



**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** \_\_\_\_\_

**Candidate Signature** \_\_\_\_\_

**I declare this is my own work.**

**GCSE**

**CHEMISTRY**

**F**

**Foundation Tier**

**Paper 1**

**8462/1F**

**Time allowed: 1 hour 45 minutes**

**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**



J U N 2 2 8 4 6 2 1 F 0 1

**For this paper you must have:**

- **a ruler**
- **a scientific calculator**
- **the periodic table (enclosed).**

## **INSTRUCTIONS**

- **Use black ink or black ball-point pen.**
- **Pencil should only be used for drawing.**
- **Answer ALL questions in the spaces provided. Do not write on blank pages.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**
- **In all calculations, show clearly how you work out your answer.**



## **INFORMATION**

- **The maximum mark for this paper is 100.**
- **The marks for questions are shown in brackets.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



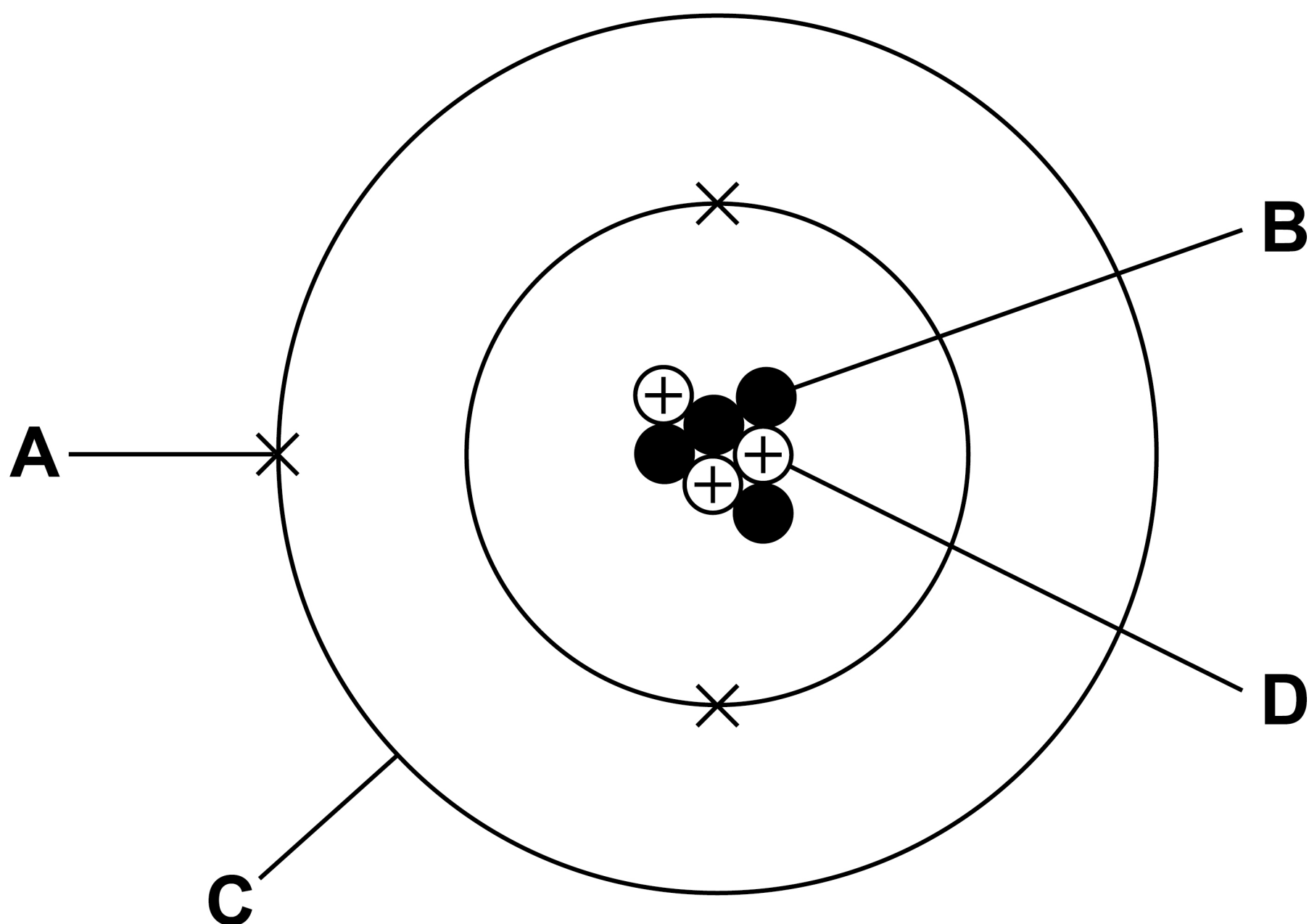
0 1

This question is about atoms.

0 1 . 1

FIGURE 1 represents an atom of an element.

FIGURE 1



**Draw ONE line from each name to the correct label. [2 marks]**

**NAME**

**LABEL**

**Neutron**

**A**

**B**

**Proton**

**C**

**D**

**[Turn over]**



0	1	.	2
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**An atom of element Y has:**

- **an atomic number of 9**
- **a mass number of 19.**

**Give the number of electrons and the number of neutrons in this atom.**

**Choose answers from the list. [2 marks]**

- **1**
- **9**
- **10**
- **19**
- **28**

**Number of electrons** \_\_\_\_\_

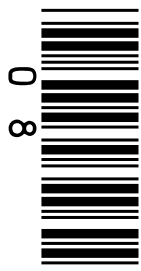
**Number of neutrons** \_\_\_\_\_



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**[Turn over]**





**TABLE 1 shows information about two isotopes of element Z.**

**TABLE 1**

	<b>Mass number</b>	<b>Percentage abundance (%)</b>
<b>Isotope A</b>	<b>39</b>	<b>93.3</b>
<b>Isotope B</b>	<b>41</b>	<b>6.7</b>

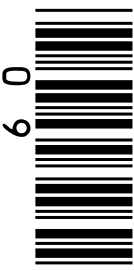
∞

**0 1 . 3**

**Calculate the relative atomic mass ( $A_r$ ) of element Z.**

**Use TABLE 1 and the equation:**





$$A_r = \frac{(\text{mass number} \times \text{percentage}) \text{ of isotope A} + (\text{mass number} \times \text{percentage}) \text{ of isotope B}}{100}$$

**Give your answer to 3 significant figures. [3 marks]**

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**$A_r$  (3 significant figures) =** \_\_\_\_\_

**[Turn over]**

**0 1 . 4**

**Suggest the identity of element Z.**

**Use the periodic table. [1 mark]**

**Element Z \_\_\_\_\_**

**0 1 . 5**

**Complete the sentence on the opposite page.**

**Choose the answer from the list.  
[1 mark]**

- **electrons**
- **neutrons**
- **protons**



**Isotopes of the same element have different mass numbers because the isotopes have different numbers of \_\_\_\_\_ .**

**[Turn over]**

9



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**0 2**

**This question is about elements, compounds and mixtures.**

**0 2 . 1**

**Which type of substance is hydrogen?  
[1 mark]**

**Tick (✓) ONE box.**

**Element****Compound****Mixture**

**[Turn over]**



The diagrams in FIGURE 2, on the opposite page, represent different substances.

Use FIGURE 2 to answer questions 02.2 and 02.3.

0 2 . 2

Which diagram represents a mixture of compounds? [1 mark]

Tick (✓) ONE box.

A

B

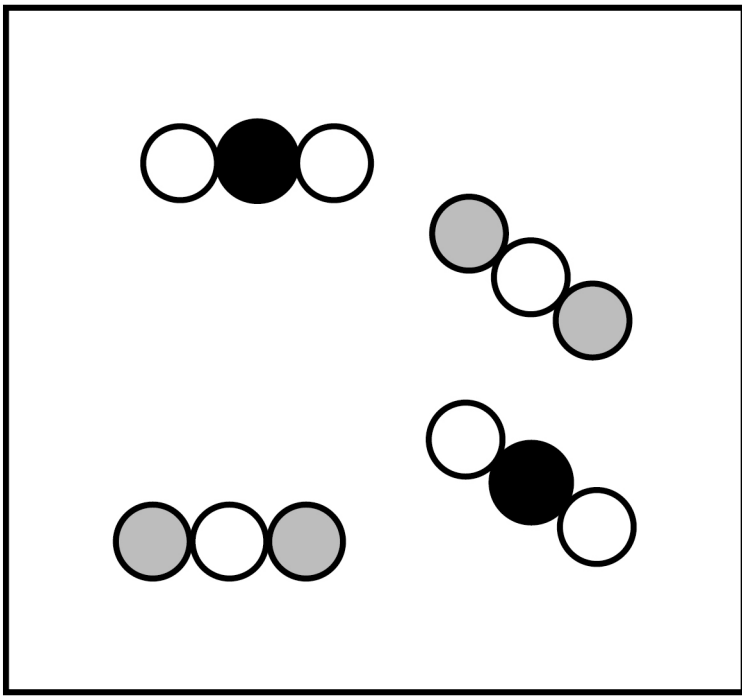
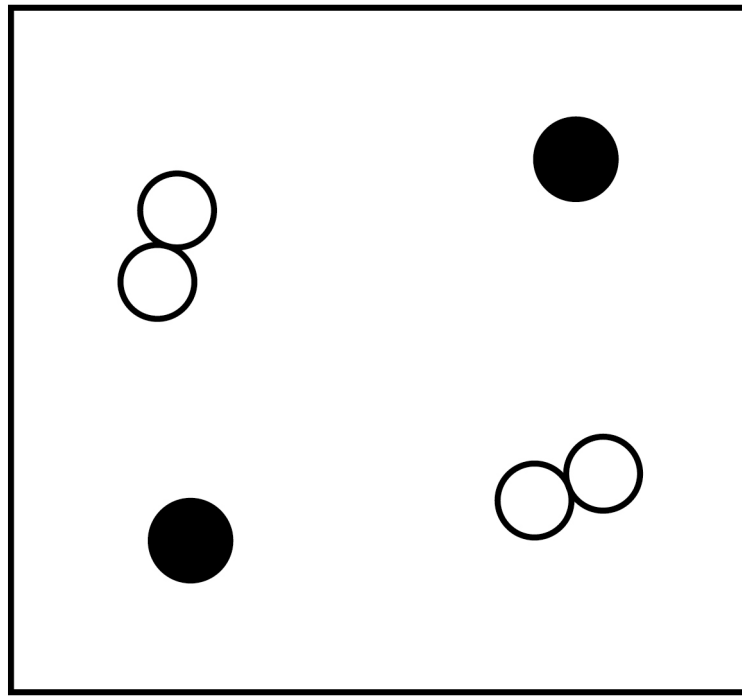
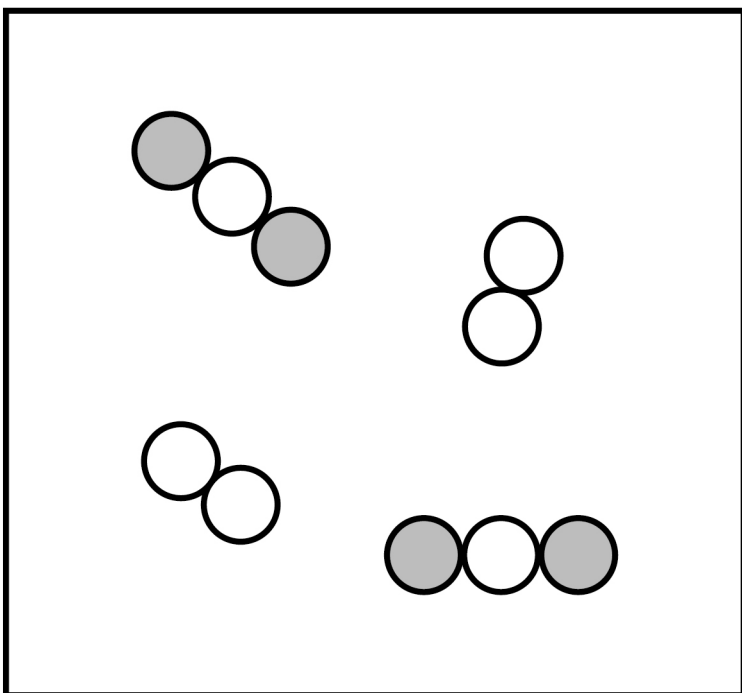
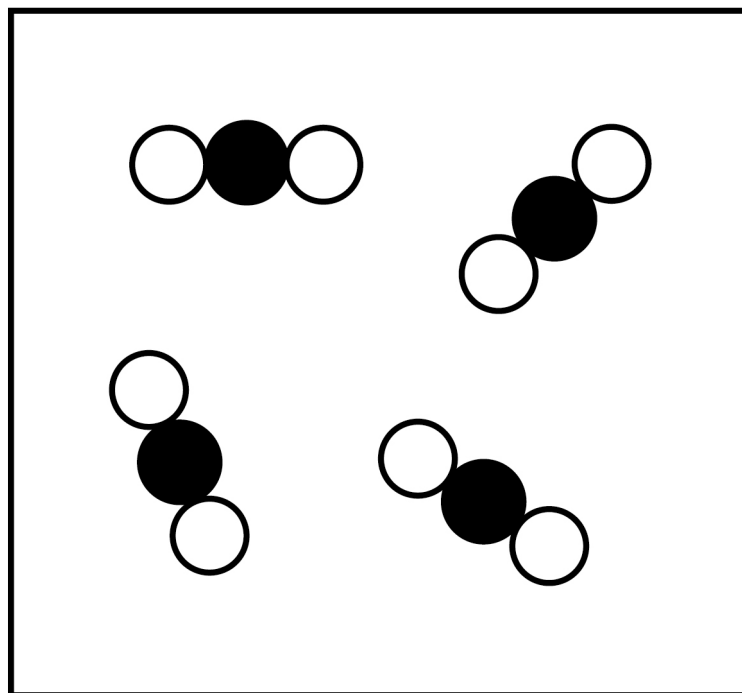
C

D



**FIGURE 2**

○ ● and ○ represent atoms of three different elements.

