



Clues about Clouds

Primary Audience: 6th – 9th

Description: Make a cloud in a plastic bottle to learn about condensation, evaporation, and air pressure.

Key Words: Clouds, Condensation, Weather, Air Pressure, Evaporation

Materials:

- Clear plastic bottle such as a 2 liter drink bottle
- Matches and an adult to help you use them
- Warm water

Instructions:

1. Fill the bottle about 1/4 to 1/3 full of warm water.
2. As the warm water evaporates, it adds water vapor to the air in the bottle. This is the first ingredient needed to make a cloud! Have an adult strike a match and let it burn a little.
3. Drop the match into the bottle and quickly put on the cap, trapping the smoke inside. Dust, smoke or other particles in the air are the second ingredient needed to make a cloud. The smoke particles give the water vapor a center to condense around.
4. Squeeze the bottle hard. As you let go, the cloud should form. The third ingredient in a cloud is a drop in air pressure. You have just created this pressure drop by first raising the pressure (squeezing the bottle) and then letting go.
5. If the cloud did not form, light another match and try again. If it still did not form, try warmer water. If it STILL did not form, perhaps you didn't squeeze hard enough, or there could be a hole in the bottle.

What's Going On?

In the bottle, the water vapor comes from the warm water evaporating. In the atmosphere, the water vapor comes from the evaporation of natural bodies of water such as lakes, rivers and oceans. There must be particles in the air for the water vapor to condense around. In our experiment, the smoke provides the particles. In the real world, pollution and naturally occurring dust from volcanoes and dust storms provides the particles. Cloud formation only occurs when there is a drop in pressure. In the atmosphere, this occurs when warm air rises and

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expands. When the air expands, the air molecules are farther apart and there is less pressure, so cloud formation can occur if there is water vapor in the air and particles for the cloud to condense around.

Relevant Ohio Science Content Standards:

Physical Science 3-5 B: Identify and describe the physical properties of matter in its various states.

- 4.4: Explain that matter has different states (e.g. solid, liquid and gas) and that each state has distinct physical properties.

Physical Sciences 6-8 A: Relate uses, properties and chemical processes to the behavior and/or arrangement of the small particles that compose matter.

- 6.4: Describe that chemical and physical changes occur all around us.

Earth and Space Sciences 3-5 D: Analyze weather and changes that occur over a period of time

- 4.3: Identify how water changes from one state to another (e.g. freezing, melting, condensation and evaporation).
- 4.4: Describe weather by measurable quantities such as temperature, wind direction, wind speed, precipitation and barometric pressure.

Earth and Space Sciences 6-8 C: Describe interactions of matter and energy throughout the lithosphere, hydrosphere and atmosphere (e.g. water cycle, weather and pollution).

- 7.3: Describe the water cycle and explain the transfer of energy between the atmosphere and hydrosphere.