



## 2

A standard 1D barcode with vertical black bars of varying widths on a white background. Below the bars, the corresponding alphanumeric characters are printed: H 3 6 7 9 7 A 0 2 1 2.

**The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.**

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1. Many everyday items are made of metals.

(a) Most metals have a high density.

Tick (✓) **two** boxes to show **two** other properties of most metals.

brittle	
good conductor of heat	
low melting point	
shiny	

(2)

(b) The bodies of aircraft are made of aluminium alloys rather than pure aluminium.

(i) What is an alloy?

.....  
.....

(1)

(ii) Suggest why the bodies of aircraft are made of aluminium alloys rather than pure aluminium.

.....  
.....

(1)

(c) Copper is used to make electrical cables.

Give **two** reasons why copper is used to make electrical cables.

(i) .....

(ii) .....

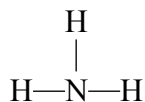
(2)

(Total 6 marks)

Q1



2. The diagram shows a molecule of ammonia.



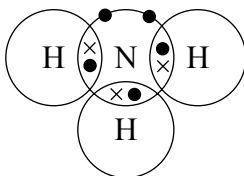
- (a) (i) Atoms of two different elements are combined in the molecule of ammonia.  
Name one of these elements.

..... (1)

- (ii) What is the molecular formula of ammonia?

..... (1)

- (b) The atoms in the molecule are bonded together by shared pairs of electrons.  
The dots and crosses represent electrons.



What type of bond joins atoms in the molecule?

Put a cross (X) in the correct box to show your answer.

covalent ☐

double ☐

ionic ☐

metallic ☐

(1)

- (c) Liquid ammonia has a low boiling point of  $-33^{\circ}\text{C}$ .  
Why does ammonia have a low boiling point?

Put a cross (X) in the correct box to show your answer.

The bonds between the atoms in ammonia are very strong ☐

The bonds between the atoms in ammonia are very weak ☐

The forces between ammonia molecules are strong ☐

The forces between ammonia molecules are weak ☐

(1)

Q2

(Total 4 marks)



3. Below is a picture of a tub of low-fat spread.



(a) The low-fat spread contains saturated, monounsaturated and polyunsaturated fats.

Complete the following statements by putting a cross (X) in the correct box to show your answer.

(i) Fats are classified by the number of carbon-carbon double bonds,  $\begin{array}{c} \diagup \quad \diagdown \\ \text{C}=\text{C} \\ \diagdown \quad \diagup \end{array}$ , in one of their molecules.

The number of carbon-carbon double bonds in one molecule of a

	more than one	<input type="checkbox"/>
monounsaturated fat is	one	<input type="checkbox"/>
	zero	<input type="checkbox"/>

(ii) Polyunsaturated fats are less viscous than saturated fats.

This means that, compared with saturated fats,

	are more runny	<input type="checkbox"/>
polyunsaturated fats	have higher melting points	<input type="checkbox"/>
	are more difficult to spread	<input type="checkbox"/>

(iii) A polyunsaturated fat is changed into a saturated fat by reacting it with

hydrogen	<input type="checkbox"/>
nitrogen	<input type="checkbox"/>
oxygen	<input type="checkbox"/>

(3)



- (b) The tub is made of two polymers.  
The bottom part is made of poly(propene) and the lid is made of poly(chloroethene).

A polymer is a large molecule.

A polymer is made when many small molecules of a substance join together.

This substance is called the monomer.

The table below shows information about the two polymers and the small monomer molecules used to make them.

Complete the table.

name of polymer	structure of polymer	name of monomer	structure of monomer molecule
poly(chloroethene)	$  \begin{array}{cccccc}  \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} \\    &   &   &   &   &   \\  -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\    &   &   &   &   &   \\  \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H}  \end{array}  $	chloroethene	.....
poly(propene)	$  \begin{array}{cccccc}  \text{CH}_3 & \text{H} & \text{CH}_3 & \text{H} & \text{CH}_3 & \text{H} \\    &   &   &   &   &   \\  -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{C}- \\    &   &   &   &   &   \\  \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H}  \end{array}  $	.....	$  \begin{array}{ccc}  \text{CH}_3 & & \text{H} \\  & \diagdown & / \\  & \text{C}=\text{C} & \\  & / & \diagdown \\  \text{H} & & \text{H}  \end{array}  $

(2)

- (c) Describe why problems are caused by plastic tubs in landfill sites.

.....  
.....

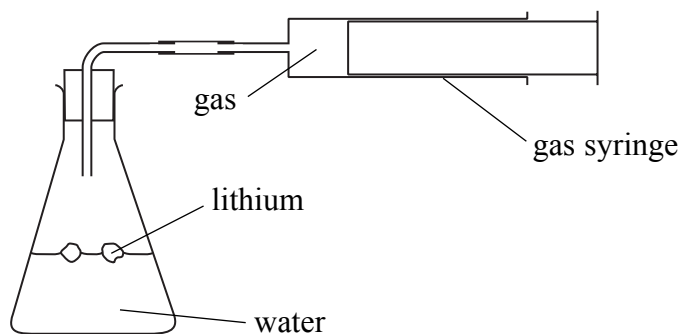
(1)

Q3

(Total 6 marks)



4. Sarah was investigating the rate of reaction between lithium and water. She measured out  $50 \text{ cm}^3$  of water and poured it into a conical flask. She dropped two pieces of lithium into the water and connected a gas syringe.



