

Safety:



Instruments:

- balloons
- beakers
- drinking straw
- balloon pump

Chemicals:

- lime water (H: 315-318-335; P: 280-302+352-304+340-305+351+338-313)
- mineral water

Experiment:

- Blow up a balloon and twist the end until no air can escape. (No knot!)
- Place a drinking straw in the balloon neck. Be careful not to let any air escape. Hold the other end of the straw in a beaker of lime water and let the air bubble through the liquid very slowly and carefully. What happens?
- Now pump up a balloon with room air using a balloon pump. Follow the same steps and let the gas slowly bubble through the lime water.
- Fill a third balloon by placing it over the mouth of a bottle of fizzy mineral water and gently shaking the bottle a little. Let this gas bubble through the lime water, too. What happens?

Advice for the teacher:

Breath and fizzy mineral water both contain carbon dioxide gas, which makes lime water cloudy. But the gas in human breath works more slowly than the gas from the mineral water. Regular air contains much less carbon dioxide. The balloon filled with the air pump does not make the lime water cloudy because of the extremely low level of carbon dioxide in normal, atmospheric air.

The pupils should learn that carbon dioxide is in our breath and in fizzy mineral water. This gas is colorless and has the property of making lime water turn cloudy. This test is a good indicator for the presence of carbon dioxide.

Advice for making lime water: Place 1 tablespoon of cement or mortar in a glass and add roughly 250 ml of water. Stir vigorously. Allow to stand for a short time so the largest particles settle out of the suspension. Finally, pour the liquid through a funnel lined with **two** coffee filters. The colorless, clear filtrate is collected in another flask and the lime water is ready! This works because cement and mortar both contain calcium hydroxide as an important component.

Tip:

The bottle of mineral water should be fresh. It is best to have it only half full, so that it is easier to shake and larger amounts of CO₂ can be collected.
