



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Danielle M. Behrens	Project Number J0504
Project Title Which Road Deicer Corrodes Steel the Most?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I wanted to determine the least corrosive of commonly available road deicers. I hypothesized that sodium chloride would be more corrosive than other higher cost deicers.</p> <p>Methods/Materials I designed and conducted a 250 sample corrosion experiment on steel wool. Nine series of seven different deicers were run in 13 batches of open top sample cups each containing 90 ml of liquid and one piece of steel averaging two grams. Sample cups and steel wool were weighed with two milligram precision. Controls included a distilled water series and two blanks (individual samples without steel wool) for most series. The batches were left for five days in a temperature monitored environment, and were processed on the sixth day. The steel wool was rinsed according to procedure and the rinse water, along with the used deicer solution, was filtered in a vacuum flask. The sample cup, filter, and steel were all dried and measured with two milligram precision.</p> <p>Results I attempted to independently measure corrosion by the weight loss of the steel wool and by the weight gain of the cups and filters. However, some batches of the steel wool corroded in the oven while drying so I could not rely on it for a corrosion measurement except where there was consistent weight loss within the batch. The average steel wool weight loss (for the series that consistently lost weight) ranged from 20 to 100 mg. When analyzing the blanks I realized that the cups were gaining weight without corrosion (probably because some of the deicer solution dried on the side of the cups adding additional weight), hence I could only rely on the filter weights to measure corrosion. During my experiment some of my cups leaked, causing the corrosion to be much higher so I dealt with these samples by putting them into a different category. Certain series are being redone to get clean results without these errors prior to the California State Science Fair.</p> <p>Conclusions/Discussion Aside from the cups that leaked, the low cost deicers (potassium chloride and sodium chloride) caused the most corrosion while the high cost deicer (potassium acetate) caused the least corrosion. This was consistent with my hypothesis. The leaked cups caused the most corrosion because of the higher oxygen exposure.</p>	
Summary Statement A quantitative 250 sample corrosion experiment was conducted to discover which deicers corrode steel the most and least of the seven tested.	
Help Received Discussions with parents, lab & computer assistance from parents.	