Improving processes and products – 2021/20 GCSE Gateway Chemistry Combined Science A

1. Nov/2021/Paper_J250/04/No.3

The diagram shows the main stages in a life-cycle assessment of a product.

What is the name of **Stage X**?

A Disposal

B Extraction

C Packaging

D Production

Your answer ☐ **[1]**

2. Nov/2021/Paper_J250/04/No.9

A copper ore contains 66.4% copper. The ore is CuS.

What is the maximum mass of copper that can be extracted from 500 tonnes of the ore?

A 7.53 tonnes

B 66.4 tonnes

C 332 tonnes

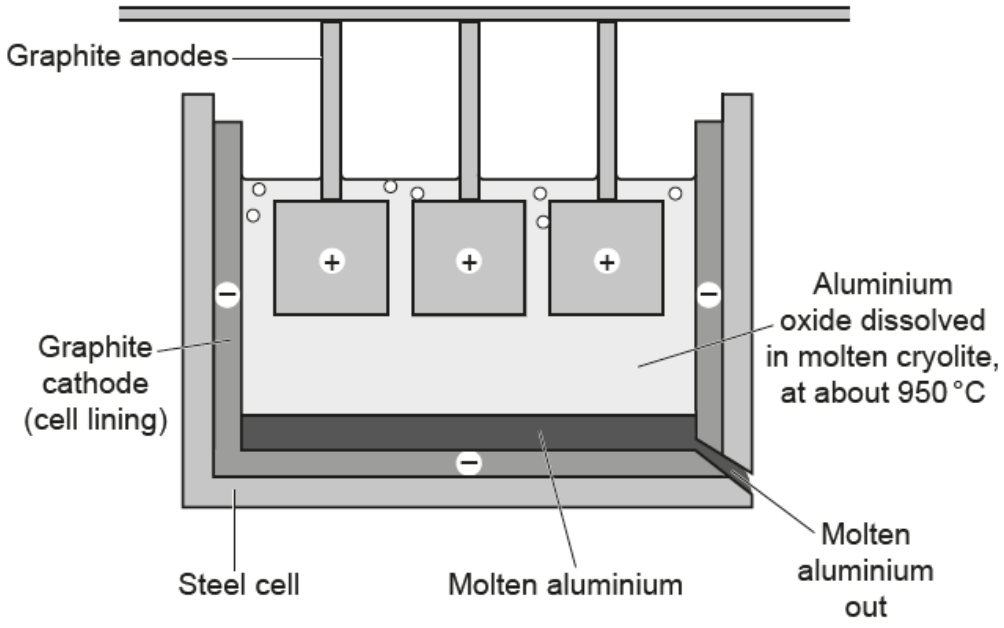
D 33 200 tonnes

Your answer ☐ **[1]**

3. Nov/2021/Paper_J250/04/No.15

Aluminium is produced from aluminium oxide by electrolysis.

The diagram shows the industrial electrolysis of aluminium oxide.



(a) Look at the equation for the electrolysis of aluminium oxide.

..... Al_2O_3 → ..... Al + ... O_2

Complete the balanced symbol equation for the reaction. **[2]**

(b) Molten aluminium oxide contains Al^{3+} and O^{2-} ions.

(i) Explain why the aluminium oxide must be molten during electrolysis.

.....

.....

..... **[2]**

(ii) Explain why aluminium is produced at the cathode.

..... **[1]**

(c) Aluminium melts at 650 °C.

Describe **two** reasons why it is cheaper to recycle aluminium than to produce it from electrolysis.

Reason 1 .....

.....

.....

Reason 2 .....

.....

.....

[2]

4. Nov/2021/Paper_J250/10/No.1

A copper ore contains 66.4% copper. The ore is CuS.

What is the maximum mass of copper that can be extracted from 500 tonnes of the ore?

A 7.53 tonnes

B 66.4 tonnes

C 332 tonnes

D 33 200 tonnes

Your answer ☐ **[1]**

5. Nov/2021/Paper_J250/10/No.15

Phytoextraction is a method of producing metals such as copper using plants which are harvested and burnt to produce an ash.

(a) The ash is reacted with sulfuric acid to produce a solution of copper(II) sulfate.

Copper can be extracted by adding iron to the solution of copper(II) sulfate.

Explain why.

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..... **[2]**

(b) 1 kg of plant ash can produce 2500 mg of copper.

Calculate the mass of ash (in kg) needed to produce 50 kg of copper.

$1\,kg = 1 \times 10^6\,mg$

Mass of ash = ... kg **[2]**

(c) Describe one advantage **and** one disadvantage of producing copper by phytoextraction.

Advantage: .....

.....

Disadvantage: .....

.....

[2]