



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Adin T. Dobkin	Project Number J0713
Project Title Will Changing the Composition of a Hydrogen Fuel Affect the Power Output?	
Objectives/Goals Will putting different materials in a hydrogen fuel cell affect the power output? I think that copper will give off the most power output because it is used in solar cells for conducting electricity. I think that lemon juice will also give off more power than a regular fuel cell because when there is no power running through it, it still gives off power.	
Abstract Methods/Materials # Clear Cup; # Popsicle Stick; # Platinum coated nickel wire; # Nine volt battery; # Nine volt battery clip; # Voltmeter; # Various metals and materials. Part I: Building the fuel cell 1. Twist 6 inches of the wire around a small nail; 2. Tape the twisted wire onto the popsicle stick; 3. Using wire cutters cut the battery clip wires in half; 4. Attach the cut wire from the clips to the platinum wire and attach the non cut wire still connected to the battery clip to the wire; 5. Attach the cut wire and the voltmeter probes together. Part II: Using the fuel Cell 1. Turn on voltmeter; 2. Pour water and material into cup; 3. Quickly touch battery to clip for three seconds then let go; 4. Record volts every five seconds; 5. Repeat steps 2 through 4 with every material.	
Results Area Under the Curve was used to generate these results. Regular water alone had a total output of 21.7 volts, the third most overall. Salt had a combined average of 10.905, the first set was 13.51, and the second set was 8.3. Salt was the worst material used and decreased output in the fuel cell. This may have happened because the energy from the fuel cell was used to split the sodium and chloride atoms in the salt. This may also explain why during the salt trials there was chlorine gas coming from the fuel cell. Sugar had a total voltage of 16.69, the fourth highest output in the tests. Lemon juice had a total output of 28.23 volts, the highest out of all the tests. Copper had a total output of 28.19 volts the second highest of all the materials. Aluminum had a total output of 15.05 volts, the fifth highest of all the materials.	
Conclusions/Discussion These results supported my thesis because I thought that copper's conducting and storing properties would save extra energy each test, and lemon's negative hydrogen ions that are naturally produced in lemon would combine with the hydrogen ions that give power to whatever the cell is powering. To further test this you could use different materials or different combinations.	
Summary Statement Testing different materials to see if they positively or negatively affect the power output	
Help Received My dad recorded the information I told him, My uncle supplied me with the metals	