



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Vardhaan S. Ambati	Project Number J0602
Project Title Effect of the Electrolyte's pH in Optimizing the Hydrogen Fuel Cell Efficiency	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Hydrogen Fuel Cells are renewable energy cells, and a promising answer to the Earth's energy crisis. My project was to determine if the pH of the electrolyte used in Hydrogen Fuel Cells has an effect on the efficiency of the Hydrogen Fuel Cell. I believe the efficiency of Hydrogen fuel cells is higher when the electrolyte is more acidic or more alkaline than when it is neutral.</p> <p>Methods/Materials Constructed a simplified Hydrogen Fuel Cell using Grove Schematic, with Platinum coated nickel wires as electrodes, and distilled water as the electrolyte. Nine volt battery was used to electrolyze water. Voltmeter and Ammeter were used to measure voltage and current generated due to reverse electrolysis caused by presence of Platinum (catalyst), when battery is removed. Hydroponics pH control kit was used to change the pH of the electrolyte. Voltage and current readings were taken for varying pH levels (4 to 10). Efficiency was calculated by multiplying current and voltage measured for each pH level. The experiment was repeated three times for accurate results.</p> <p>Results Consistently, Hydrogen fuel cell with the electrolyte of pH7 had the lowest efficiency and the electrolyte with pH10 had the highest efficiency. Both acidic and alkaline electrolytes had better efficiency than electrolyte with pH7, but alkaline electrolytes were more efficient than the acidic electrolytes.</p> <p>Conclusions/Discussion My conclusion is that Hydrogen fuel cells with alkaline and acidic electrolytes are more efficient than fuel cells with electrolytes with pH7 (neutral), but alkaline electrolytes have the best efficiency.</p>	
Summary Statement My project is to determine the effect of the electrolyte's pH in optimizing the Hydrogen Fuel Cell efficiency.	
Help Received Jim McElroy, NASA Scientist & Bloom Energy Co-founder, Arne Ballantine and Chockkalingam Karuppaiah, Leading Scientists from Bloom Energy, Gerry Glaser & Matt Jorgensen, Xilinx, provided guidance and suggested improvements for my project. My parents supervised me.	