**A****B****C****D**

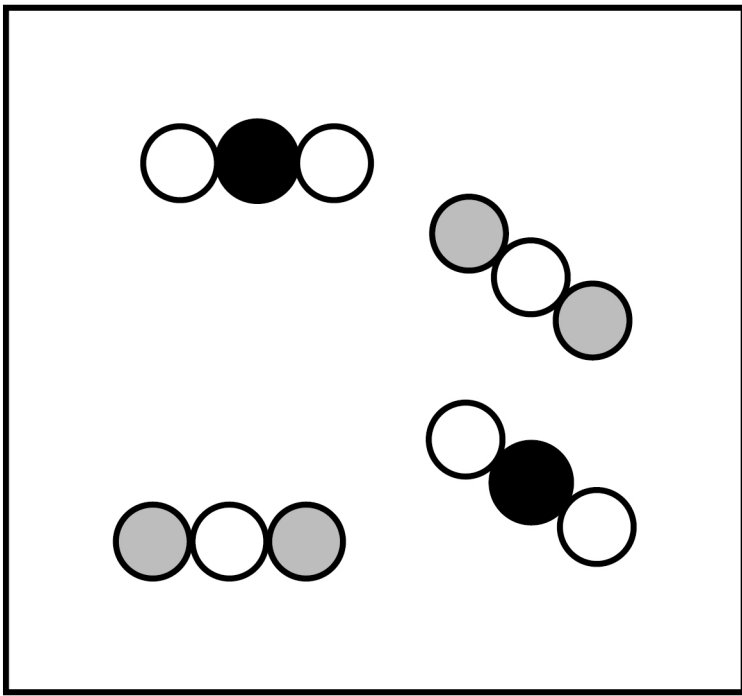
**[Turn over]**



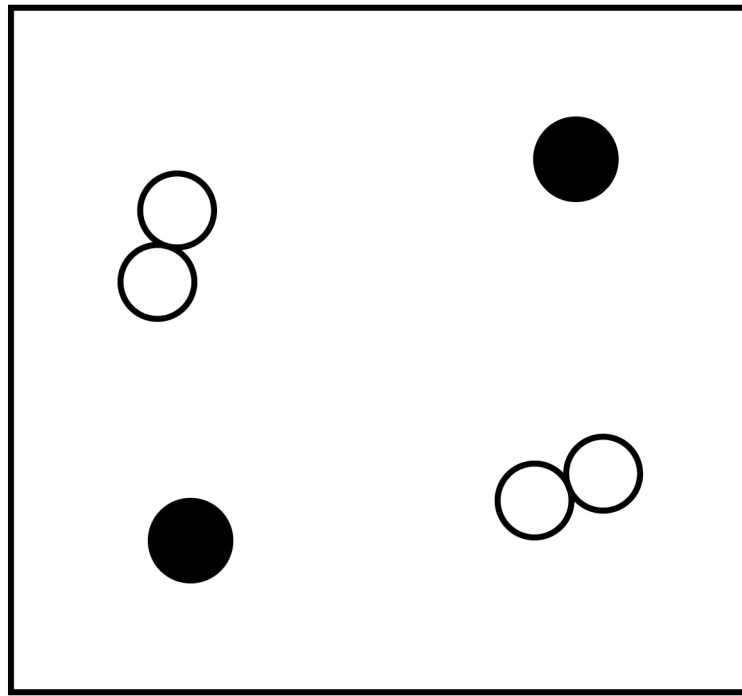
## REPEAT OF FIGURE 2

○ ● and ○ represent atoms of three different elements.

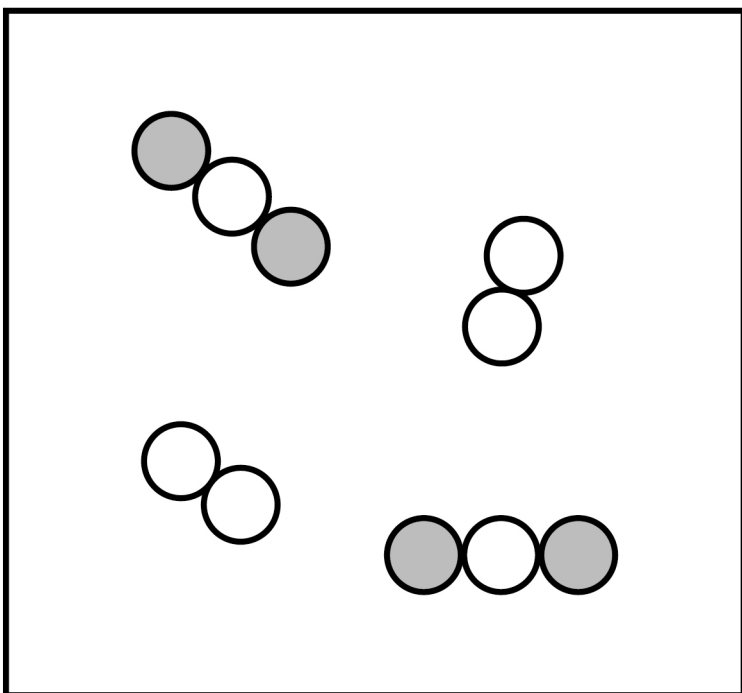
A



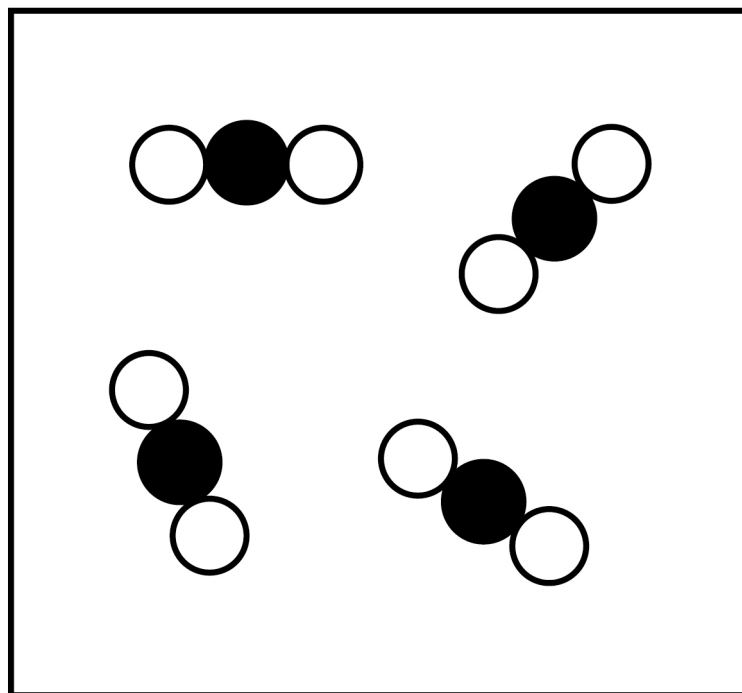
B



C



D





0	2	.	3
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**Which diagram represents a mixture of elements? [1 mark]**

**Tick (✓) ONE box.**

**A****B****C****D**

**[Turn over]**



**Substances can be separated from mixtures by using different methods.**

**0 2 . 4**

**Complete the sentence. [1 mark]**

**Sand can be separated from a mixture of sand and water by \_\_\_\_\_ .**



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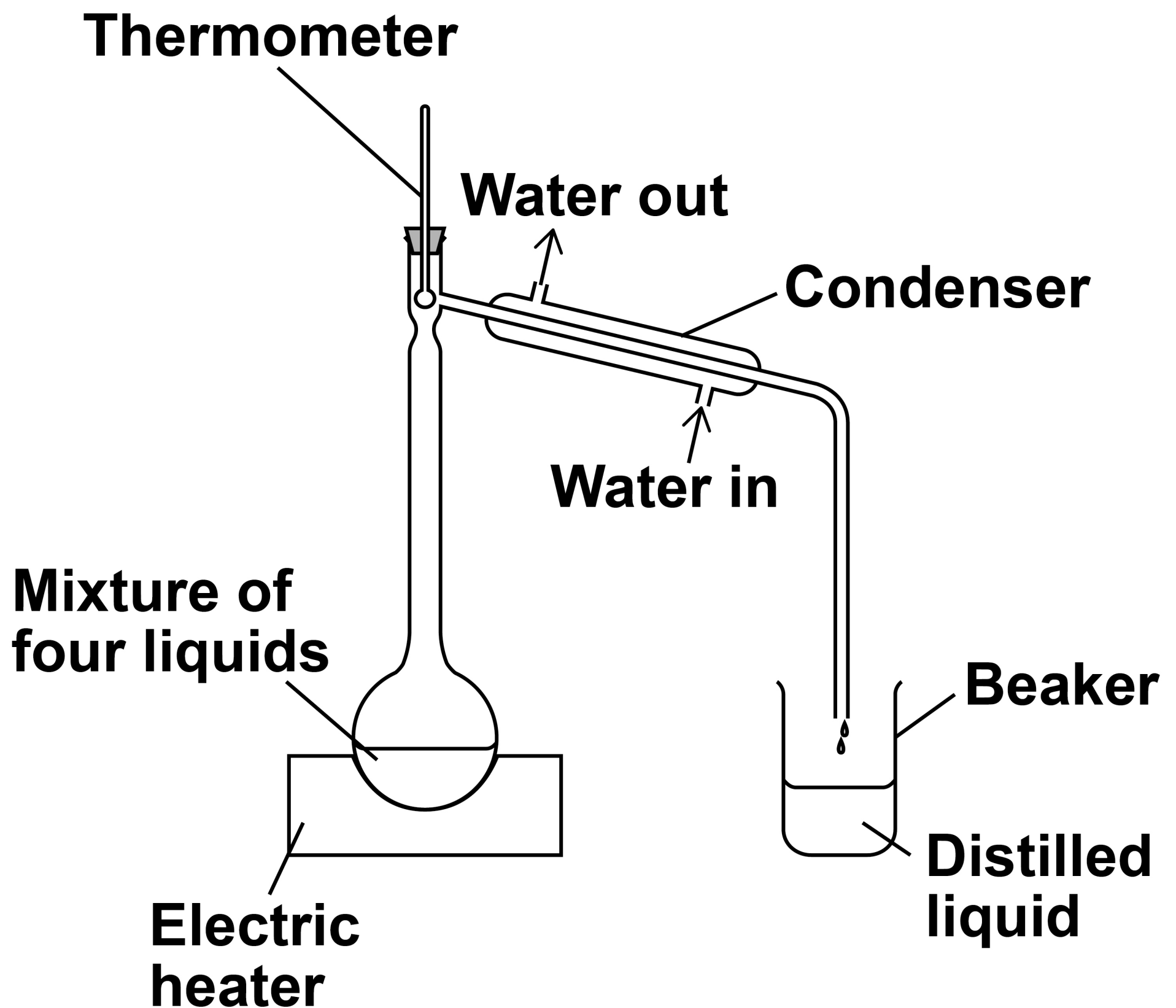
**[Turn over]**



A mixture of four liquids was fractionally distilled.

FIGURE 3 shows the apparatus used.

FIGURE 3



**TABLE 2 shows the boiling points of the four liquids in the mixture.**

**TABLE 2**

<b>Liquid</b>	<b>Boiling point in °C</b>
<b>A</b>	<b>97</b>
<b>B</b>	<b>138</b>
<b>C</b>	<b>78</b>
<b>D</b>	<b>118</b>

**0 2 . 5**

**Which liquid in TABLE 2 would distil and be collected in the beaker first? [1 mark]**

**Liquid** \_\_\_\_\_

**[Turn over]**



0	2	.	6
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**Suggest what would happen to the temperature of the water as the water flows through the condenser. [1 mark]**

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0	2	.	7
---	---	---	---

**Describe how to obtain sodium chloride crystals from sodium chloride solution by crystallisation. [2 marks]**

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**[Turn over]**

8



03

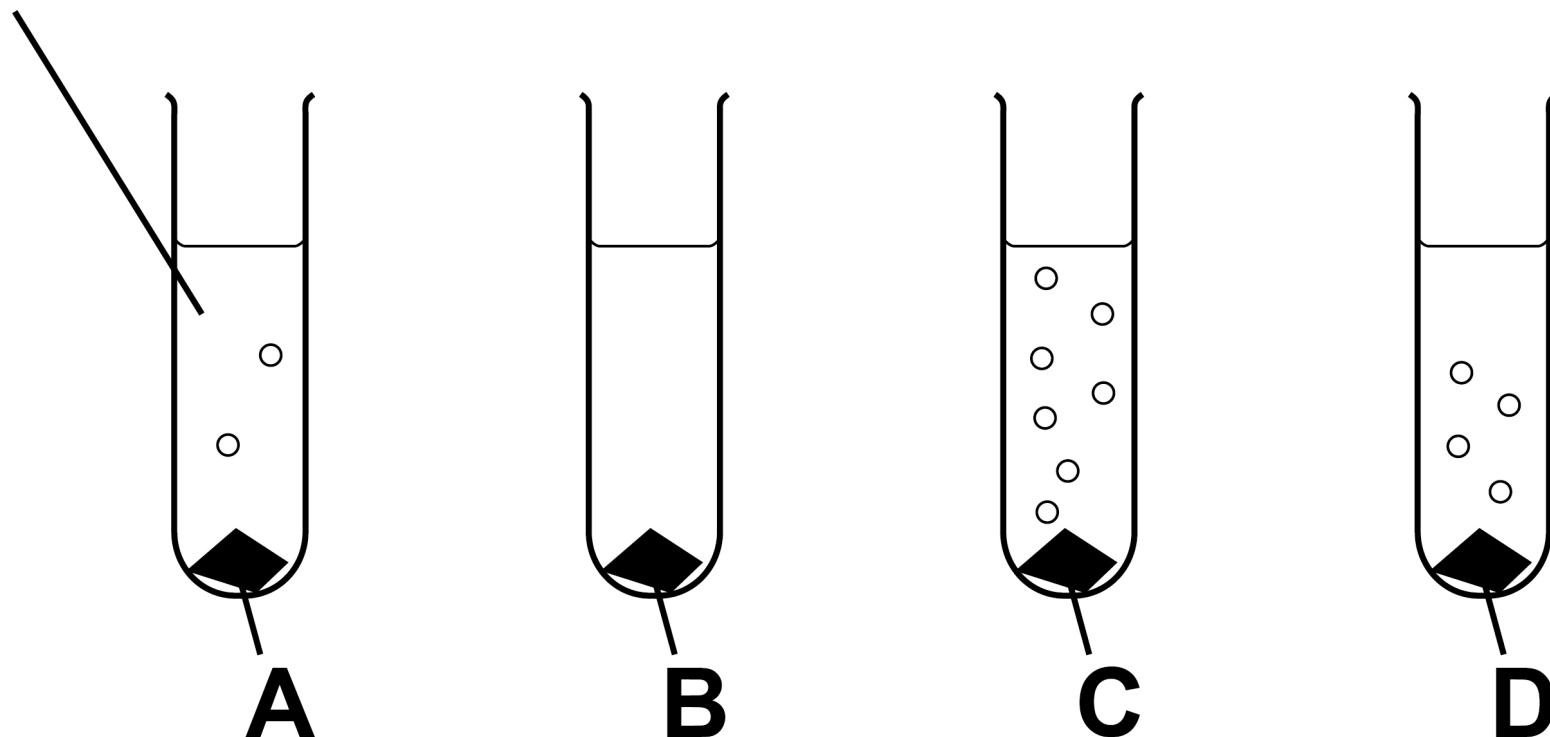
This question is about acids.

