CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

J1023

Project Title

Clean Water?

Abstract

Objectives/Goals

This project could help make drinking water cleaner all around the world. Rapid sand filters are used to purify water and work very well when removing turbidity and bacteria from stream water. The problem is that rapid sand filters don#t remove oil or gas from the water. Use of watersheds by humans including illegal pot grows has increased the risk of contaminates such as oil and gas entering streams. Our goal was to add a substance to the rapid sand filter that would successfully remove the oil from the water. We tested clay cat litter (clay), charcoal, shredded redwood bark, and organic cotton. We hypothesized that charcoal would do the best because it is a common substance used in filters, including fish tanks.

Methods/Materials

We set up our project by building a stand that held four, 3in. diameter PVC pipes. We then placed organic cotton fabric over one end and lightly hammered on a 3in tapered cap. Next we filled the PVC pipe with 4in of sterilized gravel on the bottom followed by 11in of sterilized sand. On top of the sand we added 6in of a tested substance to 3 of the tubes. One of the tubes had no added substance and was our control. The first substances tested included clay, shredded redwood bark, and charcoal. We ran clean water through each filter until water was clear. During this process we came across an issue, the clay wasn#t letting any water pass through. We then substituted organic cotton cloth for the clay as our third substance tested. Once the filters were clean, we put one tablespoon of oil into one cup of distilled water and ran the water through each filter five times, separating each test into it's own cup. After testing was complete we evaluated results by smelling and looking at the water in each cup, and looking at the water through a microscope.

Results

With a score of 0 meaning no trace of oil present, the results of our experiment found out that the rapid sand filter with no added substance scored a 25 and the one with cloth scored a 17 while the shredded redwood bark and activated carbon did the best, both scoring a 13. However, they too didn't get rid of all of all of the oil.

Conclusions/Discussion

None of our tests were successful at removing all the oil from the water. If we did this project again we would create a separate filter to try to remove oil from the water before it reaches the rapid sand filter. This way we could just focus on trying to remove oil from water.

Summary Statement

We added substances to rapid sand to filters to make it remove oil from water, however none of the water was fully purified.

Help Received

Derrin Mierau showed us his working rapid sand filter and explained how they work. Fred Meyer helped us put together our experiment and answerede questions we had.