CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Samantha M. Guhan

Project Number
J1511

Project Title
Float Me If You Can

Abstract

Objectives/Goals
A picture of a woman floating in the Dead Sea and reading a newspaper, inspired me to investigate whether salt water allows heavier objects to float than tap water and whether liquid density plays any role. My hypothesis was that salt water can float heavier objects than tap water because of its higher density. In order to prove my hypothesis, I performed several sets of experiments.

Methods/Materials
In the first experiment, a piece of carrot was dropped in a bowl filled with tap water. After the carrot sank, salt was dissolved in measured amounts to see if the increased salt content helped the carrot float.
The next experiment called the flotation experiment, addressed the role of liquid density in floating objects. Liquids with a wide range of densities (0.86g/l-1.28g/l) were chosen (with tap water as control) and tested repeatedly for the maximum mass they could float. The object, a plastic container into which glass pebbles and chickpeas were added until it sank, was chosen to ensure that the observed differences in the maximum mass floated could be attributed solely to the effect of liquid density. The averaged value of the maximum mass floated by each liquid was then compared to the value predicted by the Archimedes Principle.

Results
In the carrot experiment, it was observed that the carrot floated at a salt concentration greater than 30g/l. The data from the flotation experiment clearly demonstrated that the higher the density of the liquid, the greater the mass of the object it could float. The observed maximum masses floated were in very good agreement with their corresponding values predicted by the Archimedes Principle.

Conclusions/Discussion
The results from my experiments prove that my hypothesis that salt water floats objects better than tap water due to its higher density is true, and that Archimedes Principle clearly applies to my experiment.
It turns out that the Dead Sea has a salt concentration that is ten times more than that found in other oceans (330 g/l); the resulting higher liquid density makes it easy for objects to float in it.
In future, it would be interesting to study the properties of the object which affect its ability to float.

Summary Statement
This project highlights the role of liquid density in floating objects through suitably designed experiments whose data agree with theoretical predictions obtained using the Archimedes Principle.

Help Received
Mother served as general advisor for project and helped me understand the Archimedes Principle.