

Particles in motion?

Topic

Particulate nature of matter, gases.

Timing

30 min.

Description

Students produce carbon dioxide by reacting calcium carbonate with hydrochloric acid. They then check to see if diffusion occurs by both holding the test-tube of carbon dioxide over a test-tube of air and vice-versa.

Apparatus and equipment (per group)

- Three test-tubes
- Cork
- Delivery tube and bung.

Chemicals (per group)

- Limewater 0.02 mol dm^{-3}
- Calcium carbonate
- Hydrochloric acid 0.5 mol dm^{-3} .

Teaching tips

This experiment provides a good introduction, one suggestion is to show a demonstration of Brownian motion using a smoke cell after this experiment.

Background theory

Solids, liquids and gases consist of minute particles. If this were not the case, they would not mix so easily. This is not proof of a particulate theory, but the experiment does suggest that the particles in the gas must be in motion to spread through the air in the containers.

Safety

There is no need for any special precautions but eye protection will prevent uncomfortable, though not damaging, splashes to the eyes.

Answers

1. All the test-tubes contained carbon dioxide; the gases always diffuse and mix.
2. Carbon dioxide is denser than air.
3. Yes; both tubes should give cloudy limewater suggesting the gases in the two tubes mixed. Some of the heavier carbon dioxide molecules moved upwards into the test-tube containing air.



Credits

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Page last updated March 2018

