



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Alan P. Chen	Project Number J0605
Project Title Will Ice Cubes Melt Faster in Fresh Water or Salt Water?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals It is well-known that salts help melt ice/snow faster. I wonder if ice will melt faster in fresh water or salt water.</p> <p>Methods/Materials two bowls; ice cubes; table salt; chopsticks; iPhone; quarter coins</p> <p>Results I did three sets of experiments. In the first experiments, I filled two bowls with 2 cups of water each, and added 0.5 cup of table salt to one of them, stirred it with a pair of chopsticks to dissolve the salt. I then got two ice cubes (1" long) and dropped them into the bowls (no stirring). I used an iPhone to time how long it took to melt the ice cubes on top of the water. Results from 4 repeat measurements showed that on average ice cubes actually melted almost three times faster in fresh water (about 11 min) than in salt water (about 28 min). This seemingly unusual result was actually due to water circulation around the ice cubes. In fresh water, the water around the ice cube was heavier than the water below. So the circulation between them brought in warm water that made the ice cube melt faster. In salt water, the water around the ice cube was lighter than the water below, so there was no circulation and the ice cube remained surrounded by cold water and melted slower. If this explanation was correct, I could stir the water and make the water circulate, then the ice cubes should melt faster in salt water than in fresh water. I repeated the tests three times, and indeed ice cubes melted slightly faster in salt water (average 3.4 min) than in fresh water (3.8 min). In light of these two experiments, if I kept the ice cubes at the bottom of the bowl rather than float on the water surface, then in fresh water there would be no circulation between the water around the ice cube and the water above, but in salt water, water circulation would take place. This means that ice cubes would melt faster in salt water than in fresh water. So, before putting the water into the freezer to form ice cubes, I added a quarter into the ice cube tray. When put into water, the ice cubes now sank to the bottom of the bowl. Results from three repeat tests showed that indeed ice cubes melted two times faster in salt water (7 min) than in fresh water (14 min).</p> <p>Conclusions/Discussion 1) How fast ice cubes melt depends on the circulation of the water. 2) In general, ice cubes melt faster when water circulation takes place. 3) Under the same circulation condition, ice cubes melt faster in salt water than in fresh water.</p>	
Summary Statement Water circulation is important in determining how fast an ice cube melts.	
Help Received Mom helped make the ice cubes.	