

Make a Cloud

Estimated Time: 30 - 90 minutes

SUMMARY

Where do clouds come from? How do they form in the atmosphere? In this activity, students get the chance to *create* clouds and see the process firsthand. With a container of hot water, a source of cold temperatures, and observation skills, students can create the water cycle right on their kitchen table!

WHAT YOU'LL LEARN

- The water cycle that gives rise to clouds in the atmosphere.
- Types of clouds and their relationship to weather.
- Where water droplets come from and the difference between water vapor and steam.

Materials Used	Resources Used
<ul style="list-style-type: none">• Large Plastic Aquarium or Transparent Container• Plastic Wrap• Glass of 4-6 ice cubes• 250 mL (about 1 cup) very hot water• Flashlight (optional)	<ul style="list-style-type: none">• National Weather Service – Cloud Chart https://www.weather.gov/jetstream/cloudchart

WHAT TO DO

1. Pour hot water into your aquarium (or plastic container). Take care with the hot water (parents should do this for younger students) and don't lean over the container to avoid a face full of steam. Cover the aquarium with plastic wrap (or a lid) quickly to keep the hot, moist air inside.
2. The heat from the water will warm the air inside the container, it will begin to look steamy, and you might start to see some wisps of clouds.
3. As more droplets form in the air inside the container, the white cloud will get darker and grayer, just like heavy storm clouds.
4. Add ice cubes from the glass to the top of the aquarium. This will cool the air and create even more clouds as the air circulates up and condenses.
5. You will see small water droplets forming on the underside of the plastic wrap, inside the container. These droplets are condensing from the moist air inside and are similar to raindrops forming in clouds.
6. If the day is sunny, take the container outside and let it sit in the sun for a bit. This will help the water stay hot and you can leave the demonstration to run for a bit.
7. While it is running, have students note what clouds they can see in the sky. Sketch or describe them for later.
8. Take a look at your growing cloud and see if you can note any changes in it.
9. Use your descriptions and the link in Resources Used to identify the clouds you saw. Are these clouds associated with storms or fair weather? Does this fit the current weather forecast?

TIPS

- Clouds form in this activity because of the hot water at the bottom of the container and the cold temperatures at the top. Air near the hot water becomes full of invisible water vapor and rises up because of its heat. Then it cools near the top of the container (especially when ice is present) and cannot hold as much water vapor, so it becomes liquid water droplets around dust and pollen particles. Too many of those floating droplets leads to heavier droplets which cannot stay aloft and fall as rain. ***The bigger change in temperature you can create between the bottom and top of the container, the more cloud formation you will see.***
- Water droplets at the top of the container are *not* from the ice. This water is condensing from the air in the container. This is the same idea as having a cool glass of water on a hot day: you get condensation on the outside but the water level in the glass remains the same. If you used a cold stone, a frozen ice pack, or any other cold source you would see the same cloud-making effects. If you have access to something suitable, demonstrating this to students can help them fully understand the activity.
- ***Water vapor is not the same as steam.*** Water vapor is an invisible gas state of H_2O that is present nearly everywhere on Earth. When you see steam or mist in the air this is *liquid water* in such a small amount that it can float in the air. This is why you can walk around on a normal day and not see or feel the water in the air, but when it is a misty day or you are in a steamy room you can see the water content and feel it collecting on your clothes and skin.