

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

---

Forename(s)

---

Candidate signature

---

# GCSE SCIENCE CHEMISTRY

# H

Higher Tier

End of Year 10 test 2018

Time allowed: 1 hour

## Materials

For this paper you must have:

- a ruler
- a scientific calculator
- the periodic table.

## Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- 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

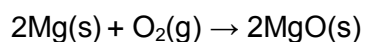
- The maximum mark for this paper is 60.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

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

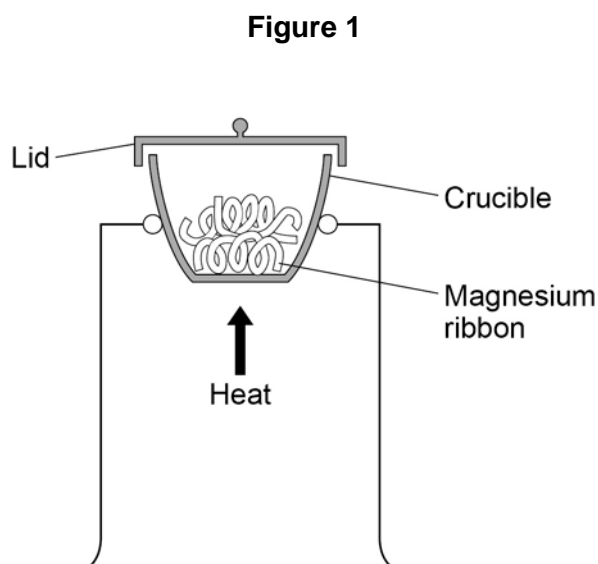
0 1

A student investigated the reaction of magnesium with air.

The equation for the reaction is:



**Figure 1** shows the apparatus the student used.



This is the method used.

1. Measure the mass of a crucible and lid.
2. Add magnesium ribbon to the crucible.
3. Measure the mass of the crucible, lid and magnesium ribbon.
4. Heat the crucible and magnesium ribbon for 10 minutes.
5. Lift the lid of the crucible every few minutes.
6. Weigh the crucible, lid and product (magnesium oxide) after heating.

**Table 1** shows the student's results.

**Table 1**

Mass of crucible and lid	52.34 g
Mass of crucible, lid and magnesium ribbon	52.52 g
Mass of crucible, lid and product after heating for 10 minutes	52.63 g

**0 1 . 1** Calculate the percentage by mass of magnesium in the product.

You should first determine:

- the mass of magnesium
- the mass of the product.

**[3 marks]**

Mass of magnesium = \_\_\_\_\_ g

Mass of product = \_\_\_\_\_ g

Percentage of magnesium = \_\_\_\_\_ %

**0 1 . 2** Explain why the reaction appears to involve a change in mass.

**[2 marks]**

---

---

---

---

**Question 1 continues on the next page**

**Turn over ►**

0 1 . 3 What improvement could the student make to obtain a more accurate result?

[1 mark]

Tick **one** box.

Add more magnesium to the crucible.

Heat the crucible, lid and product until the mass is constant.

Use a balance measuring to one decimal place.

Use a clock instead of a stopwatch.

0 1 . 4 The student repeated the investigation.

The student used:

- the same crucible and lid
- the same mass of magnesium.

The student did **not** lift the lid of the crucible during heating.

The student obtained a much lower value for the mass of crucible, lid and product in the second investigation.

Suggest **one** reason why.

[1 mark]

---

---

      
7

**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**

**0 2****Table 2** shows information about some metals.**Table 2**

<b>Metal</b>	<b>Date of discovery and extraction</b>	<b>Percentage (%) of metal in ore</b>	<b>Percentage (%) of Earth's crust containing metal</b>	<b>Annual production in kg</b>
Aluminium	1825	28.0	8.0	$5.76 \times 10^{10}$
Gold	approximately 3000 BC	Occurs as metal	0.004	$3.1 \times 10^6$
Iron	approximately 3000 BC	29.0	5.0	$1.15 \times 10^{12}$

**0 2****1**

Why is gold found in the Earth as the pure metal?

