Demonstration (5th - 10th grade)	**The Electrolysis of Water**	**Time:** max. 20-30 min.

Safety:

The tops of the canulas should be cut off with shears. Be careful that the canula is not crushed during the process. Take care when dealing with concentrated acids.

Instruments:

- 1 threaded glass
- 1 small Erlenmeyer flask
- 2 (pink) canulas (1,2 / 40mm)
- 1 Bunsen burner
- 1 lighter / matches

Chemicals:

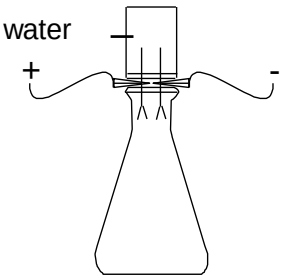
- water
- concentrated sulfuric acid, H_2SO_4 (H: 314; P: 280-301+330+331-309-310-305+351+338)

Preparation:

- Bore two holes through the lid of the threaded glass with the aid of the canulas.

Experiment:

- Fill the threaded glass almost completely full with water and add about 1ml of sulfuric acid (H_2SO_4). Seal the threaded glass.
- Push both canulas through the lid. Fasten the cables to the canulas with the help of alligator clips.
- Turn the threaded glass over and place it on the small Erlenmeyer flask.
- Connect both cables to a 9-Volt battery (or another voltage source). Wait approximately 20 minutes.



<u>Indication of a resulting gas mixture:</u>

- After 20 minutes, the resulting gas can be sampled with the aid of a syringe. It can be tested for the presence of hydrogen by expelling the gas into a Bunsen burner flame.

Observations: A gas forms on each of the canulas. This gas pushes the water into the Erlenmeyer flask through the canulas. It can then be extracted from the flask and tested for the presence of hydrogen.

Results: The compound water is split into two gases upon electrolysis: on the one canula (the negative electrode) hydrogen forms and on the other (the positive electrode) a lesser volume of oxygen forms.

Anode (oxidation): $4\ OH^- \rightarrow O_2 + 2\ H_2O + 4\ e^-$
Cathode (reduction): $2\ H_3O^+ + 2\ e^- \rightarrow H_2 + 2\ H_2O$
Total reaction $2\ H_2O(l) \rightarrow 2\ H_2(g) + O_2(g)$

indicator reaction for hydrogen: proof of an explosive gas mixture
$2\ H_2 + O_2 \rightarrow 2\ H_2O$

Disposal: no dangers
