



CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

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Project Title Boiling Hot	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if salt, sugar, pepper and baking soda have an effect on the boiling point temperature of water.</p> <p>Methods/Materials The experiment was performed at 1000 ft. above sea level. The boiling point of tap water was 111 degrees F. due to high altitude and less atmospheric pressure. Boiling tap water served as the control. A digital thermopen 5 thermometer was used to measure temperature. Salt, sugar, baking soda and pepper were added to separate pots of boiling water in teaspoon increments (up to 5 tsp.). After each teaspoon addition, the maximum boiling temp. was recorded. This process was repeated 3 times to achieve more accurate results. The boiling point temperatures were compared and graphed.</p> <p>Results After each teaspoon of substance was added the water boiled vigorously for a second and then stopped for varying lengths of time. Salt raised boiling point temp. steadily to a high temp of 218 degrees F. after 5 tsp. were added. Sugar similarly raised the boiling point temperature but not to as great a degree. Baking soda had little effect and pepper the least effect on boiling point temperature.</p> <p>Conclusions/Discussion Salt raised boiling point temperature the most because when salt is dissolved in water it forms strong ion-dipole bonds which are stronger than the hydrogen bonds in plain tap water. It took more energy to break these bonds and release the water molecules from the saltwater solution. Sugar had a similar effect on boiling point temperature. Sugar did not raise boiling point temp. as much as salt because sugar molecules are 6 times larger than salt molecules and therefore there are many more salt molecules in 1 tsp than sugar molecules. This results in more salt water bonds than sugar water bonds. Baking soda raises boiling temperature only slightly because only a small amt. dissolved in the water and pepper had the least effect because it did not dissolve in water. These results are important for cooking and kitchen safety. Food will cook faster in salt and sugar water because it will boil at a higher temperature. Care must be taken when first adding solutes to water because of the vigorous boiling that immediately happens.</p>	
Summary Statement The effect of salt, sugar, baking soda and pepper on the boiling point temperature of water.	
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