

LAB
2 Laboratory
 Activity

Floating in Freshwater and in Ocean Water

Freshwater and ocean water (salt water) have several different physical and chemical properties. One of the properties in which they differ influences how well an object floats. Both freshwater and salt water exert a buoyant force on a floating object.

Strategy

You will compare a boat floating in freshwater with a boat floating in salt water. You will determine the relationship between the density of a liquid and its buoyant force. You will observe how salt water and freshwater mix.

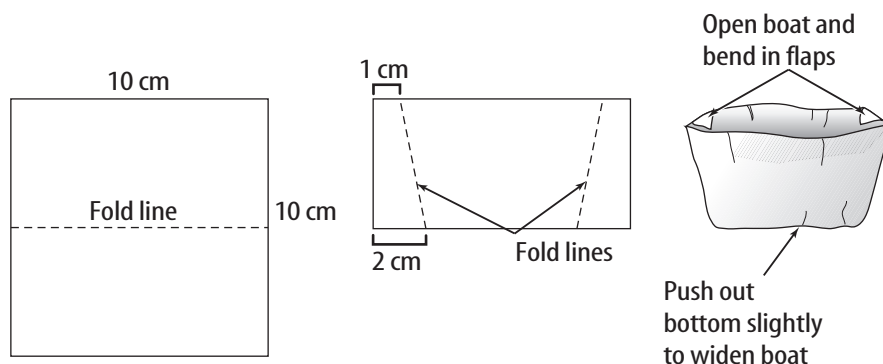
Materials

10 cm × 10 cm aluminum foil
 25-mL graduated cylinder
 clear-plastic storage boxes (2)
 ocean water (salt water—make solution with salt and water)
 freshwater (aged tap water)
 grease pencil
 metric ruler
 50-mL beaker (2)
 balance
 food coloring
 dropper
 colored pencils

Procedure

1. Fold the square of aluminum foil into a boat as shown in Figure 1.
2. Half fill one plastic box with salt water. Half fill the other plastic box with freshwater.
3. Float the aluminum boat in the salt water. Mark the waterline on the boat using the grease pencil. Measure the distance from the bottom of the boat to the waterline. Record in Table 1.
4. Float the same aluminum boat in the freshwater. Mark the waterline again.
5. Measure from the bottom of the boat to the new waterline and record.
6. Pour 25 mL of salt water into a beaker. Determine the mass of the salt water. Record the volume and mass in Table 1.
7. Pour 25 mL of freshwater into the second beaker. Determine the mass of the freshwater and record its volume and mass.
8. Color the salt water using food coloring.
9. Using the dropper, add freshwater to the beaker until you see a layer of freshwater on top of the salt water. NOTE: Allow the freshwater to run slowly down the inside wall of the beaker so it does not disturb the salt water. Sketch the layers in the beaker in Table 1.
10. Allow the beaker to stand undisturbed for several days, then observe the results. Sketch the results in Table 1.

Figure 1



Laboratory Activity 2 (continued)

Data and Observations

Table 1

	Mass (g)	Volume (cm ³)	Depth of waterline (cm)
Salt water			
Freshwater			
Beaker (start)		Beaker (after several days)	

Questions and Conclusions

- In which liquid does the boat float higher? _____
- State a hypothesis to explain your answer.

- Defend your hypothesis with what you observed about the waterline for each boat.

- Why are you able to add a layer of water on top of the salt water?

- State the relationship between the density of a liquid and its buoyant force.

- Does this confirm or contradict your hypothesis? Explain.

- What can happen to two liquids with different densities if they are in contact over a long period of time?

- What happens to the water in rivers when the river water flows into the ocean?

Strategy Check

- _____ Can you compare a boat floating in freshwater with a boat floating in salt water?
- _____ Can you determine the relationship between the density of a liquid and its buoyant force?
- _____ Can you observe how salt water and freshwater mix?