



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Wyatt Gormley; Jaime Higareda</b>	<b>Project Number</b> <b>S0506</b>
<b>Project Title</b> <b>Electrolysis Anthology</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this year's science project was to explore the process of electrolysis of water by using a Hoffman apparatus. Specifically, we tested the variables of the voltage, electrode material, the electrode's surface area, and mass. Our tests included fifteen separate trials in five (changing electrode materials) sets of three (changing the voltage). <b>Methods/Materials</b> The metals used in our test were aluminum, copper, iron, and magnesium, while the control would be an inert semiconductor, graphite carbon. We learned that during water electrolysis, an electrolyte is necessary, and we chose to use a one percent, solution of NaHCO <sub>3</sub> . In respect to voltage, we tested our anodes and cathodes using three, four and a half, and six volts of electricity; each trial lasted for a period of eight hours. Our means of data collection consisted of observing the products of gas, oxides, and hydroxides using inverted containers to measure the production of hydrogen over the cathode and oxygen over the anode. <b>Results</b> The results revealed that although larger surface area yields more chemical reaction with the electrodes, the electrode must be able to sustain the voltage passing through it in order to create such a reaction. Additionally, an increase in voltage increased the reaction rate exponentially, while for some peculiar reason, a higher electrical resistance in the electrodes tended to cause a greater reaction. Also, we deduced that certain ratios in the data can yield answers as to what the electrodes reacted with inside of the water. <b>Conclusions/Discussion</b> Electrolysis Anthology produced applicable information that may possibly influence a myriad of industry including, the paint companies (used in pigment production) the boating industries (preservation of the metals exposed to the salt water electrolyte solution), and hydrogen production plants. Although, it is conceivable, and rather likely, such industries may have already conducted similar tests.	
<b>Summary Statement</b> Electrolysis Anthology is an attempt to explore the nature of electrolysis of water by using a Hoffman apparatus and to test the effects of voltage, electrode material, mass, and surface area on the process's efficiency.	
<b>Help Received</b> Parents help to obtain materials: Dr. Malhotra (teacher), Tyler, and Michael (lab assistants at Thousand Oaks High School) gave valuable insight and criticism.	