

0 1

This question is about the extraction of aluminium.

0 1 . 1

An aluminium atom is represented as:



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

[2 marks]

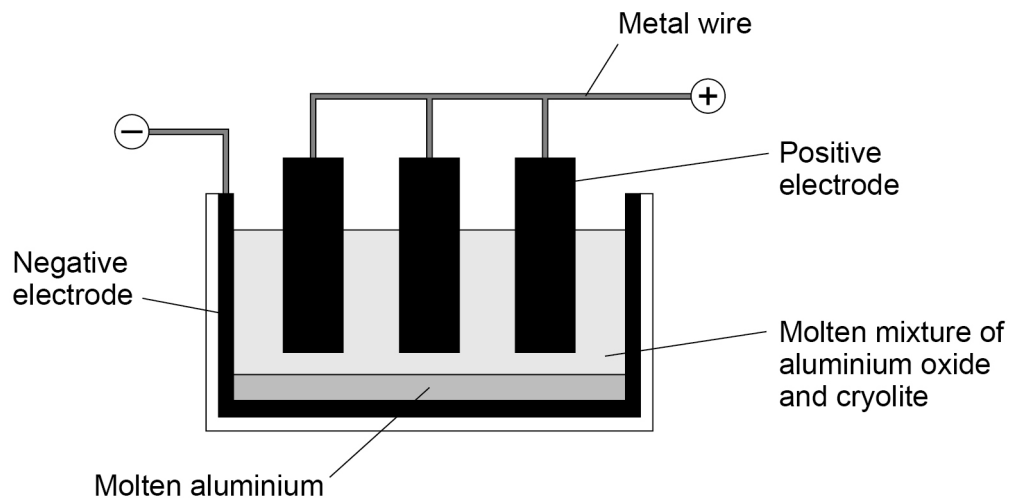
Number of electrons _____

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]



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 _____

9

Turn over for the next question

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	13	this order only	1	AO2 5.1.1.4 5.1.1.5
	14		1	
01.2	loss of oxygen	allow (Al ³⁺) gain of electrons allow aluminium oxide loses oxygen	1	AO1 5.4.1.1 5.4.1.3
01.3	(at high temperature) oxygen reacts with carbon / electrode	allow anode for (positive) electrode C + O ₂ → CO ₂ scores MP1 and MP3	1	AO1 5.4.3.1 5.4.3.2 5.4.3.3
	(so the positive) electrode burns / wears away		1	
	to produce carbon dioxide		1	
01.4	(delocalised) electron(s)		1	AO1 AO2 AO1 5.2.2.3 5.2.2.8 5.2.3.2
	ion(s)		1	
	(delocalised) electron(s)		1	
Total			9	