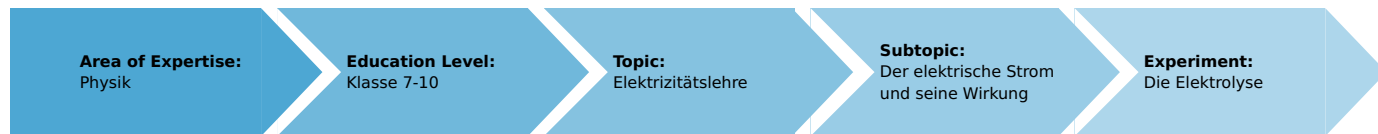


Electrolysis (Item No.: P1375100)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

- Cardboard or similar, at least 76 mm x 40 mm
- Scissors
- Pin
- Cloth or absorbent paper

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional information

The students know that metallic conductors do not change chemically when current passes through them. This experiment should bring them to the realisation, that the chemical composition of a liquid conductor does change when electrical current passes through it.

Safety measures



R: 22-36/38-50/53

S: 22-60-61

Copper(II) sulphate is harmful to health and irritating to eyes and skin. Do not inhale vapours or dusts. Wear protective glasses and protective gloves.

Waste disposal

Collect solutions containing heavy metal ions or salts in an appropriately labelled container and subject them to proper disposal.

Notes on setup and procedure

To save time, we recommend that the experimental groups are supplied with cleaned troughs and electrodes, as well as with pieces of perforated cardboard. The students are normally very willing to carry out the preliminary work required. It is also important in this experiment that the teacher centrally organises and superintends the waste disposal of the aqueous solutions, and also ensures that the necessary safety precautions are maintained during the whole of the experiment.

Remarks

Electrolysis is the term used to denote the decomposition of chemical compounds by electric current. Water is decomposed to its components oxygen and hydrogen at the cathode; molecular hydrogen emerges from the solution. The ammeter used in this experiment serves simply to show that current flows. The current measured is only an approximate value, and is, at the voltage given, predominately dependent on the ionic concentration of the solution.

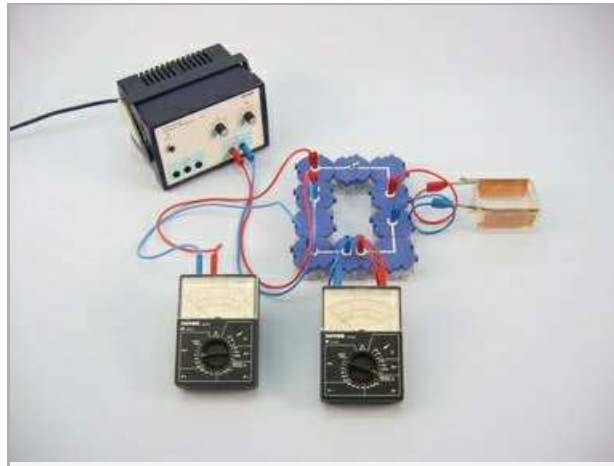
Electrolysis (Item No.: P1375100)

Task and equipment

Task

Do the chemical properties of a conducting liquid change when current is passing through it?

Conduct electric current through an aqueous solution of sodium sulphate and observe if this thereby changes chemically.



Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	1
2	Angled connector module, SB	05601-02	2
3	Interrupted connector module, SB	05601-04	2
4	Junction module, SB	05601-10	2
5	Angled connector module with socket, SB	05601-12	2
6	On-off switch module, SB	05602-01	1
7	Trough, grooved, w/o lid	34568-01	1
8	Copper electrode, 76 mm x 40 mm	45212-00	2
9	Alligator clips, bare, 10 pcs	07274-03	(2)
10	Connecting cord, 32 A, 250 mm, red	07360-01	2
11	Connecting cord, 32 A, 250 mm, blue	07360-04	2
12	Connecting cord, 32 A, 500 mm, red	07361-01	2
13	Connecting cord, 32 A, 500 mm, blue	07361-04	2
14	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
15	Multi-range meter, analogue	07028-01	2
16	Water, distilled 5 l	31246-81	1
17	Emery paper, medium, 5 sheets	01605-02	(1)
18	Sodium sulphate dried 250 g	48344-25	1
	Spoon, w. spatula end, 18 cm, plastic	38833-00	1
Additional material			
	Cardboard or similar, at least 76 mm x 40 mm		
	Scissors		
	Pin		
	Cloth or absorbent paper		

