HYDROGEN GENERATION FROM WATER DISASSOCIATION USING SMALL CURRENTS AND HARMONICS

IUPUI
INDIANA UNIVERSITY–PURDUE UNIVERSITY INDIANAPOLIS

Trien N. Nguyen[1], Mentors: David Goodman[2] and Horia Petrache[1]

[1]Department of Physics, Purdue School of Science

[2]Department of Engineering and Technology, Purdue School of Engineering and Technology

ABSTRACT

Hydrogen can be produced cheaply and efficiently from water sources using a combination of harmonics and small currents. Hydrogen is a clean and virtually inexhaustible fuel source with applications ranging from the basic combustion engine to more advanced fuel cells. The major stumbling block to hydrogen adoption is the difficulty in generation and transportation. To study these issues, a prototype hydrogen generator was created using readily available designs and materials and its hydrogen generation rates were tested by varying the gap between the cathode and anode, frequencies used in water dissociation, and voltages applied to the purified water. Since purified water and small currents are used, hydrolysis is not the driving force behind the dissociation of the water molecules. The cause of the water dissociation is the weakening effect the harmonic frequencies have on the hydrogen-oxygen bonding. The expectation is that voltage, cathode and anode surface area will have minimal effects on hydrogen production rates. Narrowing the frequency range that produces optimal water dissociation may increase hydrogen generation rates. Other experiments show that decreasing the gap between the cathode and anode may also increase hydrogen production. By increasing hydrogen production rates beyond the limits imposed by hydrolysis, the possibility exists of creating a hydrogen-on-demand system that eliminates the need to produce, store, and transport hydrogen

BACKGROUND

We are studying the use of sound waves at specific frequencies to weaken the Hydrogen-Oxygen bonds of water molecules. Other researchers have shown that the rate of production depends on:

- Spacing between cathode (outer tube) and anode (inner tube)
- Vibrational frequency of the anode tube
- Conditioning of the 316L stainless steel tubs to avoid electron leakage

METHODS

We used 316L Stainless for the electrode because it contains:

- Carbon (0.03%)
- Molybdenum (2 to 3%)
- Other Rare Earth metals (2 to 5%).

The Rare Earth metals, Silicon, and Molybdenum, will migrate to the surface and form a protective layer, preventing electron leakage.

Schedule 80 PVC was used for the tubing and electrode housing because it is:

- Corrosion resistant
- Handles temperatures up to 140F
- Resistant to most acids, bases, salts, oxidants, aliphatic solutions, halogens

PROTOTYPE

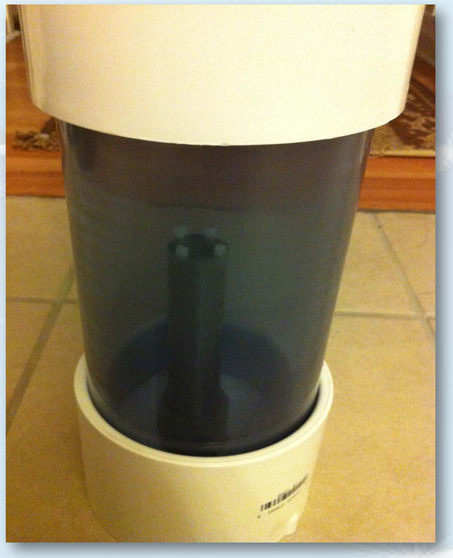

Figure 1: The Generation Chamber consists of a 18" section of 4" Clear PVC tubing, capped by a PVC cap and the electrode wires. A flow rate meter is attached to the top to measure the quantity of Hydrogen gas being produced.

Figure 2: The smaller the gap between the outer (cathode) and inner (anode) tubes, the stronger the force.

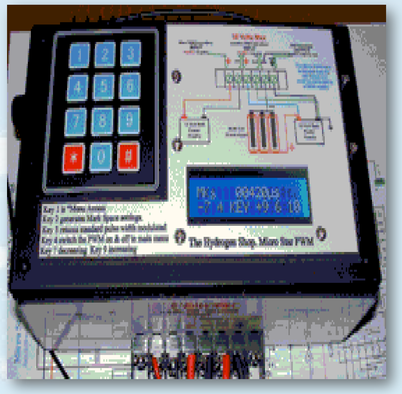

Figure 3: The Voltage and Sound Generator applies less than 1 Amperes of current while generating a 925 kHz sound wave.

REFERENCES and ACKNOWLEDGEMENTS

Mazloomi, Kaveh, Sulaiman, Nasri B., Moayedi, Hossein. "Electrical Efficiency of Electrolytic Hydrogen Production." *International Journal of Electrochemical Science*. 7. (2012)
Raju, Ravi. "Research Paper on Ravi's Water Fuel cell Replication." Panacea-BOCAF On-Line University. 2008. October 2012. http://www.panacea-bocaf.org/
"Water Fuel Cell." PESWiki.com. Pure Energy Systems. 20 Dec. 2011. Web. 15 Oct. 2012. <http://peswiki.com/index.php/OS:Water_Fuel_Cell>

This project was possible due to funding from the Department of Engineering and Technology at IUPUI and the encouragement of Dr. Goodman and Dr. Petrache.