Year 12 Chemistry **Topic Test # 3 (Organic) - 2013**

Name: **ANSWERS** Mark = _____ / 42

Part One: Multiple Choice Section **10 marks**

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1. **B** 2. **C** 3. **C** 4. **D** 5. **D** 6. **C** 7. **C** 8. **C** 9. **C** 10. **C** ✓ **each**

Part Two: Short Answer Section **32 marks**

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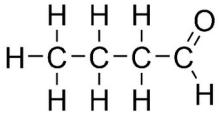
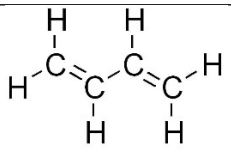
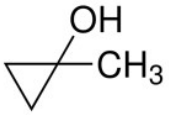
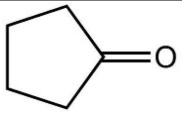
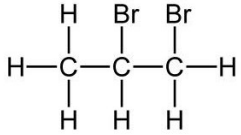
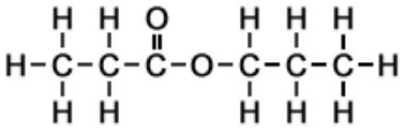
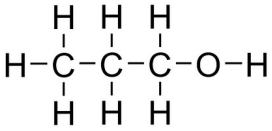
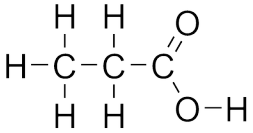
11. Name and draw full structural formula to represent the following substances;

	Description	Full structural formula
(a)	a cyclic compound with molecular formula C_4H_6	 ✓ Name: **cyclobutene** ✓
(b)	a compound with molecular formula C_4H_8O that can be oxidised to form butanoic acid	 ✓ Name: **butanal** ✓
(c)	a molecule that reacts rapidly with bromine to form 1,2,3,4-tetrabromobutane	 ✓ Name not required.
(d)	a cyclic tertiary alcohol with 4 carbon atoms	 ✓ Name: **1-methylcyclopropanol** ✓
(e)	the product of oxidising cyclopentanol with acidified potassium permanganate solution	 ✓ Name: **cyclopentanone** ✓
(f)	an organic product that can be formed when propene undergoes a reaction with bromine	 ✓ Name: **1,2-dibromopropane**

(11 marks)

12. A sweet smelling liquid **A** ($C_6H_{12}O_2$) can be hydrolysed by aqueous sodium hydroxide to form **B** and **C**. **B** can be converted into **C** by reaction with an excess of acidified aqueous potassium dichromate. Draw structural formulae for **A**, **B** and **C** and name them.

A	 ✓ Name: **1-propylpropanoate** ✓
B	 ✓ Name: **1-propanol** ✓
C	 ✓ Name: **propanoic acid** ✓

(6 marks)

13. Consider the two alcohols, propan-1-ol and octan-1-ol. Two common solvents are water and hexane. Predict and account for the relative solubilities of each of these alcohols in the two solvents.

(a) Solubility in water

Propan-1-ol is more soluble than **ocatan-1-ol** ✓

Explanation:

Hydroxyl group (-OH) provides for formation of hydrogen bonds between both alcohols and water. ✓

As hydrocarbon chain increases in length, dispersion forces predominate solute-solvent interactions, which decreases solubility. ✓

(3 marks)

(b) Solubility in hexane

Ocatan-1-ol is more soluble than **propan-1-ol** ✓

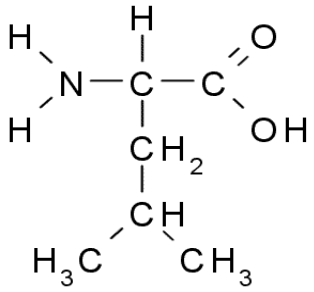
Explanation:

Hydrocarbon chain of both alcohols from dispersion forces with hexane. ✓

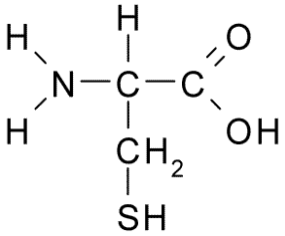
As chain length increases, so too does strength of dispersion forces, increasing solubility ✓

