GCSE Chemistry required practical activity: Electrolysis

Student sheet

Investigating the elements formed at each electrode when different salt solutions are electrolysed

You will use a low voltage power supply and carbon rod electrodes to pass a current through four different salt solutions. You will identify the element formed at the positive and negative electrode in each case.

Risk assessment

- Safety goggles should be worn throughout.

Method

You are provided with the following:

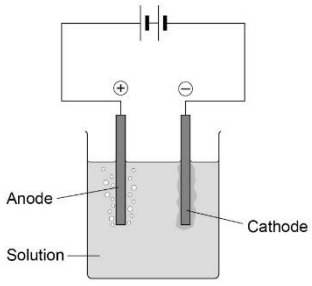
- copper (II) chloride solution
- copper (II) sulfate solution
- sodium chloride solution
- sodium sulfate solution
- 100 cm^3 beaker
- petri dish lid
- two carbon rod electrodes
- two crocodile/4 mm plug leads
- low voltage power supply
- blue litmus paper
- tweezers.

Read these instructions carefully before you start work.

1. Pour copper (II) chloride solution into the beaker to about 50 cm^3.

2. Add the lid and insert carbon rods through the holes. **The rods must not touch each other**.

   Attach crocodile leads to the rods. Connect the rods to the **dc (red and black)** terminals of a low voltage power supply.



3. Select 4 V on the power supply and switch on.

4. Look at both electrodes. Is there bubbling at neither, one or both electrodes?

5. Use tweezers to hold a piece of blue litmus paper in the solution next to the positive electrode (the one connected to the red terminal). You will need to lift the lid temporarily to do this.

   Write your observations in the first blank row of the table below. What is this element?

Solution	Positive electrode (anode)		Negative electrode (cathode)	
	Observations	Element formed	Observations	Element formed
Copper (II) chloride	**Bubbles produced Turns litmus paper white (bleaches)**		**Solution loses its blue colour A thin metallic cover formed on the electrode**	
Copper (II) sulfate	**Bubbles produced Litmus paper stays blue**		**Solution loses its blue colour A thin metallic cover formed on the electrode**	
Sodium chloride	**Bubbles produced Turns litmus paper white (bleaches)**		**Bubbles produced**	
Sodium sulfate	**Bubbles produced Litmus paper stays blue**		**Bubbles produced**	

6. After no more than five minutes, switch off the power supply. Examine the negative electrode (the one connected to the black terminal). Is there evidence of a metal coating on it? What could it be? Record your results in the table.

7. Clean the equipment carefully. Repeat steps **1–6** using solutions of:
   - copper (II) sulfate
   - sodium chloride
   - sodium sulfate.

Additional information

Gas produced at the positive electrode which does **not** bleach blue litmus paper, is oxygen. The amounts produced are usually too small to identify by testing.

If a gas is produced at the negative electrode, it is hydrogen. The amounts produced are usually too small to identify by testing.