



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Elisha K. Hoffman	Project Number J0509
Project Title Effects of Pressure and Conductivity on Regelation	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if the amount of weight on a wire, and the surface area and conductivity of the wire affects the rate at which it pressure-melts (regelation) through a block of ice. I predicted that the rate of melting would increase with more weight on the wire, and by using smaller gauge and higher conductivity wire.</p> <p>Methods/Materials I hung 1-3 plastic jugs of bottled water (weight) using 12 and 18-gauge wire (thickness=surface area) made of copper and steel (copper>conductivity>steel). Each wire weight/gauge/conductivity class was replicated five times, with controls. To control for pressure (both weight and surface area), I used each wire type and no weight and to control for conductivity, I used wire that was not conductive (nylon string). All wires were hung over standard-sized blocks (11x5x5 cm). I measured how far the wire melted into the ice after one hour.</p> <p>Results As weight increased, the distance the wire melted into the ice increased for all types of wire. Thinner wire (for both copper and steel) melted further into the ice than thick wire. I did not find a statistical difference between copper and steel wire at most thickness/weight classes. There was no pressure-melting by controls.</p> <p>Conclusions/Discussion In contrast to most other liquids, water shows some very unique characteristics during phase changes from solid to liquid. Regelation is the phenomenon in which water re-freezes to ice after it has been melted by pressure at a temperature below the freezing point of water. Pressure (weight and surface area) clearly determines its rate, but conductivity did not. Regelation might explain why ice skating is so smooth if the ice skater is actually skating on a thin layer of water caused by the pressure of the blade on the ice.</p>	
Summary Statement The rate of regelation of ice is affected by weight and surface area, but not conductivity, as demonstrated by looping a wire over a block of ice and hanging various amount of weight off wire of different gauges and conductivity.	
Help Received My dad helped me build wooden stands to hold up the ice blocks and water jugs. He also helped me lift the water jugs during experiments (they were heavy!). My mom helped me cut out the presentation board.	