A student added four metals, A, B, C and D to hydrochloric acid.

FIGURE 4 shows the rate of bubbling in each tube.

FIGURE 4

Hydrochloric acid



Use FIGURE 4 to answer questions 03.1 and 03.2.





0 3 . 1

**Which metal is copper? [1 mark]**

**Tick (✓) ONE box.**

**A**

**B**

**C**

**D**

**[Turn over]**



0	3	.	2
---	---	---	---

**Which metal is the most reactive?**  
**[1 mark]**

**Tick (✓) ONE box.**

**A****B****C****D**

0	3	.	3
---	---	---	---

**A metal oxide reacts with an acid to produce zinc sulfate and water.**

**Name the metal oxide and the acid used in this reaction. [2 marks]**

**Name of metal oxide** \_\_\_\_\_

**Name of acid** \_\_\_\_\_

**[Turn over]**



0	3	.	4
---	---	---	---

**Universal indicator is used to measure the pH of a solution.**

**On the opposite page, draw ONE line from each pH to the colour of universal indicator in a solution with that pH.**

**[2 marks]**



**pH**

**Colour of  
universal  
indicator**

**1**

**Blue**

**Green**

**Purple**

**7**

**Red**

**Yellow**

**[Turn over]**



**A student reacts an acid with an alkali in a titration.**

**0 3 . 5**

**What is the type of reaction when an acid reacts with an alkali? [1 mark]**

**Tick (✓) ONE box.**

**Combustion**

**Decomposition**

**Neutralisation**



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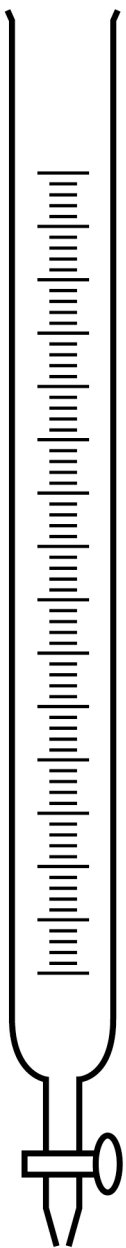
**[Turn over]**



0	3	.	6
---	---	---	---

**FIGURE 5** shows a piece of equipment used to measure the volume of the acid in the titration.

**FIGURE 5**





**What is the name of this piece of equipment? [1 mark]**

**Tick (✓) ONE box.**

**Burette**

**Pipette**

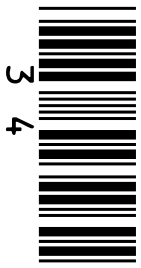
**Syringe**

**Tube**

**[Turn over]**

8





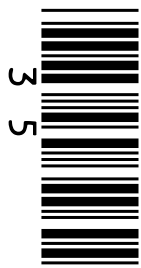
0 4

This question is about the periodic table.

FIGURE 6 shows an early version of the periodic table published by a scientist.

FIGURE 6

H														
Li	Be	B	C	N	O	F								
Na	Mg	Al	Si	P	S	Cl								
K	Cu	Ca	Zn	?	?	Ti	?	V	As	Cr	Se	Mn	Br	Fe Co Ni
Rb	Ag	Sr	Cd	Y	In	Zr	Sn	Nb	Sb	Mo	Te	?	I	Ru Rh Pd



**0 4 . 1**

**The scientist left gaps in the periodic table in FIGURE 6.**

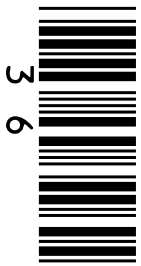
**Each gap is represented by a question mark (?).**

**Give ONE reason why the scientist left gaps in this periodic table. [1 mark]**

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**[Turn over]**



**0 4 . 2**

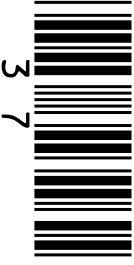
**Which scientist published the periodic table in FIGURE 6?  
[1 mark]**

**Tick (✓) ONE box.**

**Bohr**

**Chadwick**

**Mendeleev**



**0 4 . 3**

**The modern periodic table is different from the periodic table in FIGURE 6, on page 34.**

**One extra group of elements has been added.**

**What is the name of the extra group of elements in the modern periodic table? [1 mark]**

**Tick (✓) ONE box.**

**Alkali metals**

**Halogens**

**Noble gases**

**[Turn over]**

0	4	.	4
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**Why do the elements in Group 1 of the modern periodic table have similar chemical properties? [1 mark]**

**Tick (✓) ONE box.**

**The elements all form negative ions.**

**The elements all have one electron in the outer shell.**

**The elements all have the same number of shells.**

0	4	.	5
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**TABLE 3, on the opposite page, shows the melting points of the first five elements going down Group 1.**



TABLE 3

Element	Melting point in °C
Lithium	181
Sodium	98
Potassium	X
Rubidium	39
Caesium	29

Predict value X. [1 mark]

X = \_\_\_\_\_ °C

0 4 . 6

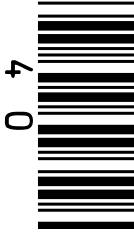
Give ONE observation you would see when a small piece of potassium is added to water. [1 mark]

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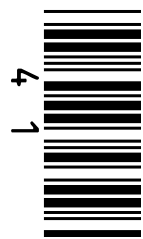


0	4	.	7
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**TABLE 4, on the opposite page, shows information about the first five elements going down Group 7.**







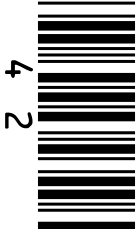
**TABLE 4**

<b>Element</b>	<b>State at 150 °C</b>	<b>Symbol</b>	<b>Formula of the compound with hydrogen</b>
<b>Fluorine</b>	gas	<b>F</b>	<b>HF</b>
<b>Chlorine</b>	_____	<b>Cl</b>	<b>HCl</b>
<b>Bromine</b>	gas	<b>Br</b>	<b>HBr</b>
<b>Iodine</b>	liquid	<b>I</b>	<b>HI</b>
<b>Astatine</b>	solid	<b>At</b>	_____

**Complete TABLE 4. [2 marks]**

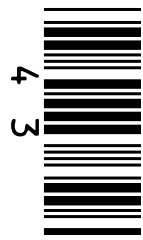
**[Turn over]**





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04.8

The elements in Group 7 consist of molecules.

What is the formula of a molecule of bromine? [1 mark]

Tick (✓) ONE box.

Br

Br<sub>2</sub>

Br<sup>2</sup>

2Br

[Turn over]



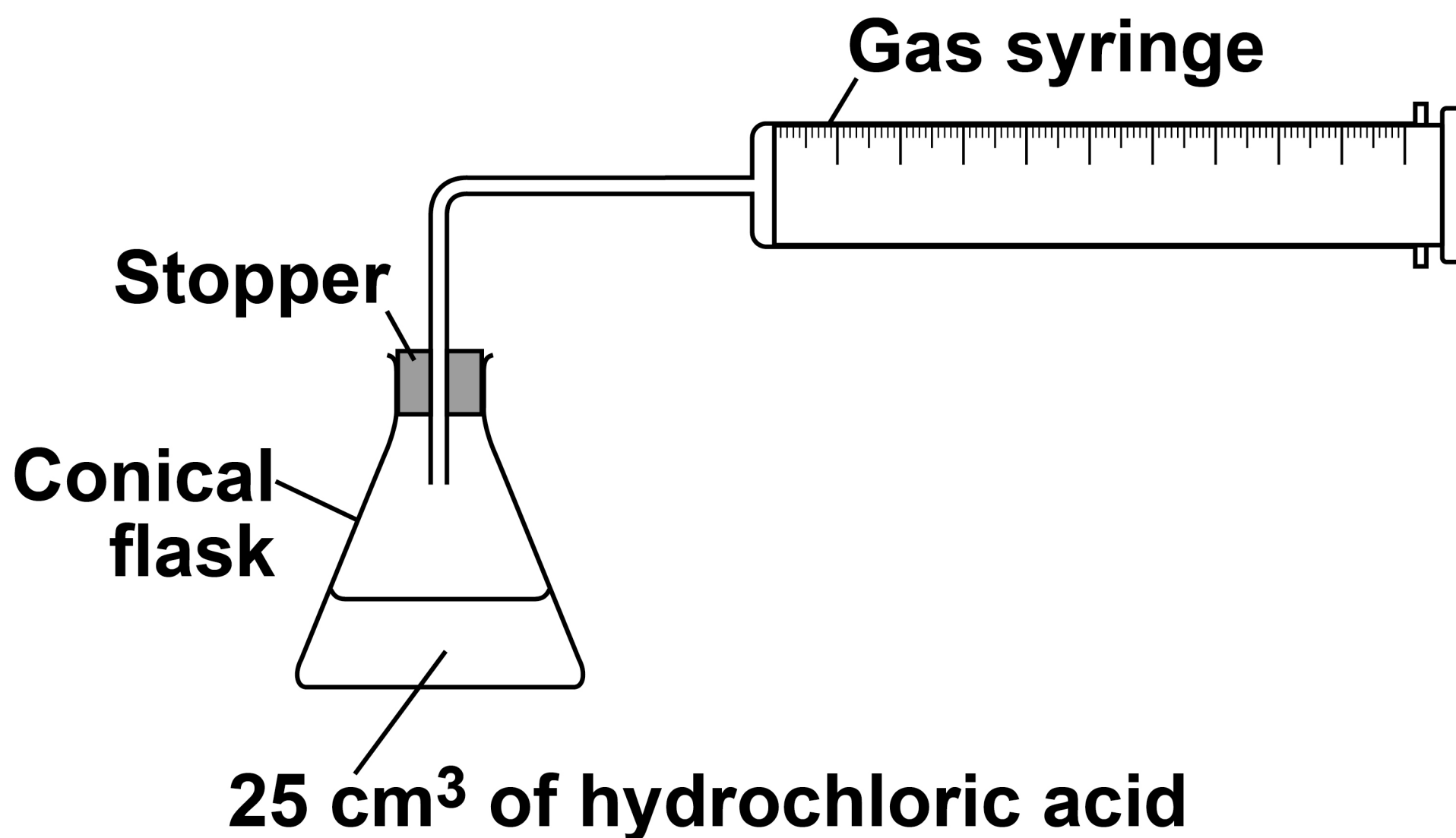
9

05

A student investigated the reaction of magnesium with hydrochloric acid.

FIGURE 7 shows the apparatus used.

FIGURE 7



**This is the method used.**

- 1. Set up the apparatus as shown in FIGURE 7.**
- 2. Cut 10 mm of magnesium ribbon.**
- 3. Remove the stopper.**
- 4. Add the magnesium ribbon to the conical flask.**
- 5. Replace the stopper as quickly as possible.**
- 6. Record the final reading on the gas syringe when the reaction has stopped.**
- 7. Repeat steps 1 to 6 three more times.**
- 8. Repeat steps 1 to 7 with different lengths of magnesium ribbon.**

**[Turn over]**



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0	5	.	1
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**Which gas is produced when magnesium reacts with hydrochloric acid? [1 mark]**

**Tick (✓) ONE box.**

**Carbon dioxide**

**Chlorine**

**Hydrogen**

**Oxygen**

**[Turn over]**



0	5	.	2
---	---	---	---

**What was the independent variable in the investigation? [1 mark]**

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0	5	.	3
---	---	---	---

**Give ONE control variable in the investigation. [1 mark]**

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**[Turn over]**



**TABLE 5, on the opposite page, shows the results for one length of magnesium ribbon.**

**TABLE 5**

	<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>	<b>Trial 4</b>
<b>Volume of gas produced in cm<sup>3</sup></b>	<b>19</b>	<b>36</b>	<b>37</b>	<b>32</b>

**One of the results was anomalous.**

**0 5 . 4**

**Which trial in TABLE 5 gave an anomalous result? [1 mark]**

**Trial** \_\_\_\_\_



0 5 . 5

**Suggest ONE reason for the anomalous result in TABLE 5. [1 mark]**

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**[Turn over]**

**0 5 . 6**

**TABLE 6** shows the mean volume of gas produced for each length of magnesium ribbon.

**TABLE 6**

<b>Length of magnesium ribbon in mm</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>
<b>Mean volume of gas produced in cm<sup>3</sup></b>	<b>7</b>	<b>14</b>	<b>21</b>	<b>28</b>	<b>35</b>	<b>42</b>

