

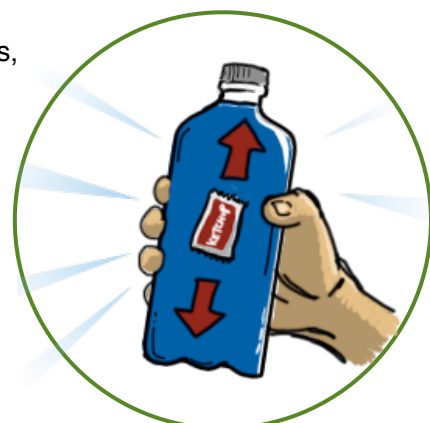
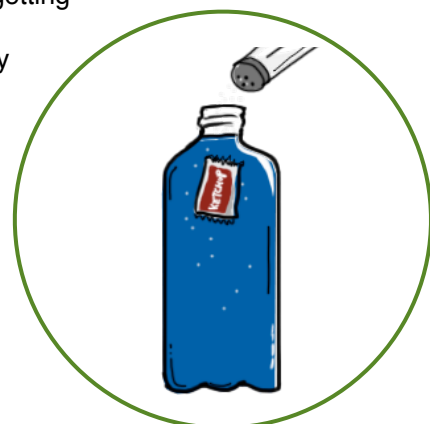
THE MAGIC KETCHUP EXPERIMENT!

YOU WILL NEED:

- A 1 liter plastic bottle or a water bottle
- Ketchup pack from a fast food restaurant
- Salt (using Kosher salt helps keep the water from becoming foggy)

WHAT TO DO

1. Remove any labels from the bottle and fill it all the way to the top with water.
2. Add a ketchup pack to the bottle.
3. If the ketchup floats, you're all set – go to step 4. If the ketchup sinks in the bottle, go to step 5.
4. For the floating ketchup pack simply screw the cap on the bottle and squeeze the sides of the bottle hard. If the ketchup sinks when you squeeze it, and floats when you release it, congratulations, you're ready to show it off. If it does not sink when you squeeze it, try a different kind of ketchup pack or try a mustard or soy sauce pack.
5. If the ketchup pack sinks, add about 3 tablespoons (45 ml) of salt to the bottle. Cap it and shake it up until the salt dissolves. (Kosher salt will keep the water from getting too cloudy, although it will usually clear up over time if using regular table salt.) Continue adding salt, a few tablespoons at a time until the ketchup is just barely floating to the top of the bottle. Once it is consistently floating, make sure the bottle is filled to the top with water, and then cap it tightly.
6. Now squeeze the bottle. The magic ketchup should sink when you squeeze the bottle and float up when you release it. With some practice you can get it to stop in the middle of the bottle.



HOW DOES IT WORK?

This experiment is all about buoyancy and density. Buoyancy describes whether objects float or sink. This usually describes how things float in liquids, but it can also describe how things float or sink in and various gasses.

Density deals with the amount of mass an object has. Adding salt to the water adjusted the water's density to get the ketchup to float. Sound complicated? It is, but here's the basics on the ketchup demo...there is a little bubble inside of the ketchup packet. As we know bubbles float, and the bubble in the ketchup sometimes keeps the heavy packet from sinking. When you squeeze the bottle hard enough, you put pressure on the packet. That causes the bubble to get smaller and the entire packet to become MORE DENSE than the water around it and the packet sinks. When you release the pressure, the bubble expands, making the packet less dense (and more buoyant) and, alas, it floats back up. This demonstration is sometimes known as a CARTESIAN DIVER.

MAKE IT AN EXPERIMENT:

The project above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. Do different food packs (ketchup, mustard, soy sauce) have the same density?
2. Does the temperature of the water affect the density of the ketchup packet?
3. Does the size of the bottle affect how much you have to squeeze to get the packet to sink?