



# Greenhouse in a Beaker

## Question

What affect does adding carbon dioxide to the air have on the air's temperature during the day and during the night?

## Hypothesis

In your science notebook, record your hypothesis in an "If...then...because..." format.

## Materials

- |   |                                   |
|---|-----------------------------------|
| ▪ 2 600 mL Beakers  | ▪ 1 Ruler                         |
| ▪ 1 250 mL Flask  | ▪ 2 Probe thermometers            |
| ▪ 1 Rubber stopper with hole                                  | ▪ Small piece of masking tape     |
| ▪ 1 Vinyl tubing, 3/16" diameter, 60 cm long                  | ▪ 4 Alka-Seltzer® tablets         |
| ▪ 1 Clip light  | ▪ Safety glasses                  |
| ▪ 1 1000-1100 lumen Bulb (equivalent to 75-watt incandescent) | ▪ 240 mL Water (room temperature) |

## Procedure

### Part 1—Day

1. Set up the light source 15 cm in front of the two beakers. The beakers should be receiving equal light.
2. Insert the tubing through the hole in the 250 mL flask, making sure to keep the tubing from reaching the bottom of the flask. Place the other end of the tubing near the bottom of one of the beakers. Secure the tubing inside this beaker with a small piece of masking tape.
3. Add 120 mL of water to the flask. Be sure the tubing is not in the water.
4. Turn on the clip light. Wait for the temperature in each beaker to stabilize. The temperatures in the beakers should be similar, but they do not have to be exactly the same.
5. Record the stable temperature of each beaker in the data table.
6. Break two Alka-Seltzer® tablets in half and drop the pieces into the flask. Secure the rubber stopper into the flask and make sure the tubing still leads from the flask to the beaker.
7. Record the temperature of each beaker every 30 seconds for three minutes.

### Part 2—Night

1. After you have data to model temperatures during the day, empty out your beakers and flask. Refill the flask with 120 mL water. Resecure the tubing inside one of the beakers.
2. Turn on the clip light. Wait for the temperature to stabilize. The temperatures in the beakers should be similar, but they do not have to be exactly the same.
3. Record the stable temperature of each beaker in the data table.
4. Break two more Alka-Seltzer® tablets in half and drop the pieces into the flask. Secure the rubber stopper as done before.
5. Turn off the light.
6. Record the temperature of each beaker every 30 seconds for three minutes.

## Data

Record your data in these tables or copy the tables into your science notebook.

### Simulated Day Data

	BEAKER 1 (WITHOUT CO <sub>2</sub> )	BEAKER 2 (WITH CO <sub>2</sub> )
Beginning Temperature		
30 seconds		
1 minute		
1 minute, 30 seconds		
2 minutes		
2 minutes, 30 seconds		
3 minutes		

### Simulated Night Data

	BEAKER 1 (WITHOUT CO <sub>2</sub> )	BEAKER 2 (WITH CO <sub>2</sub> )
Beginning Temperature		
30 seconds		
1 minute		
1 minute, 30 seconds		
2 minutes		
2 minutes, 30 seconds		
3 minutes		

Create a graph displaying both the day and night temperatures for both beakers.

### \* Conclusions

1. Do you accept or reject your hypothesis? What were the results of your investigation? Use data to explain what happened.
2. Why do you think this happened?
3. How does this demonstration relate to climate change?