**[1 mark]**


---



---

**0 2****2**

Aluminium is the most common metal in the Earth's crust.

Suggest why iron was able to be extracted much earlier than aluminium.

**[2 marks]**


---



---



---



---

0 2 . 3 Determine the ratio for the annual production of aluminium to iron.

Use **Table 2**.

[2 marks]

Ratio of aluminium : iron = 1: \_\_\_\_\_

0 2 . 4 Suggest **two** reasons for the difference in annual production between aluminium and iron.

[2 marks]

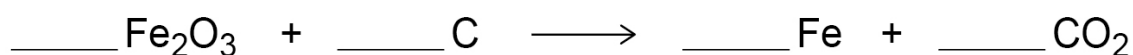
1 \_\_\_\_\_

2 \_\_\_\_\_

0 2 . 5 Iron is extracted by heating a mixture of iron oxide and carbon in a blast furnace.

Balance the equation for the reaction.

[1 mark]



0 2 . 6 Name the type of reaction that produces iron from iron oxide.

[1 mark]

Question 2 continues on the next page

Turn over ►

0 2 . 7

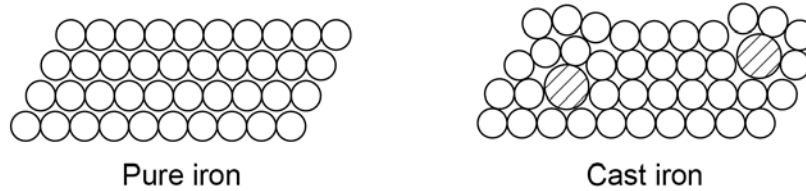
Iron from the blast furnace is called cast iron.

Cast iron contains approximately 4% carbon.

Cast iron is harder than pure iron.

**Figure 2** shows the arrangement of atoms in pure iron and cast iron.

**Figure 2**



Explain why cast iron is harder than pure iron.

**[3 marks]**

---

---

---

---

---

---

---



0 3

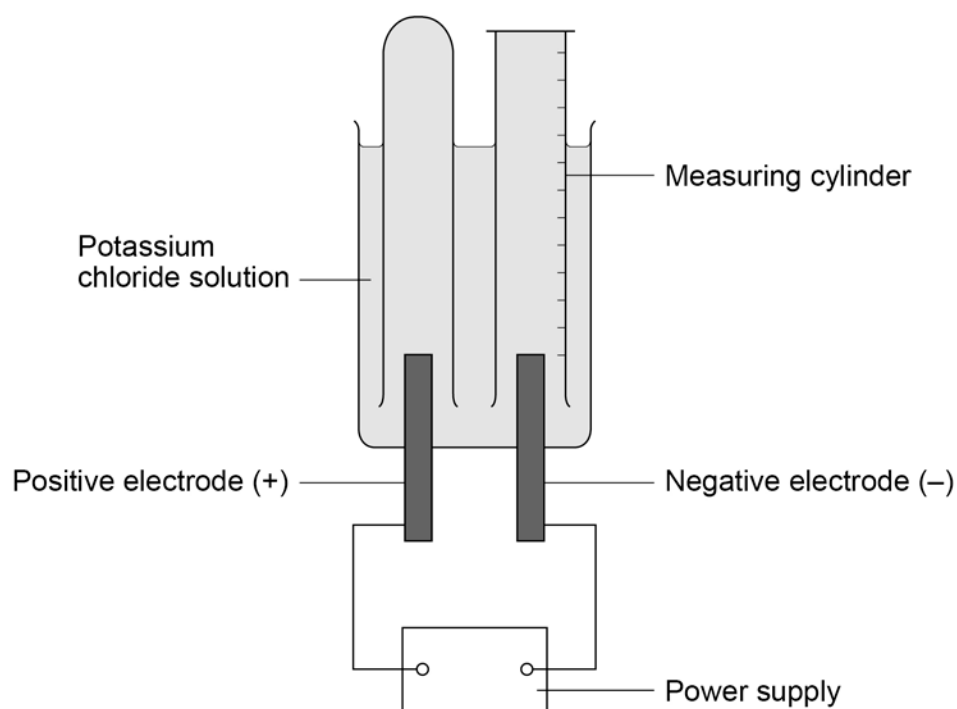
A student investigated the electrolysis of potassium chloride solution.

