

## Greenhouse Effect Demonstration

From UCAR Atmospheric Science

### Explorers

In class, in newspapers, or on TV, you have probably heard of the 'greenhouse effect.' In order to understand what this is, you need to first understand how a real greenhouse works.

Greenhouses are used extensively by botanists, commercial plant growers, and dedicated gardeners. Particularly in cool climates, greenhouses are useful for growing and propagating plants because they both allow sunlight to enter and prevent heat from escaping. The transparent covering of the greenhouse allows visible light to enter unhindered, where it warms the interior as it is absorbed by the material within. The transparent covering also prevents the heat from leaving by reflecting the energy back into the interior and preventing outside winds from carrying it away. In this activity you will be building and investigating a simple model greenhouse.

### Materials (per team)

Two two-liter plastic soda bottle "experimental chambers" (instructions to follow)

Two 14- to 16-oz. plastic containers at least 4 1/2 inches in diameter at the top (sour cream, cottage cheese, or deli containers work well)

Knife or scissors

Tape

Two thermometers

One 150-watt floodlight and stand

According to your teacher's directions, form teams of four and gather the materials listed above.

#### A. Experimental chamber construction

For each chamber, you will need a two-liter plastic soda bottle (with cap) and a 14- to 16-oz. plastic container for the base.

1. Remove the bottle label by soaking it in warm water.
2. Cut off the end of the bottle approximately 2 inches from the bottom and discard the bottom piece.
3. Place the capped bottle in the plastic base and the experimental chamber is ready for use.



#### B. Experimental Procedure

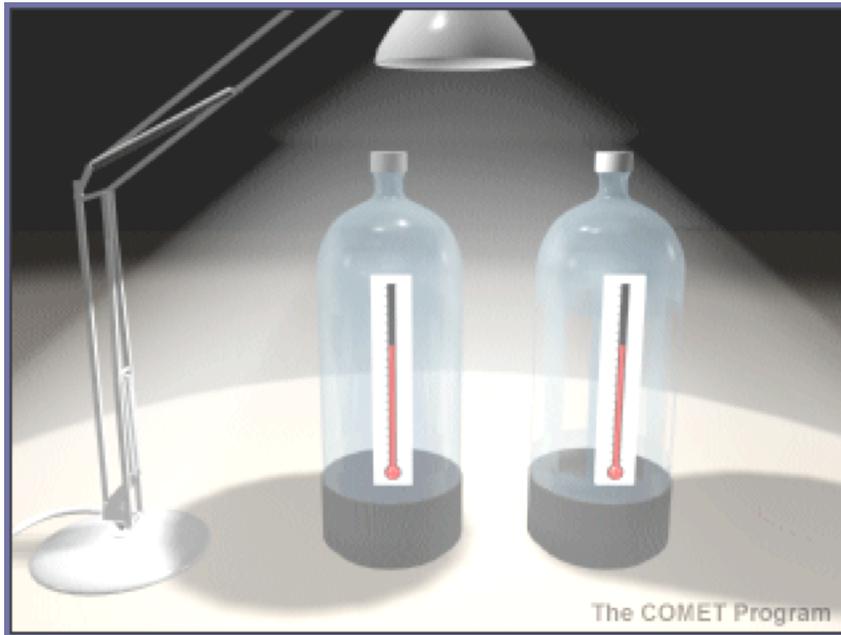
1. Use scissors to cut several elongated vents (1 x 4 inches) in the sides of one of the bottles. Leave

the second bottle intact.

2. Tape a thermometer (using cellophane tape or light-colored masking tape, not black electrical tape) to the inside of each bottle (facing out). Make sure the bulbs of the thermometers are above the top of the chamber base. (See graphic below.)

3. Place caps on both bottles.

4. Place both bottles approximately six inches away from the lamp with the thermometers facing away from the light. DON'T TURN ON THE LAMP yet !



5. Predict which bottle will get hotter when you turn on the light.

6. Turn on the light and begin collecting data every minute for 20 minutes.

### Observations and Questions

Record and graph the data in your lab book or on a separate piece of paper. Then answer the questions below.

1. Compare and contrast the graphed data from the vented bottle and the intact bottle. What happened?
2. How do you explain your observations?
3. Discuss the results with your class and develop some possible explanations.
4. Compare and contrast your plastic greenhouse to the greenhouse effect on earth.