CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
S1820

Project Title
An Investigation of the Relative Effect of Salinity and Temperature on the Viscosity of Water

Abstract

Objectives/Goals
Which of the following has a greater effect on the viscosity of water: Salinity, or Temperature?

Methods/Materials
Two (10 cm x 20 cm) glass plates were cut from one section of 2# x 2# glass. 8 lb. tensile strength fishing line was fixed to the upper glass plate and a second section of line was loosely attached to the first, thread through a pulley to decrease friction, and a 25g weight was then attached to it. Both plates were given corresponding dots to provide a reliable indication of the displacement of the plate. 10 cm were measured from the reference point and marked for a stopping point. A refractometer was used to verify the salinity of the water solution. Temperature was maintained at 23°C. A pipette was used to deposit 15 ml water on the stationary plate. The sliding plate was placed on top of the stationary plate and restricted from moving. The top plate was then allowed to move freely as gravity pulled the weight down and the fishing line pulled the top plate horizontally across the bottom plate. The time it took to travel 10 cm was measured and recorded. Iodized salt was used to increase the salinity by increments of 10 parts per thousand (ppt) from 0 ppt to 100 ppt. Temperature was then varied while keeping salinity constant at 0 ppt. The plates were submerged in distilled water and allowed to equalize, brought up into testing position, and measured with an infrared thermometer focusing on the dot on the top. When the desired temperature was reached, the test was repeated. Tests were completed from 45°C to 25°C in 5° increments.

Results
At first glance, the salinity had a greater effect on the viscosity of the water, but after closer examination, it shows that, although and increase in salinity did increase the viscosity of water, the temperature had a greater influence.

Conclusions/Discussion
After analyzing the data, it was clear that the temperature did have a greater affect on the viscosity of water than the salinity and therefore supported the hypothesis. However, there was no direct way to measure the reduced cohesive forces, its effect on the time it took for a plate to pass a set distance allowed for the calculation of the viscosity.

Summary Statement
Which has a greater effect on the viscosity of water: Salinity, or Temperature?

Help Received
Father helped acquire materials.