



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

|   |                                       |
|---|---------------------------------------|
| <b>Name(s)</b><br><b>Blake E. Hermann</b>   | <b>Project Number</b><br><b>S0612</b> |
| <b>Project Title</b><br><b>The Effect of the Molality of Salts on Freezing Points of Water</b>  |                                       |
| <b>Abstract</b><br><b>Objectives/Goals</b><br>I try to find out how the affect of changing molality of salts, effects the freezing point of water. This is relevant in that, today America spends millions on deicing roadways, and in my experiment i try to find an easier, cheaper way to get the same result.<br><b>Methods/Materials</b><br>Materials: Plastic Test tubes and rack, Beakers (50 mL), A Scale (plus or minus 0.01 g), Lab Quest and Thermometer attachment (plus or minus 0.1 degree Celsius), Standard fresh water ice, A cooler, Salt (NaCl food grade), Salt NaCl lab grade, Salt MgCl <sub>2</sub> lab grade , Stir stick<br>For my Procedure I took the salts and measured out amounts out that followed as 0.2 molality change to 10g of water that I previously measured out. I did this three times, for both salts, varying molality from 0.5 to 1.9 mol/kg. For each I observed the solution until frozen and then I recorded the results.<br><b>Results</b><br>My end results showed me that, in the end the Sodium Chloride was out shown by the Magnesium Chloride, as the MgCl was more effective in all of the tests at lowering the freezing points of the solution.<br><b>Conclusions/Discussion</b><br>After reviewing my results I can determine that they yielded the same result as other tests with freezing points and salts. As the molality rose the freezing point of the solution traveled in a downward trend. Therefore, these results fall inline with what is already known and show no drastic differences or abnormalities than what was previously known in this specific area of chemistry. In general the Magnesium chloride out preformed the Sodium chloride but economically the sodium chloride proves still the more worth it. As all three trial graphs show, as the molality of the solutions increase there is a downwards trend (lower freezing point) for the solution. This is likely due to the higher amount of ions present in the water preventing the water molecules from freezing. There is also an obvious trend between Magnesium Chloride and Sodium Chloride, Magnesium Chloride clearly has lower freezing points at all molalities on all trials. |                                       |
| <b>Summary Statement</b><br>In my project I vary amounts of salts and test to see their effect on the freezing point of water.  |                                       |
| <b>Help Received</b><br>Dr. Sidhu, teacher, provided the space for me to do the project, other than that i had no help.   |                                       |