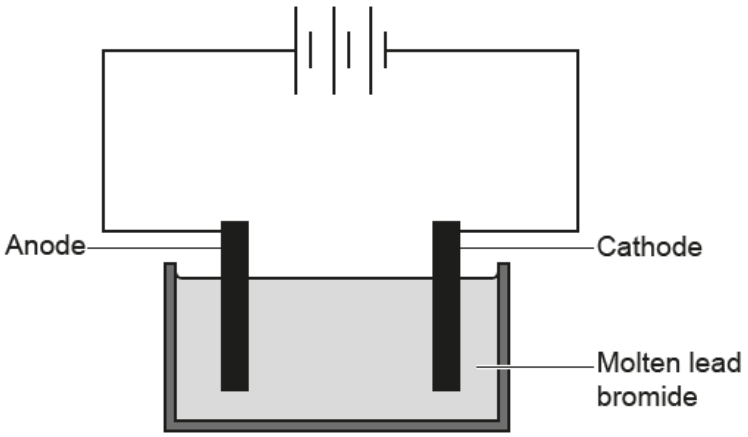
Electrolysis – 2021/20 GCSE Gateway Chemistry Combined Science A

1. Nov/2021/Paper_J250/03/No.6

The diagram shows the electrolysis of molten lead bromide.



Which row in the table shows the products formed at the **anode** and the **cathode**?

	Anode	Cathode
A	bromine	hydrogen
B	bromine	lead
C	lead	hydrogen
D	oxygen	lead

Your answer ☐ **[1]**

2. Nov/2021/Paper_J250/03/No.15(d)

(d) A student investigates the electrical conductivity of sodium chloride when it is a solid and when it is a solution.

Fig. 15.3 shows the equipment the student uses.

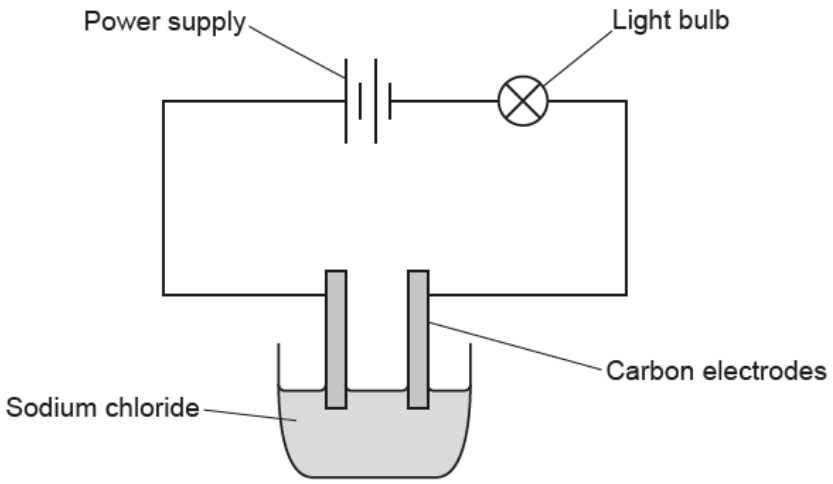


Fig. 15.3

The student produces a table for the results.

	Solid sodium chloride	**Solution of sodium chloride**
Formula and state symbol	NaCl(s)	NaCl(.....)
Does it conduct electricity?	Yes ☐ No ☐	Yes ☐ No ☐
Explanation	....	....

(i) Write in the table the **state symbol** for the solution of sodium chloride. **[1]**

(ii) Tick (✓) **one** box in each column of the table to show if solid sodium chloride and a solution of sodium chloride conduct electricity. **[1]**

(iii) Complete the table by writing in the explanation for the student's results.

Use ideas about the structure and bonding in sodium chloride in your answer. **[2]**

3. Nov/2020/Paper_J250/03/No.5

The electrolysis of aluminium oxide, Al_2O_3, makes aluminium, Al, and oxygen, O_2.

$$2Al_2O_3 \rightarrow 4Al + 3O_2$$

Which statement about electrolysis is correct?

A The masses of aluminium and oxygen formed are the same.

B The mass of aluminium decreases.

C The mass of aluminium oxide increases.

D The mass of oxygen increases.

Your answer ☐ **[1]**

4. Nov/2021/Paper_J250/10/No.3

An aqueous solution of sodium chloride, $NaCl$, is electrolysed using inert electrodes.

Which product is formed at the cathode?

A Chlorine

B Hydrogen

C Oxygen

D Sodium

Your answer ☐ **[1]**

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

Look at the equations.

$Na^+ + e^- \longrightarrow Na$

$2Cl^- \longrightarrow Cl_2 + 2e^-$

They show the two half equations that happen during the electrolysis of molten sodium chloride.

What is the correctly balanced equation for the electrolysis of molten sodium chloride?

