

Three Clouds Activity (adapted from *Windows to the Universe*)

Type of Lesson: Demonstration, Hands-on activity

Time Needed: 60 minutes

National Standards Addressed

- Earth and Space Science, Grades K-4: Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.
- Earth and Space Science, Grades K-4: Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.
- Earth and Space Science, Grades 5-8: Clouds, formed by the condensation of water vapor, affect weather and climate.
- Earth and Space Science, Grades 5-8: Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.
- Physical Science, Grades K-4: Materials can exist in different states - solid, liquid, and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling.

Quick Summary of Lesson

This activity provides three different methods for producing clouds. One activity serves as a demonstration and the other two activities serve as hands-on activities for the students.

I. Cloud in a Jar – Teacher Demonstration

Materials

- 1 gallon jar with wide mouth (like a pickle jar)
- 1 plastic storage bag (like gallon size Hefty baggy)
- 1 #64 rubber band
- small amount of water
- one match
- warm overhead projector

Procedure

1. Set up the jar on top of a lit overhead projector. The lighted overhead will focus on the inside of the jar.
2. Put a small amount of water in the bottom of the jar. A 1/4 inch depth should do just fine.
3. Drop a lit match into the jar. The water will put out the lighted match producing the smoke particles necessary for making a cloud in the jar.
4. Place the storage bag inside the jar and fasten the edges to the lip of the jar with the #64 rubber band.
5. Now grab the bottom of the bag (which should be towards the bottom of the jar) and raise the bag up. When the bag is pulled up (decreasing the pressure inside the jar), the water will land on the smoke particles (nuclei) producing a visible cloud.

Notes to the Teacher

- By raising the plastic bag (lowering the pressure) and lowering the bag (increasing the pressure), the cloud will form and disappear!
- Do make sure the room is dark - otherwise you may not be able to see the cloud!

II. Cloud in a Jug – Hands on Activity

Materials for each group

- 1 gallon jug with a small mouth (like an apple juice jug)
- #7-#10 stopper with 2 glass tubes fitted through the holes of the stopper (Size of the stopper needed depends on size of the mouth of the jug. Stopper should fit snugly in the mouth of the jug.)
- sphygmomanometer (pressure bulb with rubber tubing)
- another small piece of plastic tubing to fit over the second glass stopper tube
- pinch clamp
- small amount of water
- one match
- each student will need student worksheet available in Student Activity Sheet section below

Procedure

1. Simply have students follow instructions provided on Student Activity Sheet. Students should answer question prompts as they do the activity.

Notes to the Teacher

- Have students work in pairs for this activity. Have each student complete a Student Activity Sheet for assessment purposes.
- Some background information: when air is compressed, there are more collisions between the molecules in a given period of time -- this is registered as an increase in heat. When air expands, there are less frequent collisions between the molecules of air -- which is registered as a decrease in heat. If an air mass is cooled sufficiently, its dew point will be reached and a cloud will form (or fog will form under certain conditions at ground level).

III. Cloud in a Bottle-Hands on Activity

Materials for each group

- 1 clean, clear 2L plastic beverage bottle with cap
- 1 thin liquid, crystal temperature strip (available in most aquarium stores)
- 1 fizz keeper (available in most large supermarkets in pop or soda aisle)
- tape
- 1 match
- each student will need student worksheet available in Student Activity Sheet section below

Procedure

1. Simply have students follow instructions provided on Student Activity Sheet. Students should fill in the tables and answer prompts as they do the activity.

Notes to the Teacher

- Have students work in pairs for this activity. Have each student complete a Student Activity Sheet for assessment purposes.