



Key Concepts

1. Water molecules can be decomposed by strong electric current into the elements which make them up **hydrogen** and **oxygen**.
2. The observed ratio of hydrogen or oxygen gas produced by electrolysis is in direct proportion to the number of atoms of each in a water molecule: 2 to 1.
3. Hydrogen is an excellent fuel and will burn in the presence of atmospheric oxygen.
4. Oxygen is not a fuel but does support combustion. Fuels burn quite vigorously in the presence of pure oxygen.
5. An electrolyte is necessary to conduct the electricity in the above process. Electrolytes ionize when they dissolve.

Teaching Tips

1. **Caution:** Sodium hydroxide is caustic, so use plenty of water to rinse off any solution you may get on your hands.
2. Be sure **safety goggles** are worn during the testing of the gases.
3. Discuss possibility of obtaining large quantities of hydrogen (an excellent fuel) by means of the electrolysis of abundant ocean water.

Materials

GENECON with output cord

Electrolysis Apparatus

- o 2% sodium hydroxide solution, 500 ml
- o Matches
- o Wood splints
- o **Safety goggles**

Procedure

1. Fill the tank with the sodium hydroxide solution which will serve as an electrolyte. Using the plastic test tube holder provided, fill up the two test tubes with the solution and invert them over the electrodes. There should be no air in the tubes.
2. Connect the leads of the GENECON to the electrodes underneath the tank, as in the sketch to the right. The positively charged, color-coded electrode (see Activity #2) will become the site for the collection of oxygen gas. The hydrogen gas will collect at the negative electrode. Rotate the handle of the GENECON in a clockwise direction only. If reversed, both gases may collect in the same tube, creating a potentially dangerous mixture.
3. Prepare your students for some real work. They can take turns operating the GENECON for about a 20 – 25 minute period until both tubes are filled with gas.
4. Observe the formation of the gas bubbles at each electrode. Note that when the GENECON stops, so do the bubbles. Compare the rate at which each tube fills with gas by displacing the electrolyte solution. What is the apparent ratio?
5. When the tubes are full, put on safety goggles. Remove the tube above the negative electrodes using the test tube holder. Keep it upside down while testing the mouth of the tube with a match. Result?
6. Now test the tube above the positive electrode by thrusting a glowing wood splint in the neck of the inverted tube. Result?