromate. _____

(d) Write the structure and name for the oxidation product of **C** with acidified potassium permanganate.

structure _____ name _____

(e) Write the equation for the reaction between **D** and methanoic acid in the presence of concentrated sulfuric acid.

(f) Class alcohols **C** and **E** as primary (1°), secondary (2°) or tertiary (3°)

Alcohols	Class
C	
E	

(11 marks)

5. Write IUPAC names for the following compounds.

<i>Compounds</i>	<i>Names</i>
$\text{CH}_3\text{CH}_2\text{COOCH}_3$	
$(\text{CH}_3)_3\text{CH}$	
$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{COCH}_3$	

(3 marks)

6. Draw a piece of polymer using but-1-ene as the monomer; show 3 repeating units.



(2 marks)

7. An organic compound X has an empirical formula C_2H_4O .

0.0278 mol of this compound has a mass 2.45 g.

(a) What is the molecular formula of compound X? Show all working.

(b) Compound X has several isomers.

(i) Isomer 1 is a sweet smelling liquid which was prepared using propan-2-ol as one of its reactants. Give structure of isomer 1.

structure _____

(ii) Isomer 2 is also a sweet smelling liquid but ethanoic acid was used in its preparation. Give structure and name of isomer 2.

structure _____

name _____

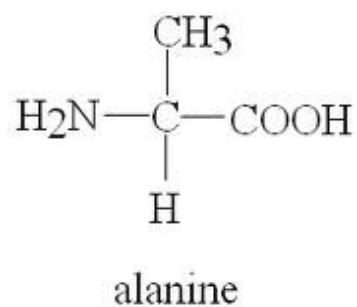
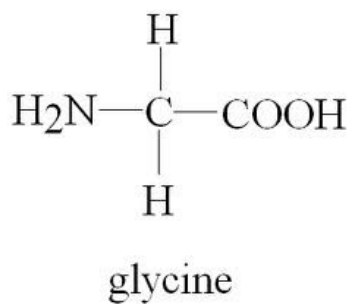
(iii) Isomer 3 gives off a gas when added to solid sodium carbonate. Give structure and name of isomer 3.

structure _____

name _____

(3 + 5 = 8 marks)

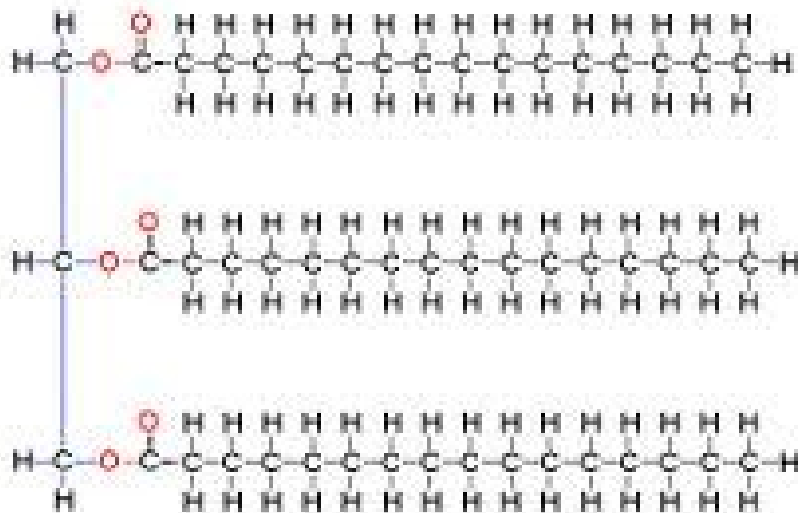
8. Two **α -amino acids** are shown below



- (a) A chemical is said to be amphoteric if it can react with an acid and a base.
Glycine can be classed as an amphoteric chemical.
Using equations illustrate the amphoteric property of glycine
- (b) Draw a piece of condensation polymer between glycine and alanine molecules

(4 + 2 = 6 marks)

9.



Triglyceride

College Program, Title

- (a) What is the important functional group in this molecule? _____
- (b) An important reaction of such fats and oils is hydrolysis by reaction with sodium hydroxide solution. Draw the two main organic products of this hydrolysis.

<i>Product 1</i>	<i>Product 2</i>

(1,2,2=5 marks)

End of Test