

Create a Portable Cloud!

The purpose of this experiment is to observe how moisture, pressure, temperature, and condensation nuclei play a role in cloud formation.

Student Learning Objectives

- Students experiment, make observations, and articulate results.
- Students learn the conditions necessary for cloud formation.

Time

- 30 minutes

Materials

For each group of 4:

- A glass or plastic gallon jar with a wide mouth
- Cold water (100 ml)
- Hot water (100 ml)
- Rubber glove
- Matches
- Large rubber band
- Paper and pencil to record observations

National Standards

NGSS ESS2.D

Source

Spark -UCAR Science Education
spark.ucar.edu

Directions

1. **Brainstorm:** what is needed for clouds to form? Students will likely mention that clouds are made of water. In this activity they will make water into a cloud.
2. **Exploring air pressure:** Have students add the cold water to their jar and stretch the open end of a rubber glove over the mouth of the jar with the glove fingers hanging down into the jar. Affix a rubber band to secure the glove. Have one student hold the seal on the mouth of the jar while another tries to pull the glove outward. Ask the students pulling gloves to describe how it feels. Discuss that this decreases the air pressure. Air molecules have to move farther apart to fill in the space. Instruct all students to record what they observe inside the jar as the glove is pulled up and then pushed down. Is there a visible change when air pressure is changed? (There won't be, but this will help students understand the impact of condensation nuclei in part 2 below.)
3. **Exploring condensation nuclei:** Tell students that particles in the atmosphere help clouds form. Instruct students to remove the glove as you drop a lit match into the jar, then quickly seal the jar with the glove as before (containing the smoke within the jar). Instruct students to record what they observe inside the jar as a student pulls the glove up and then pushes it down into the jar. Did the particles aid cloud formation? (Students should notice fog forming in their jar.)
4. **Exploring water vapor:** Discuss the process of evaporation. Have groups repeat the procedure using hot water, which will evaporate more readily than cold water. Instruct students to record what they observe inside the jar as a student pulls the glove up. Did more evaporation aid cloud formation?
5. **Discuss** what helped the cloud to form and how this model is, and is not, like the real world.



Background Information

Air pressure lowers when you pull the glove out of the jar. The jar contains the same number of air molecules, but they occupy more space. Pressure changes in the atmosphere allow clouds to form too. *Condensation nuclei:* Tiny particles, such as dust, dirt, and pollutants, provide surfaces on which water molecules can gather and condense into droplets. The smoke provides tiny nuclei in this activity. *Evaporation:* There must be water vapor in the air to make a cloud. Water vapor is created as liquid water evaporates. Hot water is more likely to evaporate.