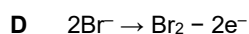
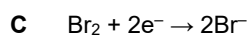
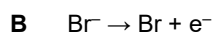
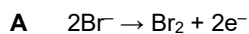


Electrolysis (H)

1. During the electrolysis of molten lead bromide, bromine is made at the anode.

Which half equation shows that bromine is made at the anode?



Your answer

[1]

2 (a). The electrolysis products of ionic compounds can be different in the molten or aqueous states.

Suggest why.

----- [1]

(b). A student investigates the electrolysis of aqueous solutions of ionic compounds.

Why is it important that the investigation is done with **inert** electrodes?

----- [1]

(c). Electroplating is used to cover a metal with another metal.

i. Which aqueous solution would you use to electroplate a metal spoon with copper using a safe method?

Tick (✓) **one** box.

Copper sulfate

Zinc bromide

Copper chloride

Sulfuric acid

[1]

ii. Give **two** reasons for your answer to (i).

1

2

[2]

(d).

i. Predict the product made at the anode when sodium sulfate solution is electrolysed.

[1]

ii. Hydrogen gas is made at the cathode instead of sodium metal.

Explain why.

[1]

iii. Write the **balanced half equation** for the formation of hydrogen gas.

Use e^- to represent an electron.

[2]

(e).

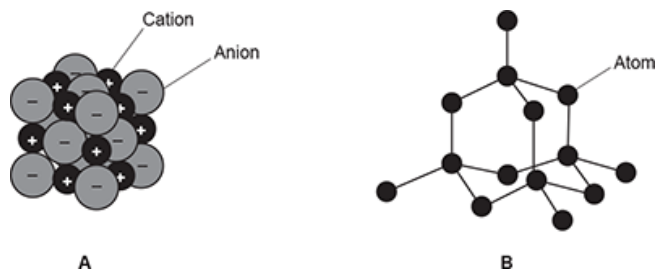
Aqueous solution	Product at cathode	Product at anode
Copper sulfate	Copper	Oxygen
Zinc bromide	Hydrogen	Bromine
Copper chloride	Copper	Chlorine
Sulfuric acid	Hydrogen	Oxygen

Write the formulae of the **ions** that are present in aqueous copper sulfate solution.

[2]

3. This question is about structure and bonding.

Look at the two structures, **A** and **B**, in **Fig. 16.1**.



- i. Identify the bonding in structure **A**.

Explain your answer.

Bonding

Explanation

[2]

- ii. Explain why structure **B** has a high melting point.

----- [2]

- iii. Explain why structure **B** does **not** conduct electricity.

----- [1]

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

The electrolysis of molten aluminium oxide makes aluminium and oxygen.

i. Write the **balanced symbol** equation for the electrode reaction that happens at the cathode.

Use the symbol e^- to represent an electron.

[1]

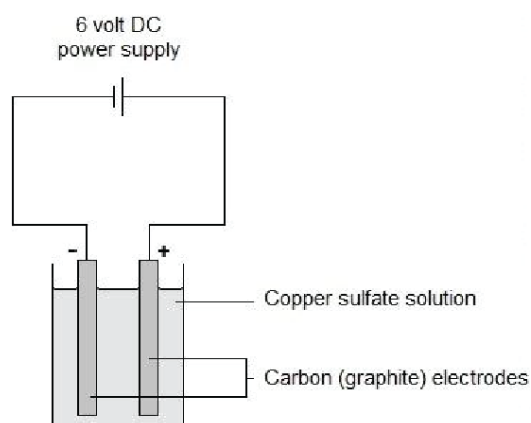
ii. Solid aluminium oxide cannot be electrolysed.

Explain why.

[1]

(b). Copper is also made by electrolysis of copper sulfate solution.

Look at the diagram of the apparatus used in this electrolysis.



Describe what you would **see** at each of the electrodes.

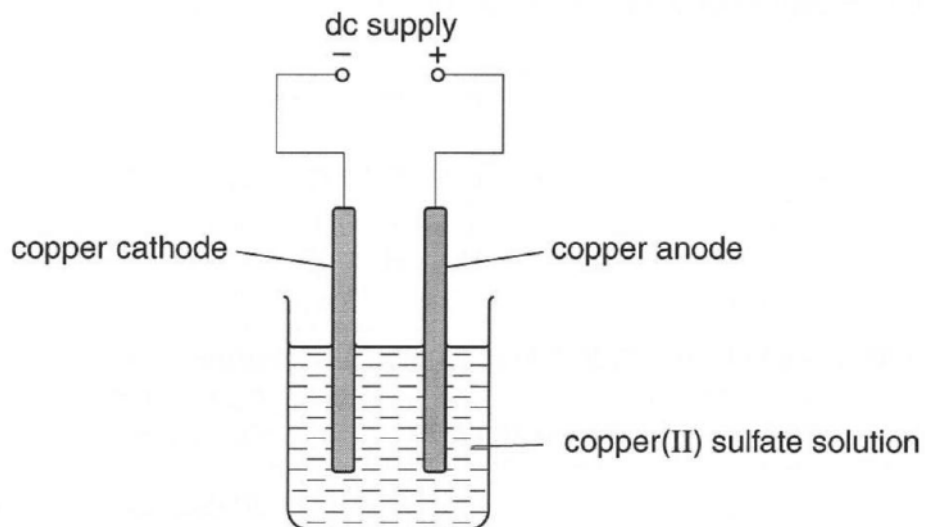
At the anode: -----

At the cathode: -----

[2]

6 (a). Meena electrolyses copper sulfate using copper electrodes.

Look at the diagram. It shows the apparatus she uses.



She investigates the change in mass at each electrode before and after the electrolysis.

Look at Meena's method.

1. Using a balance, measure the mass of the copper cathode and copper anode.
2. Set up the apparatus and run the electrolysis for 30 seconds.
3. Remove the copper cathode and the copper anode and immediately place them on the balance and measure their masses again.

What improvements could you make to Meena's experiment?

Explain your answers.

[4]

(b). Meena finds that

- the cathode gains mass
- the anode loses mass.

Explain these observations in terms of the reactions at each electrode.

[2]

7. During the electrolysis of molten potassium chloride, what is made at the cathode?

- A. chlorine
- B. hydrogen
- C. potassium
- D. potassium hydroxide

Your answer

[1]

END OF QUESTION PAPER