

(Alcohols (properties, uses, reactions))

Q1. (2018)

Suggest **one** use of methylated spirit.

[1 mark]

Q2. (2018)

Describe how ethanol is produced from sugar solution.

Give the name of this process.

[3 marks]

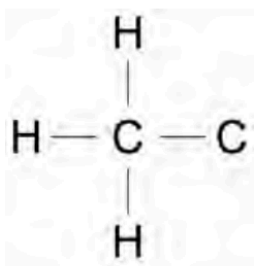
Q3. (2018)

Figure 2 shows part of the displayed formula for ethanol.

Complete **Figure 2**.

[1 mark]

Figure 2



Q4. (2018)

Name the gas produced when sodium is added to ethanol.

[1 mark]

Q5. (2018)

Methanol is used to produce methanoic acid.

What type of substance reacts with methanol to produce methanoic acid?

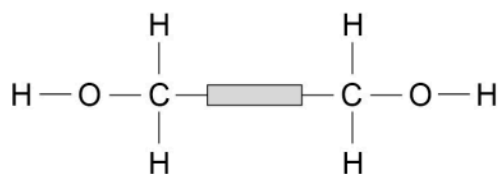
[1 mark]

Q6. a). (2021)

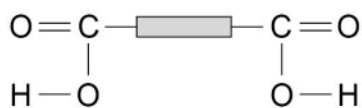
Figure 5 shows three monomers, **A**, **B** and **C**.

Monomer **A** can react with monomer **B** and with monomer **C** to produce polyesters.

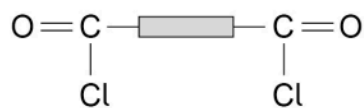
Figure 5



Monomer **A**



Monomer **B**



Monomer **C**

Draw a circle on **Figure 5** around an alcohol functional group.

[1 mark]

Complete **Table 2** to show the formula of the small molecule produced when:

- monomer **A** reacts with monomer **B**
- monomer **A** reacts with monomer **C**.

[1 mark]

Table 2

Reacting monomers	Formula of small molecule produced
A and B	
A and C	

Q7. a). (2021)

Ethanol can also be produced from sugar solution by adding yeast.

Name this process.

[1 mark]

Q7. b). (2021)

Butanol can be produced from sugar solution by adding bacteria.

Sugar solution is broken down in similar ways by bacteria and by yeast.

Suggest the reaction conditions needed to produce butanol from sugar solution by adding bacteria.

[2 marks]

Q8. (2021)

Ethanol and butanol can be used as fuels for cars.

A car needs an average of 1.95 kJ of energy to travel 1 m

Ethanol has an energy content of 1300 kilojoules per mole (kJ/mol).

Calculate the number of moles of ethanol needed by the car to travel 200 km

[3 marks]

Number of moles = _____ mol

Q9. (2022)

When butanol is burned in a car engine, complete combustion takes place.

Write a balanced equation for the complete combustion of butanol.

You do **not** need to include state symbols.

[2 marks]

Q10. a). (2023)

This question is about alcohols and carboxylic acids.

Alcohols are used as fuels.

A student burned 1.00 g of six alcohols and determined the energy released from each.

Table 2 shows the results.

Table 2

Alcohol	Formula of one molecule of the alcohol	Energy released in kJ/g
Ethanol	C ₂ H ₅ OH	29.6
Propanol	C ₃ H ₇ OH	33.6
Butanol	C ₄ H ₉ OH	36.1
Pentanol	C ₅ H ₁₁ OH	37.7
Hexanol	C ₆ H ₁₃ OH	38.9
Heptanol	C ₇ H ₁₅ OH	39.8

Calculate the mass of ethanol that must be burned to release the same amount of energy as burning 1.00 g of heptanol.

[2 marks]

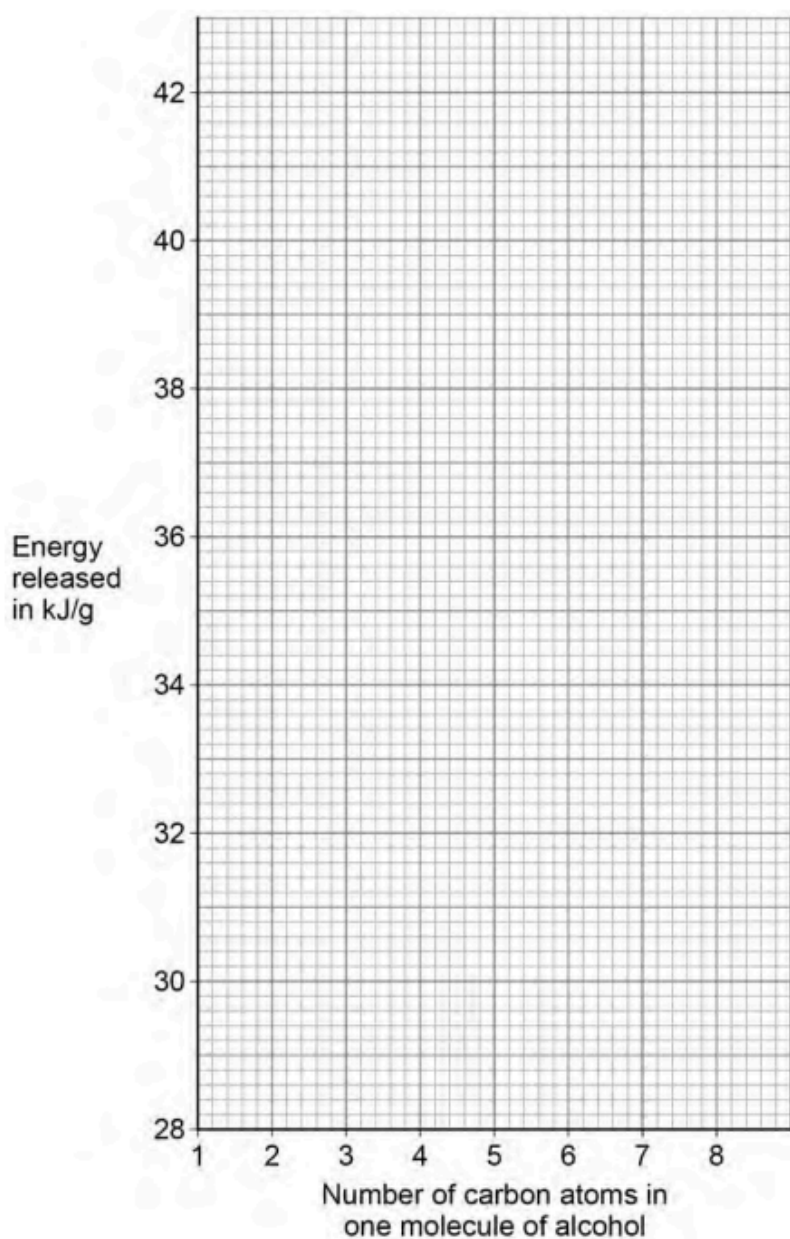
Mass = _____ g

The energy released in kJ/g varies with the number of carbon atoms in one molecule of each alcohol.

Plot the data from **Table 2** on **Figure 2**.

[2 marks]

Figure 2



Estimate the energy released in kJ when 1.00 g of octanol ($\text{C}_8\text{H}_{17}\text{OH}$) is burned.

Use **Figure 2**.

[1 mark]

Energy released = _____ kJ