

Synthetic and naturally occurring polymers – GCSE Chemistry**1. No.6.4-6.7**

The alkene needed to make poly(propene) is produced from crude oil.

Which **two** processes are used to produce this alkene from crude oil?

[2 marks]

Tick (✓) **two** boxes.

Chromatography ☐

Cracking ☐

Fermentation ☐

Fractional distillation ☐

Quarrying ☐

What type of bond joins the atoms in a molecule of poly(propene)?

[1 mark]

Tick (✓) **one** box.

Covalent ☐

Ionic ☐

Metallic ☐

Table 4 shows information about two polymers used to make plates.

Table 4

Polymer	Effect of heating the polymer
A	does not melt
B	melts at 50 °C

What type of polymer is polymer **A**?

Use **Table 4**.

[1 mark]

Why does polymer **A** behave differently to polymer **B** when heated?

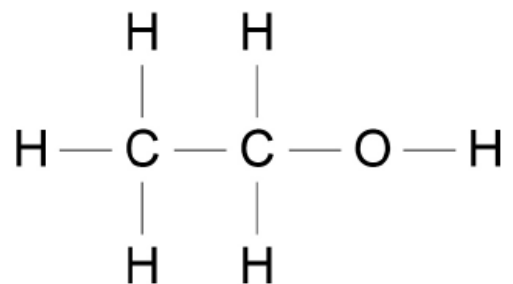
You should refer to crosslinks in your answer.

[1 mark]

2. No.7

Figure 7 shows the displayed structural formula of ethanol.

Figure 7



Draw a circle on **Figure 7** around the alcohol functional group.

[1 mark]

An ethanol molecule contains atoms of three different elements.

Complete **Table 5** to show:

- the name of each element
- the symbol for each element
- the number of atoms of each element in one molecule of ethanol.

Use **Figure 7**.

[3 marks]

Table 5

Name of element	Symbol for element	Number of atoms in one molecule of ethanol
Carbon	C	
Hydrogen		6
	O	1

Ethanol removes grass stains from clothes.

What type of substance is ethanol when used to remove grass stains?

[1 mark]

Tick (✓) **one** box.

A solute

☐

A solution

☐

A solvent

☐

Wine contains ethanol.

Wine is produced from grape juice by fermentation.

Complete the sentence.

[1 mark]

Grape juice can be fermented to produce wine because

grape juice contains _____.

What is added to grape juice to cause fermentation?

[1 mark]

Ethanol reacts with ethanoic acid to produce an ester.

What is the name of the ester produced when ethanol reacts with ethanoic acid?

[1 mark]

Tick (✓) **one** box.

Ethane

☐

Ethene

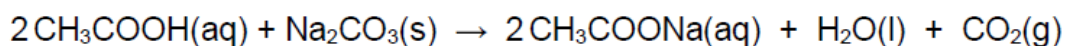
☐

Ethyl ethanoate

☐

Ethanoic acid reacts with sodium carbonate.

The equation for the reaction is:



What is the name of the liquid produced by this reaction?

[1 mark]

Vinegar is a solution that contains ethanoic acid.

400 cm³ of vinegar contains 20 g of ethanoic acid.

Calculate the mass of ethanoic acid in 1.0 dm³ of vinegar.

[3 marks]

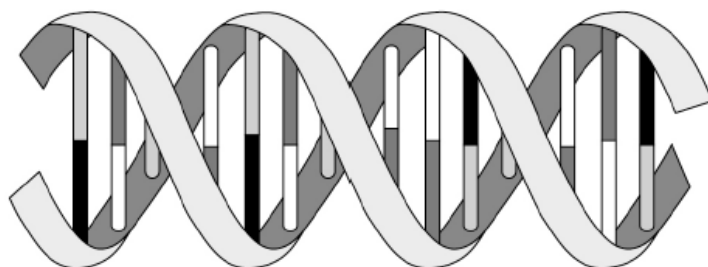
Mass = _____ g

3. No.9.6

The development and function of algae are controlled by a naturally occurring polymer.

Figure 7 represents the shape and structure of this polymer.

Figure 7



Describe the shape and structure of this polymer.

[3 marks]

4. No.5.6

Suggest **two** advantages and **two** disadvantages of using addition polymers rather than wood to make surfboards.

Use **Table 3**.

[4 marks]

Advantages of addition polymers _____

Disadvantages of addition polymers _____

5. No.6

Figure 5 shows a surfer on a surfboard.

Figure 5



Surfboards are made from polymers.

Surfboards have a poly(styrene) core and an outer skin.

Figure 6 shows the displayed structural formula of poly(styrene).

Figure 6

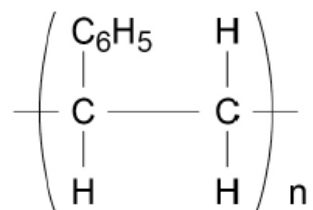
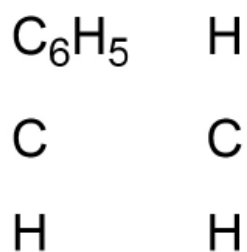


Figure 7 shows an incomplete displayed structural formula of the monomer styrene.

Complete **Figure 7**.

[2 marks]

Figure 7



The outer skin of surfboards contains a polyester.

Two monomers, **A** and **B**, are needed to make the polyester.

Figure 8 shows how these two monomers are represented.

Figure 8



Monomer **A**



Monomer **B**

Name the functional group in monomer **B**.

[1 mark]

Monomers **A** and **B** join together to produce a polyester and a small molecule.

Name the small molecule.

[1 mark]

Why does this type of polyester melt when it is heated?

[2 marks]

The outer skin of surfboards is a composite material.

The composite material contains glass fibres surrounded by a polyester.

Draw **one** line from each material to the description of that material.

[2 marks]

Material	Description of the material
	Hydrocarbon
Glass fibres	Matrix
	Monomer
Polyester	Polypeptide
	Reinforcement

The outer skin makes the surfboard more expensive.

Suggest **two** reasons why an outer skin is added to the poly(styrene) core.

[2 marks]

1 _____

2 _____
