



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Noah B. Close	Project Number S0305
Project Title Magnetic Flow	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Demonstrate that a magnet placed in the flow of different liquids will reduce the flow rate of liquids with ion concentrations.</p> <p>Methods/Materials Materials: ceramic Ferrite ring magnet with a max pull force of 65 pounds, two plastic crates, measuring device (cup that was able to measure up to 500 ml of liquid), stopwatch, calculator, metering device (plastic cup with a 5/64 inch hole diameter in the bottom), tap water, salt water (5:1, 10:1 and 20:1 water to salt concentration), apple cider vinegar.</p> <p>Method: The project started with stacking two crates one on top of each other, putting the metering device in the top crate and putting the measuring device inside the lower crate. Each liquid was poured through the metering device and flowed into the measuring device, with the magnet and without the magnet present. The time it took for the liquid to fill the measuring device to 200 milliliters was recorded. The 200ml volume of liquid was divided by the time to determine the flow rate for comparison. This process was repeated five times for an average flow rate to be able to minimize human error and compare each test to one another. The hole in the bottom of the cup stayed the same to eliminate variables. The recorded data was then entered into tables and graphs for analysis.</p> <p>Results The tap water test had no significant change in flow rate with and without a magnet that could be accurately recorded without human error. The 5:1 salt water had a 56% reduction in flow rate, 10:1 salt water had a five percent reduction in flow rate, and 20:1 salt water had no change in flow rate. The vinegar had an eight percent reduction in flow rate.</p> <p>Conclusions/Discussion Considering that human error is present in this project, the results supported the hypothesis. The very low amounts of ions in water made it difficult for the magnet to slow down the flow. The vinegar had a flow rate of eight percent from magnet to no magnet. With a ph of about 3, vinegar has plenty of H⁺ ions which, as the data suggest, contribute to the slower flow rate. The ions in the NaCl (table salt) were slowed down by the magnet. The slowest liquid was the 5:1 salt water with 56% reduction in flow rate when a magnet was present versus no magnet.</p>	
Summary Statement Magnetic fields and their effects on the flow rate of different liquids.	
Help Received Mother helped with artistic presentation of content. Brothers and sister helped take photos of experiment. Dad helped with mathematics and understanding how to use Excel computer software.	