AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.4.3.2

Electrolysis of molten ionic compounds

Past-paper questions

Tier	**Higher**
Question groups	**2**
Available paper years	**2019–2020**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

5.4.3.2 Electrolysis of molten ionic compounds

Question 01

June 2019 | 8464/C/1H | Original Q5

0 5 This question is about electrolysis.

0 5 . 1 Some metals are extracted from molten compounds using electrolysis.

Why is electrolysis used to extract some metals?

[1 mark]

_____

_____

0 5 . 2 Aluminium is produced by electrolysis of a molten mixture.

What **two** substances does the molten mixture contain?

[2 marks]

1 _____

2 _____

0 5 . 3 Copper and chlorine are produced when molten copper chloride is electrolysed.

Complete the half equation for the reaction at each electrode.

[2 marks]

Half equation at negative electrode

Cu^{2+} _____ $\rightarrow$ _____

Half equation at positive electrode

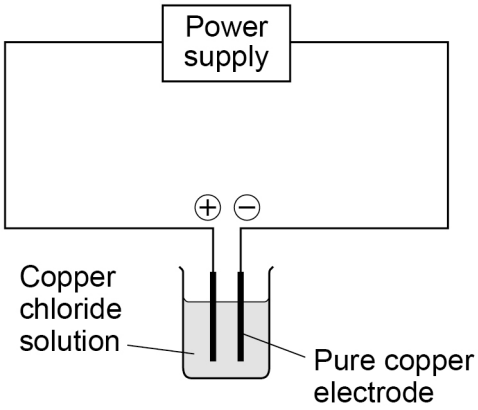
$2\ Cl^{-} \rightarrow$ _____

5.4.3.2 Electrolysis of molten ionic compounds

Question 01 · continued

Figure 4 shows the apparatus a student used to electrolyse copper chloride solution.

Figure 4



The student:

- measured the mass of copper deposited on the negative electrode after 60 minutes
- compared the mass deposited with the expected value.

0 5 . 4 Suggest **two** reasons why the mass deposited was different from the expected value.

[2 marks]

1 _____

_____

2 _____

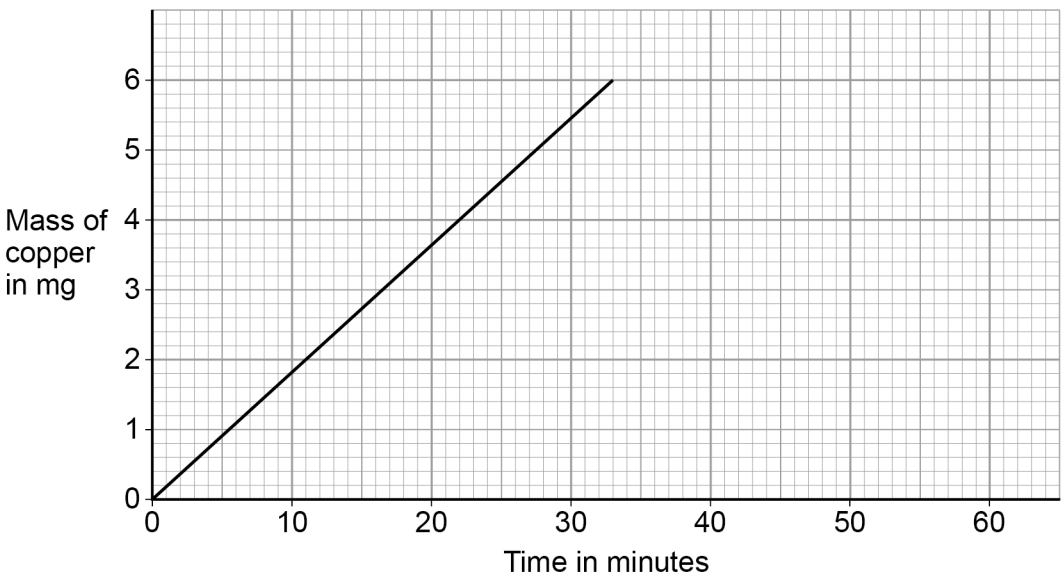
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Question 5 continues on the next page

5.4.3.2 Electrolysis of molten ionic compounds

0 5 . 5 **Figure 5** shows the expected mass of copper produced each minute.

Figure 5



Determine the expected mass of copper after 24 hours.

Use **Figure 5**.

