

Activity: Oil Spills



The WPI Engineering Ambassadors taught me about
“Oil spills: A slippery situation”



Engineers apply their knowledge to maximize the benefits of oil to society and reduce the harmful effects of oil spills (like hurting our friend, Larry-the-Duck).



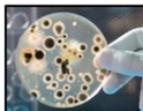
Key learnings:



Oil is essential to many luxuries we enjoy. We mainly use oil to generate energy, like fuel for cars and to heat homes. What may not be as obvious is we also use oil to make things like crayons, DVDs, plastic and tires.



Despite oil’s usefulness in our everyday lives, oil spills damage our environment. Oil spills can occur when transporting oil from one country to another, during war, when equipment breaks down, during natural disasters, or because of illegal dumping.



Engineers clean up oil spills using chemistry concepts like dispersants, sorbents, booms and skimmers, and burning. One new way biochemical engineers are helping is by developing microorganisms to eat the oil and produce clean water.

These types of engineering majors are involved in making our world a safer place through minimizing the chance of oil spills and helping clean-up oil spills:

1. Chemical Engineering
2. Biochemical Engineering
3. Mechanical / Robotics Engineering
4. Environmental Engineering
5. Civil Engineering

Activity Summary: Oil Spills

The purpose of this activity is to simulate the role of an engineer in an oil spill by allowing students to experiment with different methods of cleaning up oil. Using the materials given, participants are to find the best method of removing oil from the surface of water. Importantly, students have a chance to explore the impact of oil spills on the environment. Before cleaning up the oil, they can use the feathers to see how oil affects birds. It is gunky, hard to clean, and it probably makes flying very difficult.

Students should have a chance to form a hypothesis and plan their approach to cleaning up the oil spill before they start. Afterwards, discussion should center around what worked well, what didn't, and how that compared to the students' expectations. It is essential to connect these concepts back to the presentation using terminology.

Material needed	Quantity
Plastic Reusable Container	1
Vegetable oil mixed with cocoa powder	3 tbs/2 tbs
Tap water dyed with blue food coloring	3 cups
Liquid dishwashing detergent	2 fluid ounces
Sorbents (paper towels, cotton balls, rags, strings, sponges)	Variety
Feathers	1

Plastic Table Covers

Step 1, Prepare the fresh (tap) water: Fill a glass dish/bowl with cold tap water within 1 inch of the top. Add 5-6 drops of food coloring. Mix coloring and water with a popsicle stick. Let the solution settle.

Step 2, Simulate crude oil: Place 3 tablespoons of vegetable oil in the coffee mug. Add 2 tablespoons of cocoa powder. Mix cocoa powder and vegetable oil thoroughly with a popsicle stick.

Step 3, Contaminate the water: Very slowly pour the simulated crude oil from a height of 1 inch onto the water dish/bowl. If you pour the oil too quickly, the experiment won't work. Wait 3 minutes.

Discuss: What happened to the simulated crude oil when you poured it onto the water? What role does density play in how liquids settle?

Step 4, Determine how oil affects feathers: Dip a feather into the oil-contaminated water.
Discuss: What happens when a feather gets oil on it? How might this affect a bird?

Step 5, Test the sorbents: Place one of the sorbent samples in the center of the contaminated water. This can be a paper towel, cotton ball, rag, string or with a sponge.

Discuss: How much oil did the sorbent clean up? How quickly? Does the sorbent pick up water, too? If so, how can you tell? Does the sorbent sink or float? What is the condition of the contaminated sorbent?

Remove the sorbent with tweezers or tongs. Repeat Step 5 with the remaining sorbent samples.

Discuss: How would you pick up the oil-contaminated sorbents in a “real” oil spill? How would you dispose of the oil-contaminated sorbents in a “real” oil spill? Of the sorbents you tested, which one worked the fastest or the best? What other materials could you use as sorbents?

Step 6, Prepare the ocean (salty) water: In the second dish/bowl, repeat Step 1. Add 1 teaspoon of salt and mix well. Let the solution settle. Repeat Step 2, Step 3, Step 4 and Step 5. Discuss: Are the results of the experiment different when you use fresh water instead of ocean water?

Step 7, Test the reaction of detergent: In a real oil spill clean-up, liquids can be applied to the oil to help clean up the spill. These are called dispersants. Dishwashing detergent can be used to simulate this. Add 1 squirt of dishwashing detergent to each of the oil-contaminated fresh and ocean water dishes.

Discuss: What happened when the detergent was added? How clean is the water in each of the dishes?

This activity is from the Australian Maritime Safety Authority (AMSA) Kids.

Full instructions are available at: <http://tinyurl.com/zcx23dl>

