

work check
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Oil Spill Lab

Title:

What would be the most effective method between skimming and detergent dispersant to remove oil from water?

Hypothesis:

If I use the detergent dispersant and the skimming method, then the detergent dispersant method would clean less oil because all the oil would be harder to remove. The detergent dispersant breaks down the oil and I would predict that it would be more difficult to get a large percentage of it removed.

Introduction:

This deep water horizon oil spill is a tragic disaster that occurred in the Gulf of Mexico. It is America's biggest environmental disasters. It happened April 20, 2010. This started because an explosion started on the main oil rig that caused an explosion. The explosion was so bad and lasted so long that the structure of the oil rig was sagging. It used to be strong steel but the fire caused a lot of damage. The amount of oil spilled in the gulf was about 200,000 gallons a day and lasted for about 6 months. In result of this spill, there are 4 states that are threatened in the initial spill and it is moving westward. This has also affected the fisherman's income because the fish have been contaminated with oil so they don't have anything to sell.¹

Due to the oil spill, there has been many environmental effects.

The oil is effecting the ecosystems primary producer: the algae gets contaminated with the oil and eventually dies off leaving no food for the secondary consumer. The spill in the gulf is something that needs to be removed. There has been methods used to remove the oil like skimming and dropping dispersant's. The dispersant breaks down the oil and actually makes it smaller and that's harmful for the aquatic animals because with such tiny oil particles, it is easier for toxins to be absorbed. When the fish are contaminated with oil the birds go and eat them then they are poisoned so it is a big cycle that is killing off animals in the ecosystem. ²



Birds affected by the oil

Although the oil has effected the environment, it is also hurt the economy. The fishermen that make a living collecting seafood have been not able to sell anything. The fishing industry accounts for one in 17 jobs in the region. Due to the oil spill many small fishers are threatened with bankruptcy. This spill has also affected BP. The damage and oil spilled has cost a lot in money. BP stock has dropped nearly 20 percent, equivalent to of about 34 billion dollars. Fisherman have been entitled to reimbursement checks because of the lost of their business but it is a long process and not as nearly the amount of salary they make from working as a fisherman.³

Fisherman have lost business



This oil spill has cost many societal affects and the people who live around this spill are the one experiencing it. The people affected by the oil spill have been hit with medical problems. A few that have reported symptoms including throat irritation, cough, shortness of breath, eye irritation, nausea, chest pain and headaches, worked on the oil rig or were part of the effort to clean up the spill. The pollution to the air has affected the quality and may be the reason for some of the symptoms. An improvement to decrease these problems would be discontinuing the idea to release dispersant into the water.⁴



Volunteers cleaning up the oil

Although the oil spill is affecting one certain area at the moment, everyone should worry about it and come together to help. If the oil isn't removed from the water then it will continue to spread and move westward. This is a big ecological, societal and economic impacts that might be able to be improved if everyone helps. The methods used now to clean the water is dropping dispersant and skimming the oil from the top. We experimented with two different methods to clean up oil from water to see how hard it is to remove it and what would be the most effective method that you would advise to use. In this experiment we compared the skimming method an dispersant method. If we used the detergent dispersant and the skimming method, then the detergent dispersant method would clean less oil because all the oil would be hard to remove.

Materials (per trial):

Materials for Procedure #1:

- Detergent (50 mL)
- Oil (100 mL)
- Water (350 mL)
- Cylinders (2)
- Filter (1)
- Coffee Filter (1)
- Scale (1)
- Tray (1)
- Clock/Stopwatch (1)
- Napkin (1)

Method (Skimming)

1. Get materials
2. Put 350 ml of water in tray
3. Weigh 100 ml of oil
4. Put oil in tray
5. Let it sit for 5 minutes
6. Form foil into a bowl shape and skim the oil with aluminum foil
7. Weigh the remaining oil
8. Record data (Weight/Grams) and repeat 2 more times
9. Put filter in funnel and pour remaining oil/contents in filter

Materials for Procedure #2

- Water (350 mL)
- Oil (100mL)
- Cylinders (2)
- Coffee Filter (1)
- Filter (1)
- Aluminum Foil

- Scale (1)
- Clock/Stopwatch (1)
- Tray (1)
- Napkin (1)

