

Title: How Greenhouse Gases Affect Global Warming

Subject: Science

Grades: 8th Grade

Rational or Purpose:

Students will construct three models to show how the effects of excess amounts of Greenhouse gases will increase the atmospheric temperature by the Greenhouse effect.

Materials needed:

For each student:

- Data Table Handout
- Quiz

For each group:

- Procedure Handout
- Computer with Logger Pro Software
- 3 temperature probes
- 1 lamp
- baking soda
- 4 beakers
- 3 small rulers
- tape
- soil
- plastic wrap
- vinegar

Lesson Duration: 60 minutes

Source:

Laying the Foundation in Middle Grades Life and Earth Science

TEKS:

(1) (A), (2) (A-E), (3) (A-D), (4) (A-B), (10) (B), (12) (C), (14) (C)

Background:

In the last 100 years greenhouse gases have been increasing in the Earth's atmosphere. Scientists have proposed that this increase in greenhouse gases like Carbon Dioxide is aiding in the phenomenon known as Global Warming. By comparing two different models that have the same characteristics as our atmosphere with different amounts of greenhouse gases, we can see the effect of the release of these gases on the Earth in relation to Global Warming.

Activity:

Students will be able to develop different types of models of the environment in order to observe the differences in temperature that are produced by increasing greenhouse gases.

- Observe the temperatures produced from the models and explain what made it different and which is the highest.
- Use software and collect data.
- Observe and explain how the greenhouse effect helps with global warming.

Procedure:

1. Give out handouts and ask students to get into groups of four.
2. Tell the class that they will do an experiment to see how greenhouse gases increase Global Warming. (Have half of the class follow instruction 1 while the other half of the class follows instruction 2.)
3. Have the students follow the procedure handout and do the experiment.
4. After the students cleaned up their lab stations, have them get back to groups and analyze their data and finish the questions on the Data Handout.
5. Have the class get back together and discuss why the Greenhouse gases produced more heat. Also discuss global warming and how this may aid in the process. Also go over the questions from the conclusion.
6. Give Quiz after discussion and turn in all handouts.

Name: _____

Greenhouse Gases Investigation

In the last 100 years, Greenhouse gases have been increasing in the Earth's atmosphere. Scientist has proposed that this increase in greenhouse gases like Carbon Dioxide is aiding in the phenomenon known as Global Warming. From comparing different models that have the same characteristics as an atmosphere and different amounts of greenhouse gases, we can see the effect the increase of the release of these gases effect the Earth and Global Warming. In this lab we will be making our own Earth with different gases held by a made atmosphere. There will be three different situations with one being the control that is a beaker with no atmosphere. The other two models will have an atmosphere made by putting plastic over the top of the beakers. One beaker will have ordinary air while the other will have extra amounts of Carbon Dioxide. By testing these environments, we can see what causes more heat in which aids in Global Warming.

Materials:

- Computer with Logger Pro Software
- 3 temperature probes
- 1 lamp
- baking soda
- 4 beakers
- 3 small rulers
- tape
- soil
- plastic wrap
- vinegar

Procedure:

1. Gather all of the materials listed above.
2. Make a hypothesis about which beaker will have the highest temperature.
3. Set up the computer and Logger Pro that all three temperature probes can record on one data sheet on the computer.
4. Now tape each probe to a ruler so that the ends of the probes do not touch the bottom of the beakers. This will give a more accurate data.
5. Prepare three beakers with soil. Only have a layer of soil one cm deep in each.
6. Next put one probe and ruler combination into each beaker with soil.

7. One of these beakers is your control so you can set one on the side since it is finished. The other two are what you are comparing to see what happens with an atmosphere and having an atmosphere with greenhouse gases.
8. No in order to have the greenhouse gas, we must make it so grab your fourth beaker and make Carbon Dioxide. The best way to make Carbon Dioxide is to mix fifteen grams of baking soda with twenty mL of vinegar. This produces a heavy gas and you are able to pour it into one of the beakers.
9. Slowly pour the Carbon Dioxide in one of the beakers slowly and make sure that none of the liquid is poured.
10. Immediately cover both atmospheric models with plastic wrap to make an atmosphere. (Make sure the Carbon Dioxide model is done first so no gas escapes.)
11. Position all three beakers underneath your lamp. Turn on your lamp and click on the collect button to collect the temperature data from the probes.
12. For groups having to do Instruction 1, the group should keep their lamps on for 15 minutes recording the data every minute. For groups doing Instruction 2, the group should leave the lamp on for 5 minutes and then cut it off for another five minutes. Then put the lamp back on for the last five minutes and record data every minute.
13. When the fifteen minutes are up, turn off the lamp and clean up the lab station putting all the materials back where found.

Analysis:

1. Use Excel and plot the data collected in four different graphs. One for each one and one with all three plots together.
2. Print out two copies of your graphs and give one to another group that did a different instruction than you. Look at the graphs and answer questions.

Name: _____

Greenhouse Gases Data Sheet

Data:

	Beaker 1	Beaker 2	Beaker 3
Time (minutes)	Probe 1 (Celsius) Control	Probe 2 (Celsius) Normal Atmosphere	Probe 3 (Celsius) Atmosphere with Carbon Dioxide
Initial Temperature			
1 minute			
2 minutes			
3 minutes			
4 minutes			
5 minutes			
6 minutes			
7 minutes			
8 minutes			
9 minutes			
10 minutes			
11 minutes			
12 minutes			
13 minutes			
14 minutes			
15 minutes			

Conclusion:

1. Why are there two types of data being used? (Hint: What happens when lamp is off?)

2. Which environment model has the highest temperature?

3. Name one example that this phenomenon can be seen or felt?

Name: _____

Greenhouse Gases Quiz

1. What type of Greenhouse Gas is used in this experiment?
2. Which beaker gave the highest temperature? Why?
3. Why did we have two types of data and the significance from doing it?
4. Did the atmosphere beakers increase or decrease in temperature compared to the control?
5. Explain how this experiment relates to Global Warming.