[3 marks]

Mass = _____ mg

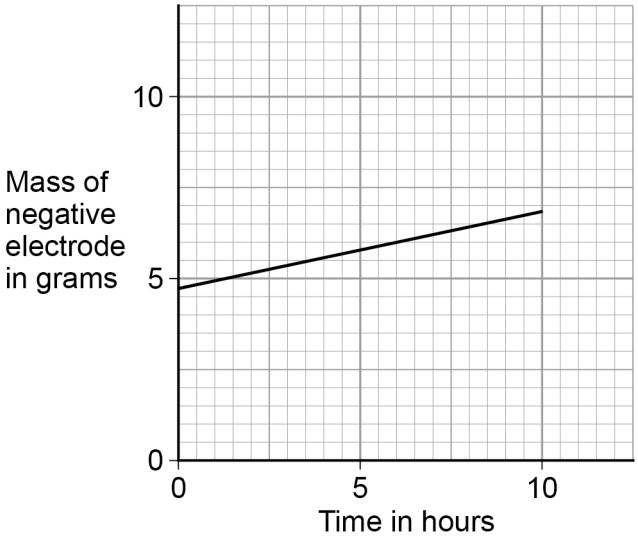
5.4.3.2 Electrolysis of molten ionic compounds

Question 01 · continued

Silver nitrate solution is electrolysed.

Figure 6 shows the change in mass of the negative electrode over 10 hours.

Figure 6



0 5 . 6 Determine the mass of the negative electrode at the start of the experiment.

Use **Figure 6**.

[1 mark]

0 5 . 7 Calculate the gradient of the line in **Figure 6**.

Give the unit.

[3 marks]

Gradient _____

Unit _____

14

5.4.3.2 Electrolysis of molten ionic compounds

Question 02

November 2020 | 8464/C/1H | Original Q1

0 1 This question is about the extraction of aluminium.

0 1 . 1 An aluminium atom is represented as:

$$^{27}_{13}Al$$

Give the number of electrons and neutrons in the aluminium atom.

[2 marks]

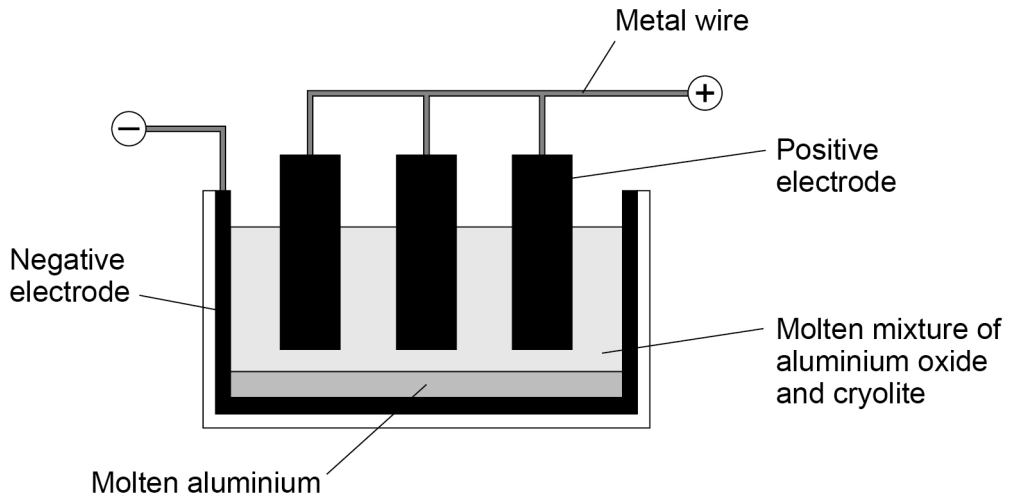
Number of electrons _____

Number of neutrons _____

Aluminium is extracted by the electrolysis of a molten mixture of aluminium oxide and cryolite.

Figure 1 shows the cell used for the electrolysis.

Figure 1



0 1 . 2 Aluminium is produced by the reduction of aluminium oxide (Al_2O_3).

What is meant by the term reduction?

[1 mark]

_____

_____

5.4.3.2 Electrolysis of molten ionic compounds

Question 02 · continued

0 1 . 3 Oxygen is formed at the positive carbon electrodes.

Explain why the positive carbon electrodes must be continually replaced.

[3 marks]

0 1 . 4 A substance conducts electricity because of free moving, charged particles.

What are the free moving, charged particles in a:

- carbon electrode (made from graphite)
- molten mixture of aluminium oxide and cryolite
- metal wire?

[3 marks]

Carbon electrode (made from graphite) _____

Molten mixture of aluminium oxide and cryolite _____

Metal wire _____

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