



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Zachary R. Barnard	Project Number J1202
Project Title Corrosion of Copper: Green with Envy	
Objectives/Goals The objective of my project was to see if salt water produced more physical change in copper than vinegar, baking soda, salt water, or tomato juice.	
Abstract Methods/Materials I filled 26 jars with 360ml of 5 different solutions: vinegar, bleach, tomato juice, 6gm baking soda in distilled water mix, and 18gm salt in distilled water mix. Distilled water was used as a control. The pH level of each acidic & basic solution was recorded and a copper strip placed in each jar. Daily observations of each copper jar were recorded. At the end of a 10-day period the copper strips were removed, solution pH levels checked, and physical changes noted. I decided to rerun the test with more copper surface exposed to air versus being submerged. I filled 16 jars with 120ml of 3 different solutions: vinegar, bleach, and baking soda for a 5-day trial. Distilled water was used as a control.	
Results The copper and salt water formed the least amount of patina (copper carbonate) with no corrosion. Bleach produced the most physical change in the copper. It formed a creamy-like patina and corroded the plates. Vinegar formed a distinct powder-like patina that stuck to the plate, was hard to remove, but did not corrode.	
Conclusions/Discussion The salt water did not form any patina, and did not physically change the copper when compared to vinegar and bleach. The copper plates in salt water physically remained the same for the duration of the experiment. I had based my hypothesis on the Statue of Liberty's formation of patina but realized that I didn't factor 100 years of weathering into my experiment.	
Summary Statement My project showed whether vinegar, tomato juice, baking soda, bleach, or salt water would produce the most physical change in copper plates.	
Help Received Mom helped with report and organization of board. Dad helped with displays and photos.	