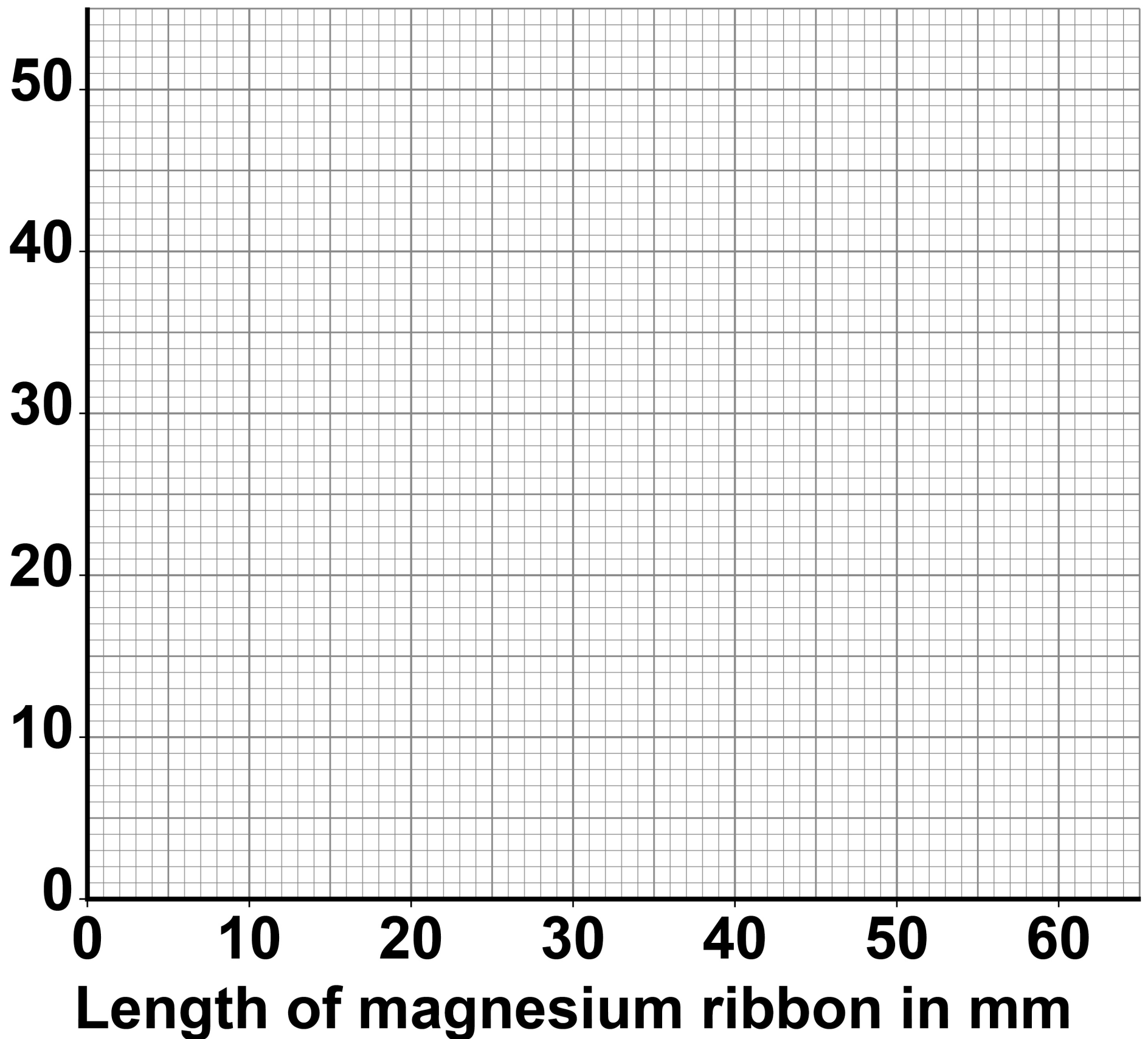
**Plot the data from TABLE 6 on FIGURE 8, on the opposite page.**

**Draw a line of best fit. [3 marks]**



**FIGURE 8**

**Mean volume of gas  
produced in cm<sup>3</sup>**



**[Turn over]**



0	5	.	7
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**Complete the sentence. [1 mark]**

**As the length of the magnesium ribbon increases, the mean volume of gas produced \_\_\_\_\_.**

9



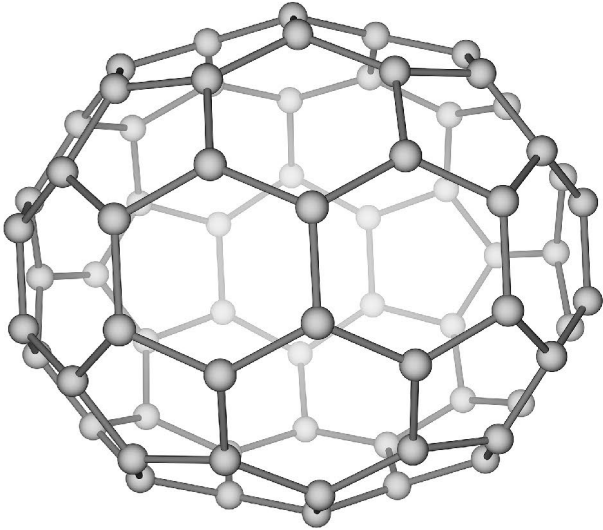
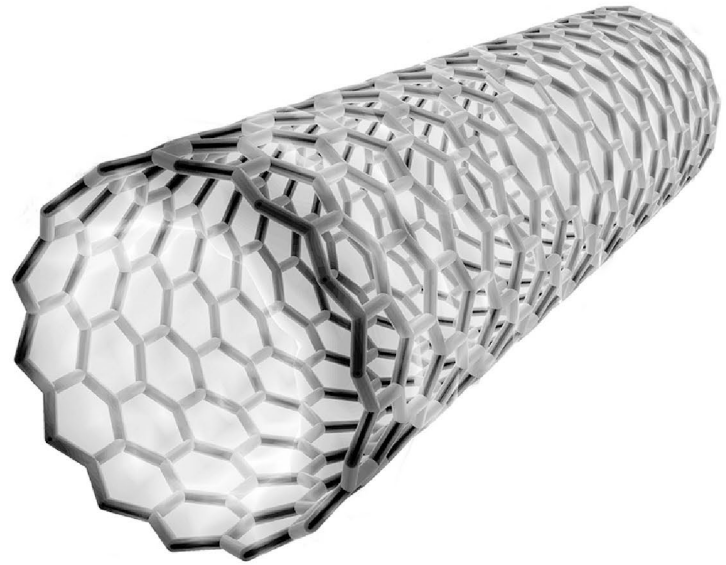
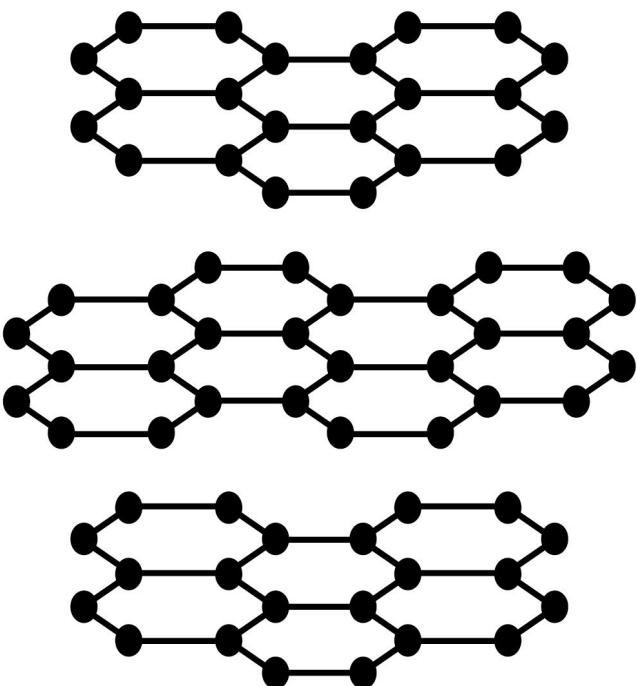
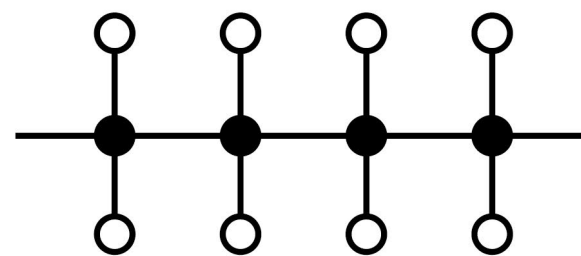
0	6
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**This question is about carbon and compounds of carbon.**

**FIGURE 9, on page 56, shows diagrams that represent different structures.**

**[Turn over]**



**FIGURE 9****A****B****C****D**

**Use FIGURE 9 to answer questions 06.1 and 06.2.**





0	6	.	1
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**Which diagram represents graphite?**  
**[1 mark]**

**Tick (✓) ONE box.**

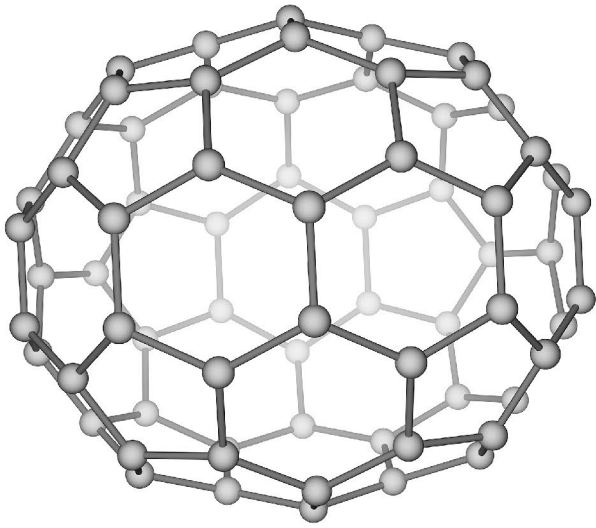
**A****B****C****D**

**[Turn over]**

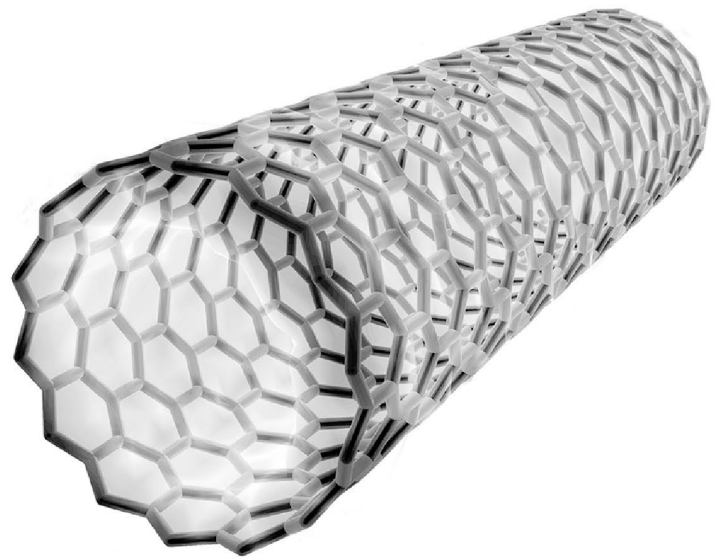


## REPEAT OF FIGURE 9

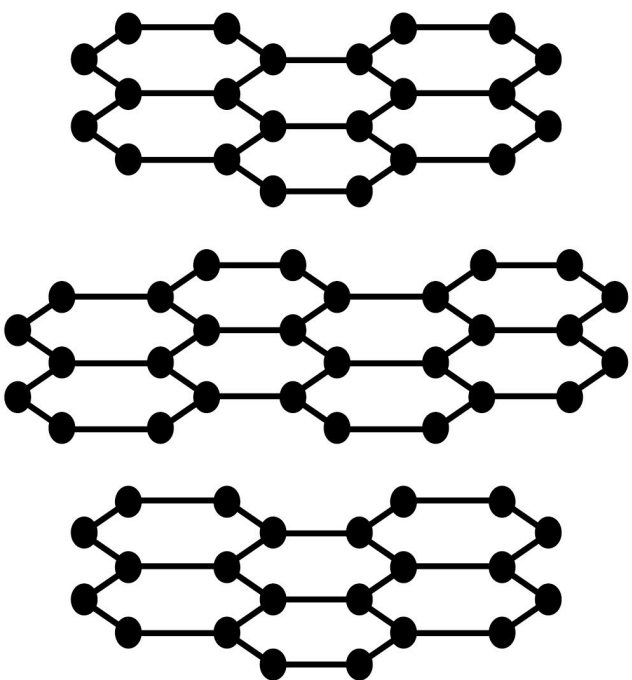
A



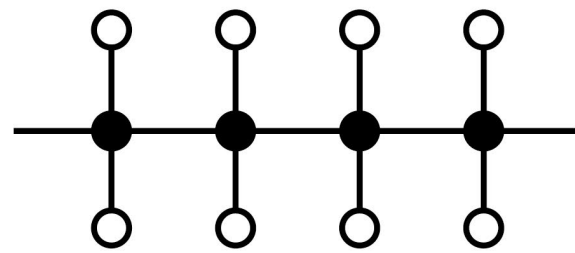
B



C



D



0	6	.	2
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**Which diagram represents poly(ethene)?**  
**[1 mark]**

**Tick (✓) ONE box.**

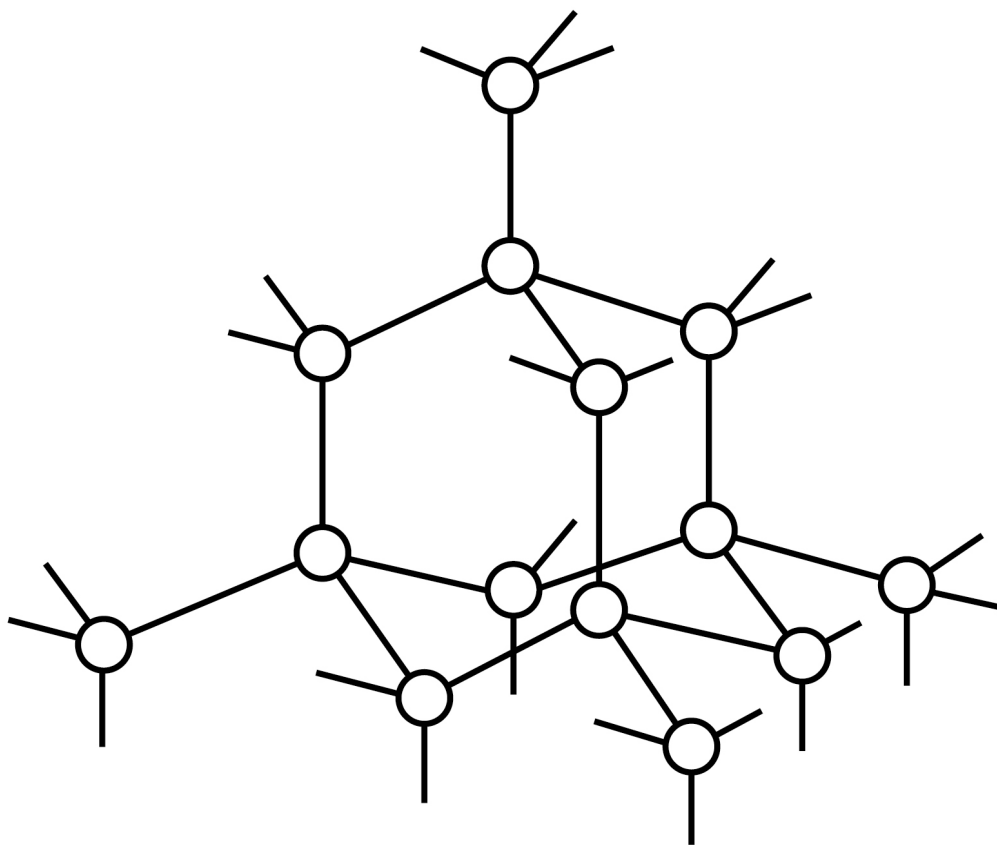
**A****B****C****D**

**[Turn over]**



**FIGURE 10** represents the structure of diamond.

**FIGURE 10**



**KEY**

○ Carbon atom

**0 6 . 3**

**How many covalent bonds does each carbon atom form in diamond? [1 mark]**

0	6	.	4
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**Which is a property of diamond?**  
**[1 mark]**

