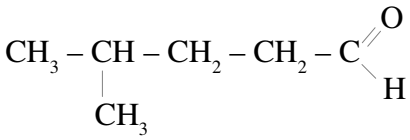
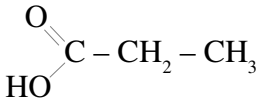
**Year 12 Chemistry Test** **NAME**_____

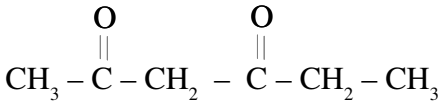
## Topic 3: Organic and Biological Chemistry **TOTAL MARKS: 76**

1. Name the following compounds:

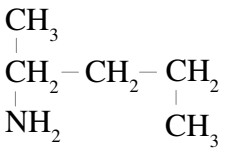
(a) 

(b) 

(c) 

(d) 

(e) $CH_3CH_2CH_2COOCH_2CH_3$

(f) 

(12)

2. Write structures for the following compounds:

(a) butane-1,3-diol

(b) 3-chloro hexanoate ion

(4)

3. Describe how Tollen's reagent may be used to distinguish between propanal and propanone.

_____

_____

_____

_____ (2)

4. Explain why hexanoic acid has a higher boiling point than ethanoic acid
(223ºC compared to 141ºC )

_____

_____

_____

_____ (2)

5. Explain why methanamine is soluble in water while chloromethane is not.

_____

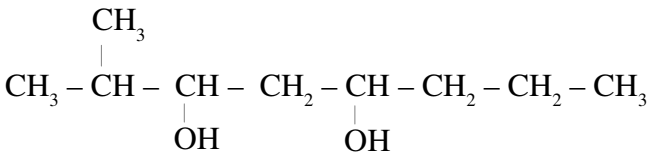
_____

_____

_____

_____ (3)

6. Consider the following organic compound :



(a) Circle and name all the functional groups on the molecule (2)

(b) If a small amount of acidified dichromate was added to a sample of this compound and warmed, what would you expect to see? Explain.

_____

_____

_____

_____

_____ (3)

7. (a) An edible oil can be converted into fat for a candle by a reaction with reagent **A**, in the presence of substance **B**, as shown in the equation below:

$$\text{oil} + \mathbf{A} \xrightarrow{\mathbf{B}} \text{fat}$$

(i) Identify:

reagent **A**._____

substance **B**._____ (2)

(ii) Certain reaction conditions are essential for the conversion to occur.

State *one* essential reaction condition.

_____ (1)

(iii) State the change in the chemical structure of the oil when it is converted into fat.

_____ (1)

(iv) Describe the change in *one* physical property of the oil when it is converted into fat.

_____

_____ (2)

(b) An edible oil can also be converted into soap by the process of saponification.

(i) State the reaction involved in saponification.

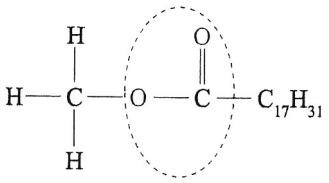
_____ (2)

(ii) Draw a labelled diagram showing how the molecules in soap arrange to allow grease to be carried away with water.

(2)

8. Diesel fuel, which is made from petroleum, is used in some motor vehicles. An alternative to diesel is biodiesel, which is made from vegetable oil.
The first step in the production of biodiesel is the hydrolysis of vegetable oil to produce carboxylic acids. The carboxylic acids then react with an alcohol to produce biodiesel.

One of the molecules in biodiesel has the structural formula shown in the diagram below:




(a) Name the alcohol that was used to make this molecule.

_____ (1)

(b) Name the functional group circled in the diagram.

_____ (1)

(c) Describe why the formation of biodiesel is a condensation reaction.

_____

_____ (2)

(d) State why this formation reaction is likely to be performed in the presence of sulfuric acid.

_____ (1)

(e) Draw the structural formula of the vegetable oil that was used to make this molecule.

(2)

(f) State whether or not biodiesel reacts with bromine water, and give a reason for your answer.

_____

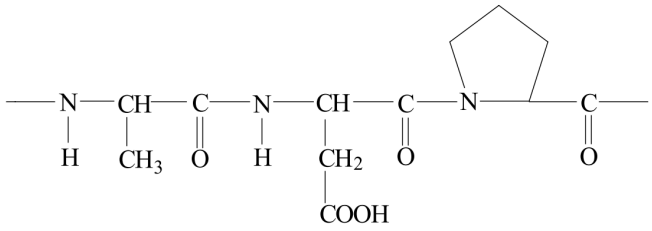
_____

_____ (2)

9. (a) State the name given to a chain formed by condensation of amino acids.

