

Activity: Make a Vegetable Oil Tanker

Suggestions to the Speaker

Grade Level

Elementary (4th and 5th graders)
Middle School (6th graders)

Materials

- Small piece of aluminum foil per student. (They may want additional foil to create a double hulled ship, etc.)
- Cooking oil. (It is more interesting if you have 2 or 3 types of cooking oil available such as corn oil, olive oil, sesame oil, etc. The sesame oil has a unique aroma that can be used as an example of how different types of petroleum oils have different odors.)
- 9-inch pie pan or 10-inch or larger plastic bowl filled half full with water. One per student. (You can ask the teacher to ask the students ahead of time to bring a container from home.)
- Kite string, cotton balls, lettuce, and paper towels.
- Dish washing detergent (detergent is a *surfactant* that helps oil and water mix. Oil and water generally do not mix well because they are so different (chemically). A surfactant such as soap or detergent is a specially designed material that has one end like water and the other like oil. When you add it to an oil/water mixture, it helps the 2 mix together.)
- Small (2 or 4 oz) paper or plastic cups.
- Spoons.

Background Information

You've probably heard about oil spilling into a river or the ocean. While accidents are rare, engineers and scientists have had to develop technology to help clean up these spills.

There are several methods used while the oil is still in the water.

- Boats with special "skimmers" can remove oil, much like using a ladle in a soup pot.
- Chemicals called dispersants, which are like detergents, help break oil into droplets and then bacteria and other natural organisms in the water can digest the oil.
- Burning is a quick way to be sure a spill doesn't get to shore, but this results in air pollution.
- If the spill does get to the shoreline, sorbents are used to soak it up. One example of a sorbent is polyethylene, a plastic (which is made of oil). Engineers and scientists have used absorbent pillows, like cotton balls, to soak up spilled oil. They have also used big floating booms, giant styrofoam logs wrapped in plastic, to contain the oil spill. Try to contain your own oil spill with a loop of string.
- Mud tracked into a child's house as compared to spilled milk on the floor is a good way of verbally explaining how some things are more easily absorbed (here, with a paper towel or sponge) than others.
- Can compare pouring honey out of a jar to pouring lemonade out of a pitcher as an example of fluids with different viscosities. Petroleum oils from different reservoirs have different viscosities (along with other physical properties). The temperature of the ocean and air affects the spilled oil viscosity also.

Activity

1. Shape a small piece of aluminum foil into a canoe, about 4 or 5 inches long.
2. Fill it with approximately 1 to 2 tablespoons of cooking oil. Float the boat in a bowl filled half full of water.
3. When you are ready, tip it over. The student may want to place a loop of string around the boat first before tipping it over. The string is a pretend oil boom.
4. Have 1 or 2 of the student groups *thoroughly* mix in some dish washing liquid (detergent). Note how results for this group are the same / different from the ones without detergent.

5. Now use some cotton balls, a ripped piece of paper towel, and/or a piece of lettuce to soak up the oil - or anything else you can think of. Remove the oil to a paper or plastic cup.
6. Record your results on a piece of paper. Note that recording such things as the quantity of liquid removed to the cup, relative amounts of water / oil removed and color of liquid will be helpful in drawing conclusions.

Observations / Conclusions

- Do oil and water mix?
- Does lasooing the oil with the string work? Can you collect all the oil in one part of the pan that way? Can you remove the oil from the pan that way?
- What about the other methods? Were they successful? Why or why not?
- How did detergent affect the oil/water mixture? Any ideas why?
- How were the results different with the oil/water/detergent mixture? Why?

Questions for Students

- Can you name some products that are made with oil?
- What other ways can you clean up your spill? (Detergent, a spoon for skimming, etc.)
- While you contain the oil with your string, what happens if a wave comes? (Suggest the students create some movement with a spoon.)
- Which do you think would be hardest to clean and why... a spill in a lake, river, or the ocean?
- Would you add detergent (or some other surfactant) to the spill as part of a clean up? Would you use it to help clean up birds and other wildlife?

Conclusion

The oil is absorbed by the fibers in the cotton or paper. The only problem is that you would need a whole ship just to carry this "absorbent" around, because there is just not enough room to keep it on the oil tanker's themselves.