**Tick (✓) ONE box.**

**Conducts electricity**

**Low melting point**

**Very hard**

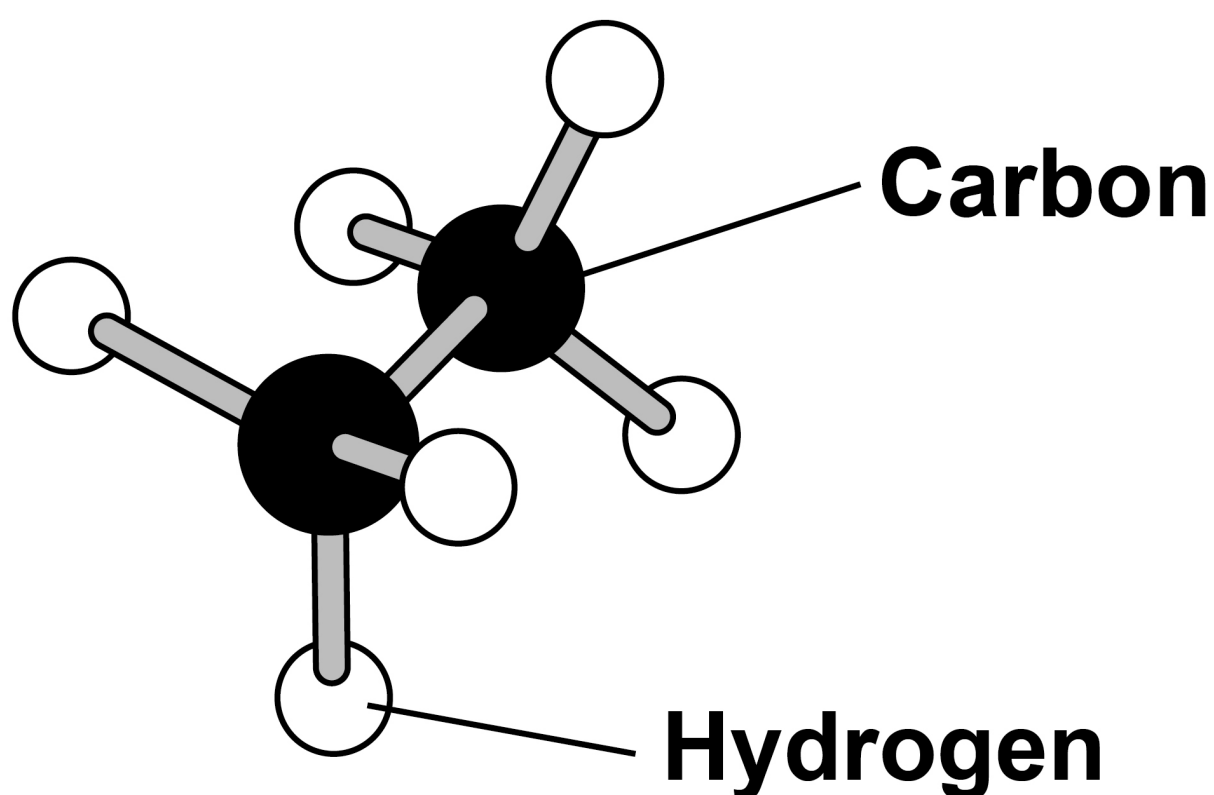
**[Turn over]**



0	6	.	5
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**FIGURE 11** shows a model of a molecule.

**FIGURE 11**



**Complete the molecular formula of the molecule. [1 mark]**

**Molecular formula = C \_\_\_\_\_ H \_\_\_\_\_**

**Carbonic acid is a compound of carbon.**

**The formula of carbonic acid is  $\text{H}_2\text{CO}_3$**

**0 6 . 6**

**Which ion is produced by carbonic acid in aqueous solution? [1 mark]**

**Tick (✓) ONE box.**

**$\text{H}^+$**

**$\text{OH}^-$**

**$\text{O}^{2-}$**

**[Turn over]**



0	6	.	7
---	---	---	---

Calculate the relative formula mass ( $M_r$ ) of carbonic acid ( $\text{H}_2\text{CO}_3$ ).

Relative atomic masses ( $A_r$ ):

H = 1    C = 12    O = 16

[2 marks]

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---

Relative formula mass ( $M_r$ ) =

---

8





0	7
---	---

**This question is about small particles.**

0	7	.	1
---	---	---	---

**Coarse particles, fine particles and nanoparticles are all small particles.**

**Which is the largest particle? [1 mark]**

**Tick (✓) ONE box.**

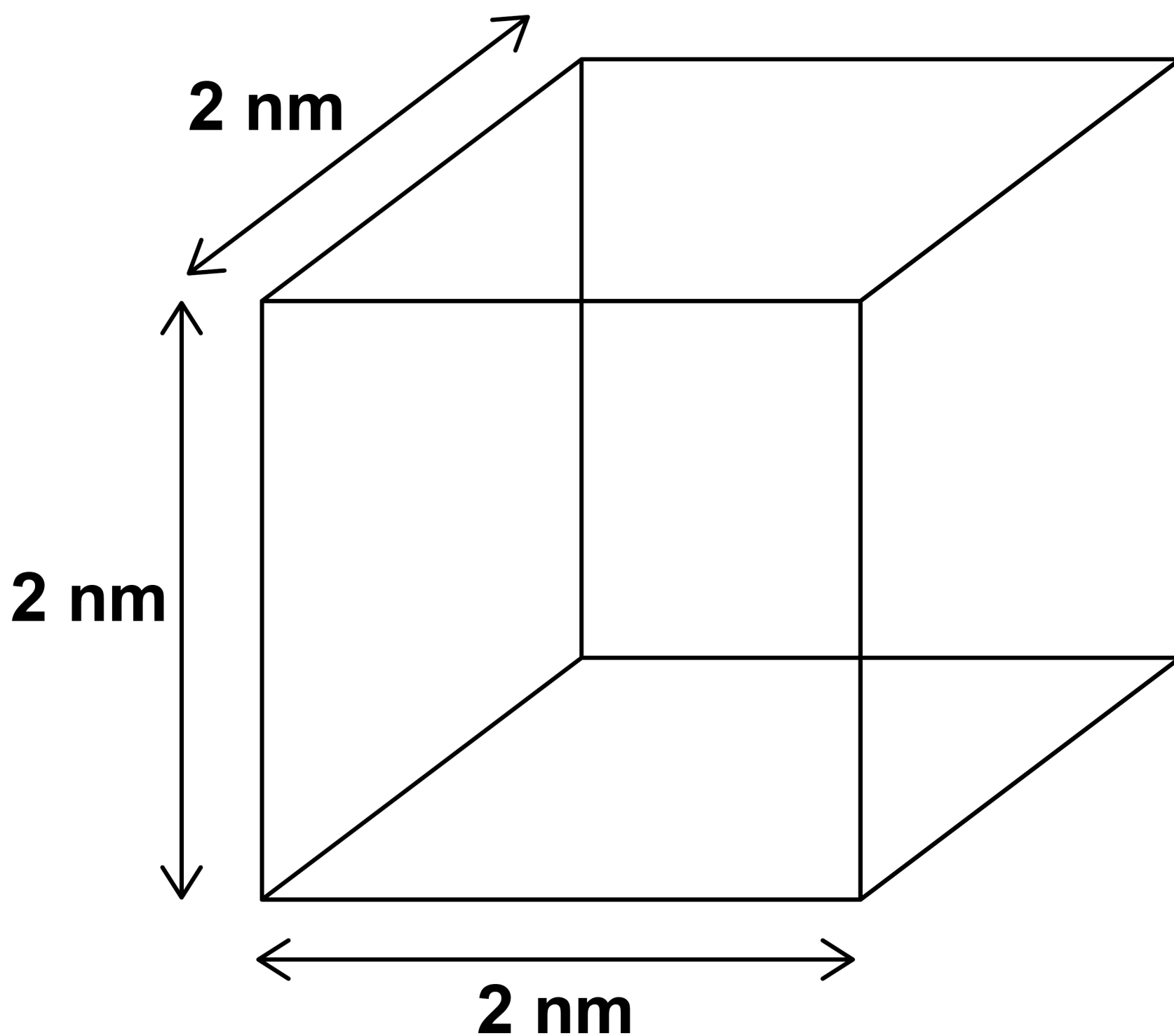
**Coarse particle**

**Fine particle**

**Nanoparticle**

**[Turn over]**



**07.2****FIGURE 12 shows a cubic nanoparticle.****FIGURE 12****The surface area of the cubic nanoparticle is  $24 \text{ nm}^2$ .**

**Calculate:**

- **the volume of the cubic nanoparticle**
- **the simplest surface area : volume ratio of the cubic nanoparticle.**

**[4 marks]**

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**Volume = \_\_\_\_\_ nm<sup>3</sup>**

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**Simplest surface area : volume ratio =**  
**\_\_\_\_\_ : 1**

**[Turn over]**



0	7	.	3
---	---	---	---

**Catalysts made of nanoparticles are often more effective than catalysts made of normal sized particles.**

**Complete the sentences. [2 marks]**

**Compared with normal sized particles, the surface area to volume ratio of nanoparticles is \_\_\_\_\_ .**

**This means that the mass of a nanoparticle catalyst needed to have the same effect as the same catalyst made of normal sized particles is**

\_\_\_\_\_ .



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**[Turn over]**



**07.4**

**Silver nanoparticles can be added to the material used to make socks.**

**Some facts about silver and bacteria are:**

- **silver nanoparticles are small enough to be breathed in**
- **silver is very expensive**
- **silver can kill bacteria**
- **bacteria can cause infections**
- **bacteria can break down sweat to produce unpleasant smells.**



**Suggest ONE advantage and ONE disadvantage of wearing socks containing silver nanoparticles.  
[2 marks]**

**Advantage** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Disadvantage** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**[Turn over]**



0	7	.	5
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An atom has a radius of  $1 \times 10^{-10}$  m.

A spherical nanoparticle has a radius of  $1 \times 10^{-8}$  m.

How many times larger is the radius of the nanoparticle than the radius of the atom? [1 mark]

Tick (✓) ONE box.

2 times

10 times

100 times

200 times

10





0	8
---	---

**This question is about electrolysis.**

**Ionic compounds decompose when they are electrolysed.**

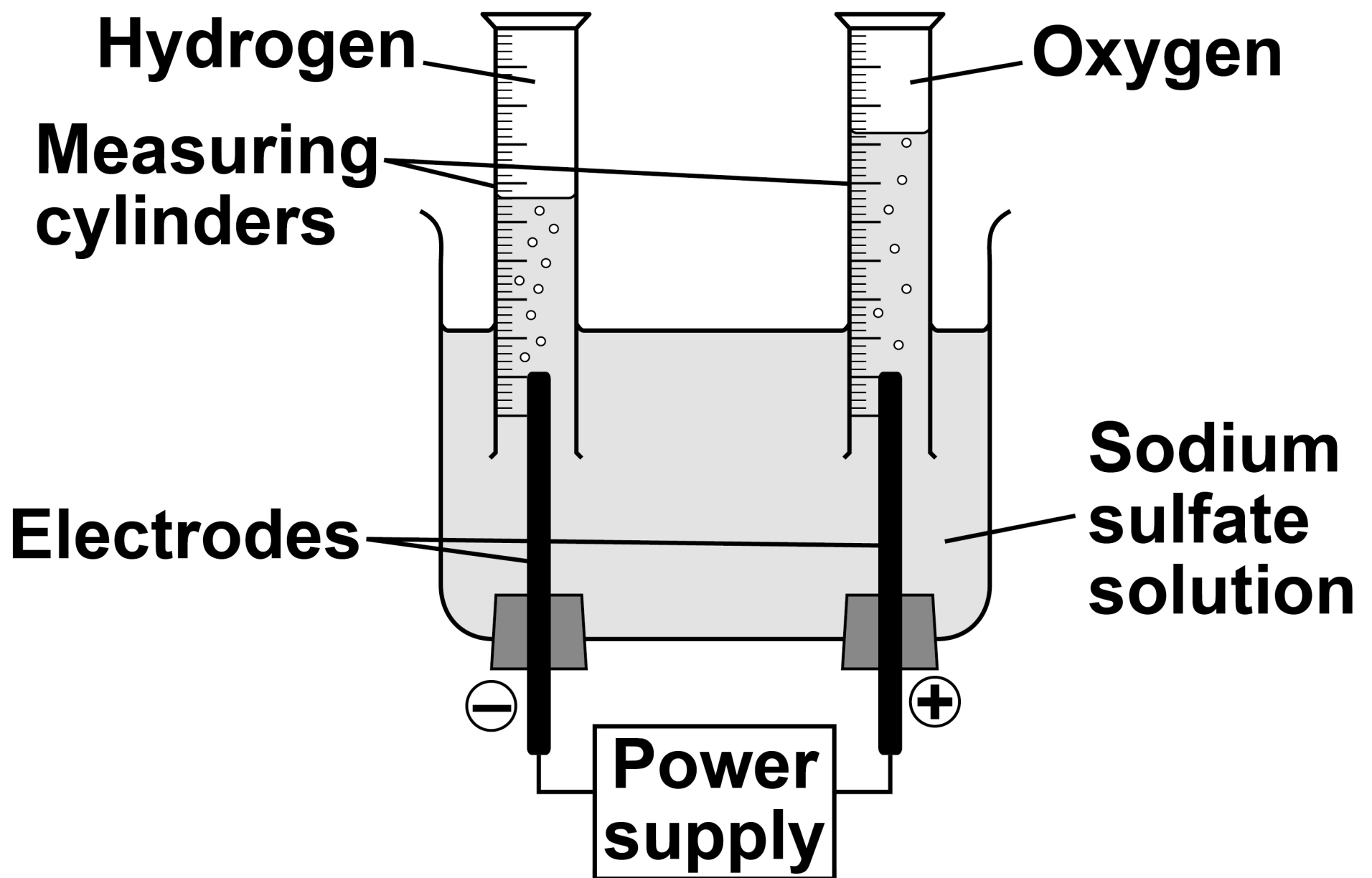
**A student electrolyses sodium sulfate solution.**

**FIGURE 13, on page 74, shows the apparatus used.**

**[Turn over]**



FIGURE 13



0	8	.	1
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**Sodium sulfate solution contains:**

- hydrogen ions
- hydroxide ions
- sodium ions
- sulfate ions.



