**Carbon topic test solutions**

**SECTION A: Multiple-choice questions (1 mark each)**

**Question 1**

*Answer:* C

*Explanation:*

The -CHCH- in the structure indicates a carbon-to-carbon double bond.

**Question 2**

*Answer:* B

*Explanation:*

The alcohol functional group takes priority. The methyl group is on the fourth carbon atom.

**Question 3**

*Answer:* A

*Explanation:*

The molecule contains four carbon atoms so it will be a butane derivative. The oxygen atom on the end of the molecule makes it an aldehyde.

**Question 4**

*Answer:* D

*Explanation:*

The alcohol group on the second carbon takes precedence over the alkene group.

**Question 5**

*Answer:* C

*Explanation:*

The second and the third carbon both have two different functional groups attached.

**Question 6**

*Answer:* C

*Explanation:*

1-chlorobutane, 2-chlorobutane, 2-chloro-2-methylpropane, 1-chloro-2-methylpropane

**Question 7**

*Answer:* D

*Explanation:*

* CHO aldehyde, -C=O ketone, -NH2 amine, -COOH carboxylic acid

**Question 8**

*Answer:* B

*Explanation:*

Alkenes and alkanes have low solubility being non-polar.

**Question 9**

*Answer:* D

*Explanation:*

There are covalent bonds in the molecule and hydrogen bonds between molecules.

**Question 10**

*Answer:* C

*Explanation:*

Option C does not have any carbon atoms that have four different groups attached.

**SECTION B: Short-answer questions**

**Question 1** (11 marks)

**a**. 4 marks

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

 

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

 

**b**. 4-chloropentan-2-ol 3-methylpentanoic acid. 2 marks

**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 |
|  | CH3CH2OCOCH2CH3 |  | C5H10O2 | C5H10O2 |

**Question 2** (7 marks)

**a**. 4 marks



Butanoic acid ethyl ethanoate



**b**. 2 marks



**c**. 1 mark

**Question 3** (11 marks)

**a**. C5H8 1 mark



**b**. 2 marks

 Amines are an alkane with NH2 substituted for a H atom while amides include a carbonyl carbon – CONH2



**c**. dimethylpropan-1-ol 2 marks



**d**. 2 marks

 ketone aldehyde

**e**. 2 marks

 C6H10

**f**. **i**. the longest chain will match a hexane rather than pentane 1 mark

 **ii**. carboxylic acid groups have priority when naming so the carboxyl group needs to be a 1

 1 mark

**Question 4** ( 11 marks)

**a**. **i**. pentene octene octanol octanoic acid 2 marks

 **ii**. octene is higher than pentene as the molecule is longer

 functional groups add to the boiling point and carboxyl groups cause more of an increase than alcohols

**b**. Yes, like dissolves like. Both are non-polar 2 marks

**c**. 2 marks

**d**. Autoignition point: lowest temperature at which a fuel can burst into flame

 Flashpoint: lowest temperature at which a flame can cause the vapour of a fuel to ignite. 2 marks

**e**. Ethanoic acid is more soluble. As the molecule gets longer the solubility drops as the significance of the

 oxygen atoms gets less. 2 marks