

DIY CLOUD

Clouds aren't always wanted, especially when they bring rain. But you can control the clouds yourself with this classic experiment.

MATERIALS

- Plastic 1-liter bottle with cap
- Hot water
- Measuring cup
- Match (with adult supervision)

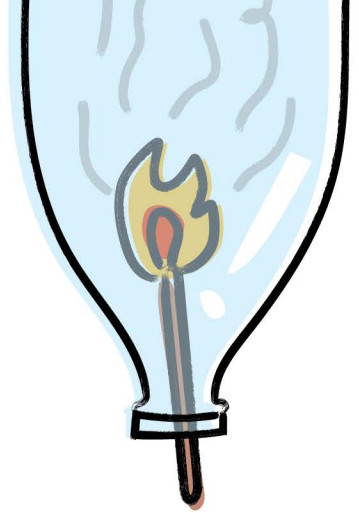
INSTRUCTIONS

Make sure the plastic bottle is empty and clean. Heat one cup of water so it is hot, but not boiling.

Hold the bottle upside down. With an adult helping you, light a match and hold it under the opening of the bottle so the smoke rises into the bottle. Lift the match so it continues to burn while just inside the bottle. Blow the match out and capture the additional smoke in the bottle.

Turn the bottle and hold it slightly angled up so you can carefully pour the hot water into the bottle. Pour about half an inch of water in the bottom and tightly place the cap on the bottle. Squeeze the bottle repeatedly. Does anything happen?

After several squeezes and releases, a cloud should form in the bottle that looks like fog. When you squeeze the bottle, it should clear up and then become cloudy again when you release the pressure.



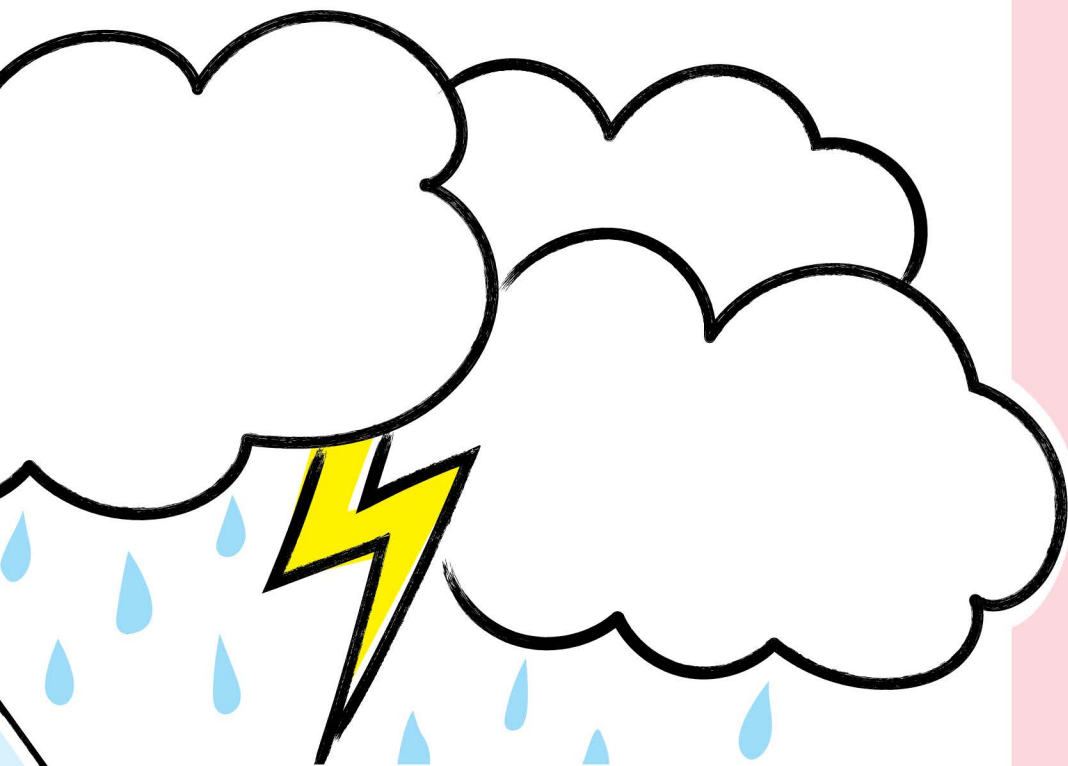
WHAT'S HAPPENING?

This experiment creates a model of a cloud system in a bottle. Clouds form every day around the world. How and when clouds form depends on a few factors including temperature, pressure, water vapor and dust.

Water vapor exists in the atmosphere as individual water molecules bouncing around like the other gases in our atmosphere (nitrogen, oxygen, carbon dioxide and others). The amount or concentration of water vapor varies. When it feels humid outside, there is more water vapor in the air. In the winter, there is less water vapor and the air feels drier.

The amount of water vapor the air can hold depends on temperature. In this experiment, we manipulate the temperature inside the bottle with pressure. When you squeeze the bottle, you increase the pressure inside which raises the temperature. When you let go, the pressure and temperature drop. With lower pressure and lower temperature, water vapor comes together in tiny droplets and a cloud forms.

Why do we add smoke? The cloud effect is more dramatic when there are tiny particles in the air like smoke or dust. Those particles give the water molecules someplace to clump together as they form. So adding smoke particles to the bottle makes it easier for a cloud to form and easier to see. Clouds in the sky naturally form with dust and other particles in our atmosphere.



TIPS

Only use matches with adult supervision!

EXTENSIONS

Make another weather phenomena in a bottle—a tornado! Fill a plastic 1-liter bottle about two-thirds full with water. Place a metal washer on the top of the bottle and put another plastic 1-liter bottle upside down so its top is also on the washer. Connect the two bottles by wrapping their tops (and the washer) with duct tape, creating a seal. Quickly turn the bottles over and place them upright on a table. Move the bottles in a circle and watch the water spiral into a vortex as it drains into the lower bottle.

LEARN MORE

The 40-foot vortex in MSI's *Science Storms* exhibit makes a swirling cloud using ultrasonic vaporizers.

RECOMMENDED READING

The Cloud Book, by Tomie DePaola

Water is Water: A Book About the Water Cycle, by Miranda Paul