

## The electrolysis of solutions – teacher notes

### Introduction

Electrolysis of aqueous solutions leading to the ability to predict results, reactivity series.

### Equipment

#### Apparatus

- Eye protection
- Beaker, 100 cm<sup>3</sup>
- Electrodes (S-shaped are preferable)
- Small test tubes for gas collection
- Two leads
- Two crocodile clips
- DC power supply (6 V is reasonable)

#### Chemicals

- Universal indicator paper

Access to solutions of :

- Sodium chloride 0.5 mol dm<sup>-3</sup>
- Copper chloride 0.5 mol dm<sup>-3</sup>
- Potassium iodide 0.5 mol dm<sup>-3</sup>
- Sodium bromide 0.5 mol dm<sup>-3</sup>
- Potassium sulfate 0.5 mol dm<sup>-3</sup>
- Copper(II) sulfate 0.5 mol dm<sup>-3</sup>
- Silver nitrate 0.1 mol dm<sup>-3</sup>

### Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3VVLha5>
- Always wear eye protection.
- Chlorine is toxic and harmful to the lungs, eyes and respiratory tract. See CLEAPSS Hazcard HC022a.
- Bromine vapour is an irritant and very toxic if inhaled. See CLEAPSS Hazcard HC015b.
- Iodine is harmful by skin contact. See CLEAPSS Hazcard HC045.
- Hydrogen is extremely flammable. See CLEAPSS Hazcard HC048.
- Oxygen supports combustion. See CLEAPSS Hazcard HC069.
- Ensure good ventilation.
- Do not allow chlorine or bromine vapour to be produced for very long.

### Notes

Teachers may wish to show students how to fill and invert the small test-tubes over the electrodes.

With care, these can be inverted without spilling the liquid. Using small tubes filled with water rather than the test solution is safer.

These are then inverted into the solution to be tested.

The tubes may be clamped or supported by rubber bands wound round the test-tubes and round the electrode.

The class results can be pooled as there will not be time to test all the solutions individually.

Students may need reminding of, or introducing to, the common tests for hydrogen, oxygen, chlorine, bromine and iodine.

### Answers

1. Metals or hydrogen.
2. Non-metals.
3. From the water.
4. (a) The metal is produced if it is lower than hydrogen in the reactivity series, otherwise hydrogen is produced. (b) Halides give halogens, sulfates and nitrates give oxygen.