CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J0903

Project Title
Cleaning Up Oil Spills

Abstract

Objectives/Goals
The purpose of this experiment is to find out which sorbent is the most effective in cleaning ocean oil spills. I became interested in doing this project when I read about a recent oil spill its devastating impact on the environment. I wanted to know about the methods being used and how effective they were. Sorbents are materials that soak up liquids through the mechanism of absorption, adsorption, or both. To be useful in oil spill cleanup, sorbents need to be both oleophilic and hydrophobic. Sorbents can be divided into three basic classes, natural organic materials, natural inorganic materials, and synthetic substances. The materials that I tested, polyester, gauze, polypropylene, and cheese cloth, all belong to the last category. I hypothesize that the polypropylene will be the most efficient since both polypropylene and oil are composed of hydrocarbon molecules and are attracted to each other.

Methods/Materials
I tested the effectiveness of polyester, polypropylene, gauze, and cheese cloth in absorbing oil from ocean water in 3 steps. First, I tested the amount oil a 2 in. by 2 in. piece of each material absorbed and converted it into a percentage. Next, I repeated this with sea water alone. Finally, I tested the effectiveness in absorbing oil in a mock oil spill by counting the number of pieces needed to clean up a mock oil spill with 5 mL of vegetable oil in 500 mL of sea water.

Results
The results I got were that the gauze absorbed the most oil and the most water in the individual absorbency tests. However, in the actual mock oil spill, the polypropylene was the most efficient, needing only 4 pieces to clean up the spill compared to 10 for the gauze.

Conclusions/Discussion
The polypropylene is the most efficient in cleaning up the mock oil spill even though it was third in individual absorbency of oil. However, it was last in water absorption. Therefore, as the other materials absorbed both water and oil when cleaning up the mock oil spill, the polypropylene absorbed very little water and mostly oil, making it the most effective. Polypropylene is made up of nonpolar molecules like oil. In contrast, gauze is made up of cellulose, which in turn is made up of polar molecules like water. The polypropylene#s nonpolar molecules repel the water#s polar molecules. This gives the polypropylene its oleophilic and hydrophobic properties, which are needed for cleaning up ocean oil spills.

Summary Statement
My project tested the absorbency of various synthetic sorbents in water and in oil and then determined which sorbent was the most efficient in cleaning up a mock oil spill.

Help Received
Mother helped gather materials