A $Na^+ + 2Cl^- \longrightarrow Na + Cl_2$

B $Na^+ + 2Cl^- \longrightarrow NaCl_2$

C $2Na^+ + 2Cl^- \longrightarrow 2Na + Cl_2$

D $2Na^+ + 2Cl^- \longrightarrow 2NaCl$

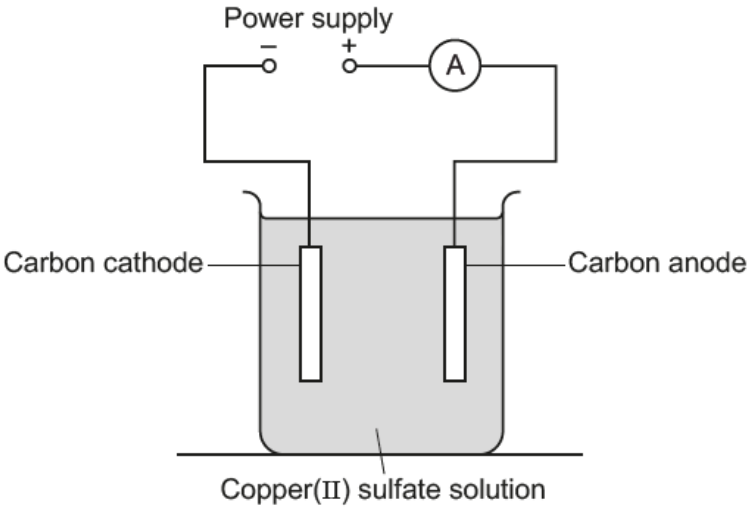
Your answer ☐ **[1]**

6. Nov/2021/Paper_J250/10/No.16

Copper can be produced from a copper(II) sulfate solution by electrolysis.

A student investigates how the mass of copper produced changes with the size of the current used during the electrolysis. The student varies the current used during electrolysis and investigates the mass of copper produced at the cathode.

The diagram shows the apparatus they use.

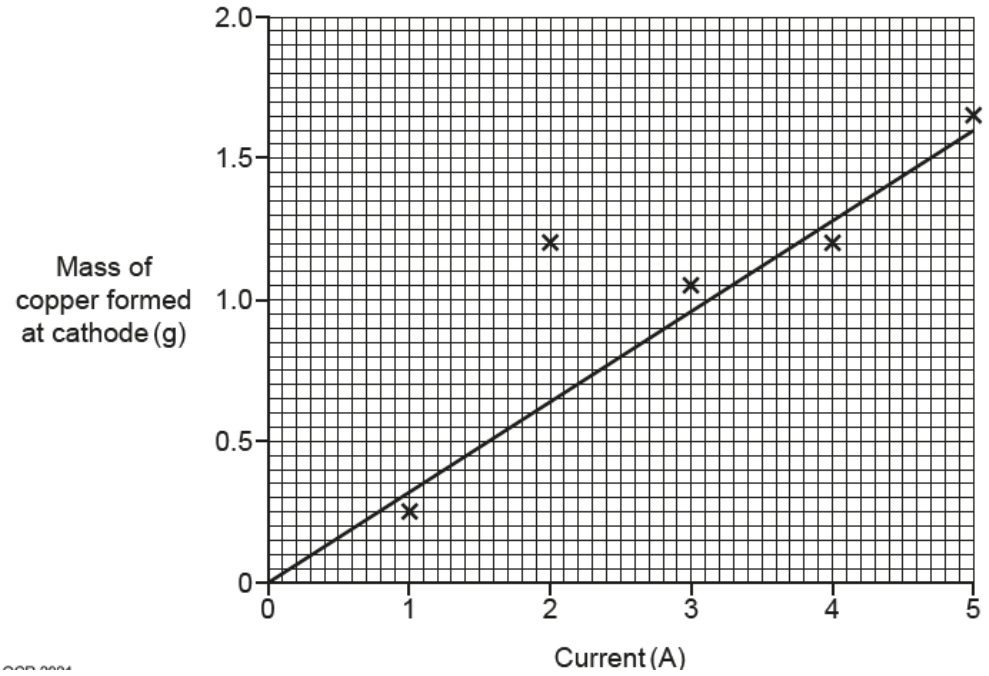


The student:

- Measures the mass of the dry cathode at the start of the experiment.
- Switches the power pack on for 10 minutes.
- Removes the cathode and washes it with water.
- Dries the cathode.
- Measures the mass of the cathode again.
- Calculates the mass of copper formed at the cathode.

The student repeats the experiment at different currents.

They plot a graph of their results.



(a) The copper(II) sulfate solution contains copper ions, Cu^{2+}.

Write the balanced **half equation** for the formation of copper at the cathode.

Include state symbols in the equation.

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

(b) Look at the graph.

(i) The student decides that the result for the mass of copper formed at the cathode at 2A is incorrect.

Give a reason for this result.

.....

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

(ii) Has the student drawn the correct line of best fit?

Give a reason for your answer.

.....

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

(iii) Explain how **repeating** the experiment could improve the accuracy of the results.

.....

.....

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

(c) Use the graph to calculate the mass of copper produced by a current of 15A.

Give your answer to **1** significant figure.

Mass of copper = ... g **[3]**

7. Nov/2020/Paper_J250/09/No.17

Potassium chloride, KC*l*, is an ionic compound containing potassium ions, K^+, and chloride ions, Cl^-.

Potassium chloride can be electrolysed when it is a molten liquid, KC*l*(l), or an aqueous solution, KC*l*(aq).

Electrolysis of potassium chloride, KC*l*(l) forms:

- potassium at the cathode
- chlorine at the anode.

(a) Explain the term **electrolysis**.

.....

.....

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

(b) Electrolysis involves the reactions of cations and anions.

Describe the difference between cations and anions.

.....

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

(c) The electrolysis of molten potassium chloride makes potassium at the cathode.

(i) Write the **balanced half equation** for the formation of potassium.

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

(ii) State and explain if this equation shows oxidation or reduction.

.....

.....

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

(d) Name the product formed at the **cathode** when an aqueous solution of potassium chloride, KC*l*(aq), is electrolysed.

Give a reason for your answer.

.....

.....

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

(e) Name the product formed at the **anode** when an aqueous solution of potassium chloride, KC*l*(aq), is electrolysed.

Give a reason for your answer.

.....

.....

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