

OCEAN CURRENTS AND SALINITY

(Level: primary school to high school)

SUBJECT: OCEAN CURRENTS
EXPERIMENTS TO DO IN CLASS

1. THE QUESTION

Gabrielle: “Does water salinity affect ocean currents?”

To answer this question, the association Planète Sciences proposes the following experiment.

2. MATERIAL

- 2 empty, transparent plastic bottles
- 1 meter of transparent tubing (12-16mm in diameter)
- 2 plastic garden spigots, each with 2 female connectors, to fit tubing ends
- 1 role of Teflon tape
- Coarse salt
- Food coloring
- Hot glue pistol, and glue sticks

3. MAKING THE APPARATUS

1. Cut 4 lengths of tubing (about 15cm long each)
2. Make 2 holes in each of the bottles on one side. One hole should be well spaced above the other and the holes should be the same size as the tubing. The holes should be about the same heights in the 2 bottles.
3. Fit a tubing end into a hole, and use the hot glue pistol to make a sealed connection. Use some Teflon tape if needed for a water-tight seal.
4. Attach the remaining lengths of tubing to the other 3 holes in the same way
5. Connect the 2 upper tubing lengths with a garden spigot, and the same with the lower tubes. Use Teflon tape to make water-tight seals if necessary.

4. EXPERIMENT

1. Fill the bottles with water
2. Close both spigots, and add salt and food coloring to one bottle and mix.
3. Replace screw caps on bottles if possible.
4. Open the spigots and see what happens.

5. GOING FURTHER

In this experiment, the colored, salty water diffuses rapidly from the salty water bottle to the fresh-water bottle via the lower tube. Simultaneously, fresh water passes from the fresh-water bottle to the salty water bottle in the reverse direction. After a few moments, you can see that the un-colored fresh water remains on the surface, and the denser, salty, colored water stays at the bottom.

Ocean currents arise from different factors, which act on the whole planet: waters with different densities are one factor. This difference in density is linked to water temperature (see the Currents and Temperature Experiment) and salinity.

On Earth, this phenomenon moves large deep-water masses – this is called “thermohaline circulation”. In winter, as the pack-ice forms, the ice excludes salt, which makes the unfrozen underlying water denser, causing it to sink to the depths at the North Pole.

This experiment was designed by the association Planète Sciences.