CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
S0812

Project Title
The Ability of Sand and Soil to Adsorb Pollution from Water as Represented by Chlorine and Acidity

Abstract

Objectives/Goals
Water for drinking and irrigation is important for any community to flourish, making it necessary to protect underground water aquifers from surface pollutants such as chlorine. The objective of this experiment was to study how chlorine from sodium hypochlorite (NaOCl), as found in household bleach, percolates through different types of soil. Such understanding would help prevent drinking water contamination. It was hypothesized that soil with organic content will adsorb more chlorine out of the 50 ppm chlorine aqueous solution than sandy soil.

Methods/Materials
Sodium hypochlorite from household bleach and distilled water was used to create an aqueous solution with 50 ppm of chlorine. Soil consisting of sand and another containing organic matter were compared. For each experiment, a fresh 50 gram sample of soil was placed in a coffee filter, placed in a funnel, and the solution was allowed to percolate through it and into a graduated cylinder. Using microchlorine paper, the influent and effluent chlorine concentrations were recorded. This experiment was conducted five times for each type of soil.

Results
The influent aqueous solution had 50 ppm of chlorine. The effluent from the organic soil bed had a chlorine concentration range of 15-20 ppm, and from the sandy soil 30-35 ppm. Average deviation for both sets of data was 2.4 ppm.

Conclusions/Discussion
As hypothesized, it was found that organic soil adsorbed more chlorine from the aqueous solution than did sandy soil. This information can be used to understand how quickly surface chlorine from cleaning compounds and other sources can percolate through a type of soil and cause aquifer contamination, and plan ways to prevent this. Also, by using the ionic nature and percolation rate of chlorine, percolation and potential contamination of other surface pollutants can be predicted and prevented.

Summary Statement
By understanding chlorine ion percolation through soil, contamination of drinking water can be prevented.

Help Received
Dad provided materials necessary for this experiment.