Detergent

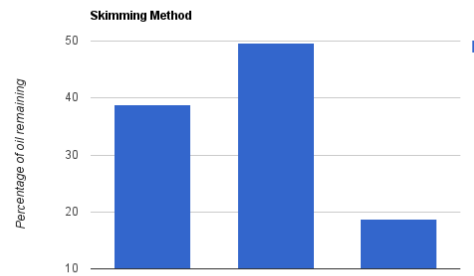
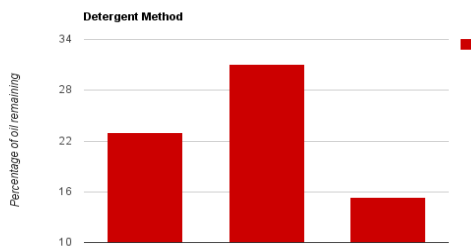
1. Get materials
2. Put 350 ml of water in tray
3. Put detergent in tray
4. Put 100 ml of oil in tray
5. Let it sit in for 5 minutes
6. Form foil into bowl shape and skim the oil and with aluminum foil
7. Weigh the remaining oil\ (Grams)
8. Record data (Weight/Mass) and repeat 2 more times
9. Put filter in funnel and pour remaining oil/contents in filter

Results:

The data gathered by my group shows that the oil remaining was different for each trial. The skimming technique shows better results than the detergent method because in the end there was more percentage of oil remaining. This method seemed to be the best way to remove oil from water.

Data Table/Graphs

| Test | Original Weight | End | Remaining % |
|------------------|------------------------|-------------|--------------------|
| Skimming | 1st: 61.8 | 24.0 | 38.83 |
| | 2nd: 61.8 | 30.7 | 49.67 |
| | 3rd: 61.8 | 11.6 | 18.77 |
| Detergent | 1st: 61.8 | 14.2 | 32.97 |
| | 2nd: 61.8 | 19.2 | 31.06 |
| | 3rd: 61.8 | 9.5 | 15.37 |



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that the skimming method was more

effective than using the detergent dispersant. The detergent dispersant broke down the oil and actually made it harder to remove all of the oil that was poured in the water. In my data, it proved that the dispersants were less effective because the percentage of oil remaining was near 20% while the skimming method took away at least 40% of the oil. It was easier to skim most of the oil with the aluminum foil when all of the oil was visible to see. Before performing this experiment, I hypothesized that the detergent dispersant wouldn't be able to clean all of the oil. Although the reason was because it broke down the oil, I assumed that it wouldn't be able to break down all the oil and would conclude in not being able to remove it. It is harder when it all broke down because you can't catch all the oil. In my data table, it shows that in the third trial was the least successful because the oil collected was under 20%. We barely collected any oil for that trial. It was very hard to collect any oil because the detergent broke it down in many parts.

In trial 1, we found that the detergent method cleaned 14.2% , when skimming cleaned 24 %. For each trial, it proved that the detergent dispersant method was not as effective as the skimming method alone. In trial 2, we found that the detergent method cleaned 19.2%, better than trial 1 but but skimming again cleaned more with 30.7 %. The detergent dispersant method was not as effective as the skimming

method because the detergent broke down the oil into tiny particles so it was harder to collect a large percentage of it.

Doing this experiment I wonder although skimming was effective, what would be another method to fix the spill in the gulf? Are there other materials that would improve the skimming method other than aluminum foil? Things that would limit the clean-up of the gulf oil spill would be the lack of money to spend. There was so much oil spilled meaning that there has to be a lot of money to clean it up. It also seems hazardous for people to successfully clean up the spill without being struck with health affects. There is many limitations for successfully cleaning the spill but that doesn't mean it can't be done. With a lot of help and money I believe that the most of the oil can be removed.

Errors that would affect my data were 1) not collecting all the oil we could have. We didn't have much time for each trial so we collected as much oil we could in the time we were provided. 2) I didn't know how to use to scale so I might have collected the wrong amount of mass. Sometimes I forgot to subtract the amount of the cup so that definitely affected my data. 3) spilling some of the oil we collected. We might have collected more oil than was recorded so that was a possible error.

End Notes:

1. "Gulf Oil Spill: 10 Horrifying Facts You Never Wanted To Know." *Care2 - Largest Online Community for Healthy and Green Living, Human Rights and Animal Welfare*. Web. 17 May 2011. <<http://www.care2.com/causes/environment/blog/10-most-horrifying-facts-about-the-gulf-oill-spill/>>.

2. "Gulf Oil Spill's Environmental Impact: How Long to Recover? - CSMonitor.com." *The Christian Science Monitor - CSMonitor.com*. Web. 17 May 2011. <<http://www.csmonitor.com/USA/2010/0510/Gulf-oil-spill-s-environmental-impact-How-long-to-recover>>.

3. Beam, Christopher. "How Will the BP Disaster Affect the U.S. Economy? - By Christopher Beam." *Slate Magazine*. Web. 17 May 2011. <<http://www.slate.com/id/2253183/>>.

4. "Fishermen Frustrated by Oil Spill's Impact - CBS News." *Breaking News Headlines: Business, Entertainment & World News - CBS News*. Web. 17 May 2011. <<http://www.cbsnews.com/stories/2010/05/01/national/main6451393.shtml>>.