

# Cartesian Diver

## Description

If you press the bottle with your hands, water is pressed into the diver, buoyancy is reduced, the diver sinks to the bottom and vice versa.

## Materials

- 1 Empty transparent plastic bottle (0.5 l)
- 2 Empty baking aroma tube
- 3 Pipette
- 4 Bowl
- 5 Water

## Procedure

- 1 Fill the bowl with water and put the empty baking aroma tube into it. It floats horizontally on the water. Now fill the tube with water using the pipette. Test again. Your tube sinks to the bottom. Your task is now to fill just enough water into the tube so that it „stands“ in the water. As a final preparation, fill the bottle to the brim with water. Tip: The bottle should not be too tight, but also not too flexible.
- 2 Now put your prepared diver, i.e. your baking aroma tube, into the bottle with the opening facing down. Close the bottle tightly. The diver floats in the top of the bottle. If you now press on the bottle from the outside, the diver starts to sink. With a little skill and the right pressure from the outside on the bottle, you can even make the diver float in the middle of the bottle.

## Background

Cartesian divers are named after the French philosopher, mathematician and scientist Rene Descartes. In the floating diver, besides water, there is also some air. By pressing on the bottle, the pressure inside the bottle increases. Since water cannot be compressed, this pressure is transmitted through the water to the diver and the air enclosed in him, which is thus compressed. Its volume is reduced and water can penetrate. As a result, the diver's weight increases and he begins to sink.

If the pressure on the cylinder is reduced, the pressure on the water also decreases, the air in the diver expands again, displaces the water that has previously flowed in again, and the buoyancy is sufficient to allow the diver, who is now lighter again, to rise to the surface. With a little practice, the Cartesian diver can also be kept in suspension. This principle is also used for drift buoys in marine research or smaller science submarines.