

## Clouds in a Bottle Demonstration

To accompany

<http://serc.carleton.edu/eslabs/weather/3b.html>

Goal: Create clouds-in-a-bottle to demonstrate the role of pressure changes cloud formation.

Gather these materials:

- clear plastic 1 or 2-liter bottle, with cap
- long-stemmed matches, or matches and wooden splints
- water
- liquid crystal temperature strip, available at aquarium supply stores
- clear tape



1. Read the information about cloud formation and mountain ranges on your station card or on the Earthlabs website. As you read, relate the information on the card to the steps in your demonstration.

2. Assemble and practice your demonstration of cloud formation

### Temperature and Pressure

- a. Hang the temperature strip inside the middle of the bottle, using tape.
- b. Seal the bottle, and let it rest a few minutes.
- c. Read the temperature shown on the temperature strip
- d. Compress the bottle, decreasing the volume of air inside the bottle
- e. Hold the bottle in its compressed position for 30 seconds or more, in order to let the strip sense the new temperature and then read the temperature.
- f. Release the pressure on the bottle and record the change in temperature.
- g. Repeat the procedure several times.

### Cloud formation and pressure

- a. Remove the bottle cap and add a small amount of water to the bottle.
- b. Swirl the water to wet the bottle; pour out the excess.
- c. Have one person light a match and blow it out.
- d. Meanwhile, have a second person compress the bottle.
- e. Hold the smoking match near the bottle and release the pressure on the bottle, drawing the smoke into the bottle. Quickly cap the bottle tightly.
- f. Apply and release pressure on the capped bottle. A cloud will appear in the bottle.

3. Review the information about mountain ranges and topography on your station card and discuss the similarities and differences between the cloud-in-a-bottle demonstration and the uplifting due to mountain ranges.

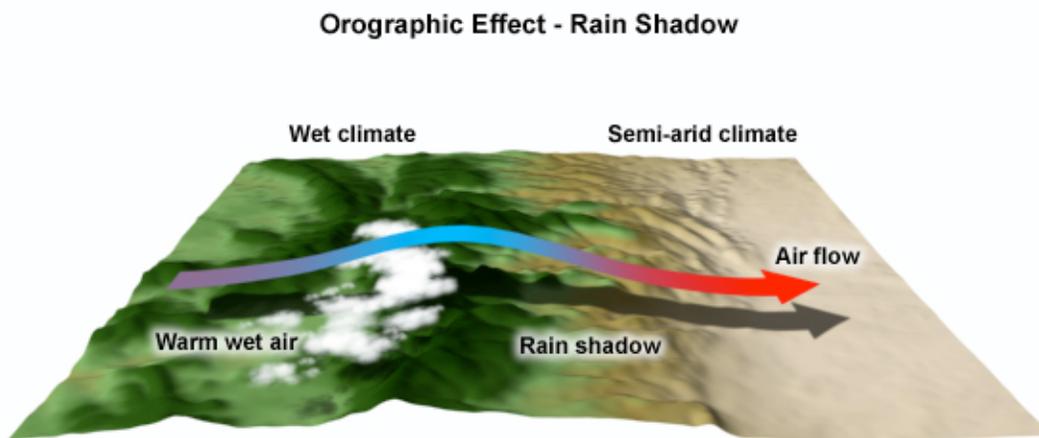
4. Prepare the demonstration for the class. Make sure that everyone on your group has a role in the demonstration.

Optional: Watch a version of the procedure on You-Tube.  
<http://www.youtube.com/watch?v=E8AvfXar9zs>.

If you can't access streaming video sites, similar instructions, with pictures, are available from <http://www.wikihow.com/Make-a-Cloud-in-a-Bottle>

### Mountain ranges and topography

Mountain ranges also influence regional weather and climate. As air flows upward over a mountain range, it expands, cools and condenses. The windward (upwind) sides of mountain ranges are moist, rainy and cool. As the air descends on the other side of the range, it is compressed and warms. These warm and dry, downslope winds can be quite strong and often are given their own unique names. Areas on the leeward (downwind) side of mountains are generally arid. For example, compare the climate of California to Nevada.



As air is forced upward over the mountains, it cools,  
causing water vapor to condense and rain out.