

## Observing Currents

Deep ocean currents can be set in motion by temperature or salinity.

### Objective

Determine how the density of water changes with temperature and salt content and see how this affects ocean currents.

### Materials

- a glass aquarium
- food coloring
- plastic gloves
- a teaspoon measure
- a thermometer
- a source of hot water
- a brick
- an ice cube tray
- salt
- a measuring cup
- a source of fresh water

**Safety Notice:** All applicable laboratory safety rules must be followed. Students should not perform any experimental activity without the teacher's supervision and express permission. Students must follow safety guidelines and wear appropriate protective gear.

### Procedure

1. Fill an ice cube tray with fresh water and add drops of food coloring to the water in the tray. Then, put your colored ice cubes in the freezer to harden.
2. Tip the aquarium on an angle and brace it there with the brick. Then, fill it with water, allowing it to stand for an hour or so to reach room temperature.
3. Put a colored ice cube into the water, against the glass at the high end of the aquarium. Be sure to do this very carefully so as not to create motion in the water.
  - What do you think you will see?

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4. Watch the action of the cube, recording what you see. Don't disturb the tank until the ice cube is completely melted, but you can keep the ice cube in place with your finger, if necessary.
  - What happened as the colored ice melted?

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5. Perform this step a few more times, recording your results in the data table.
6. Empty and refill the aquarium with clear fresh water. Again, be sure to let the water reach room temperature.

7. Fill the measuring cup with hot water. Use the thermometer to be sure the water is at least 110 degrees Fahrenheit or 43 degrees Celsius. Now add a few drops of food coloring to the hot water. Be sure it is darkly colored.

- What do you think you will see this time when you pour the hot water into the tank?
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8. Very gently pour the colored hot water into the aquarium at the high end. What happened this time? Record your observations in the data table.

9. Refill the aquarium one more time with fresh water and let it achieve room temperature.

10. Fill the measuring cup with water and mix in about a teaspoon of salt. When the salt is thoroughly dissolved, add food coloring, until the water turns a dark color. What do you think you will see this time when you pour the salt water into the tank?
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11. Carefully put the colored salt water into the aquarium at the high end. Step back and see what happens, recording your observations.
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### Conclusions

- What type of water is more dense: fresh water or salt water? How do you know?
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- What type of water is more dense: cold water or hot water? Explain why.
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**Data Table**

	Fresh water (room temp)	Fresh water (hot)		
Observations				