

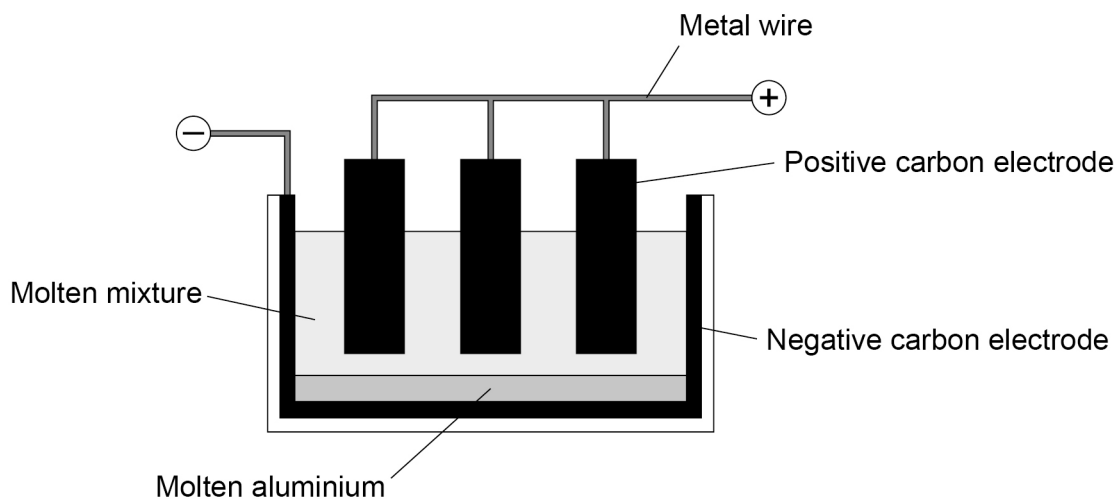
0 5

This question is about extraction of metals.

Aluminium is extracted from a molten mixture of aluminium oxide and cryolite using electrolysis.

Figure 12 shows the electrolysis cell.

Figure 12



0 5 . 1

Complete the sentence.

[1 mark]

The extraction of aluminium is expensive because the process uses large amounts of _____.

0 5 . 2

Oxygen is produced at the positive carbon electrodes.

The oxygen reacts with the carbon electrodes.

Which gas is produced when oxygen reacts with the positive carbon electrodes?

[1 mark]



Titanium is extracted from titanium chloride by reacting titanium chloride with sodium.

The reaction between titanium chloride and sodium is carried out in an inert atmosphere.

0 5 . 3 Suggest why the reaction is carried out in an inert atmosphere.

[1 mark]

0 5 . 4 Complete the sentence.

Choose the answer from the box.

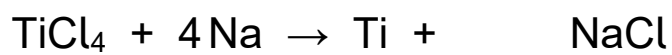
[1 mark]

argon	chlorine	hydrogen
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The gas used for the inert atmosphere is _____.

0 5 . 5 Balance the equation for the reaction.

[1 mark]



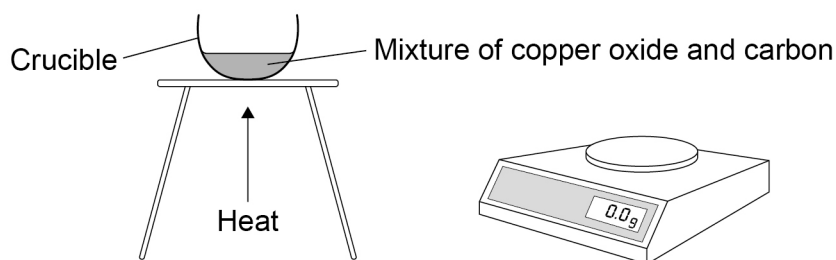
Turn over ►



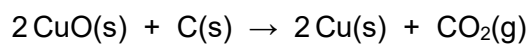
Copper is extracted from copper oxide by reacting copper oxide with carbon.

Figure 13 shows the apparatus.

Figure 13



The equation for the reaction is:



In an experiment 15.9 g of copper oxide and 1.2 g of carbon reacted.

12.7 g of copper was produced in the reaction.

0 5 . 6

Calculate the mass of carbon dioxide produced in this experiment.

[1 mark]

Mass of carbon dioxide = _____ g

0 5 . 7

Explain why the mass of the contents in the crucible changed during the experiment.

[2 marks]



0 5 . 8 What happens to copper oxide in the reaction?

Give **one** reason for your answer.

Use the equation for the reaction.

[2 marks]

Tick (✓) **one** box.

The copper oxide is dissolved

The copper oxide is oxidised

The copper oxide is reduced

Reason _____

10

Turn over for the next question

Turn over ►



Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	energy / electricity		1	AO1 5.4.3.1 5.4.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	carbon dioxide		1	AO1 5.4.3.1 5.4.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	sodium reacts with air / oxygen or sodium is highly reactive	allow titanium (chloride) reacts with air / oxygen	1	AO3 5.1.2.5 5.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	argon		1	AO3 5.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	$\text{TiCl}_4 + 4\text{Na} \rightarrow \text{Ti} + 4\text{NaCl}$	allow multiples	1	AO2 5.1.1.1 5.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	4.4 (g)		1	AO2 5.3.1.1 5.3.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	(the) mass decreased		1	AO2
	(because) carbon dioxide escapes (into the atmosphere)	allow (because) carbon dioxide is a gas allow (because) a gas is produced	1	5.3.1.1 5.3.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.8	the copper oxide is reduced		1	AO2
	(reason) (copper oxide) loses oxygen		1	5.4.1.3

Total Question 5	10
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