



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Andrew T. Ostrom	Project Number S0617
Project Title Corrosion II: Attack of the Anions	
Abstract Objectives/Goals The purpose of this project was to determine the effect of anions on the corrosion of steel nails and galvanized nails. I hypothesized that nails in the sodium chloride solutions will have the most corrosion because it is similar to seawater. I also hypothesized that the steel nails will corrode more than the galvanized nails due to the protective zinc coating. Methods/Materials One molar solutions of twelve sodium salts were prepared. The pH of each salt solution was measured and split into two glass jars. Two steel nails were pre-weighed and placed in each of the twelve solutions. This was repeated using two galvanized nails. The jars were capped and periodic observations of each jar were made to determine the extent of corrosion. After one month, each pair of nails were dried and weighed to determine any weight change. Results All of the nails tested showed a weight change. Some of the nails had a weight loss and some had a weight gain. The steel nails had a greater percent weight change than the galvanized nails, which confirmed my hypothesis. The solution of sodium bicarbonate had the greatest percent weight change for both the steel and galvanized nails, which did not confirm my hypothesis. Many of the solutions had solids at the bottom of the jars. Some of the nails had corrosion on them, but the solutions were clear. Conclusions/Discussion The nails that showed a weight loss was from rust forming and falling off the nails. The nails that showed a weight gain was from the oxidation of the iron in the nail. Some solutions had a solid in the bottom of the jar, but the nails had a weight gain. This meant that some of the rust fell off, but more of the iron was oxidized on the nail. Zinc cations can combine with some of the anions to form solids. This depends on their solubility and the pH of the solution. This would explain why some galvanized nails showed a weight gain and some showed a weight loss.	
Summary Statement My project determines the effect of anions on the corrosion of steel and galvanized nails.	
Help Received My Mom helped me assemble project board. My Dad supervised the experiments and filled out this form.	