



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

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Project Title The Magic of Metal Corrosion	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Analyze the corrosive behavior between metal fully submerged in liquid versus metal partially submerged and determine whether corrosion reacts similarly when using three types of liquid: An acetic acid, a sodium bicarbonate solution, and salt water. I hypothesized that metals fully submerged will have more corrosion and that the metals will react similarly when tested in different liquid solutions, whether partially or fully submerged.</p> <p>Methods/Materials Six-inch strips of aluminum, brass, copper, and iron were cut into two-inch pieces and placed in three different types of liquid: An acetic acid consisting of one cup of full strength white vinegar; a sodium bicarbonate solution consisting of two teaspoons of baking soda dissolved in one cup of distilled water; and salt water produced by dissolving one cup of distilled water with 8 grams of sea salt. Each strip was divided into a 3x5mm hand drawn grid to track and measure the rate of corrosion. Two sets of twelve 18-ounce cups were filled with one cup of solution and labeled. One metal strip was suspended from the top of each cup and submerged; 12 fully and 12 half way. Photographs were taken regularly and observations were logged every two days for 35 days.</p> <p>Results The fully submerged samples showed corrosion on 100% of the surface area. The brass and copper were completely covered with tarnish caused by the sodium bicarbonate. The iron sample in sodium bicarbonate showed no reaction, and the aluminum sample in vinegar had minimal corrosion.</p> <p>The partially submerged samples had over 65% surface corrosion on all samples except for iron in sodium bicarbonate, which had no reaction. The brass and iron in vinegar were completely corroded above the water line and displayed different chemical reactions than those fully submerged. The results also showed that the partial samples rusted faster, however the parts above the water line rusted more slowly.</p> <p>Conclusions/Discussion The hypothesis stated that metals, when fully submerged in liquid, will have more corrosion than those partially submerged. While the hypothesis proved to be true, the metal strips that were partially submerged did corrode faster and their corrosion surface area averaged 65.6%, except for the iron submerged in sodium bicarbonate. While the hypothesis was supported, the partially submerged metals proved to have interesting and in some cases magical results.</p>	
Summary Statement Analyzed the corrosive behavior of four types of metals fully and partially submerged in three types of liquid solutions and compared the results.	
Help Received Mother proof read and bound report, re-typed the log, made the graphs, and took the pictures.	