

Greenhouse Effect Exploration

Lab Guide

Name

Date

PART A: EXPERIMENT

What is a greenhouse? What does it do? How might the Earth be like a greenhouse? In this short experiment, you and your partner will investigate the greenhouse effect.

PREDICTION:

After reading through the experiment steps below, I predict that the air temperature inside of the plastic bag with the carbon dioxide (Thermometer A) will be _____ (higher/lower/the same) in comparison to the air in the plastic bag without the carbon dioxide (Thermometer B).

The reason that I think this will happen is:

Equipment Needed:

- Two thermometers
- Two small paper cups
- Two large plastic bags that will seal
- Two tablets of sodium bicarbonate
- Timer, watch, or clock
- A sunny area to work, either outdoors or indoors

Procedure:

1. Pick a spot outdoors that will be in full sunlight for at least 45 minutes.
2. Put both thermometers in direct sunlight and allow them to remain undisturbed there for three minutes.
3. After three minutes, record the temperature of each thermometer in the top row of the data table labeled "Initial."
4. Place a cup of water into one of the plastic bags. Be careful not to spill any water in the bag. Place the thermometer in the bag next to the cup. Have one person drop both of the sodium bicarbonate tablets into the cup of water. As soon as the sodium bicarbonate has been added, seal the bag.

5. Place another cup of water into the second bag. Place the second thermometer next to it and seal the bag.
 - The bag with the sodium bicarbonate represents the greenhouse effect in our atmosphere because the sodium bicarbonate tablet releases carbon dioxide.
 - The bag without sodium bicarbonate represents our atmosphere without greenhouse gases like carbon dioxide.
6. For the next 45 minutes, check the thermometers and record the temperature every five minutes.

Time Elapsed	Thermometer A – w/sodium bicarbonate (CO₂) Temperature (°F or °C)	Thermometer B – w/o sodium bicarbonate (no CO₂) Temperature (°F or °C)
Initial		
After 5 mins		
After 10 mins		
After 15 mins		
After 20 mins		
After 25 mins		
After 30 mins		
After 35 mins		
After 40 mins		
After 45 mins		



Analyze:

1. How did the sodium bicarbonate tablet (carbon dioxide gas) affect the temperature of Thermometer A?

2. Why do you think the air with greenhouse gases gets warmer than the air outside of the bag? How does the greenhouse gas carbon dioxide affect the incoming sunlight?

3. How is this experiment useful for understanding Earth's atmosphere?


4. How do you think the actual greenhouse effect is different from this experiment?

5. How do you think fossil fuel combustion impacts Earth's atmospheric temperatures? Explain your answer using terms from your carbon cycle model.

PART B: FURTHER RESEARCH

Read the [Greenhouse Effect](#) article and answer the following questions based on the reading.

1. Create a labeled diagram showing how the greenhouse effect works. Be sure to include the following terms in your diagram: greenhouse gases, incoming light, heat, and include at least two sources from which greenhouse gases originate.
2. How is the greenhouse effect helpful for life on Earth?
3. What are natural sources of greenhouse gases?

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4. What kinds of human activities contribute to greenhouse gas emissions?
 5. What are the main sources of carbon in the greenhouse gas carbon dioxide (hint: think about your carbon cycle model)?
 6. What is the immediate impact of increasing greenhouse gas emissions?
 7. What secondary impacts result from increasing greenhouse gas emissions?
 8. What are three solutions humans can implement to reduce greenhouse gas emissions?