



Ocean Explorers

What are Currents?

We are bringing the beach to you! Grab your essential oils, turn on some ocean sounds, get your yoga mat and join us to make waves as we learn about ocean currents through a few simple experiments.

Ocean Movement

Although our planet is called “Earth” it might be better described as “ocean” as over 70 percent of the planet’s surface is covered with water!

Ocean water is always on the move in the form of currents. A current is the continuous movement of ocean water caused by several factors including wind, temperature and salinity differences; the Earth’s rotation; and the impact of the moon’s gravity (tides). In these activities we are going to focus on salinity and temperature.

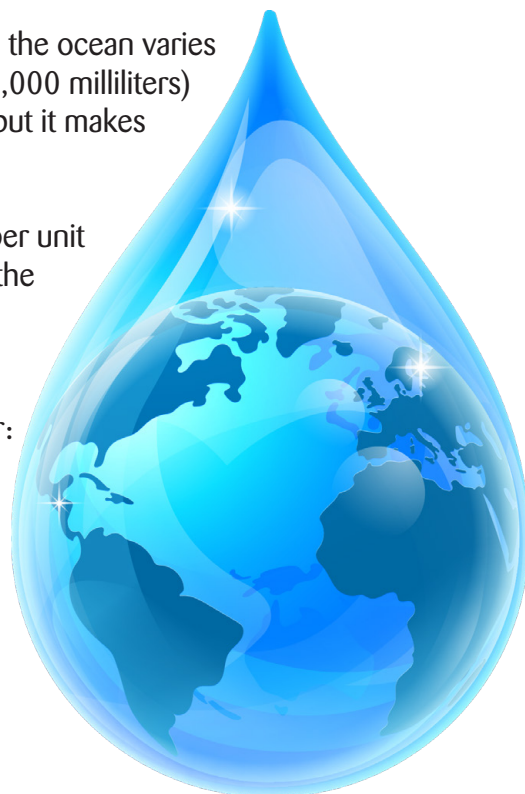
Salinity

Have you ever tasted sea water? It’s salty, right? The amount of salt in the ocean varies but overall, it is about 3.5 percent salt. This means for every 1 liter (1,000 milliliters) of seawater, there are 35 grams of salt. That may not seem like a lot but it makes a significant difference in how currents flow across the ocean.

Adding salt to water changes its density. Density is defined as mass per unit volume. The more mass something has in the same volume (space), the denser it is. Salt adds mass to water.

What do you think would happen if you mix salty water and fresh (no salt) water? Check out our Science Short video to find the answer: www.youtube.com/watch?v=b5thFonbdSk&t=11s.

Was your prediction correct? Salt water is denser, and it sinks under the less-dense fresh water. This sinking and floating helps create movement in the water.





Temperature

Temperature also affects water movement because different water temperatures have different densities.

Which do you think is denser: warm water or cold water?

Let's do an experiment to find out!

Activity 1

What You'll Need

- 2 colors of food coloring dye (we suggest blue and yellow but you can use any two colors)
- 3 glass or clear plastic cups containing:
 - Cold water colored blue
 - Hot water colored yellow
 - Room temperature water (don't put dye in this water)
- 2 eye droppers or pipettes
- Colored pencils or crayons to match the dye colors for recording your data

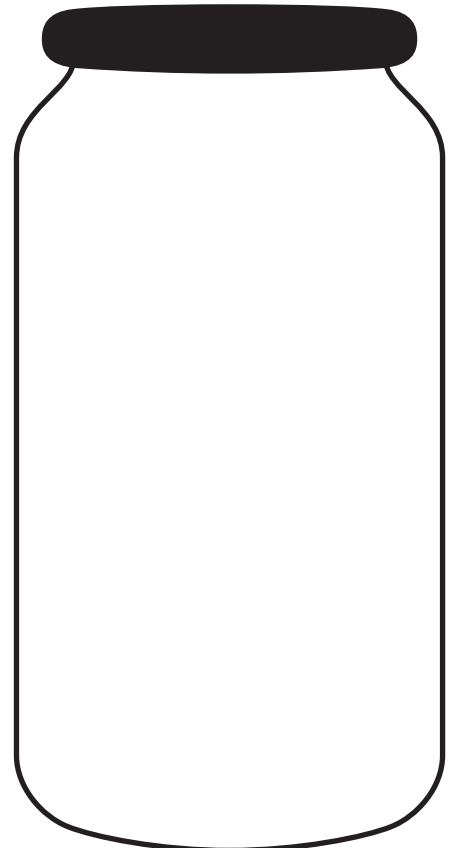


What You'll Do

1. Fill one dropper with the cold blue water.
2. Place the end of the dropper about half way into the room temperature water. Gently squeeze the dropper.
3. Repeat using the hot water making sure to gently squeeze the dropper on the opposite side of the room temperature water glass.
4. Observe what happens. Which is most dense: room temperature water, cold water or hot water? Which is least dense?
5. Draw what you observe in the glass chart below and label the water cold, hot and room temperature. Use colored pencils or crayons to color in your chart to match your experiment. Label the densest and least dense water samples on your chart.

What Happened?

