

HOW-TO GUIDE: Greenhouse Effect Demonstration

This demonstration will show the effect that increased carbon dioxide has on atmospheric temperature. The total time for this demonstration is about one hour.

Step 1

Partially fill both bottles with water.



Step 2

Cover the top of one bottle with the duct tape and poke a small hole through the top with scissors (have an adult help you). Then, put the thermometer through the hole. *Alternatives would be to secure the thermometer using clay or using digital thermometers probes instead of glass thermometers.*



Step 3

Drop the seltzer tablets in the second bottle. Cover immediately using one of the options above to secure the second thermometer in the top of the second bottle.



Step 4

Record the temperature of each bottle immediately. Measuring the temperature immediately after adding the seltzer tablets eliminates the possibility that adding seltzer adds heat somehow.



MATERIALS NEEDED

- 2 clear 2-liter soda bottles (remove the label, bottle cap, and rinse it out)
- Water
- Duct tape (*alternative: clay*)
- Scissors
- 2 glass thermometers (*alternative: digital thermometer probes*)
- 2-4 seltzer tablets
- Tabletop lamp (*at least 100W bulb*)
- Timer

Step 5

Turn the high-wattage lamp on, making sure that the light is shining *directly* and *evenly* on both bottles.



Step 6

Observe and record the temperature of each bottle every 20 minutes (using the timer) for the next hour.



At the end of the hour, which Bottle is showing a higher temperature?

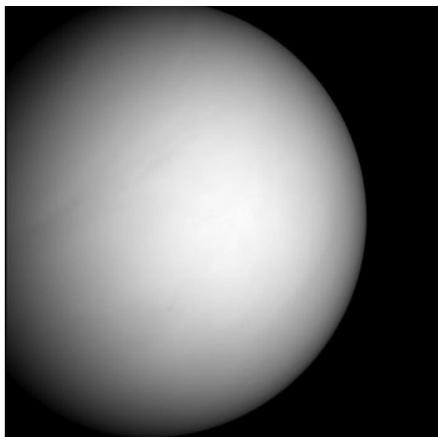
What does this mean for the effect that carbon dioxide has on atmospheric temperature?

How does this activity demonstrate the greenhouse effect that naturally occurs in Earth's atmosphere?



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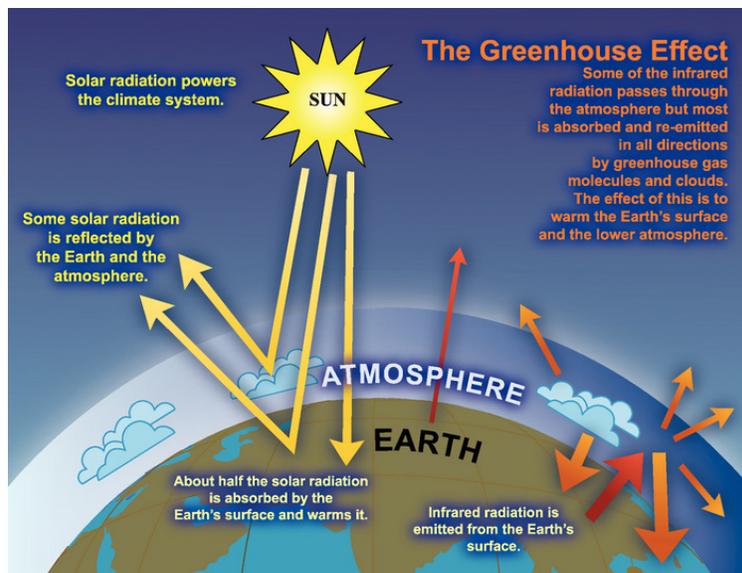
Greenhouse Effect



Fun Fact

To see the full effect of the greenhouse effect, look at the planet Venus. The atmosphere of Venus consists of 96% carbon dioxide, 3.5% nitrogen, with the remaining amount, less than 1%, other gases. The carbon dioxide atmosphere has allowed the temperature of the surface to exceed 900°F (482°C). This is hot enough to melt lead.

Spacecraft that have successfully landed on Venus, despite being well protected, have lasted only about an hour in the excessive heat and crushing pressure.



Sources

Learning Lesson: It's a Gas, Man from National Weather Service's JetStream Online School for Weather (www.srh.noaa.gov/jetstream/atmos/ll_gas.htm)
Climate Literacy and Energy Awareness Network (<http://cleanet.org/clean/community/activities/c2.html>)



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