CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22528

Project Title
Comparing Fuel Cell Efficiency

Abstract

Objectives/Goals
Fuel Cell technology is the passageway to the future. It allows less fossil fuels in our atmosphere. This project compares the efficiency of a fuel cell when using regular air and hydrogen verses pure oxygen and hydrogen.

Methods/Materials
The efficiency was calculated by dividing the amount of coulombs produced in the fuel cell by the amount of coulombs produced in the Power supply. The hydrogen and oxygen were obtained using an electrolysis procedure, which gave the hydrogen and oxygen to he fuel cell.

Results
With the thirty three total efficiency tests I have executed I have an efficiency of air that varies fom 30% to about 60%. The efficiency ithpure oxygen is about 50% to 80%.

Conclusions/Discussion
A fuel cell operates using oxygen and hydrogen. The hydrogen creates a reaction with the cathode. In this reaction the products are hydrogen and electrons. The electrons proceed to have a reaction with the anode. While they are traveling to the cathode they run through a circuit, creating energy. While they are running through the circuit they have the ability to produce power. In the end the electrons combine with the oxygen molecules and positive hydrogen ions, creating water and heat. These are environmentally sound byproducts, which will help industries comply with the Kyoto Protocol.

In December of 1997 the Japanese created the Kyoto protocol. The pact, signed by official from 160 countries, requires 38 industrialized countries to ratify it. If these countries except the restrictions they will produce 5% emissions lower than in 1990. These reduced levels are supposed to be achieved from 2008-2012. America will not sign this document in feat that it will hurt their economy. It will hurt the car production business and industries in the United States, however there is an alternative that is a use of fuel cells. If the United Nation Framework Convention on Climate Change can have the Kyoto Protocol passed it will open all sorts of new opportunity for fuel cell technology.

To take this project further I plan on testing th efficiency of my electroylsis procedure and the efficiency of a fuel cell when using a 50% air and 50% oxygen solution as another independant variable.

Summary Statement
Comparing Fuel Cell Efficiency

Help Received
I had a mentor, Dr. Sitiram Ramaswamy, from the UCDavis, he mentored me throughout the project