CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
J1110

Project Title
How to Remove Crude Oil from Seawater Using Heat, Paraffin Wax, and Gravitational Differences

Abstract

Objectives/Goals
The objective of this project was to determine if crude oil can be separated from seawater using a paraffin wax plug, heat, and centrifugal force.

Methods/Materials
The first step was to make simulated seawater using distilled water and Kosher salt. The seawaters specific gravity was tested with a hydrometer. Next, I simulated crude oil by using a recipe from www.quora.com, which was a mixture of gasoline, Zippo lighter fluid, diesel fuel, motor oil, and paraffin wax. I needed two crude samples so I used 0w-30 motor oil for light density and 15w-40 motor oil for a heavier density crude. Then, I prepared 4 separate test tubes of oil/seawater mixes. To create a plug for separation I added paraffin wax chips to the thoroughly mixed crude/seawater mixes and heated in boiling water. The temperatures were tested with a infrared temperature gun. All four test tubes were placed in a centrifuge and spun at 6,000 RPM for 5 minutes. Finally, all samples were removed for inspection.

Results
As the main objective of my experiment was to place a solid wax plug between the seawater and crude oil, the results were a full wax like plug containing all of the crude oil sample and paraffin wax on top and cleaned seawater on bottom. This result does support my theory of density shifting however, it does not support my theory of wax plug separation. I believe that heat was a factor. If I was to do this project again I would vary several heat levels for each sample to check for differences. I would also vary the amount of paraffin wax to the mix.

Conclusions/Discussion
Although the results varied from my expected results, I think this is a viable means of removing crude oil without re-contaminating the seawater while extracting as the crude is solidified. If I was to add anything to the project it would be testing how to de-solidify the crude wax plug to see if I can get the crude to return to its original state.

Summary Statement
Using a centrifuge, i manipulated gravitational differences to create a paraffin wax plug that effectively separated crude oil from seawater.

Help Received
I designed, built, and conducted most of the project myself, however, i did receive help, safety tips and supervision from my father Scott Currier, while mixing the chemicals for the crude oil recipe, the heating process of the samples, operation of the centrifuge he made, and understanding density theory.