



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Aleksa E. Jarasunas	Project Number J0608
Project Title The Mpemba Effect: Does It Exist? Can I Change My Initial Experiment to Cause the Effect to Occur More Frequently?	
Abstract Objectives/Goals The Mpemba effect is the observation that under certain conditions, warmer water can freeze faster than colder water. My objective was to determine if the Mpemba effect exists. Secondly, I wanted to change one constant in my initial experiment to investigate what causes the Mpemba effect to occur. Methods/Materials I filled three 50 ml beakers with 15 ml of water, inserted the probe of a thermometer into each beaker, and either heated or cooled the water in each beaker to 60°C, 40°C, and 20°C. I placed the beakers on insulating fabric in my freezer and recorded the temperature of the water in each beaker every 2 minutes, until the water in at least 2 of the beakers reached -10°C. For my second experiment, I kept the same setup and procedure but used 150 ml beakers. The larger beakers increased the effect of evaporative cooling by increasing the surface area of the water sample but decreased the effect of convection currents since the water columns were not as tall. Results The Mpemba effect occurred in 6 out of 10 trials in my first experiment but in only 2 out of 10 trials in my second experiment. Conclusions/Discussion My hypothesis that the Mpemba effect exists was correct. I also concluded that strong convection currents may be necessary for the Mpemba effect to occur. My experiments controlled for loss of mass due to evaporation by covering the beakers with plastic wrap. Since dissolved gases are thought to contribute to the Mpemba effect, I used previously boiled tap water that had cooled to room temperature in these experiments. Additionally, to prove my experimental set-up before running my experiments, I ran 1 trial using room-temperature previously-boiled tap water and saw that the water samples cooled uniformly down to -10°C.	
Summary Statement I demonstrated that the Mpemba effect exists and that strong convection currents may be necessary for the Mpemba effect to occur.	
Help Received	