

Oil Spill Lab

Oil tankers are the largest ships to sail in the ocean. They are designed to hold millions of barrels of crude or refined oil in relative safety, and without damage to the environment. For countries such as Japan that have no oil reserves of their own, tankers are the only way that the oil needed to power their economies can be moved.

Generally, these ships are safe, and most of the time they get to their destinations without incident. However, these ships sometimes release oil through either accidental or purposeful means. During the Gulf War of 1991, it was thought that Iraq would attack oil tankers leaving port; as a result, allied forces spent a large amount of resources and money making sure that these ships were safe. As for accidental releases of oil, the Exxon Valdez released millions of barrels of oil in the Prince William Sound in Alaska in the mid-80's.

When these ships are damaged or sunk, the oil spreads out over the surface of the water in a large slick. These oil slicks can cover hundreds of miles, causing huge environmental damage. Because oil slicks are so damaging to the environment, numerous ways of containing them and cleaning them up have been developed.

One method that people use is to surround the oil slick with something called a containment boom. Basically, a containment boom is just a large float that surrounds the slick. As the boom is pulled into a boat that can skim the oil off the top, the oil slick shrinks, until finally it is completely cleaned up. Although it is possible to clean a slick by this method, it is mainly useful for containing oil slicks which will be cleaned up by other means.

Another method to clean slicks is to spray a detergent solution on it. When detergent is sprayed on oil slicks, the oil breaks up into clumps which sink to the bottom of the ocean. Although these clumps are themselves hazardous, the problems caused by the clumps are much easier to deal with than the problems caused by oil slicks.

Oil can also be caused to clump by pouring absorbent sand on it. The oil is absorbed into the sand, which drags it to the bottom in sandy clumps.

Recently, oil-eating bacteria have been designed which can actually use the oil slick as food. As the bacteria reproduce, they eat more and more of the slick until it finally vanishes. When the slick is gone, their food source is gone and they die, leaving nothing behind at all.

If oil slicks are extremely small and contain highly flammable compounds, they are sometimes set on fire to eliminate the oil. This is very rarely done, simply because most oil slicks contain compounds that aren't very flammable; even

automobile motor oil (which is itself very light) does not burn when lit with a spark.

If the slicks are very small, as in fresh water settings, the oil can sometimes be cleaned up by absorbing it into specially absorbent pads. When the pads are full of oil, they can be easily cleaned off the surface of the water.

In this lab, your job will be to clean up a mini “oil spill” using materials similar to the ones used by petroleum engineers.

Prelab:

- 1) Of the methods described in the introduction to this lab, which do you think will be most effective in cleaning up an oil spill? Explain.

- 2) How do you think oil spills can be minimized in the future? What steps do we need to take to keep the risk of environmental damage low?

Experiment:

The first step in this lab is to make an oil spill. Take a 9 oz. clear plastic cup and fill it about 2/3 full with water. Pour about a tablespoon of oil into it. This will be your mini oil spill that you have to clean up for this lab.

Elsewhere in the room are the materials which you may use to clean up the oil spill. Choose the method that you think will work best and try that first. You should *clearly and neatly* write down what methods you tried and why on the next page. By reading this section, I should be able to tell what you did and how well it worked.

You may use as many methods as you want, but at the end of the lab, two things must be done:

- 1) The oil should not be at the top of the water.
- 2) There should be at least half a cup of the original water left.

Remember to clean up your lab area when you are finished. During the experiment, you should be careful about disposing of the oily materials in a way that will keep the room clean (such as putting oily rags, liquid, sponges, sand, etc. into paper towels and throwing them into the garbage).

Write what you tried here, and how well it worked:

Questions:

- 1) What method worked best for your group? Why do you think this method was better than the others you tried?

- 2) What method worked worst for your group? Why do you think it was more ineffective than the others you tried?

- 3) Do you feel that this lab did a good job of simulating what happens in an oil spill? If so, why? If not, why not?

- 4) Was there any method that you tried which surprised you? Explain:

- 5) Do you think that the method which worked best for you would also work the best on a real oil spill? Explain why or why not.

- 6) What were some problems that you had in this lab? How did you get around them?