



How Do Clouds Form?

Have you ever looked up at the sky and wondered how those fluffy white clouds get there?

You already know that the sun warms up water and turns it into an invisible gas called water vapor.

But how does invisible gas turn into a cloud you can see?

The Ingredients for a Cloud

To make a cloud, you need three things: The first is **Water Vapor**, an invisible gas floating in the air. Next you need **Cooling Air**. As air rises high into the sky, it gets colder. Cold air makes the water vapor turn back into tiny liquid drops. Finally you need something called **Cloud Seeds**. Water vapor needs something to grab onto to make a drop! In the sky, it grabs onto tiny pieces of dust, smoke, or dirt floating in the air.

Cloud in a Bottle!

We have provided a special bottle in your kit so you can make your very own cloud appear and disappear right in your hands.

Materials Included:

- 1 Plastic bottle labeled "Cloud in a Bottle"

WARNING Important Safety Rule:

DO NOT OPEN THE CAP! The bottle is sealed tightly to keep your cloud ingredients trapped inside. If you open the cap, your cloud will escape forever!

Make the Cloud Appear:

1. **Twist the Bottle:** Hold the top of the bottle with one hand and the bottom with the other. Carefully twist the bottom half of the bottle to squish the air inside. Hold it twisted tightly for a few seconds.
2. **Look Closely:** While it is twisted tight, look inside the bottle. It should look perfectly clear.
3. **Let Go:** When you let go, the bottle will untwist very quickly. Let it pop back to its normal shape.
4. **Watch the Cloud:** POOF! A foggy cloud will instantly appear inside your bottle!
5. **Make it Disappear:** Twist the bottle tight again, and watch the cloud completely disappear! You can do this over and over again until the plastic of the bottle starts to get weak. Once the plastic weakens, it is unsafe to continue using the bottle.

When is the Bottle Weak?

- **Stress Marks:** You see deep creases, folds, or white lines forming in the plastic where it is repeatedly twisted.
- **Loss of Shape:** The bottle feels permanently crushed or crinkled and no longer pops back into its normal, round shape when untwisted.
- **Hissing or Leaking:** You hear a hissing sound when squeezing the bottle, which means the plastic has developed a micro-crack and the pressurized air is escaping.



How to Dispose of the Bottle:

Because the bottle contains rubbing alcohol vapor and liquid, an adult should handle the disposal.

Open the bottle in a well-ventilated area, like near an open window or outside. Pour the remaining drops of liquid down a sink drain while running plenty of tap water to safely dilute the rubbing alcohol. Rinse the empty bottle out with tap water, leave the cap off so it can dry, and place the bottle in your standard plastic recycling bin.

The Science Behind the Magic

Inside your bottle is a tiny bit of water and a special liquid called rubbing alcohol. Rubbing alcohol turns into an invisible gas very easily, making it perfect for our cloud.

- When you twist the bottle, you are squishing the air and making high pressure. High pressure makes the air warm up. When the air is warm, the gas stays invisible.
- When you untwist the bottle, you are giving the air more room, creating low pressure. The air quickly cools down. The invisible gas cools off so fast that it turns into tiny drops (condensation) and makes a thick cloud you can see!