This is the method used.

1. Dissolve 20 g of potassium chloride in water.
2. Add more water until the total volume of the solution is 1 dm<sup>3</sup>
3. Put the solution in an electrolysis cell.
4. Switch the power supply on and start timing.
5. Record the volume of hydrogen gas produced in 10 minutes.
6. Repeat steps 1–5 with different masses of potassium chloride.

**Figure 3** shows the electrolysis cell used.

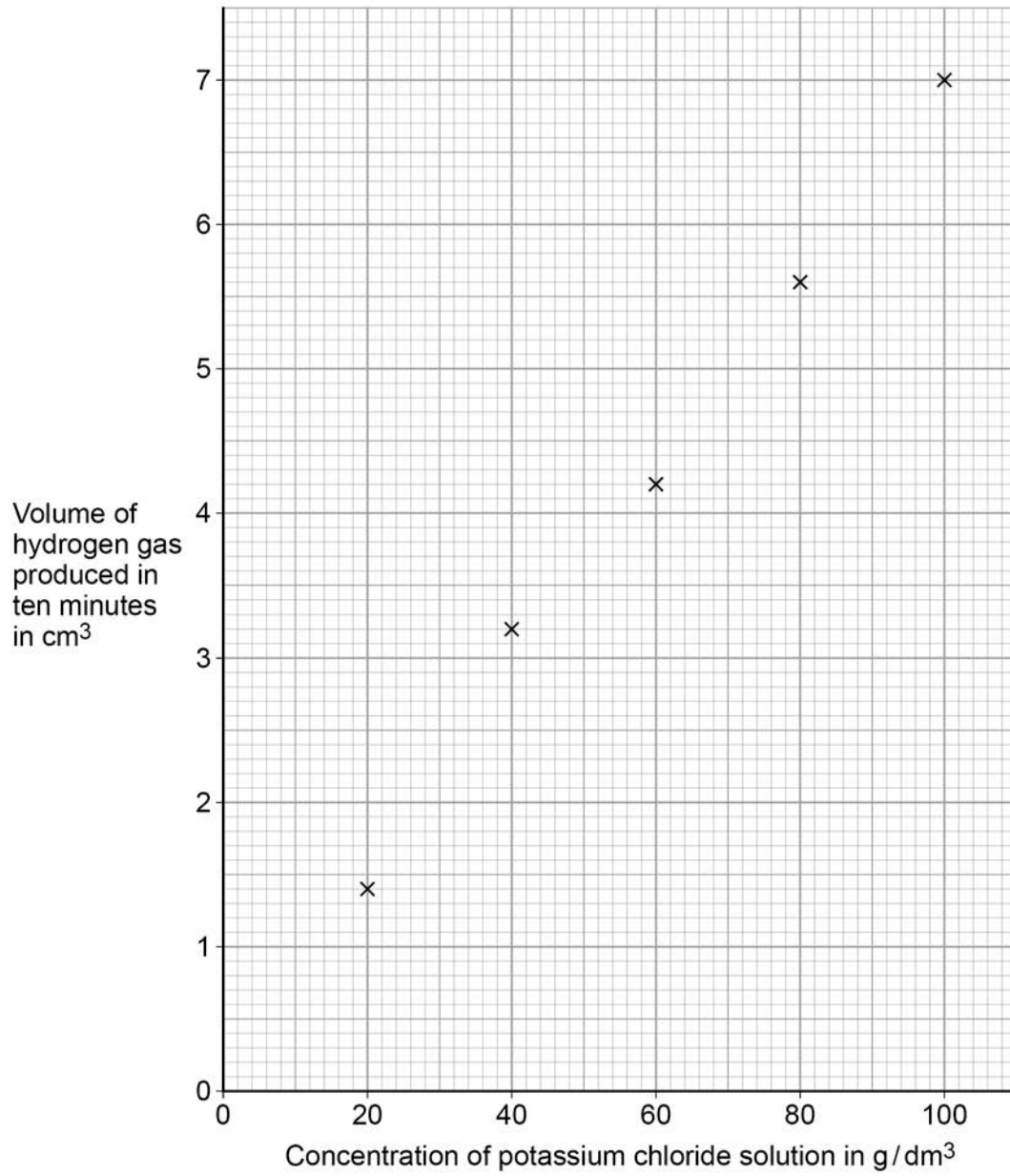
**Figure**



Turn over ►

Figure 4 shows the student's results.

Figure 4



**0 3** . **1** The result at a concentration of  $40 \text{ g/dm}^3$  is anomalous.

What could be the cause of the anomalous result?

[1 mark]

Tick **one** box.

Decreased voltage from the power supply

Potassium chloride is not fully dissolved

Some gas has escaped

The timing was started too early

**0 3** . **2** What is the interval of the independent variable?

[1 mark]

---

**0 3** . **3** Describe the mathematical relationship shown by the results.

Use **Figure 4**.

[1 mark]

---

---

**Question 3 continues on the next page**

**Turn over ►**

0 3 .

4

Why is hydrogen produced at the negative electrode and not potassium?

[1 mark]

Tick **one** box.Hydrogen ions travel faster than potassium ions Hydrogen is a gas Hydrogen is a non-metal Hydrogen is less reactive than potassium 

0 3 .

5

Predict:

- what you would observe at the positive electrode
- the substance that will be produced at the positive electrode.

[2 marks]

Observation \_\_\_\_\_

Substance produced \_\_\_\_\_

---

6

**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**

**0 4**

This question is about the salt potassium nitrate.

Look at **Table 3**.

**Table 3**

<b>Maximum mass of potassium nitrate in g that dissolves in 100 cm<sup>3</sup> of water</b>	<b>Temperature in °C</b>
13	0
33	20
65	40
106	60
167	80
240	100

0 4 . 1 Complete **Figure 5**.

