ASSESSMENT

Student Assessment Questions/Answers

1. **Vocabulary**
   - **Anode:** Positively charged electrode
   - **Cathode:** Negatively charged electrode
   - **Hydrogen:** Element found in water. Has been used for energy in the past
   - **Oxygen:** Element found in water.
   - **Electrolysis:** The separating of elements so that use of each one can be used
   - **Positive Polarity:** The type of orientation, often of a magnet, but also in electricity
   - **Negative Polarity:** They type of orientation, often of a magnet, but also in electricity. Opposite of positive.
2. What happens when a magnet with positive polarity is place near one with negative polarity? They pull together.
3. This reaction proves that opposites ___attract_____.
4. How might this be useful when trying to separate multiple elements from one substance? (Consider water, or H20)
5. Use of polarity can pull charged elements away from each other and toward the electron with the opposite charge as the element.
6. The gas on the Cathode side, or negative charge, is ____ hydrogen_____.
7. If the Cathode is a negative, the gas found must be charged ___ positively_____.
8. The gas on the Anode side, or positive charge, is ____ oxygen_____.
9. If the Anode is positively charged, the gas found must be charged _____ negatively_____.
10. Did gases increase with more power? If not, why not? If so, how much more?

    Answers will vary.

    Have students record their answers on the attached Student Handout.

TEACHERS GUIDE

HOFFMAN ELECTROLYSIS APPARATUS

ITEM # 3155-01

GRADE LEVEL HS+

CHEMISTRY - PROPERTIES OF MATTER

For qualitative and quantitative study of the electrolytic decomposition of electrolytes such as water, hydrochloric acid etc. Consists of two vertical 50 ml, gas-collecting, graduated glass tubes with stopcocks at top and joined by a bridging tube to a reservoir and fitted with a pair of platinum electrodes at the lower ends of the glass tubes. A lead wire connecting the platinum electrode passes through the glass tube for external connections, so that only the platinum electrode comes in contact with the electrolyte. Packed in a Styrofoam case. Mounted on a cast iron stand designed for safe clamping. Requires a 6V battery or low voltage DC power supply for operation.

Materials

- Ionized water
- Hoffman apparatus
- 9-Volt battery
- test tube
- wooden splint or match
- Internet or library access
- Electrolysis Data/Discussion Student Handout

Goals & Objectives

Students will:

- Apply vocabulary related to expressing what happens during Electrolysis of water. (Students can take notes on definitions so words can be used during experiment, or teacher may create a crossword puzzle for a creative exploration of the words.)
- Compare what they know about polarization in magnets and any experience with Electrophoresis to predict what might happen in electrolysis.

Discussion

Optional Study and Discussion

1. Can electrolysis save my gas costs?
2. If the elements we need for current technology are attached to other elements, how do we separate them?

Activities

1. Fill the apparatus with water and turn on power.
2. Observe the amount of gas collecting on the cathode side. Collect into an upside down test tube and cover with thumb. Remove thumb suddenly; there should be a “pop.” If so, this is hydrogen.
3. Observe the amount of gas collecting on the cathode side. Collect into an upside down test tube and cover with thumb. Obtain a smoldering splint from the teacher and place it in the test tube. If it re-ignites, it is oxygen.
4. Repeat steps 3-5 with a different amount of power. Discuss differences.
5. Discuss what the demo suggests about the possibility of alternative fuels from water or its elements.

Note

It is always best to DO an experiment ahead of time to be able to best present it to the class.

6. Read two sources written in the last year about electric motors, or alternative fuels and their pros and cons. Be ready to share.

STUDENT HANDOUT

Student Name: _____

1 Vocabulary

- **Anode**
- **Cathode**
- **Hydrogen**
- **Oxygen**
- **Electrolysis**
- **Positive Polarity**
- **Negative Polarity**

2 What happens when a magnet with positive polarity is place near one with negative polarity?

3 This reaction proves that opposites _____attract_____.

4 How might this be useful when trying to separate multiple elements from one substance? (Consider water, or H20)

5 The gas on the Cathode side, or negative charge, is _____.

6 If the Cathode is a negative, the gas found must be charged _____.

7 The gas on the Anode side, or positive charge, is _____.

8 If the Anode is positively charged, the gas found must be charged _____.

9 Did gases increase with more power? If not, why not? If so, how much more?

Write your findings from sources here and on the back of this sheet. (Don't forget to include source information, like title, author, date, website, etc.)