

5.1

GLOBAL WARMING

How is a ziplock baggie like the atmosphere?

Activity Time: 30 minutes

Background

Many scientists believe that recent global warming is due to increasing greenhouse gases in the atmosphere. These gases, such as carbon dioxide and methane, absorb and re-radiate heat, trapping it close to the earth's surface like a greenhouse. The greenhouse effect warms the polar air and water that circulate into the Polar Regions. In this experiment, a light strikes a thermometer and heats it. The plastic bag traps the heat. The closed baggie (like the atmosphere) keeps the thermometer reading higher than the one outside the plastic bag.

Directions

1. Talk with the students about their experiences in a greenhouse. How do you feel inside a greenhouse? What is the purpose of a greenhouse?
2. Ask a student to read the temperature on the thermometer.
3. Ask another student to shine a flashlight on the thermometer for a minute and read the temperature. What caused the temperature to rise?
4. Explain that we get little heat from the sun; instead it is energy that comes in the form of visible light. When the light strikes an object, the energy is absorbed and turned into heat. The warm object then heats up the air around it. Illustrate this by drawing a line that represents land and the atmosphere above it. Show them that the atmosphere traps the air close to the surface of the earth like a greenhouse. A globe with a shower cap on it would illustrate this as well.
5. Ask students to do this activity using the directions provided.

Discussion

- Why was the thermometer in the baggie warmer than the one out of the baggie?
- How was the baggie like the atmosphere?
- What kinds of gases trap the heat in the atmosphere? *[Mainly it comes from CO₂ by burning fossil fuels (burning coal, oil and natural gas), and a smaller amount is methane gas from rotting vegetation, swamps and animal waste and gas pipe lines.]*
- How many degrees do you think the earth is warming? *(1.4 degrees in the last century)*

Assessment

Use question #7 on **Worksheet 5.1** to check for understanding.

Extension

Design your own experiment about the Greenhouse effect without using a baggie.

Related Activities

- Why is albedo important in the polar regions? **(5.3)**

Materials

- Flashlight for demonstration
- Globe
- Clear shower cap

Per Group:

- 1 ziplock bag
- 2 small thermometers
- Clock or stopwatch
- Lamp or sunny spot
- 1 sheet of student directions

Vocabulary

Iceberg: mass of freshwater ice that is calved, or broken off, from a glacier or an ice shelf (a huge slab of permanent ice that floats on water).

Volume: in mathematics, the amount of space occupied by a three-dimensional solid body.

ALIGNMENT TO NGSS:

Scientific and Engineering Practices

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Crosscutting Concepts

- Cause and effect
- Systems and models
- Energy and matter
- Stability and change

Disciplinary Core Ideas

- K-5: ESS2.A; ESS2.D; ESS3.C
- 6-8: ESS2.A; ESS2.D; ESS3.C; ESS3.D