Set-up and procedure

Set-up

Safety measures



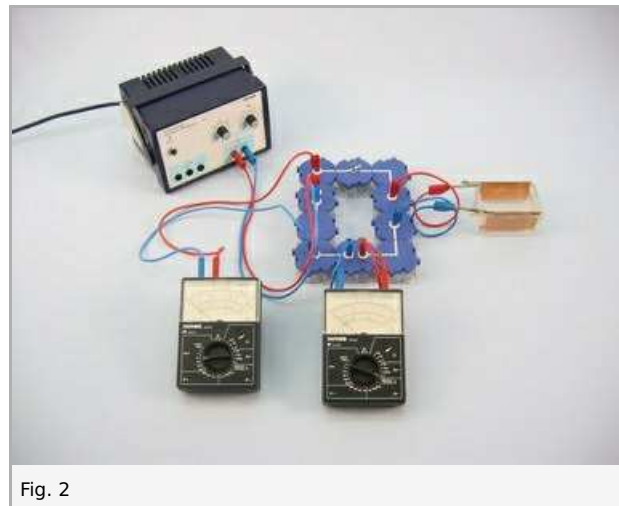
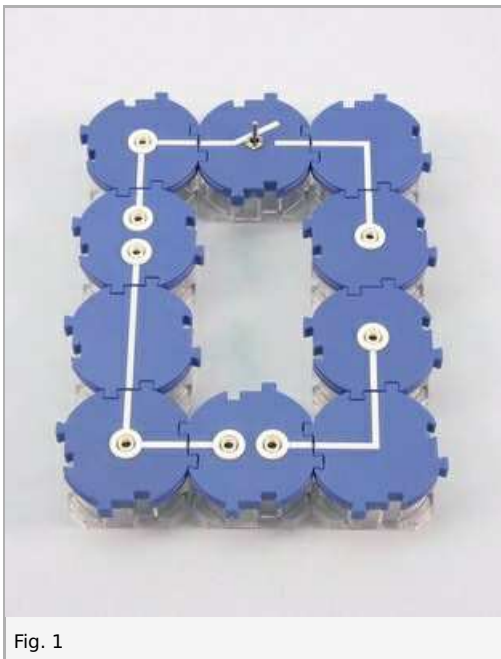
R: 22-36/38-50/53

S: 22-60-61

Copper(II) sulphate is harmful to health and irritating to eyes and skin. Do not inhale vapours or dusts. Wear protective glasses and protective gloves.

Set-up

- Set up the experiment as shown in Fig. 1 and Fig. 2, with the switch first open. Fill the cleaned trough to about two thirds with distilled water; sprinkle a half-spoonful of sodium sulphate slowly in the water so that no clumps form and stir.
- Cut out pieces of cardboard of the same size as the electrodes, and perforate them with a pin.
- Insert the carefully cleaned electrodes at the sides and the pieces of perforated cardboard in the middle of the trough



Procedure

- Select the 3 A- measurement range.
- Switch on the power supply and adjust it to 12 V-.
- Close the switch and let the current flow for 2 to 3 minutes; measure the current and observe any processes or changes which occur in the trough.
- Open the switch, set the power supply to 0 V and switch it off.
- Note the measured value for the current and your observations in the report.
- Dry the electrodes and properly dispose of the aqueous solution; clean the trough and wash your hands with soap and water.

Report: Electrolysis

Result - Observations

Note down the measured values and your observations during the experiment.

- a) Current intensity I
- b) Processes or changes at the cathode
- c) Processes or changes at the anode

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Evaluation - Question 1

Attempt to explain the processes observed at the cathode, whereby it would be best to use equations for the reactions.

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Evaluation - Question 2

Attempt to explain the visible changes in the solution in the area between the anode and the pieces of cardboard.

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Evaluation - Question 3

Before electrical current was passed through the aqueous solution, it was composed of water + sodium sulphate. Write down the components present in the solution at the end of the experiment:

water + sodium sulphate + +