(3 marks)

14. Two amino acids are shown below.

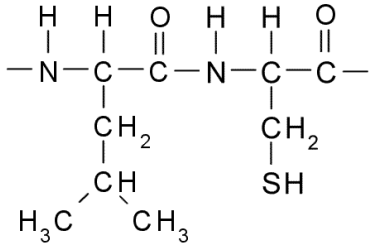


leucine (leu)

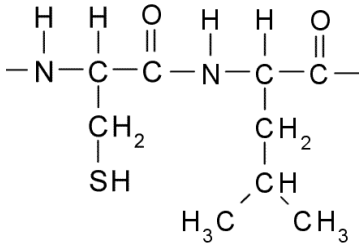


cysteine (cys)

(a) Assuming that leucine and cysteine are able to form a polymer with alternating monomer units (i.e. leu-cys-leu-cys), carefully draw ONE repeating unit of the polymer chain.



or

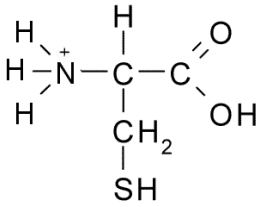


✓

(1 mark)

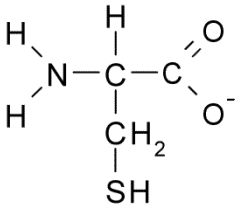
(b) During digestion, proteins are broken down into amino acids. Different parts of the digestive system have different pH's. For example, the human stomach has a pH of about 3 whilst the intestine has a pH of about 9. Draw the structure of cysteine that you would expect in the stomach and the intestine.

stomach



✓

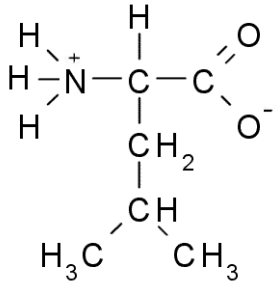
intestine



✓

(2 marks)

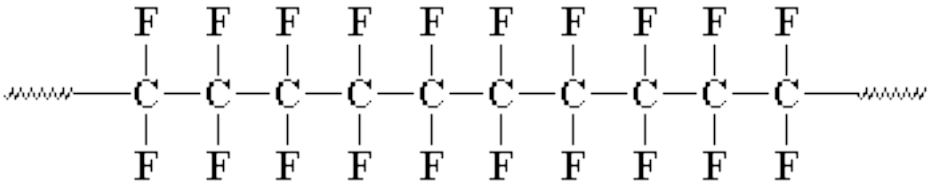
(c) Using leucine as an example, draw a zwitterion.



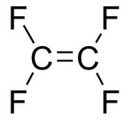
✓

(1 mark)

15. A common polymer is 'PTFE', a section of which is shown below.



(a) Draw the monomer from which it is made.



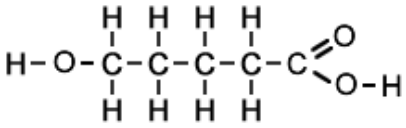
✓

(1 mark)

(b) What type of polymersiation is this? **addition** ✓

(1 mark)

16. An abbreviated structural formula of 5-hydroxypentanoic acid is $HO(CH_2)_4COOH$.
In the box beneath, draw its full structural formula.

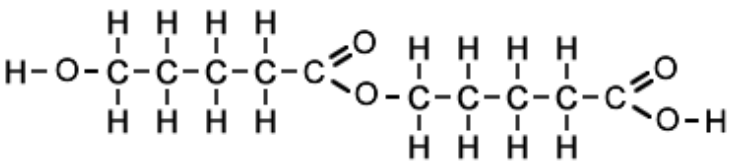


✓

(1 mark)

5-hydroxypentanoic acid has a molar mass of approximately 118 g mol^{-1}.

When a few drops of concentrated sulfuric acid is added to it, a new compound can be formed, which has a molar mass of approximately 218 g mol^{-1}. Draw a possible structure of this compound.



✓

(2 marks)

End of Test