

## Chemical reactions

**Total Mark – 15**

### **Question: 1**

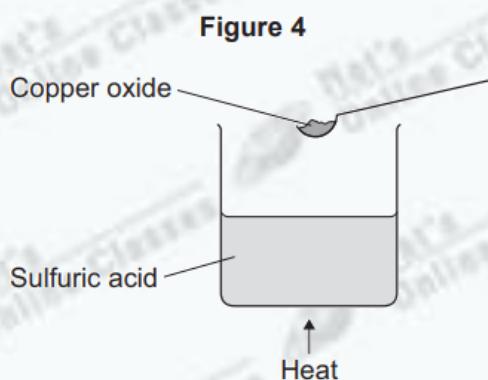
**2** This question is about sulfuric acid, copper sulfate and ethene.

**2 (a)** A student added copper oxide to sulfuric acid to make copper sulfate.

The word equation for the reaction is:



**Figure 4** shows the first stage of the student's method.



**2 (a) (i)** The state symbol for CuO is missing from the equation below.

Use the correct answer from the box to complete the equation.

**[1 mark]**

aq	g	l	s
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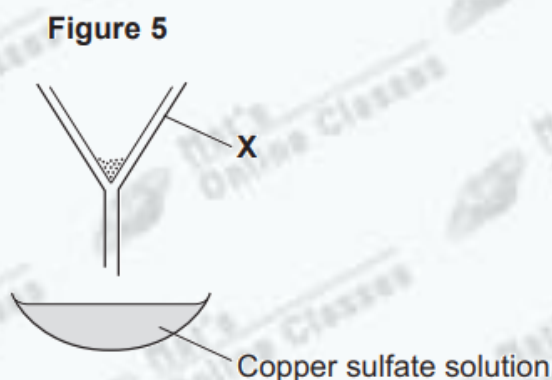
**2 (a) (ii)** Why is the sulfuric acid heated?

**[1 mark]**

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2 (b) Figure 5 shows the second stage of the student's method.



2 (b) (i) Name the apparatus labelled X on Figure 5.

[1 mark]

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2 (b) (ii) What could the student do to the copper sulfate solution to get copper sulfate crystals?

[1 mark]

\_\_\_\_\_  
\_\_\_\_\_

2 (c) The student weighed the copper sulfate crystals.

Why was the mass of the copper sulfate crystals less than the student expected?

[1 mark]

Tick (✓) **one** box.

The student added too much copper oxide.

☐

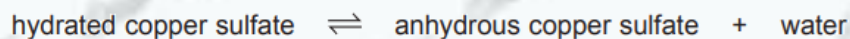
The student left some copper sulfate crystals in the apparatus.

☐

The student weighed the copper sulfate crystals when they were wet.

☐

- 2 (d) The equation shows the reaction when blue hydrated copper sulfate crystals are heated.



- 2 (d) (i) What colour is anhydrous copper sulfate?

[1 mark]

\_\_\_\_\_

- 2 (d) (ii) What would you see if water is added to anhydrous copper sulfate?

[1 mark]

\_\_\_\_\_

- 2 (e) Ethene and sulfuric acid are used to make many substances.

**Table 1** shows data about wealth of countries, ethene production and sulfuric acid production.

**Table 1**

Country	Wealth of country in billions of dollars	Ethene production in kilotonnes	Sulfuric acid production in kilotonnes
A	4000	13 900	36 000
B	1300	4 400	6 600
C	1290	2 700	26 000
D	460	1 500	2 500

- 2 (e) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

alloys

chlorine

graphite

polymers

Ethene is used to make \_\_\_\_\_.

**2 (e) (ii)** Describe the relationship, if any, between the wealth of a country and the production of ethene.

[1 mark]

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**2 (e) (iii)** Describe the relationship, if any, between the wealth of a country and the production of sulfuric acid.

[1 mark]

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
<b>2(a)(i)</b>	s		1	<b>AO2</b> 2.6.1a
<b>2(a)(ii)</b>	to speed up the reaction		1	<b>AO2</b> 2.6.1b
<b>2(a)(iii)</b>	tick (✓) by: 1		1	<b>AO1</b> 2.6.2d
<b>2(a)(iv)</b>	tick (✓) by: To make sure all the sulfuric acid has reacted		1	<b>AO1</b> 2.6.1b
<b>2(b)(i)</b>	funnel	accept filter funnel	1	<b>AO1</b> 2.6.1b
<b>2(b)(ii)</b>	heat / evaporate / boil	accept cool accept leave (to evaporate) do <b>not</b> accept heat until all water gone	1	<b>AO1</b> 2.6.1b
<b>2(c)</b>	tick (✓) by: The student left some copper sulfate crystals in the apparatus.		1	<b>AO3</b> 2.3.3d



<b>2(d)(i)</b>	white	accept grey	1	<b>AO1</b> 2.5.1d
<b>2(d)(ii)</b>	it goes blue	accept steam / water vapour ignore unspecified colour change	1	<b>AO1</b> 2.5.1d
<b>2(e)(i)</b>	polymers		1	<b>AO1</b> 2.2.5a
<b>2(e)(ii)</b>	as wealth decreases, ethene production decreases	accept converse	1	<b>AO2</b> 2.6; 3.7.12
<b>2(e)(iii)</b>	no relationship		1	<b>AO2</b> 2.6; 3.7.12
<b>Total</b>			<b>12</b>	

## Question: 2

- 5 Sodium hydroxide reacts with hydrochloric acid. Sodium chloride and water are made.

What is the name of this type of reaction?

- A Neutralisation
- B Oxidation
- C Reduction
- D Thermal decomposition

Your answer

[1]

<b>5</b>	<b>A</b>	<b>1</b>	
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### Question: 3

- 6 Neutralisation occurs when acids react with alkalis.

What is the ionic equation for neutralisation?

- A  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$   
B  $\text{H}^- + \text{OH}^+ \rightarrow \text{H}_2\text{O}$   
C  $\text{H}^+ + \text{OH}^+ \rightarrow \text{H}_2\text{O}$   
D  $\text{H}^- + \text{OH}^- \rightarrow \text{H}_2\text{O}$

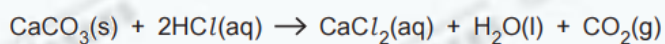
Your answer

[1]

6	A	1
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### Question: 4

- 3 Look at the balanced symbol equation.



What does the symbol (s) represent in the balanced symbol equation?

- A Solid  
B Solute  
C Solution  
D Substance

Your answer

[1]

3	A	1	1.1
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