



CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY

<b>Name(s)</b> Nicole Madrazo	<b>Project Number</b> <b>J0609</b>
<b>Project Title</b> <b>Just a Needle and a Lot of Surface Tension</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this experiment was to determine if surface tension of water is affected by temperature.</p> <p><b>Methods/Materials</b> For this experiment 10 containers were used that had different temperatures of water in them. I poured the water into another shallow bowl under a balance made from two tin cans and a wood rod with a needle as the fulcrum. To balance the beam, I used a small amount of modeling clay. A paper basket tied with eight inches of string was attached to one end of the wooden rod. I put pieces of small paperclips in this basket to allow me to measure the surface tension and a triple-beam balance scale to measure the mass of them. On the other side, four inches of nylon string held a needle which rested on the surface of the water. The different temperatures of water were measured with a digital thermometer in degrees Celsius. I heated or cooled ½ cup of water. After measuring the temperature, I put the water into the shallow bowl and rested the needle gently on top of it. Using tweezers, I gently put the small pieces of paper clips into the paper basket until the needle lifted off the surface of the water. Then I measured the mass of the pieces of paperclip. Then using the formula <math>F=2sd</math> (<math>s</math>=surface tension, <math>d</math>=length of the needle resting on the water, and <math>F=</math> (mass of paperclips)<math>\times(9.83)\times(10^{-3})</math> to make it N/g). I repeated did this 10 times for each different temperature.</p> <p><b>Results</b> 10 trials were taken for five different temperatures of the water. Each trial was measured in grams. I recorded the results in a table and calculated the surface tension with the formula <math>F=2sd</math> where <math>s</math> is the surface tension, <math>d</math> is the length of the needle resting on the water and <math>F</math> is the mass of the paper clips <math>\times</math> the gravitational pull of the earth <math>\times 10^{-3}</math>. Surface tension is expressed in Newtons/m. The results demonstrate that as the temperature of the water increases the surface tension decreases and creates a somewhat linear graph.</p> <p><b>Conclusions/Discussion</b> My hypothesis was proven correct when I discovered that the higher the temperature gets, the lower the surface tension is. There are various examples of surface tension in real life. Temperature plays a big roll in the behavior of a liquid. When the liquid is stretched by something or is poured on a surface, it tends to form the droplets due to the surface tension.</p>	
<b>Summary Statement</b> My project tests the effect of temperature on the surfaace tension of water.	
<b>Help Received</b> Mother took me to the store to buy materials and organization; Father helpeld build balance; Aunt lend me her thermometer; Teacher gave me ideas on project	