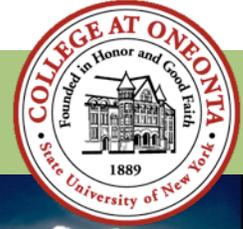


The Cloud in a Bottle



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Using these instructions, you can create your own cloud in a bottle... and learn about the science of how they form and how the ideal gas law works!

Things you need:

- 🕒 A clear plastic two liter bottle
- 🕒 A Fizz-stopper - a type of pump that can be used to keep the carbonation in soda
- 🕒 A 1/4-1/3 cup of water (warm is best)
- 🕒 Glade air freshener

How do you do it?

- 1) Put the water in the bottom of your bottle (just enough to make some “puddles”)
- 2) Using the air freshener, put just a little squirt into the bottle (no more than half a second!)
- 3) Put the fizz stopper on tightly and pump it around 100 times. You shouldn’t pump it over 200 times.



4) Hold the pumped-up bottle in front of a dark background and then open the top of the bottle. And watch the air in the bottle turn white with a cloud!!

5) If you take the cap off, you can actually squeeze some cloud out of the bottle!! Try it!

Questions about how it works:

🕒 Why do you need water in the bottle?

Liquid water is always *evaporating*, or letting water molecules escape and become gaseous water you can’t see. The water in the bottle helps us make sure there is enough water vapor to form a cloud!

🕒 What happens to the air inside the bottle when you pump it up?

The *ideal gas law* tells us that when you increase the pressure of a gas (pump it up), the temperature must go up too! When you release the pressure, the temperature goes back down!

🕒 Why do you need a match or air freshener?

When water vapor cools, it *condenses*, or transforms into a liquid. We see that liquid as a cloud droplet! But before it can do that, it needs something to condense onto. Things like smoke, certain dusts, salt, and air freshener act as *cloud condensation nuclei (CCN)*. Maybe you can experiment with other kinds of particles to see if they are CCNs as well!