The cold water should have flowed to the bottom of the room temperature water in the glass. The hot water should have risen and collected at the surface. Hot water is the least dense of the three water temperatures and floats on top while cold water is the densest and sinks to the bottom.



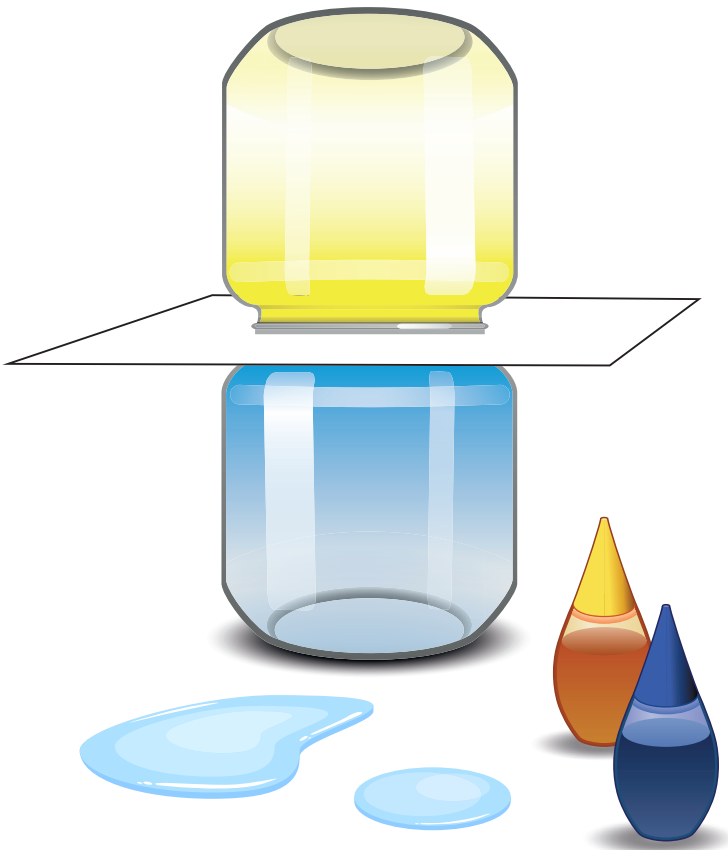
Activity 2

What You'll Need

- 2 colors of food coloring dye (we used yellow and blue)
- Two clear jars that are the exact size and shape (recycled spaghetti jars or baby food jars work well)
- Water-resistant card that will cover the opening of the jars (for example, a playing card or a laminated index card)
- Water
- Towels for clean up
- An adult's help!

What You'll Do

1. Fill one jar with very cold water. (To get the water cold enough, fill a pitcher with cold water, add a few ice cubes and place it in the fridge for a little while before you start the activity.) After you fill the jar, add 2-3 drops of blue food coloring.
2. Fill the other jar with hot tap water (be careful!) and 2-3 drops of yellow food coloring.
3. Hold a water resistant card over the top of the hot water jar. While holding the card tightly against the jar opening, carefully turn the jar upside down. (For younger scientists, an adult should do this part of the experiment.)
4. With the card still in place, position the jar of hot water directly over the jar of cold water so the lids line up exactly.
5. Slowly and carefully remove the card so that the hot water jar sits on top of the cold water jar.



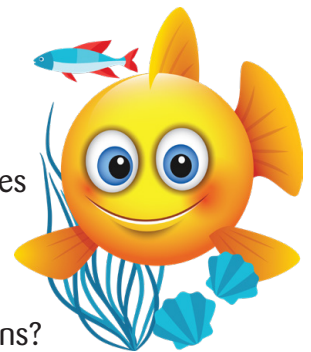
What Happened?

The hot water should have stayed on top and not mixed too much with the cold water on the bottom. Why is this? Hot water is less dense than cold water so it floated on top. Just as fresh water is less dense than salt water and floats on top.

What would happen if you repeated the experiment in reverse, placing the cold water on top of the hot water? Make a prediction, then repeat the experiment with fresh supplies!

Go Further

Repeat activity 1 but try it not only with different temperatures but also different salinities. Experiment with different temperatures and salinities at the same time. What happens?





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Science Spotlight

Even though scuba diving had not yet been invented, in the early 1950s, 16-year-old **Sylvia Earle** decided that she had to experience the ocean for herself. She strapped on a diving helmet and dove into the waters below. After her dive, her enthusiasm for the ocean deepened, which encouraged her to take scuba lessons in college and major in botany, the major she believed would help her understand ocean systems best.

After college, Earle spent time in submarines. When men would not let her participate in submarine research projects, she formed an all-female research crew that stayed under the water for two weeks. In the 1970s, Dr. Earle made history when she walked across the bottom of the ocean floor, 1,250 feet (381 meters) below sea-level.

Even though she is in her 80s, Earle's enthusiasm for the ocean remains. She has led over 70 expeditions and received over 100 awards. She is an advocate for conservation and through her organization Mission Blue Sylvia Earle Alliance, works to establish protected areas, called Hope Spots, where marine life cannot be harmed. Read more about Earle at <https://mission-blue.org/about/>.



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Dive in and explore our oceans!

