



CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s) Cookie F. Dutch	Project Number J0609
Project Title Do Solutes Affect the Heating Process of Water?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals About 17% of the energy used daily in the US is used for heating water. If heating water became faster and more efficient, people wouldn't waste time and money trying to heat things. If you were cooking a meal and knew that adding a certain solute would change the time it has to heat, you'd save energy. Speeding up the heating process of water would also make restaurants more efficient. The kitchen would be able to get orders out faster and using less energy. An acceleration in the heating of water would greatly benefit everyone who heats anything on stoves, microwaves, etc.</p> <p>Methods/Materials 236.5mL of each solute; Medium pot; 3 L distilled water; Thermometer(celsius); Timer.</p> <p>Pour 473mL of water and 236.5mL of salt into designated pot, whisking until salt dissolves. Place pot on the burner. Let the solution heat for 3 minutes, recording temperature every 30 seconds. At 3 minutes, record the final temperature of solution. Wash and dry pot. Let pot cool for 5 minutes. Repeat steps 1-4 for each of the remaining solutes. Pour 473mL of water into pot and place on the burner on high heat for 3 minutes, recording the temperature every 30 seconds. At 3 minutes, record final temperature of the water.</p> <p>Results Water had the fastest rate of temperature change at 10.6C per 30 seconds and sugar+water had the slowest rate of temperature change at 4.3C per 30 seconds. The solution with the second fastest rate of temperature change was salt+water, at 8.5C per 30 seconds and the solution with the second slowest rate of temperature change, at 6.3C per 30 seconds, was flour+water. The two solutions that almost had the same rate of change were baking powder+water and baking soda+water, at 7C per 30 seconds and 7.5C per 30 seconds. These two solutions' rates of temperatures were similar because they are very similar substances with similar chemical compositions. Water had the fastest rate of change because it was not mixed with any solutes.</p> <p>Conclusions/Discussion My hypothesis was incorrect. I thought that flour would make the most difference in the heating process of water, but I was wrong. Sugar slowed the heating process of water the most because sugar has the highest boiling point or heat capacity of all the solutes. Even though it may be thought that salt would have sped up the heating process, this is not accurate. My conclusion is that all of the solutes I tested slowed down the heating process of water.</p>	
Summary Statement Heating solutions and observing their temperature changes.	
Help Received	