**Oxygen is produced at the positive electrode.**

**Which ions are discharged at the positive electrode to produce oxygen?  
[1 mark]**

**Tick (✓) ONE box.**

**Hydrogen ions**

**Hydroxide ions**

**Sodium ions**

**Sulfate ions**

**[Turn over]**



0	8	.	2
---	---	---	---

**FIGURE 14, on the opposite page, shows one of the measuring cylinders during the electrolysis.**

**What is the volume of gas in the measuring cylinder? [1 mark]**

**Volume of gas = \_\_\_\_\_ cm<sup>3</sup>**

0	8	.	3
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**Ionic compounds can be electrolysed when molten or dissolved in water.**

**Why can ionic compounds NOT be electrolysed when solid?**

**You should answer in terms of ions. [1 mark]**

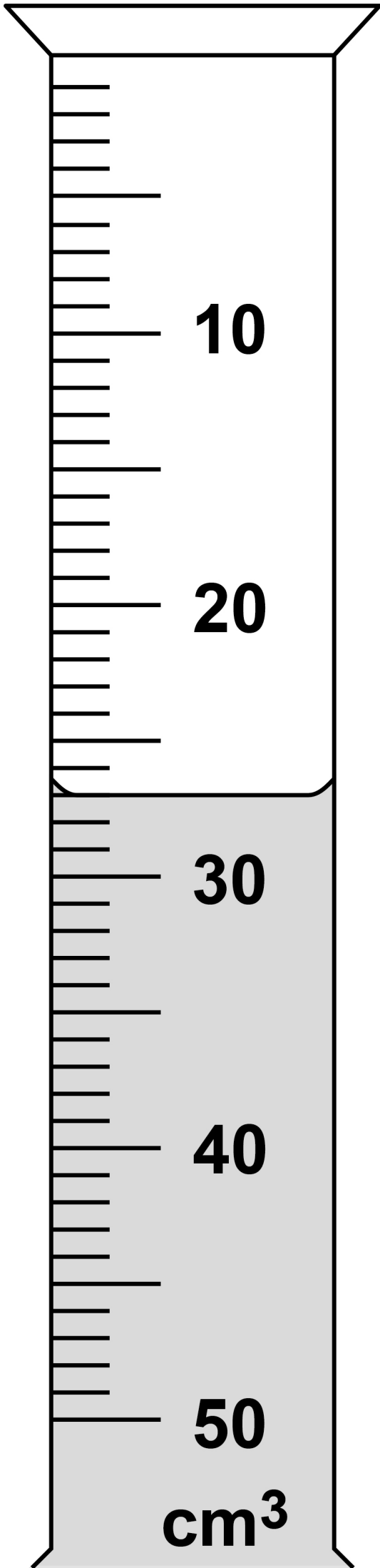
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**FIGURE 14**



**[Turn over]**



08.4

**TABLE 7** shows the products of electrolysis of two molten compounds.

**TABLE 7**

<b>Molten compound</b>	<b>Product at negative electrode</b>	<b>Product at positive electrode</b>
<b>Potassium iodide</b>	<b>Potassium</b>	_____
<b>Zinc bromide</b>	_____	<b>Bromine</b>

**Complete TABLE 7. [2 marks]**



0	8	.	5
---	---	---	---

**The electrolysis of molten sodium chloride is used to extract sodium metal.**

**Why is sodium metal extracted by electrolysis instead of by reduction with carbon? [1 mark]**

**Tick (✓) ONE box.**

**Carbon conducts electricity.**

**Carbon is less reactive than sodium.**

**Carbon reduction uses more energy.**

**[Turn over]**



08.6

**What is the state symbol for molten sodium chloride? [1 mark]**

**Tick (✓) ONE box.**

**(aq)**

**(g)**

**(l)**

**(s)**





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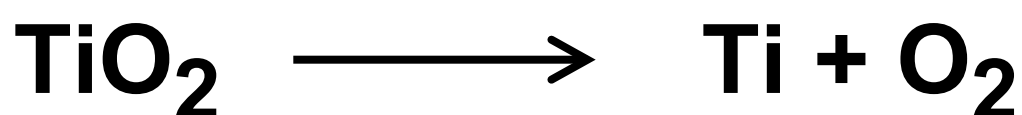
**[Turn over]**



**08.7**

**Titanium can be produced from titanium oxide by electrolysis.**

**The equation for the reaction is:**



**Calculate the percentage atom economy for the production of titanium from titanium oxide by electrolysis.**

**Use the equation:**

**Percentage atom economy =**

$$\frac{\text{Relative atomic mass of desired product}}{\text{Relative formula mass of reactant}} \times 100$$



**Relative atomic mass ( $A_r$ ): Ti = 48**

**Relative formula mass ( $M_r$ ):  $\text{TiO}_2 = 80$**

**[2 marks]**

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**Percentage atom economy =**

\_\_\_\_\_ %

**[Turn over]**

9

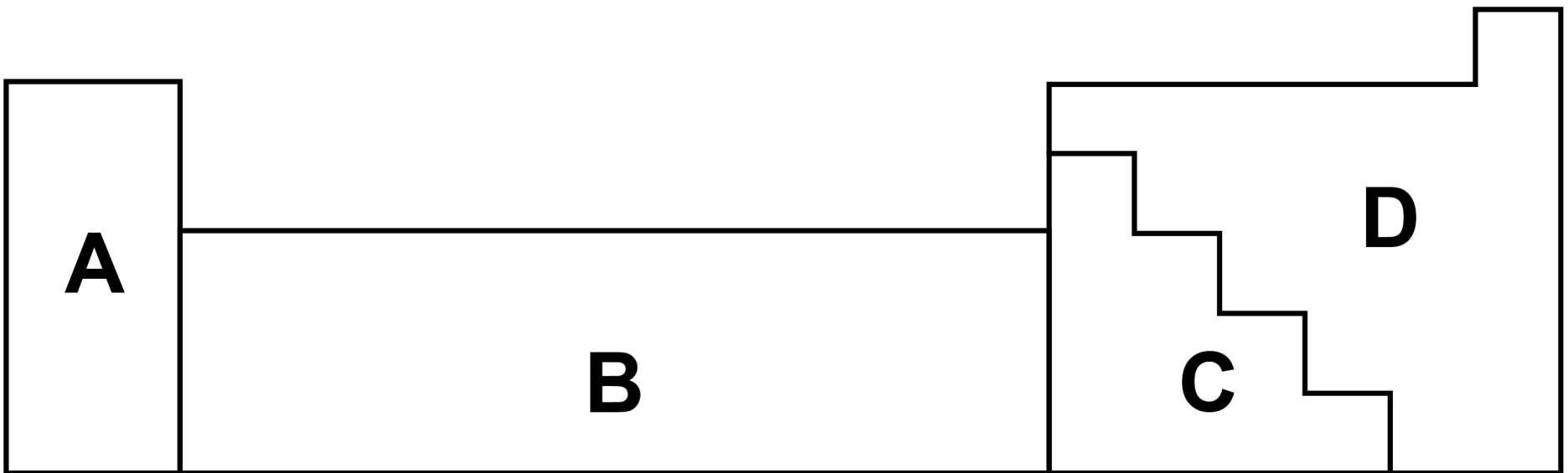


09

This question is about metals and non-metals.

FIGURE 15 shows an outline of part of the periodic table.

FIGURE 15



**09.1**

**Element Q is a dull solid with a melting point of 44 °C.**

**Element Q does not conduct electricity.**

**Which section of the periodic table in FIGURE 15 is most likely to contain element Q? [1 mark]**

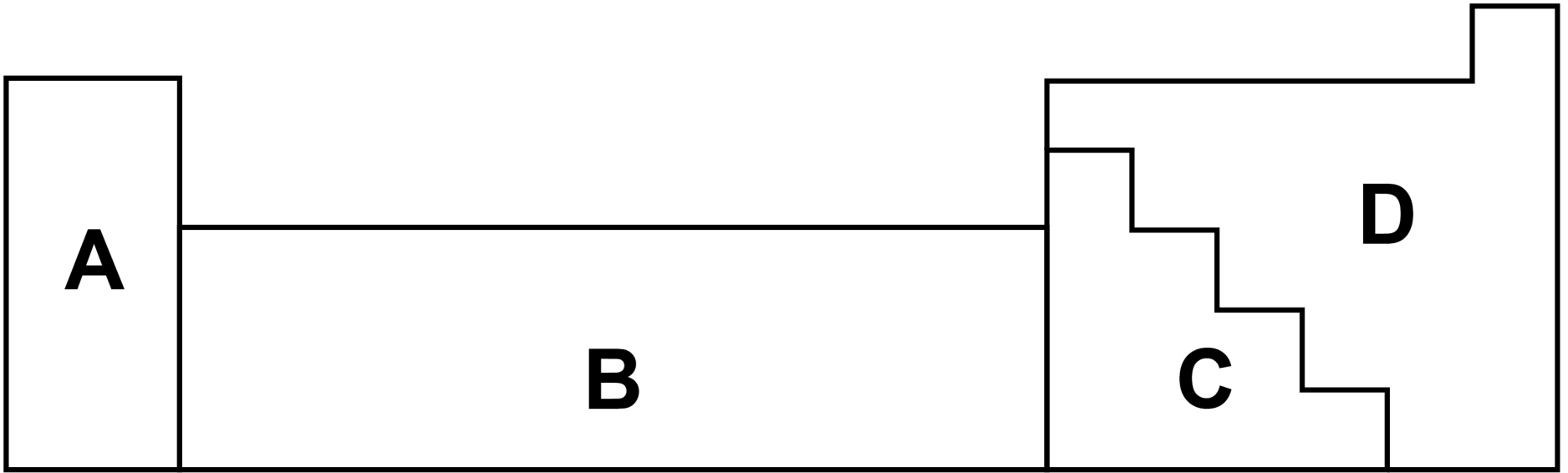
**Tick (✓) ONE box.**

**A****B****C****D**

**[Turn over]**



REPEAT OF FIGURE 15



0	9	.	2
---	---	---	---

Element R forms ions of formula  $R^{2+}$  and  $R^{3+}$

Which section of the periodic table in **FIGURE 15** is most likely to contain element R? [1 mark]

Tick (✓) **ONE** box.

**A****B****C****D**

**[Turn over]**



0	9	.	3
---	---	---	---

**Give TWO differences between the physical properties of the elements in Group 1 and those of the transition elements. [2 marks]**

**1** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



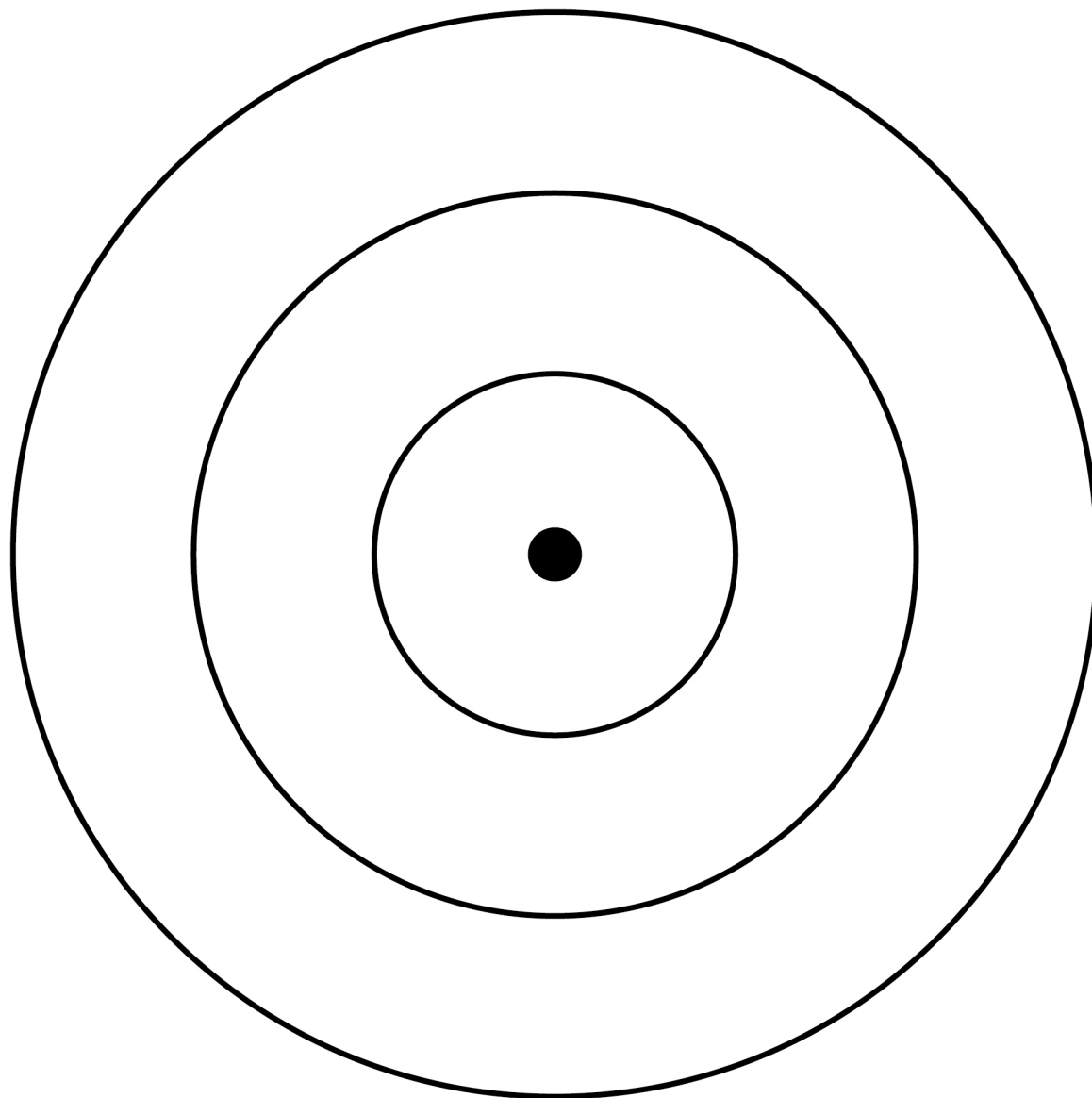


0	9	.	4
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**Complete FIGURE 16 to show the electronic structure of an aluminium atom.**

