

Submarine in a Bottle

Introduction

Submarines, fish, and even people can use buoyancy to sink and float in the water. Learn how to make a diving object using materials at home.

Tools and Materials

-  A clear, plastic bottle with a cap
 - A 20 oz., 32 oz., or a 2-liter bottle all would work
- An empty small container that will fit into the mouth of the plastic bottle
 - Lip gloss container or small perfume bottle would work
- Thin wire - about 9 inches worth total
 - Twist ties from a food package
 - Floral wire
 - Thin copper wire
- A small item that you want to “tag” on the bottom
 - Marble
 - Small rock
 - Small toy
- Scissors or wire cutter (optional)

Directions

Controlling the amount of air inside of an object changes its buoyancy (how well it floats). Turn a small container into a “submarine” and make it sink or float by squeezing and releasing the bottle to control the amount of air inside.

- 1 Gather all the materials.
- 2 Fill the large bottle with water.
- 3 Add wire to the open end of the small container (see image). This will make one end of the container heavier than the other and will keep the container from flipping over.



Submarine in a Bottle Continued

- 4 Place the small container, open side down, in the bottle. Try to keep it from flipping over. If it sinks, remove or cut away some of the wire. Repeat this step until the small container successfully floats in the bottle.



- 5 If any water spilled out, fill the bottle back up with water and place the cap back on the bottle.
- 6 Squeeze and release the sides of the plastic bottle to make the “submarine” sink and float.
- 7 Add the small item to the bottle. Try to “tag” the item with the “submarine”.

What's Happening?

An object in water sinks if gravity pulls down more than the water can push up (buoyancy). All objects have density, the relationship between how much space something takes up (its volume) and how much stuff there is (its mass). The small container has air trapped inside. Air doesn't have a lot of mass, but it has a large volume. This gives air a low density and makes it float.

When the sides of the bottle are squeezed, the air bubble gets smaller, which increases its density. Soon the air bubble is too small to hold up the container. When the bottle is released, the air bubble gets larger, which decreases its density again. The container floats.

Submarines and fish can change the amount of air inside of them. This means that they can control their buoyancy, deciding when to sink and float.