



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Timothy S. Brown</b>	<b>Project Number</b> <b>J0506</b>
<b>Project Title</b> <b>The Power of Oxygen</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This experiment is an extension of a previous experiment on electrolysis that had unexpected results. No oxygen gas was produced and a red substance dissolved into the water. This led to the hypothesis that the oxygen reacted with iron in the nail at the anode to produce iron oxide, or rust. The purpose of this experiment is to understand what happened to the oxygen by measuring the amount of hydrogen and the weight loss of the nail.</p> <p><b>Methods/Materials</b> An electrical current is run through salt water to split it into hydrogen and oxygen. The oxygen dissolves the nail used as a conductor for the anode, while hydrogen constantly bubbles off the cathode. The hydrogen, and the weight loss of the nail at the anode are measured and compared to see if it supports the hypothesis. Materials include salt water, nails, bowl, plastic container, measuring cup, electrical tape, and a laptop power adapter.</p> <p><b>Results</b> The experiment consisted of five electrolysis sessions, each with different amounts of time. Hydrogen bubbled off the nail of the cathode as the red and green substance dissolved into the water. The weight of the nail and the amount of hydrogen was measured before and after each session. As the increments of time increased, more iron disintegrated off the nail.</p> <p><b>Conclusions/Discussion</b> The results confirmed the hypothesis that the weight loss of the nail would be proportional to the hydrogen produced. In this experiment there was an average of 462 ml of hydrogen/gram of iron. This is close to the predicted 660 ml/gram, especially considering the method of capturing and measuring hydrogen, and the fact that steel nails rather than pure iron was used.</p>	
<b>Summary Statement</b> This experiment studied oxidation of metals by correlating excess hydrogen produced by electrolysis of water with the dissolving of the metal anode.	
<b>Help Received</b> I thank my mom for helping me lay out the pages onto the poster board and my dad for giving me good feedback and advising the electrolysis sessions.	