_____ (1)

(b) On the section of chain below, circle and name the functional group that makes up a peptide link.

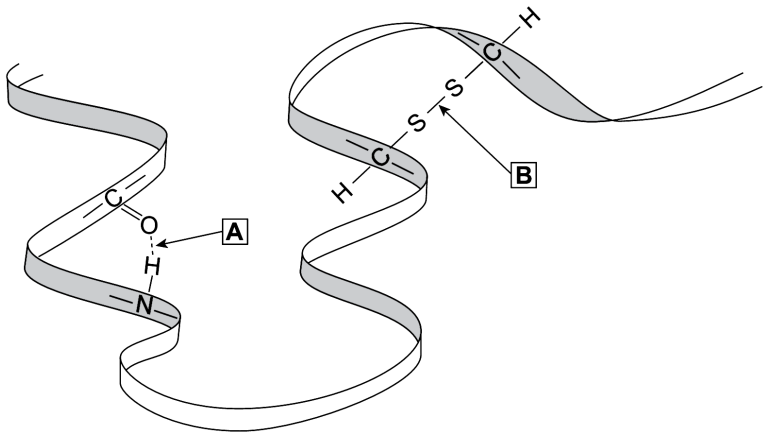


_____ (2)

(c) Draw the structural formula of one of the monomers used to make up the section of chain above.

(2)

(d) Some interactions between atoms in a larger section of a similar chain are shown below:




(i) Name the types of interactions labelled **A** and **B**.

**A** _____ **B** _____ (2)

(ii) Explain why a change of pH may affect the biological action of this chain.

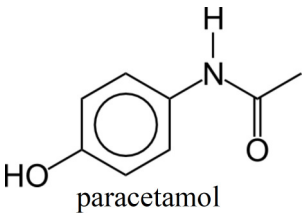
_____

_____

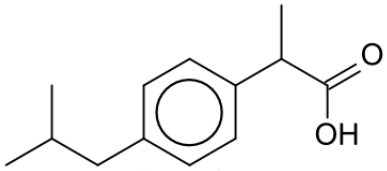
_____

_____ (2)

10. Paracetamol and ibuprofen are both drugs commonly taken as pain relievers. They are both solids at room temperature.



paracetamol



ibuprofen

Explain, by comparing the structural formulae above, why a tablet containing ibuprofen is likely to also contain a base such as sodium carbonate, whereas this is not necessary for a tablet containing paracetamol.

*Credit will be given for answers which correctly use appropriate chemical terms and effectively communicate knowledge and understanding of chemistry.* (2)

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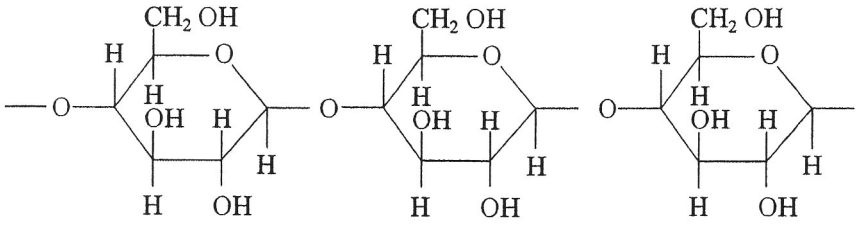
_____ (6)

11.

Cotton is made up of more than 90% cellulose and readily absorbs water. A section of a cellulose chain is shown below:



(a) State whether cellulose is a polysaccharide, a disaccharide, or a monosaccharide.

_____ (1)

(b) State why cellulose is classified as a carbohydrate.

_____

_____ (1)

(c) Cellulose can be broken down by microbes in the presence of water. This reaction produces simpler carbohydrates such as glucose.

(i) Write the molecular formula of glucose.

_____ (1)

(ii) Explain why an aqueous solution of glucose is able to react with Tollen's reagent.

_____

_____

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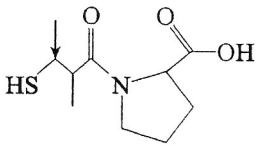
_____ (2)

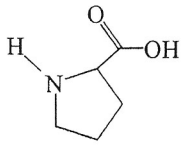
12. Captopril is drug used to lower blood pressure. The structural formula of Captopril is shown in the diagram below:




(a) Identify the central atom indicated by the arrow.

_____ (1)

The hydrolysis of Captopril results in the formation of *two* products. The structural formula of one of these products, an amino acid, is shown in the diagram below.




(b) Draw the structural formula of this amino acid in its self-ionised form.

(2)

(c) Explain why the self-ionised form of this amino acid is more soluble in water than the molecular form.

_____

_____

_____

_____ (2)

(d) Draw the structural formula of the other product formed from the hydrolysis of Captopril.

(2)