CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
J0229

Project Title
The Effects of Water Temperature on a Fuel Cell's Efficiency

Abstract

Objectives/Goals
The objective of my experiment was to determine if water temperature affects a Fuel Cells efficiency. This experiment is to offer data that can determine at which temperature will Fuel Cells work best at.

Methods/Materials
To conduct this experiment, I had to insert water of varying temperatures(cold temp. 1.67 deg. Celsius, room temp. 18.3 deg. Celsius, or warm temp. 29.4 deg. Celsius) into the Fuel Cell (FC). My testing was conducted inside a testing box, which was the same temperature as the water. The water would be electrolyzed until about 15 mL of Hydrogen was produced. I measured the amount of volts/amperes going into the FC to electrolyze the water so I could calculate the Input Power (Watts). After a 5-minute waiting period I started to measure the amount of volts/amperes being produced by the FC in a 4 min. operating time to get the Output Power. I then calculated the efficiency for each water temperature using the Input/Output Energy.

Results
My data showed that the cold water temp. was 39% efficient, room temp. was 19% efficient, warm temp. was 24.6% efficient. Cold water temp. was more efficient than warm water temp. by 13.4% and nearly two times efficient as room temp. water.

Conclusions/Discussion
I hypothesized that the warmer the water temperature the more efficient the fuel cell would be. As of now, my data does not support my hypothesis. The colder the water temp. the more efficient it is. More testing will have to be conducted to get more constituent and conclusive results.

Summary Statement
My experiment measured the input/output voltage and amperes to calculate the efficiency of a fuel cell with different water of different temperatures inserted.

Help Received
Forrest & Debi Csulak helped with improving on my project. Lisa & Josh Arreola also helped with improving on my project. My father supervised while I conducted my testing.