**Topic test 1: Unit 4 Carbon chemistry**

**SECTION A – Multiple-choice questions**

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| **Instructions for Section A**  Answer **all** questions.  Choose the response that is **correct** or **best answers** the question.  A correct answer scores 1, an incorrect answer scores 0.  No mark will be given if more than one answer is completed for any question.  Marks will **not** be deducted for incorrect answers. |

**Question** **1**

Which of the following is an alkene?

**A**. C7H12

**B**. CH3CH2CH(CH3)CH3

**C**. CH3CH2CHCHCH3

**D**. hexyne



**Question 2**

The systematic name for this molecule is

**A**. 2-ethylpentan-5-ol

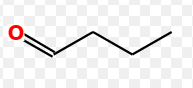
**B**. 4-methylhexan-1-ol

**C**. 4-ethylpentan-1-ol

**D**. 3-methylhexan-6-ol

**Question 3**

A skeletal structure is drawn below.



This compound is

**A**. butanal

**B**. propanal

**C**. propanoic acid

**D**. propanone

**Question 4**

The systematic name for this molecule is

**A**. pent-1-en-4-ol

**B**. 4-penten-1-ol

**C**. pent-4-en-1-ol

**D**. pent-4-en-2-ol

**Question 5**

Which of the following will have a geometric isomer?

**A**.



**B**.



**C**.



**D**.

**Question 6**

How many structural isomers does the molecule C4H9OH have?

**A**. 2

**B**. 3

**C**. 4

**D**. 5

**Question 7**

Four compounds are drawn below.



The functional groups present are, respectively

**A**. aldehyde, carboxylic acid, amide and carboxylic acid

**B**. alcohol, aldehyde, amine and carboxylic acid

**C**. carboxylic acid, ketone, amide and alcohol

**D**. aldehyde, ketone, amine and carboxylic acid

**Question 8**

Which of the following will be the least soluble in water?

**A**. 1-chlorobutane

**B**. butene

**C**. butan-1-ol

**D**. butan-2-ol

**Question 9**

What types of bonds are present in a solution of ethanol in water?

**A**. Covalent bonds only.

**B**. Hydrogen bonds only.

**C**. Covalent bonds and ionic bonds.

**D**. Covalent bonds and hydrogen bonds.

**Question 10**

Which of the following will not have a chiral centre?

A. CH3CHBrCH2CH2CH2CH2CH2CH3

**B**. CH3CHClCH2CH3

**C**. CH3CCl2CH2CH2

**D**. CH3CHOHCH2CH2

**SECTION B- Short-answer questions**

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| **Instructions for Section B**  Questions must be answered in the spaces provided in this book. To obtain full marks for your responses you should   * Give simplified answers with an appropriate number of significant figures to all numerical questions; unsimplified answers will not be given full marks. * Show all workings in your answers to numerical questions. No credit will be given for an incorrect answer unless it is accompanied by details of the working.   Make sure chemical equations are balanced and that the formulas for individual substances include an indication of state; for example, H2(g); NaCl(s) |

**Question 1** (11 marks)

**a**. Draw the following molecules. 4 marks

**i**. 3-methylpentanoic acid **ii**. propyl methanoate

**iii**. 2,3-dichloropent-2-ene **iv**. 3-methylbutan-2-ol

**b**. Give IUPAC names for the following. 2 marks



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**c**. Use the table below to give the required representation of the ester ethyl propanoate. 5 marks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Structural diagram | Semi-structural formula | Skeletal structure | Molecular formula | Empirical formula |
|  |  |  |  |  |

**Question 2** (7 marks)

**a**. Draw and name two structural isomers with the molecular formula C4H8O2. 4 marks

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**b**. Draw and name the stereoisomers of 2,3-dimethylhex-3-ene. 2 marks

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**c**. Identify the chiral centre in the molecule shown. 1 mark



**Question 3** (11 marks)

**a**. What is the empirical formula of the linear alkyne that contains five carbon atoms? \_\_\_\_\_\_\_\_\_\_\_ 1 mark

**b**. Draw the following two molecules and use them to explain the difference between an amine and an amine.

2 marks

propan-1-amine and the primary amide propanamide

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**c**. Draw and name the simplest tertiary alcohol possible. 2 marks

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**d**. Draw the ketone and the aldehyde molecules that contain four carbon atoms. 2 marks

ketone aldehyde

**e**. Draw cyclohexene and write its molecular formula. 2 marks

**f**. Explain why each of these names is not a correct IUPAC name:

**i**. 2-ethylpentane 1 mark

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**ii**. 1-chlorobutan-4-oic acid 1 mark

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**Question 4** ( 11 marks)

**a**. **i**. Rank the following in order of boiling point (lowest to highest). 2 marks

octene pentene octanoic acid octanol

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**ii**. Explain the reasoning behind your ranking. 1 mark

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**b**. Will pentane be soluble in octane? Explain your answer. 2 marks

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**c**. Draw a diagram to show the bonding between ethanoic acid and water molecules in a solution of ethanoic

acid. 2 marks

**d**. Explain the difference between the following two terms: 2 marks

Autoignition point: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Flashpoint: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**e**. Which will be more soluble in water, ethanoic acid or hexanoic acid? Explain your answer. 2 marks

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