

Activity: Green House in a Beaker

Modified from National Energy Educational Development program (NEED)

Question

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

Hypothesis:

(if, then statement)

Part 1: Daytime Model

What to do:

1. Set up the light source 15 cm in front of the two beakers. The beakers should be set up so that they receive equal light.
2. There is a rubber stopper with some tubing connected to it at your station. Place one end of the tubing near the bottom of the beaker. Secure the tubing inside the beaker with a small piece of masking tape.
3. Add 125 ml of water to the **flask** (not the beakers).
4. Place thermometers in each of the beakers.
5. Wait for the air temperature in each beaker to remain constant. The temperatures in the beakers should be similar, but they do not have to be exactly the same.
6. Record the stable temperature of each beaker in the data table.
7. Turn on the light source.
8. Break two Alka-Seltzer tablets in half and drop the pieces into the flask. Secure the rubber stopper. The Alka-Seltzer tablet is a source for CO₂ gas.
9. Record the temperature of each beaker every 30 seconds for three minutes.



MOST*

MATERIALS NEEDED

Two 600 ml beakers
1 250 ml flask
1 rubber stopper with hose
1 vinyl tubing 3/16 diameter, 60 cm long
1 clip light with 1 75 watt bulb
1 ruler
2 probe thermometers
Small piece of masking tape
2 Alka-Seltzer tablets
Science notebook
Safety glasses
240ml water room temp.
stopwatch

Students should be able to:

Record their data and graph their results
Determine what the data means
Apply their data to Earth's atmosphere

New York State Standards

Standard 1: Mathematical Analysis
Key Idea 1: M1.1a, M1.1b,
Key Idea 2: M2.1a
Key Idea 3: M3.1, M3.1a

Standard 1: Scientific Inquiry:
Key Idea 1: S1.2b
Key Idea 2: S2.1, S2.1a,
S2.1b, S2.1d
Key Idea 3: S3.1, S3.1a,
S3.1b, S3.2,
S3.2f, S3.2h

Standard 1: Engineering Design:
Key Idea 1: 1.4
Key Idea 2: 2.1, 2.2, 2.3
Key Idea 5: 5.2

General Skills: 1, 2, 3, 4, 8, and 9

Standard 4: Physical Environment
Key Idea 2: 2.1a, 2.2j,
2.2k, 2.2r
Key Idea 3: 3.1d, 3.1h

Activity: Green House in a Beaker

Create a graph in your science notebook displaying both the data for the beaker with CO₂ and the one without CO₂. An example is provided.

	Beaker 1 (without CO₂)	Beaker 2 (with CO₂)
Beginning Temperature without Light		
30 Seconds		
1 minute		
1 minute 30 seconds		
2 minutes		
2 minutes 30 seconds		
3 minutes		

The Greenhouse Effect

Read the information from NASA's Climate website <http://climate.nasa.gov/causes/> and then summarize the greenhouse effect in your notebook using pictures to help explain what occurs.

Conclusion

Answer these questions in your science notebook:

Do you accept or reject your hypothesis?

What did the Alka-Seltzer add to the experiment?

What were the results of your investigation?

Use data to explain what happened. Why do you think this happened?

How does this demonstration relate to climate change?