**Use the periodic table. [1 mark]**

**FIGURE 16**



**[Turn over]**



09.5

**Aluminium is a metal.**

**Describe how metals conduct electricity.**

**Answer in terms of electrons. [3 marks]**

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0	9	.	6
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**Name the type of bonding in compounds formed between metals and non-metals.**  
**[1 mark]**

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**[Turn over]**



0	9	.	7
---	---	---	---

**Magnesium oxide is a compound formed from the metal magnesium and the non-metal oxygen.**

**Describe what happens when a magnesium atom reacts with an oxygen atom.**

**You should refer to electrons in your answer. [4 marks]**

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**[Turn over]**

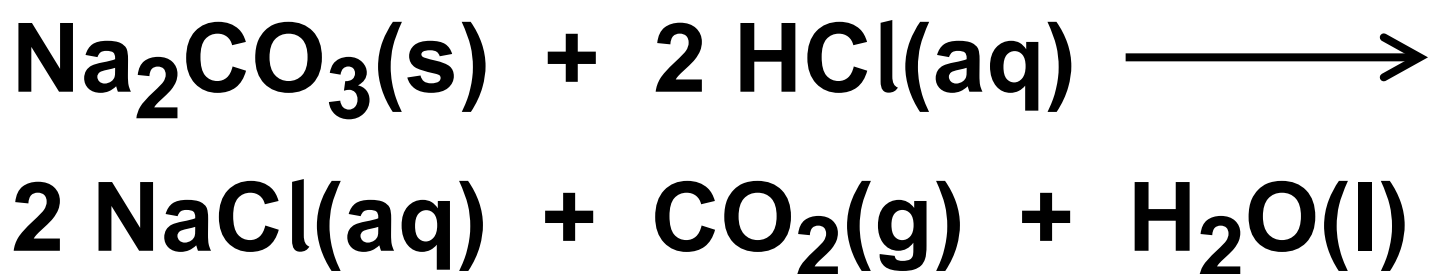
<b>13</b>



1	0
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**Sodium carbonate reacts with hydrochloric acid in an exothermic reaction.**

**The equation for the reaction is:**



**A student investigated the effect of changing the mass of sodium carbonate powder on the highest temperature reached by the reaction mixture.**

1	0	.	1
---	---	---	---

**Plan a method to investigate the effect of changing the mass of sodium carbonate powder on the highest temperature reached. [6 marks]**





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**FIGURE 17, on page 98, shows a line of best fit drawn through the student's results.**



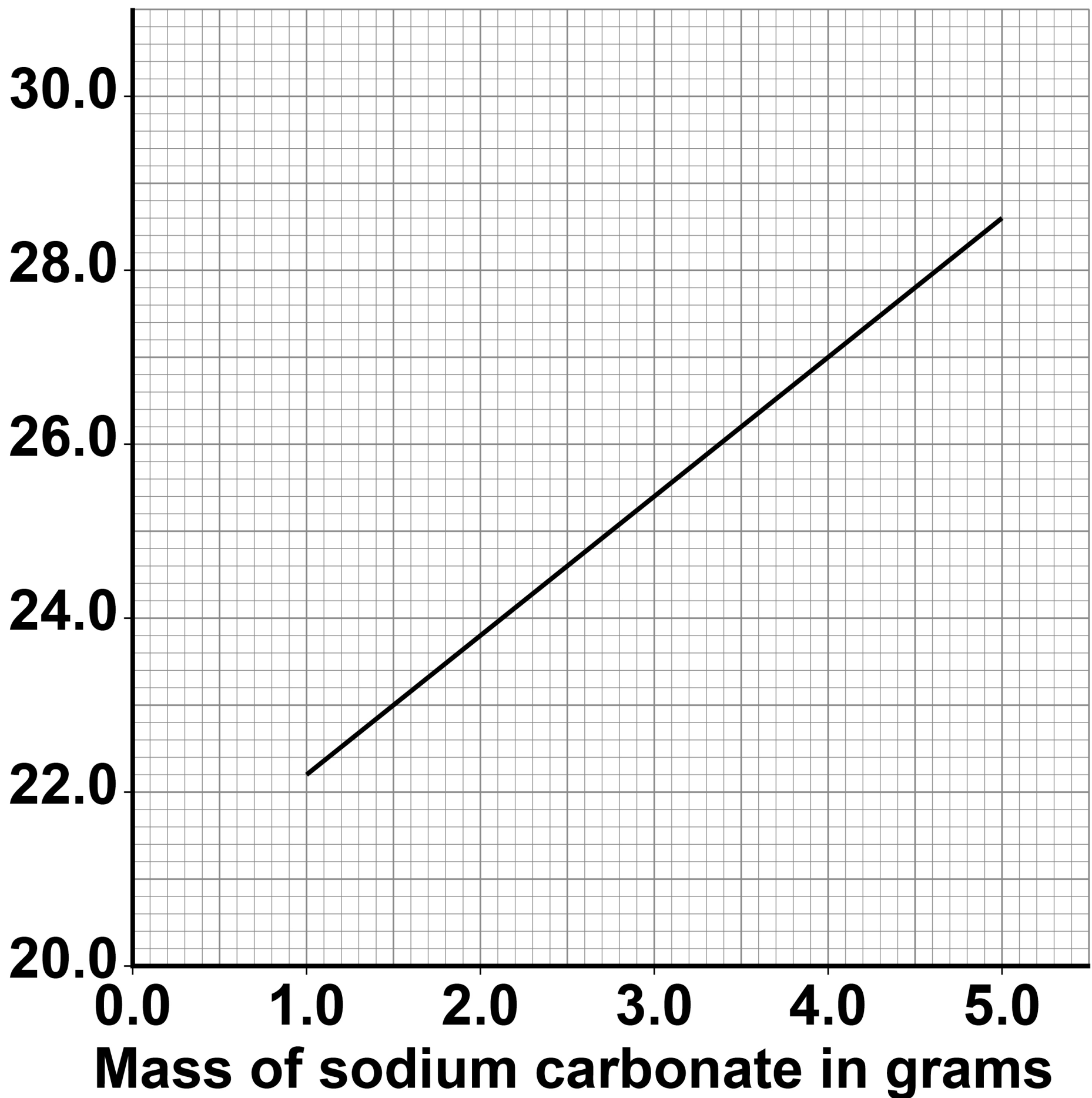
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**[Turn over]**



**FIGURE 17**

**Highest temperature reached by  
the reaction mixture in °C**



**10.2**

**Determine the gradient of the line of best fit in FIGURE 17.**

**Use the equation:**

**Gradient =**

$$\frac{\text{Change in highest temperature}}{\text{Change in mass}}$$

**Give the unit. [5 marks]**

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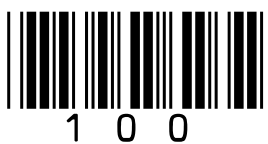
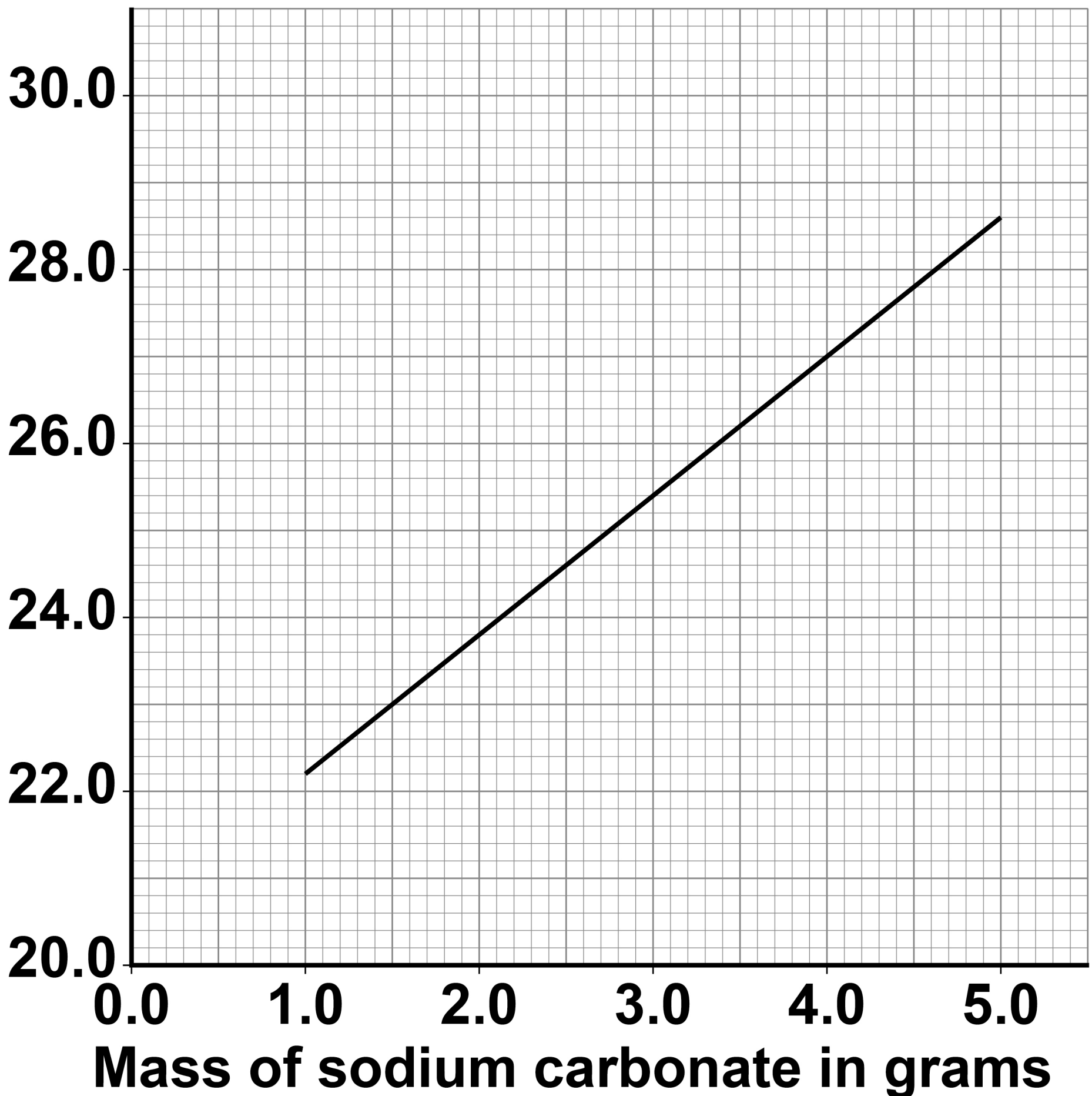
**Gradient = \_\_\_\_\_ Unit \_\_\_\_\_**



**[Turn over]**

## REPEAT OF FIGURE 17

Highest temperature reached by  
the reaction mixture in °C



**10.3**

**The initial temperature of the reaction mixture is where the line of best fit would meet the  $y$ -axis.**

**Determine the initial temperature of the reaction mixture.**

**Show your working on FIGURE 17.  
[2 marks]**

**Initial temperature of the reaction mixture = \_\_\_\_\_ °C**

**[Turn over]**



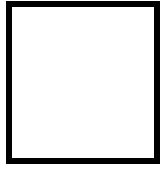
**10.4**

**Another student repeated the investigation but added sodium carbonate until the sodium carbonate was in excess.**

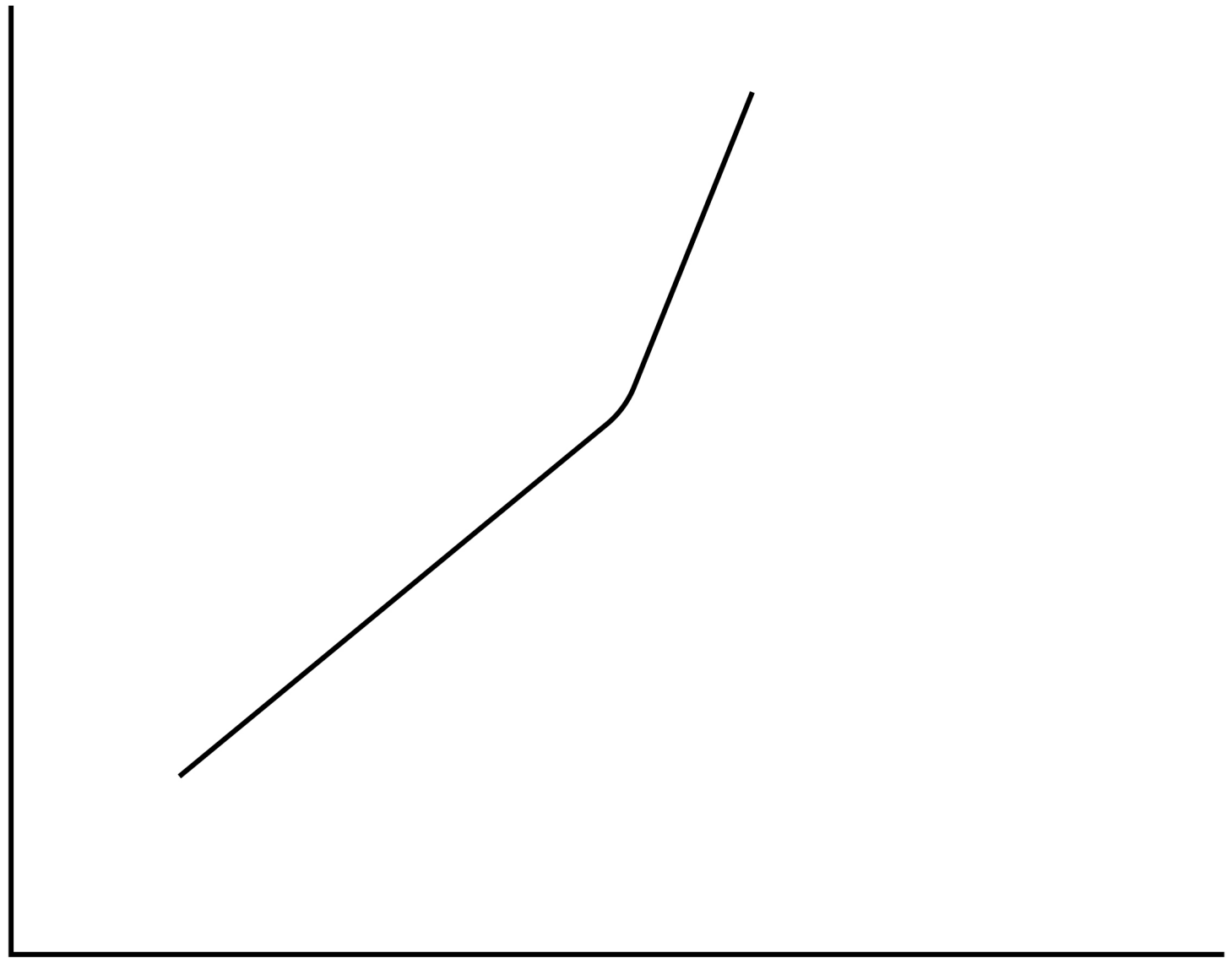
**Which sketch graph, on pages 103 to 105, shows the results obtained when sodium carbonate was added until in excess? [1 mark]**

