

Ocean in a Bottle

In physical oceanography, scientists and researchers study the ocean's physical attributes, including temperature, salinity, material in solution, waves, tides, and currents. The science relates to a wide range of applications, from forecasting weather to designing undersea robotics. This activity gives an opportunity to observe how water moves in a system, as well as how other materials may mix with the water.

Make Your Own!

1. Using the funnel, fill approximately 1/3 of your bottle with water.
2. Add several drops of food dye.
3. Optionally, add a spoonful of glitter to the bottle (this adds greater visual detail to the movement of the water)
4. Fill the rest of the bottle with oil, and tightly seal the cap.
5. Shake, spin and rock the bottle! Observe how the water moves— is it just the top that moves? What directions does the water flow? Does the oil or glitter mix?

Materials

- Water
- Cooking Oil
- Blue Food Dye
- Clear, Plastic Bottle With Cap
- Funnel
- Optional: Glitter



Photo courtesy ladybehindthecurtain.com

Why don't the oil and water mix?

Water molecules are *polar* – they have a small positive charge at one end and a small negative charge at the other end. Because of the polarity, the molecules stick to each other, a little bit like magnets do. Oil molecules are *non-polar* – they have no charge.

Because of this, oil molecules are more attracted to each other than to water molecules. Water molecules are more attracted to each other than to oil molecules.

Oil and water can be forced to mix together by adding an *emulsifier*. An emulsifier (egg yolk and mustard are two household examples) creates a stable mixture of water with droplets of oil spread through it, or oil with droplets of water spread through it, that does not settle out.