A gas was produced.  
Sarah measured the volume of gas collected at various times.

- (a) Tick (✓) **two** other pieces of apparatus that Sarah must use in this experiment.

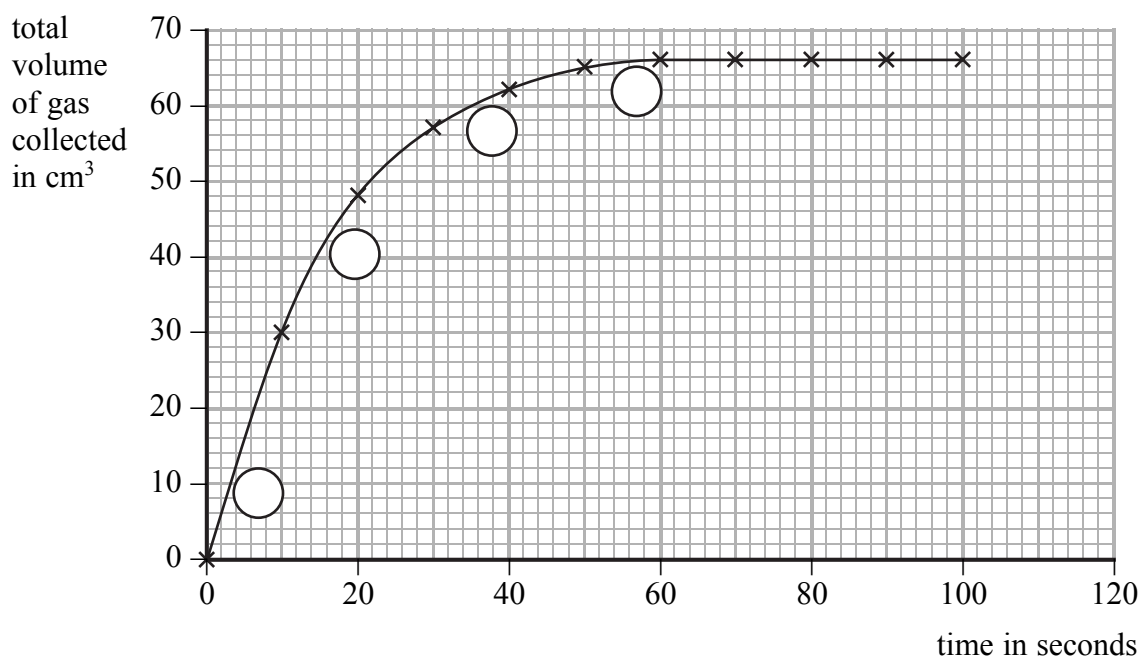
beaker	
measuring cylinder	
stopwatch	
test tube	


(2)





(b) Sarah plotted a graph of her results.



(i) In one of the circles  on the graph, mark 'X' where the reaction was fastest. **(1)**

(ii) Sarah took readings for 100 seconds.  
Use the graph to find after how long the reaction stopped.

..... seconds **(1)**

(c) Sarah wants to make this reaction go faster.  
She knows there is no suitable catalyst for the reaction.

State one change that she could make so that the same mass of lithium and the same volume of water would react faster.

.....  
..... **(1)**

**(Total 5 marks)**

**Q4**

5. Lithium and sodium are reactive metals in the same group of the periodic table.

(a) The lithium atom contains electrons, neutrons and protons.

(i) Describe the position of these particles in the lithium atom.

.....

.....

.....

.....

(2)

(ii) A lithium atom has an atomic number of 3 and a mass number of 7.  
State the number of each type of particle in this lithium atom.

..... protons

..... electrons

..... neutrons

(2)

(b) When lithium is heated and put into a gas jar of oxygen, a vigorous reaction takes place.

(i) During the reaction, heat is given out.  
What type of reaction is this?

.....

(1)

(ii) The product is lithium oxide.  
The lithium oxide contains lithium ions,  $\text{Li}^+$ , and oxide ions,  $\text{O}^{2-}$ .  
Write the formula of lithium oxide.

.....

(1)



- (c) The electronic configuration of lithium is 2.1.  
Sodium is below lithium in the periodic table and has the electronic configuration 2.8.1.

- (i) Describe how the electronic configuration of an atom of an element shows the group and period in which the element appears in the periodic table.

.....  
.....  
.....  
.....

(2)

- (ii) Sodium is more reactive than lithium.

Use the electronic configurations of their atoms to explain why.

.....  
.....

(1)

Q5

(Total 9 marks)

**TOTAL FOR PAPER: 30 MARKS**

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