

A Cartesian diver

Topic

Particulate nature of matter, liquids and gases.

Timing

Variable.

Description

Students make a Cartesian diver from a fizzy drink bottle and a plastic pipette. This experiment illustrates how gases are more compressible than liquids.

Apparatus and equipment (per group)

- 5 cm³ Plastic disposable pipette
- Hex nut (from most DIY superstores 11mm across face to face)
- One 2 dm³ or 1.5 dm³ or 1 dm³ soft drink bottle with lid (clear plastic)
- 250 cm³ Plastic beaker
- Access to scissors.

Teaching tips

It is important to adjust the diver so that it barely floats in the beaker. If the diver requires a strong squeeze to make it sink there is not enough water in the diver. If the diver sinks then it has too much water inside. The diver should be about half full with water.

Background theory

The diver sinks if it is more dense than the surrounding water and rises if it is less dense.

Safety

Mop up any water spillage from the floor.

Answers

1. Air is compressed and the volume of air is reduced.
2. When compared with those in liquids, the gas particles which make up air are a large distance apart. It is therefore easier to squash them closer together thus reducing the volume.
3. When the bottle is squeezed pressure in the water pushes on the pocket of air inside the diver. The volume of air is reduced and this allows more water into the diver. This makes the diver more dense and it therefore sinks. When the pressure is released, the air expands taking up a larger volume. Water is pushed out of the diver which becomes less dense and therefore floats in the water.

Credits

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