Universität Basel
Swiss Nanoscience Institute

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Extinguishing candles with vinegar and baking powder

Blowing out candles yourself all the time is boring. There are other ways to extinguish a candle flame. Vinegar and baking powder are a great option! And remember: whenever you're experimenting with fire, please ask a grown-up to join you, and be extra careful.

What you'll need:

- a glass
- vinegar
- a tealight
- a long lighter or long matches
- 2 sachets of baking powder
- a spoon with a long handle
- an empty glass bottle with a screw cap
- a nail
- a hammer
- something to protect your work surface

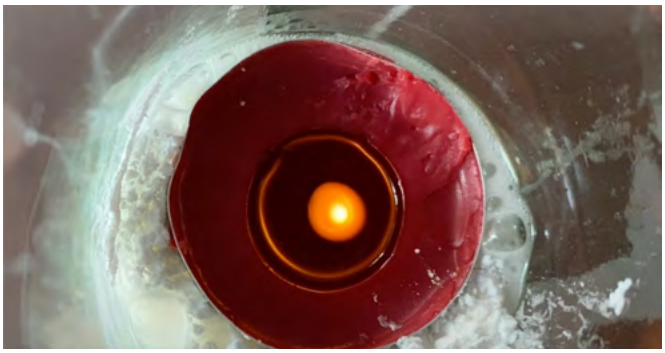
Instructions:

- First of all, pour some vinegar into the glass. The level of the vinegar should be lower than the height of the tealight.
- Carefully place the tealight into the glass without splashing vinegar onto the wax, and light it. Be careful not to burn your fingers! If you need to, hold the glass at a slight angle.
- Now carefully tip some baking powder into the vinegar using the spoon. Make sure you keep the baking powder away from the flame, as it could catch fire and cause a dust explosion.
- Now watch what happens.
- When the flame goes out, try lighting it again.

- For the second part of the experiment, take an empty glass bottle with a screw cap, and remove the cap. Punch a hole in it using the hammer and nail. Be sure to protect your work surface.
- Light the tealight.
- Tip a sachet of baking powder into the bottle. Once again, be sure to keep the baking powder away from the flame.

- Now tip some vinegar into the bottle, give it a good shake, and quickly screw on the cap while holding your finger over the hole.
- Point the bottle toward the candle flame and take your finger off the hole.

What happens and how does it work?



- When vinegar and baking powder mix, a chemical reaction occurs and carbon dioxide (CO_2) is formed.
- Carbon dioxide is a gas that is heavier than air, so it sinks to the bottom of the glass.
- The candle cannot burn without oxygen. When the carbon dioxide has displaced the oxygen in the bottom of the glass, the flame goes out.
- As the carbon dioxide is still in the bottom of the glass, you'll find that it is impossible to light the candle again – the flame from your lighter or match just goes out too.

- The same thing happens with our bottle extinguisher. Carbon dioxide forms inside the bottle, and escapes through the hole when you remove your finger. Sometimes, the stream of carbon dioxide emerging from the hole is so strong that the flame is literally blown out.
- Incidentally, there is actually a type of fire extinguisher that works in this way, known as a CO_2 fire extinguisher.

- If the experiments don't work the first time round, try again with a little more vinegar and baking powder.