



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

<b>Name(s)</b> <b>Dana L. Adcock</b>	<b>Project Number</b> <b>J0601</b>
<b>Project Title</b> <b>Sugar, Salt, Ice, and Everything Nice</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> (abbreviated version) My project, Sugar, Salt, Ice, and Everything Nice, is a second year study of freezing point depression. The purpose of this project was to see if I could use the freezing point depression formula to accurately predict the change in freezing point. I also wanted to see if different solutes (sucrose and sodium chloride) in different quantities (1, 2, 3, and 4 grams) differed in temperature change when added to water. My hypothesis was, "If I use the highest quantity (4 grams) of salt, then it will take the longest to freeze and reach the lowest temperature. If I use the least amount (1 gram) of sugar, it will freeze the fastest."</p> <p><b>Methods/Materials</b> Using the freezing point depression formula, I calculated the change in freezing point for all of the different solutions. To get measured data, I made a solution with each amount of each solute (I also had a control group) and 10 milliliters of water in a test tube, and completely submerged it in a beaker that had a mixture of ice (filled to the 550 milliliter mark) and 10 grams of sodium chloride. I measured and recorded the temperature of the solution every minute for 35 minutes. I agitated the solution throughout the experiment.</p> <p><b>Results</b> My hypothesis was correct. The lowest average temperature (-6.48 degrees Celsius) occurred with 4 grams of sodium chloride. The solution with 1 gram of sucrose was completely frozen by the end of each trial. The sodium chloride did not freeze in any of the trials. This makes sense because the predicted change in freezing point for the sodium chloride was significantly larger than with the sucrose. For example, the predicted change in freezing point for 4 grams of sucrose was approximately -2.17 while the predicted change in freezing point for 4 grams of sodium chloride was approximately -25.44.</p> <p><b>Conclusions/Discussion</b> In conclusion, sucrose and sodium chloride can both be used as the solute in freezing point depression, however sodium chloride is more effective than sucrose (especially in larger quantities). My project could be improved with regards to having something more stable than the ice and salt mixture to surround the solution and eliminating the outlier that brought up my average for the 1 gram of sodium chloride solutions. Also, some of the crystal lattices in the ice surrounding the solution could have been tighter or looser than others. This project was a valuable learning experience for me.</p>	
<b>Summary Statement</b> In my science fair project, I tested freezing point depression.	
<b>Help Received</b> Mrs. Englund (science teacher) supplied equipment and a few references	