



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alexander N. Iatrou</b>	<b>Project Number</b> <b>S1818</b>
<b>Project Title</b> <b>Paraffinsulators: Ice Cube Insulators Made of Candle Wax</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project was to determine if a paraffin wax coating on an ice cube acts as a thermal insulator and delays the melting time of the ice cube. It was hypothesized that as the thickness of the paraffin wax coating on an ice cube increases there will be an linear increase in the melting time of the ice cube.</p> <p><b>Methods/Materials</b> One control set of 16 ice cubes with no paraffin wax coating and five test sets of 16 ice cubes having increasingly thicker paraffin wax coatings were prepared. Set #1 had one coat of paraffin wax, set #2 had two coats, set #3 had three coats, set #4 had four coats, and set #5 had five coats. The ice cubes in each test set were set out at room temperature and the time to melt was recorded for each ice cube. After the ice cubes had melted, the wax wall thickness of each ice cube was measured with calipers, and the thickness of the wax was recorded.</p> <p><b>Results</b> With the exception of one test set, as the thickness of the wax coating on an ice cube increased there was a linear increase in the melting time of the ice.</p> <p><b>Conclusions/Discussion</b> The results of the experiment suggest that paraffin wax acts as a thermal insulator and slows heat transfer to an ice cube. As paraffin wax does not have a dense hydrocarbon structure, heat energy from outside the wax coating does not transfer well to the lattice structure of the ice cube. Because less heat enters the ice structure, it takes longer for the ice cube to melt. Increasing the thickness of a paraffin wax coating on ice cube decreases the transfer of heat to the ice cube and increases the time to melt of the ice cube. With the exception of one test set, as the thickness of the wax coating on an ice cube increases there is generally a linear increase in the melting time of the ice cube. Test set 4 was an exception to my conclusion. It is unknown why a thicker coating of wax did not build up and why the average time to melt per ounce was less than in test set 1. The other test sets were not frozen as long as test set 4. Perhaps a molecular change in the water or wax occurred when left in the freezer longer than the other test sets.</p>	
<b>Summary Statement</b> This project examines if paraffin wax acts as a thermal insulator and delays the melting process of an ice cube.	
<b>Help Received</b> Parents purchased experimental equipment and helped with the dipping of ice cubes in melted wax.	