Hydrogen Fuel Cell

Name__________________________
Name__________________________
Name__________________________

Supplies:
1. one hydrogen fuel cell model car and controller per group
2. one water electrolyzer
3. 2 test tubes
4. 6 thin wood splints
5. tape measure
6. a plastic bottle filled with distilled water (200 mL)
7. balance
8. paper towels
9. waste container

Information:
Volume of a cylinder, \( V = \pi r^2 \) where \( r \) is the radius and \( h \) is the height.
Circumference, \( C = 2\pi r \)
1 kWatt-hr = 3600 kJ = 3600000 J
1 mile = 5280 ft
229 kJ released per mol \( \text{H}_2 \) consumed
1000 kg electric vehicle uses 0.3 kWatt-hr/mile

How much \( \text{H}_2 \) energy is contained in the green balloon?

How will you compare the energy available in the fuel to the energy used by your car?

Data:

For Discussion:
1. Describe what happened when the splints were inserted into the gas samples. How does this relate to the expected properties of the gases?
2. What relative volumes of the two gases would you expect upon electrolysis?
3. From the volume of hydrogen in the balloon, what was the energy content of the fuel?
4. What is the efficiency of the engine in the car?
5. Where could energy be lost?