

## Oil and Water Tubes: An Illustration of Ocean Properties

### Background & Key Concepts



[library.thinkquest.org/CR021547/1/oil\\_spills.htm](http://library.thinkquest.org/CR021547/1/oil_spills.htm)

This activity, which involves pouring oil and water into a tube and then adding splash dye tablets, can be used to discuss a variety of important science concepts that are relevant to the environment. First, oil and water don't mix; they have different chemical bond types (water is polar and oil isn't) and different densities (oil is less dense), so oil floats atop water. This is helpful when there is an oil spill, because cleaning up oil is easier when it's at the surface. Some microbes consume oil as a food source, and this can come in handy after an oil spill. This is just one example of how microbes are beneficial (C-MORE 2008).

Second, this activity can be used as an analogy for ocean currents. The movement of deep ocean water is driven by density and gravity. The density difference is due to the different temperatures and salinities between different water masses. Cold, salty water is denser than warmer, less saline water.



Finally, the bubbles produced by the splash dye tablets are carbon dioxide ( $\text{CO}_2$ ). This activity can be used as a starting point to discuss "ocean acidification", the process by which the ocean is becoming more acidic. When excess atmospheric  $\text{CO}_2$  (e.g., caused by human activities such as burning fossil fuels) dissolves in the ocean, it forms an acid. This lowers the ocean's pH (that is, makes the ocean more acidic) and can have significant effects on marine ecosystems. Ocean acidification is discussed in the next activity.

### Hawai'i Content & Performance Standards (HCPS III)

The following standards and benchmarks can be addressed using this lesson:

Science Standard 1: The Scientific Process: SCIENTIFIC INVESTIGATION: Discover, invent, and investigate using the skills necessary to engage in the scientific process.

*Grade 3 Benchmarks for Science:*

Benchmark SC.3.1.1 Pose a question and develop a hypothesis based on observations.

Benchmark SC.3.1.2 Safely collect and analyze data to answer a question.

Science Standard 2: The Scientific Process: NATURE OF SCIENCE: Understand that science, technology, and society are interrelated.

*Grade 5 Benchmarks for Science:*

Benchmark SC.5.2.1 Use models and/or simulations to represent and investigate features of objects, events, and processes in the real world.

Science Standard 6: Physical, Earth, and Space Sciences: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe.

*Grade 6 Benchmarks for Science:*

Benchmark SC.6.6.6 Describe and compare the physical and chemical properties of different substances.

**Materials**

- 1 preform tube with cap ([teachersource.com](http://www.teachersource.com); item #SM-100a; cost = \$19/pack of 30)
- 2 blue “color splash dye” tablets ([teachersource.com](http://www.teachersource.com); item # CSP-130; cost = \$6/pack of 100)
- Vegetable oil (less than one liquid ounce)

**Procedure**

- 1) First ask your students to make a prediction. What will happen when you pour the water into the oil? The choices are:
  - a) The oil and water will mix together.
  - b) The water will stay at the top (above the oil).
  - c) The water will sink to the bottom (below the oil).
  - d) Other (please specify) \_\_\_\_\_
- 2) Fill the tube  $\frac{3}{4}$  full with oil.
- 3) Add 1 capful of water, but don’t cap the tube. Observe what happens. (The water bubbles down to the bottom.) Why did this happen? (Water is denser than oil, and they don’t mix.)
- 4) Drop in one dye tablet, wait 15 seconds, and then drop in the second tablet.
- 5) Observe what happens, and cap the tube.

**References Cited**

C-MORE. 2008. Key Concepts in Microbial Oceanography. Center for Microbial Oceanography: Research and Education (C-MORE).

[http://cmore.soest.hawaii.edu/downloads/MO\\_key\\_concepts\\_hi-res.pdf](http://cmore.soest.hawaii.edu/downloads/MO_key_concepts_hi-res.pdf)

**Additional References**

Oil spill information, educational materials, and pollution fact sheets:

[http://www.amsa.gov.au/marine\\_environment\\_protection/educational\\_resources\\_and\\_information/kids/oil\\_and\\_water\\_dont\\_mix/](http://www.amsa.gov.au/marine_environment_protection/educational_resources_and_information/kids/oil_and_water_dont_mix/)