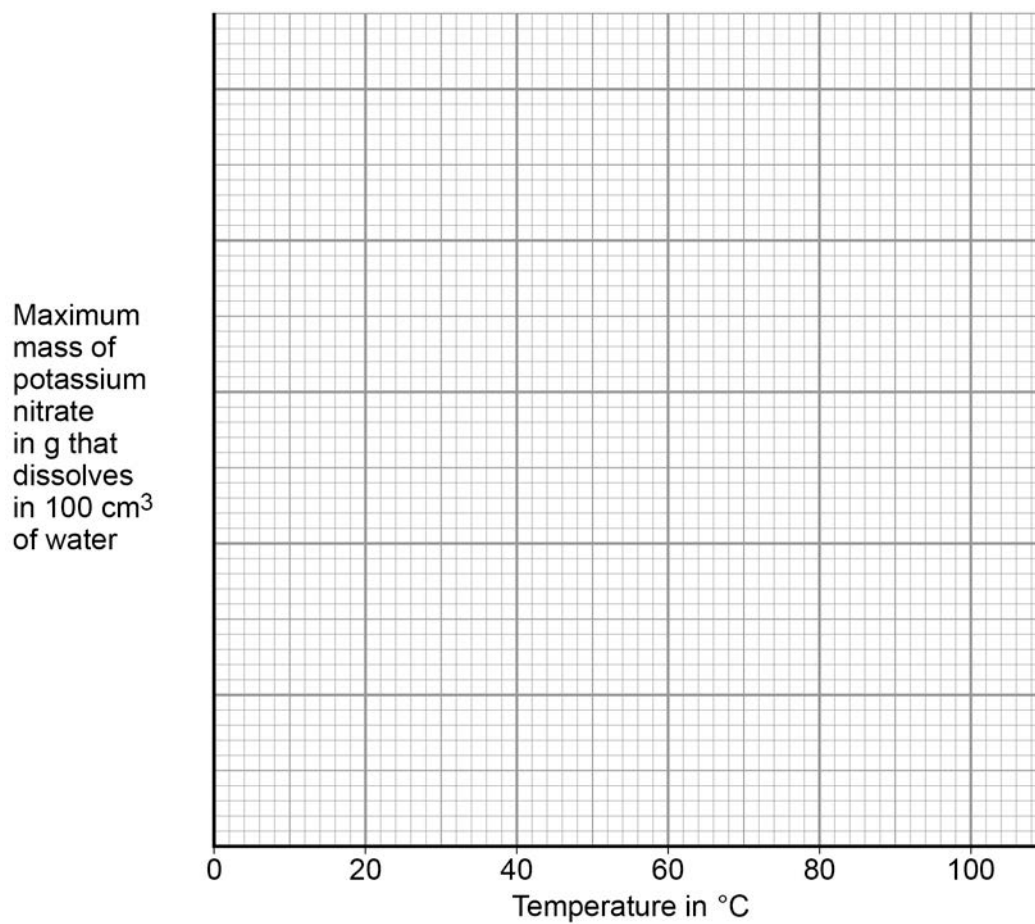
Use the data in **Table 3**.

You should:

- complete the scale on the *y*-axis
- plot the results
- draw a line of best fit.

[4 marks]

**Figure 5**



**Question 4 continues on the next page**

**Turn over ►**





**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**

**0 5**

Graphene and diamond are forms of carbon.

**0 5 . 1**

Draw a diagram to show the structure of a graphene layer.

**[1 mark]****0 5 . 2**

Estimate the approximate thickness of a graphene layer in metres.

**[1 mark]**

Approximate thickness = \_\_\_\_\_ m

**0 5 . 3**

Explain why graphene does conduct electricity but diamond does not conduct electricity.

**[2 marks]**

0 5 . 4 Explain why diamond has a high melting point.

Answer in terms of the structure and bonding of diamond.

[4 marks]

---

---

---

---

---

---

---

---

---

---

0 5 . 5 Fullerenes are also forms of carbon.

Give **two** differences between the structures of fullerenes and graphene.

[2 marks]

1

2

10

Turn over for the next question

Turn over ►

**0 6** Chlorine has two isotopes,  ${}_{17}^{35}\text{Cl}$  and  ${}_{17}^{37}\text{Cl}$

**0 6** . **1** Describe the difference between the two isotopes.

Answer in terms of numbers of subatomic particles.

**[1 mark]**

---

---

**0 6** . **2** The relative atomic mass of chlorine is 35.5.

Suggest why the relative atomic mass of chlorine is 35.5 and **not** 35, 36 or 37.

**[2 marks]**

---

---

---

---

**0 6 . 3** Element **X** has the following properties.

Melts at 1538 °C.

Boils at 2861 °C.

Forms an ion with a 3<sup>+</sup> charge.

Write a balanced symbol equation for the reaction of element **X** with chlorine gas.

Use the information given.

Include state symbols.

Represent the element by the symbol **X** in the equation.

**[3 marks]**

---

**Turn over for the next question**

**6**

**Turn over ►**

0 7

This question is about atomic structure.

0 7 . 1

An atom of lithium is represented as  ${}^7_3\text{Li}$ .

Explain why a lithium atom has no overall electrical charge.

**[3 marks]**

---

---

---

---

---

---

0 7 . 2

Give **one** similarity and **one** difference in the electronic structure of the elements in the period from lithium to neon.**[2 marks]**

Similarity

---

---

Difference

---

---



**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Copyright Information**

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.