Organic chemistry topic test Total mark 50

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 1**

The empirical formula of an organic molecule is CH2O. The molecule could be

1. methanol
2. ethanol
3. ethanoic acid
4. propanoic acid

**Question 2**

The molecule HCOOH is

1. methanol
2. hydrogen ester
3. ethanoic acid
4. methanoic acid

**Question 3**

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The functional groups present on this molecule are

1. hydroxyl, amide and carboxyl
2. hydroxyl, amine and carboxyl
3. hydroxyl, amide and ester
4. hydroxyl, amide and carboxyl

**Question 4**

The general formula for an alkanol is

1. CnH2nO
2. CnH2n+1O
3. CnH2n+2O
4. CnH2nO2

**Question 5**



The order of boiling points, from lowest to highest, for these molecules will be

1. propane, butane, 2-propanol
2. propane, 2-propanol, butane
3. butane, 2-propanol, propane
4. propanol, propane, butane

**Question 6**

A short organic pathway is drawn below.

uv/Cl2 KOH/H2O

1-**butanol**

**Y**

**X**

In this process, molecule Y could be

1. butene
2. butane
3. butanol
4. 1-chlorobutane

**Question 7**

Which of the following molecules has *cis-trans* isomers?

**A**. ethene

B. bromoethene

**C**. 1,1-dibromoethene

**D**. 1,2-dibromoethene

**Question 8**

The systematic names for the above molecules are, respectively

**A**. propanal, propan-1-ol and propanamide

**B**. butan-1-al, butanol and propan-1-amide

**C**. butan-1-al, butan-1-ol and butan-1-amine

**D**. butanal, butan-1-ol and butanamide

**Question 9**

An alkane has the molecular formula C6H12. The molecule is likely to be

**A**. cyclohexane

**B**. cyclohexene

**C**. hexene

**D**. hexane

**Question 10**

The molecule shown can be formed from the reaction

**A**. between propan-1-ol and methanoic acid

**B**. of butan-2-ol with a strong oxidant in acid conditions

**C**. between methylethanoate and a strong oxidant

**D**. of propan-1-ol and methanol

**Section B**

**Question 1** (10 marks)

**a**. 1-propanol can be formed from a substitution reaction

+ KOH/H2O + +

1-propanol

Molecule A Substance B

Use the boxes provided to draw the missing reactant and the missing product

2 marks

**b**. 1-propanol can be formed from an addition reaction.

1-propanol

+ H2O/H3PO4

**i**. Use the box provided to draw the missing reactant.

**ii**. 1-propanol is unlikely to be the only product from this reaction. Draw another possible

product.

**iii**. An ester is to be formed from 1-propanol.

Draw a possible pathway for this process, showing any necessary catalysts or reagents.

1 + 1 + 4 = 6 marks

**c**. An alkene has a molar mass of 112 g mol-1 with a carbon-to-carbon double bond on the first

carbon. Name the alkene and give its molecular formula. 2 marks

**Question 2** (7 marks)



propanol 1- propanoic acid

The names provided for these molecules are both incorrect. Explain why.

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2 marks

**b**. **i**.

4-methyl pentane is not the correct systematic name for this compound. Explain why.

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**ii**. Is this molecule an isomer of pentane? Explain your answer.

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1 + 1 = 2 marks



**c**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**i**. Name the two molecules.

**ii**. Use these two examples to explain the difference between a primary alcohol and a

secondary alcohol.

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2 + 1 = 3 marks

**Question 3**  (8 marks)

The following questions relate to the pathway used to produce the molecule drawn.



**a. i**. Name this molecule \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ii**. Circle and name the functional group Name: \_\_\_\_\_\_\_\_\_\_\_

1 + 1 = 2 marks

**b**. **i**. How many different hydrogen environments does this molecule have? \_\_\_\_\_\_\_\_\_\_\_

**ii**. How many different carbon environments does it have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1 + 1 = 2 marks

**c**. This molecule was produced from the reaction of two molecules.

**i**. Draw and name these two molecules.

Molecule 1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Molecule 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ii**. Give the chemical formula of the other product of the reaction between these two

molecules.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**iii**. Write a balanced chemical equation for this reaction.

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2 + 1 + 1 = 4 marks

**Question 4** (8 marks)

There are many structural isomers of compounds. The larger the size of the compound, the greater the number of isomers.

**a. i**. What is a structural isomer?

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**ii.** How many structural isomers will C4H9OH have? \_\_\_\_\_\_\_\_\_\_\_\_

**iii**. Draw the structural formula of two of the isomers. 1 + 1 + 2 = 4 marks

**b**. Draw and label the cis-trans isomers of pent-2-ene.

2 marks

**c**. **i**. What is a chiral centre?

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**ii**. Identify the chiral centre in the molecule shown.



1 + 1 = 2 marks

**Question 5**  (7 marks)

But-1-ene can react with water and phosphoric acid to produce two different products.

a.  **i**. Draw but-1-ene

**ii**. Draw the two different products that can form when but-1-ene reacts with water and

phosphoric acid.

**iii**. Both products formed in part ii. of the question are reacted with dichromate ions (Cr2O72-)in

acid conditions.

Draw the molecules formed from each product.

1 + 2 + 2 = 5marks

**b**. Draw two possible reactants that could be used to form the product shown.



2 marks

**END OF TEST**