CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
Rachel N. Clift

Project Number
J1005

Project Title
The Effectiveness of Neodymium Magnets at Cleaning Oil Spills

Abstract

Objectives/Goals
My goal was to measure the effectiveness of neodymium magnets at cleaning oil spills. I tested the process using different densities of oils, chosen to match actual oils that are commonly transported. My hypothesis was that more of the lighter oils would be collected. I also ran tests in various temperatures of water, chosen to match actual ocean temperatures in different parts of the world. My hypotheses was that more oil would be picked up in warmer waters.

Methods/Materials
Materials: mineral oil, gasoline, crude oil, ferrofluid with mineral oil as the carrier fluid, neodymium magnet, tap water, graduated cylinder, petri dishes, pipettes, thermometer. Methods: put water in dish, add 2.5 mL oil, add 3 drops ferrofluid to oil, move magnet through oil, transfer remaining liquid to cylinder, measure remaining oil.

Results
The magnet was more effective with lighter densities of oil (55% for gasoline, 31% for mineral oil, and 16% for crude oil). However, water temperature did not seem to influence the effectiveness very much. There was more variation between the trials than there was between the different temperatures.

Conclusions/Discussion
My hypothesis that the process would work better for lighter oils was correct. One possible explanation is that the magnet had a harder time picking up a heavier substance. Another possibility is that the ferrofluid had an easier time dispersing through the lighter oils. I was surprised, however, that temperature didn't seem to affect how well the oil was picked up by the magnet. This is good news for the environment, because it means that this method should work in any of the world's oceans.

Summary Statement
My project is about a recently-discovered method to clean oil spills, by first magnetizing the spilled oil, and then collecting it with a powerful neodymium magnet.

Help Received
My dad was my lab assistant, and also helped me make my board neat.