

Sink or Float?

Safety Precautions

- Don't submerge any electronic or other items that can be damaged by water.

Vocabulary

- buoyancy - the ability or tendency to float in water or air or some other fluid
- density - mass per unit volume
- specific gravity - the ratio of the density of a substance to the density of a standard, usually water

Materials and Equipment

- shallow water container
- salt
- 2 4" x 6" pieces of foil
- small plastic bag
- pennies, small metal cubes, other sinking objects
- small wooden cubes, corks, other floating objects
- tiny plastic bottle
- plastic spoon

Questions

1. Why does the foil ball sink? Why does the foil boat float?
2. Why does the wooden cube float? What other objects float?
3. Why does the penny sink? What other objects sink?
4. Why does the penny float in the foil boat?
5. How does the height of the foil boat in the water change as additional pennies are added?
6. How does the height of the tiny plastic bottle in the water container change when it is half filled with water?
7. How does the height of the tiny plastic bottle in the water container change after salt is added to the water?

Research

The density of an object is determined by measuring its mass, measuring its volume, and then dividing its mass by its volume. The density of water is approximately 1 gram per cubic centimeter. Objects whose mass is greater than water will sink, and objects whose mass is less than water will float. When the foil boat is submerged in water, it moves some of the water aside, creating a buoyant force, and we can make objects denser than water float by placing them in that foil boat.



Hypothesis

What is your hypothesis? Be sure to include your “best guess” answers to the 7 questions above.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Experiment

1. Roll one of the two pieces of foil into a small, tightly packed ball.
2. Make a small boat with the other piece of foil.
3. Drop the foil ball into the water and rest the foil boat in the water. Observe what happens to the foil ball and the foil boat.
4. Drop the floating and sinking objects into the water. Observe what happens to each of them.
5. Drop a penny into the water and drop a penny into the foil boat. Observe what happens to the penny in the water and the penny in the foil boat.
6. Slowly add more pennies to the foil boat, and observe how the height of the foil boat changes in the water.
7. Empty any water in the tiny plastic bottle into the water container.
8. Drop the empty tiny plastic bottle into the water container. Observe what happens to the tiny plastic bottle.
9. Half fill the tiny plastic bottle with water and drop it into the water container. Observe what happens to the tiny plastic bottle.
10. Remove the tiny plastic bottle from the water container, but leave the water in the tiny plastic bottle.
11. Now add a spoonful of salt to the water in the tiny plastic bottle and shake the bottle to dissolve the salt. container.
12. Drop the tiny plastic bottle into the water container. Observe what happens to the tiny plastic bottle.
13. Empty the water container, the tiny plastic bottle, and put all of the pennies and other objects back in their plastic bags.

Data and Observations

- What did you observe? Which objects floated? Which objects sunk?



This work is licensed under a
Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

Dr. Denise Meeks, tucsonkosmicgirl@gmail.com

Analysis

1. Explain why the foil ball sinks, but the foil boat floats.
2. Explain what the floating objects have in common.
3. Explain what the sinking objects have in common.
4. Explain why the penny floats in the foil boat.
5. Explain why the height of the foil boat in the water changes as additional pennies are added.
6. Explain why the height of the tiny plastic bottle in the water container changes when the tiny plastic bottle is filled with water.
7. Explain why the height of the tiny plastic bottle in the water container changes after salt is added to the tiny plastic bottle.

Conclusions

Objects that have a specific gravity greater than 1, sink, and objects that have a specific gravity less than 1, float. The foil ball is denser than water, so it sinks, but the mass of the boat is spread out over a larger volume, so the foil boat floats and displaces water, which results on a buoyant force on the foil boat. After many pennies are added to the boat, their weight becomes greater than the buoyant force and the foil boat and pennies sink. The tiny empty bottle floats, the tiny plastic bottle filled halfway partially sinks, and the tiny plastic bottle with salt added sinks because the salt water is more dense than water.

