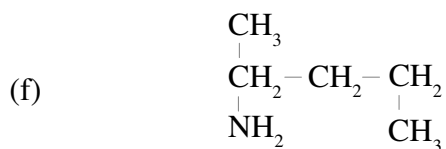
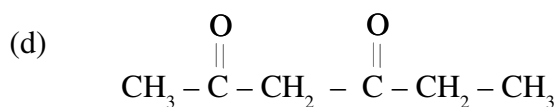
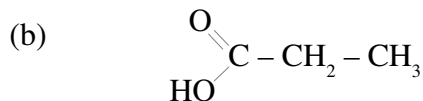
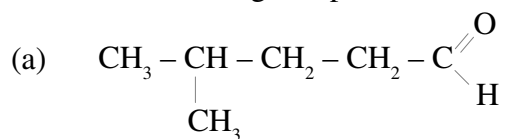


Topic 4: Organic and Biological

TOTAL MARKS: 69

1. Name the following compounds:



(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)

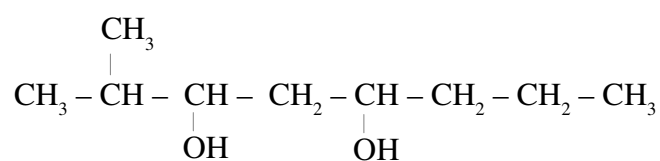
4. Explain why hexanoic acid has a higher boiling point than ethanoic acid (223°C compared to 141°C)

(2)

5. Why is methanamine soluble in water while chloromethane is not?

(2)

6. Consider the following organic compound :

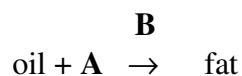


- (a) Circle and name all the functional groups on the molecule (2)
- (b) If a small amount of acidified dichromate was added to a sample of this compound and warmed, what would you expect to see? Explain.

(3)

7.

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:



(a) Identify:

reagent **A**. _____

substance **B**. _____ (2)

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

State *one* essential reaction condition.

_____ (1)

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

_____ (1)

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

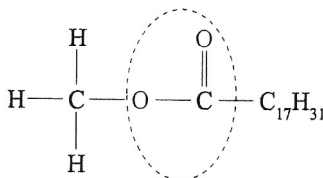
_____ (2)

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

(2)

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

_____ (2)

(a) Draw an isomeric ester of butanoic acid, and name it.

(b) Which one of the following is the most likely boiling point of your ester : 151.6°C, 81.2°C or 15.9°C ? Explain your answer.

(2)

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

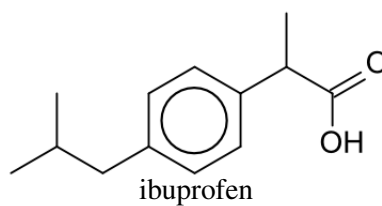
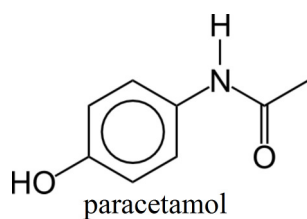
(1)

CC(NC(=O)NCC(C(=O)O)C(=O)N1CCCC1C(=O)N)C(=O)N

(2)

(2)

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



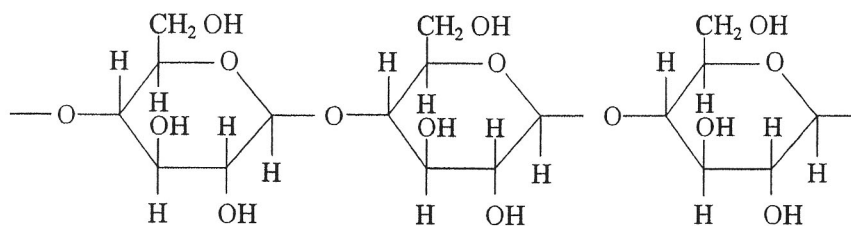
Explain, by comparing the structural formulae above, why a tablet containing ibuprofen is likely to also contain a base such as sodium carbonate, whereas this is not necessary for a tablet containing paracetamol.

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

[illegible]

12.

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) Explain why cellulose readily absorbs water.

_____ (2)

- (c) Cellulose can be broken down by microbes in the presence of water. This reaction produces simpler carbohydrates, which can then undergo fermentation.

- (i) Name the type of reaction that occurs when cellulose is broken down by microbes.

_____ (1)

- (ii) Write the molecular formula of the simplest carbohydrate product of the breakdown of cellulose.

_____ (1)

- (iii) State *one* condition that is necessary for fermentation to take place.

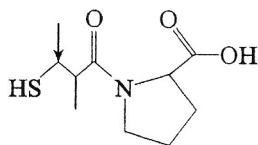
_____ (1)

- (iv) Write an equation for the fermentation of a monosaccharide to produce ethanol.

_____ (2)

13.

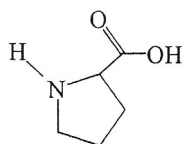
Captopril is drug used to lower blood pressure. The structural formula of Captopril is shown in the diagram below:



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

_____ (1)

The hydrolysis of Captopril results in the formation to *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) Draw the structural formula of the other product formed from the hydrolysis of Captopril.

(2)