**Tick (✓) ONE box.**





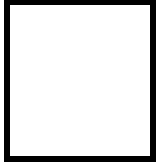
**A Highest temperature reached by the reaction mixture in °C**



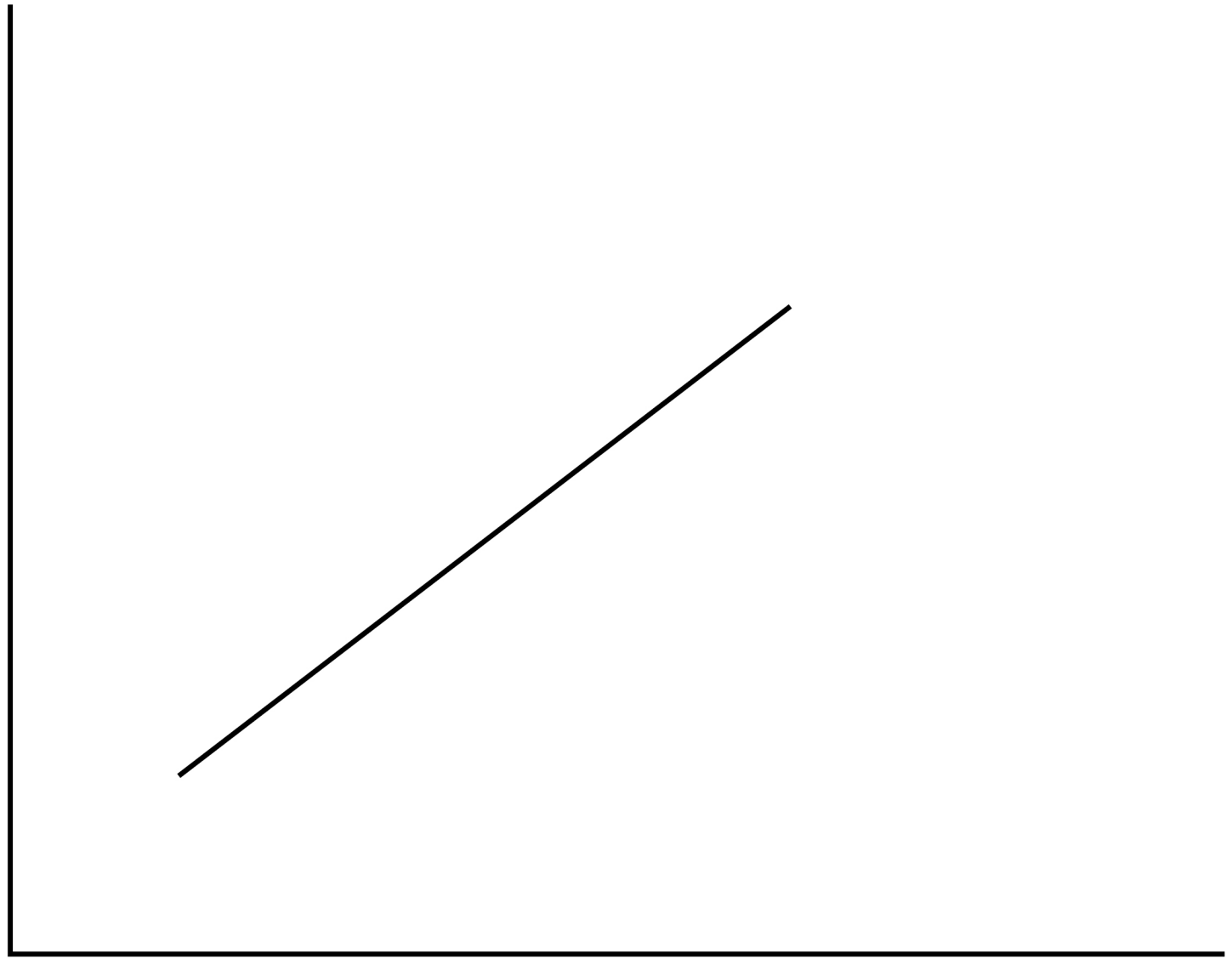
**Mass of sodium carbonate in grams**

**[Turn over]**





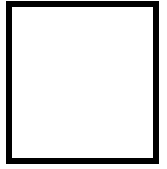
**B Highest temperature reached by the reaction mixture in °C**



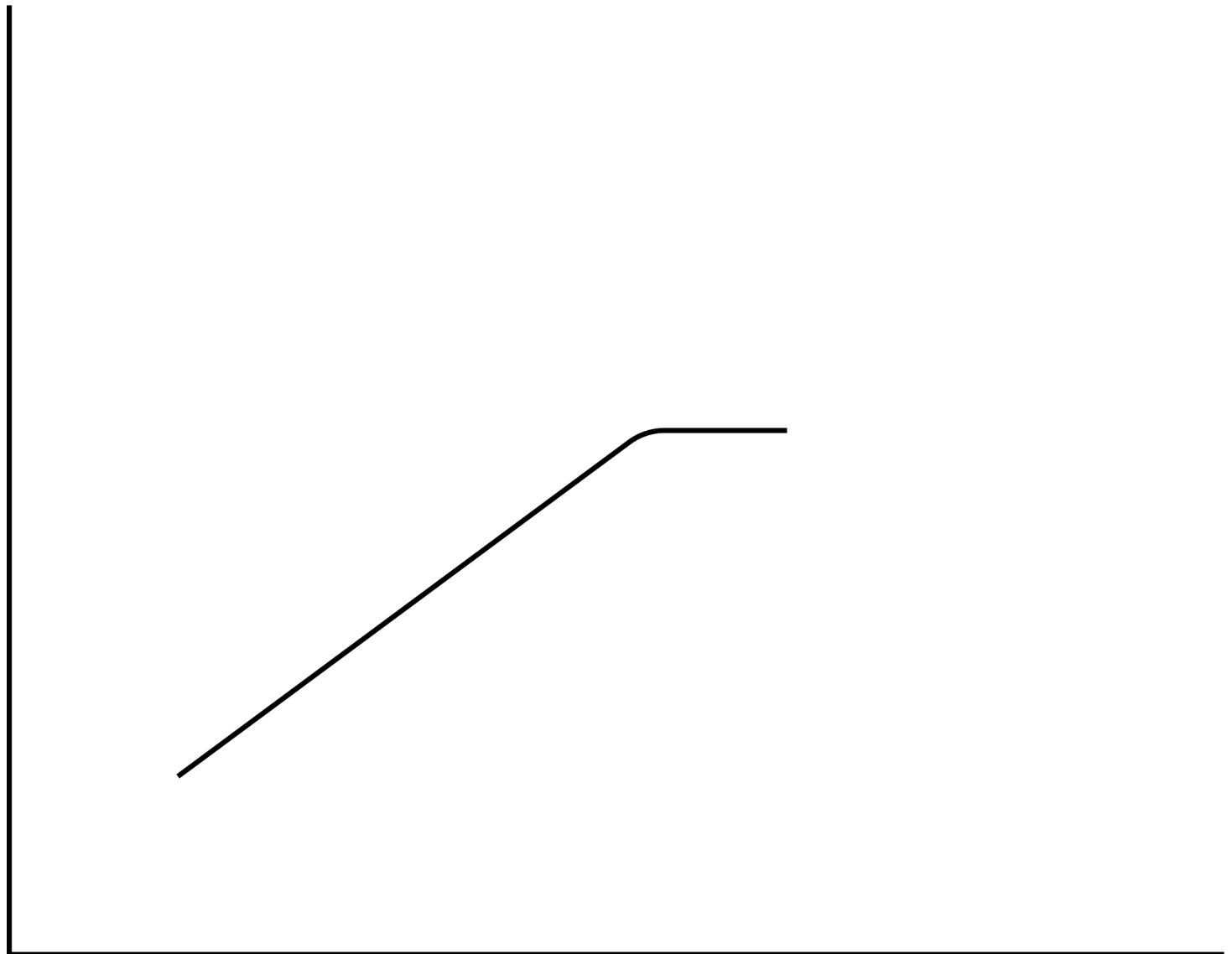
**Mass of sodium carbonate in grams**







**C Highest temperature reached by the reaction mixture in °C**



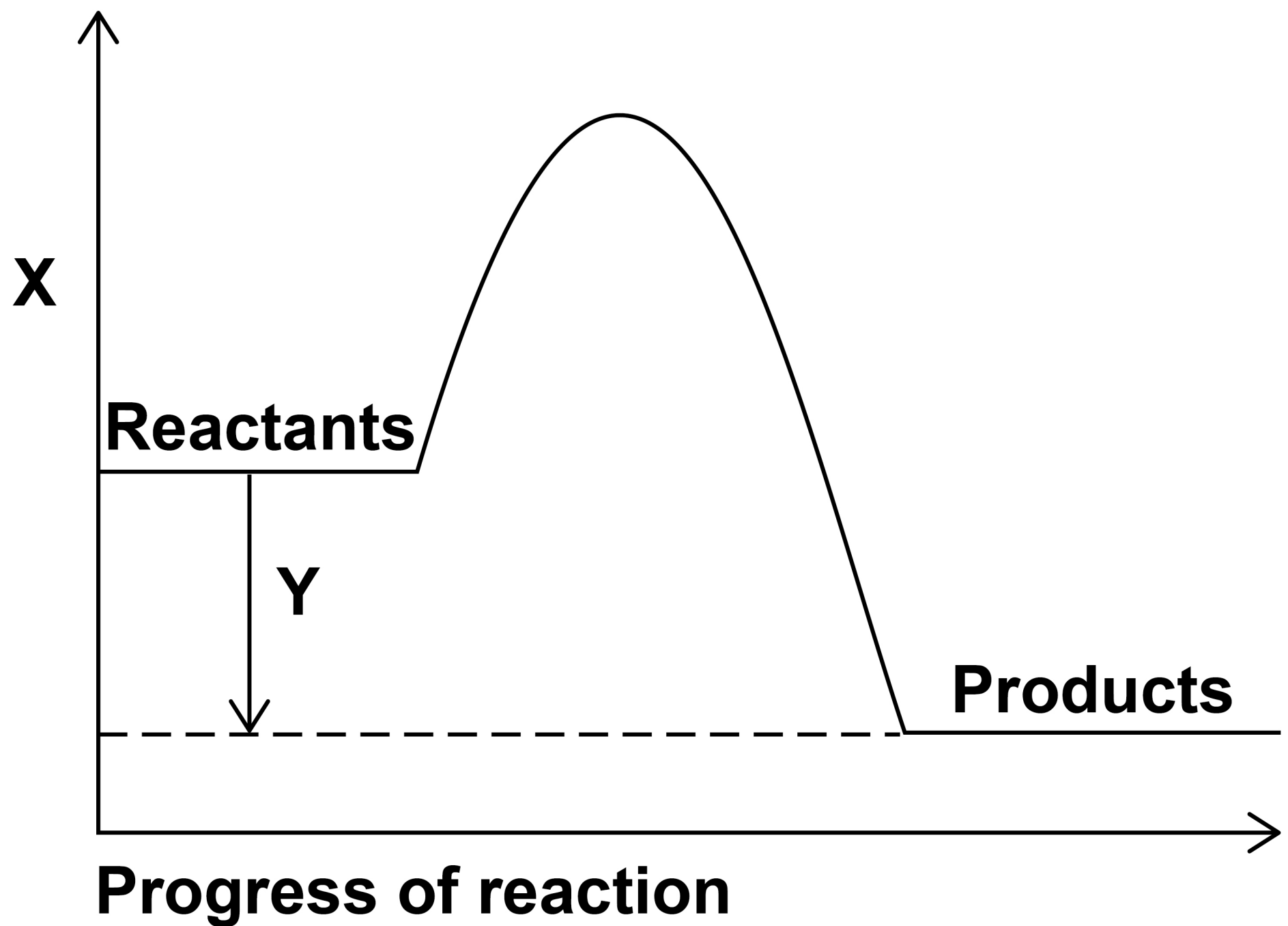
**Mass of sodium carbonate in grams**

**[Turn over]**



**FIGURE 18** shows a reaction profile for the reaction of sodium carbonate with hydrochloric acid.

**FIGURE 18**



1	0	.	5
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**What do labels X and Y represent on FIGURE 18? [2 marks]**

**X**

---

**Y**

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1	0	.	6
---	---	---	---

**How does the reaction profile show that the reaction is exothermic?**

**Use FIGURE 18. [1 mark]**

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**END OF QUESTIONS**

17







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For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>TOTAL</b>	

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