



Drexel-SDP GK-12 ACTIVITY

Subject Area(s): Solar Energy

Associated Unit: None

Lesson Title: Green House Effect

Header:



Image 1

Description: Picture of a plant sprouting a flow the looks like the earth. The entire plant is inside a greenhouse with the sun beating down on it.

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Grade Level 5

Lesson # 1 of 1

Time Required : 1 hour

Summary

In this activity, students will learn about what the green house effect is and then will conduct an experiment to demonstrate the green house effect.

Engineering Connection

The greenhouse effect is one of the biggest environmental issues of the modern world. In order to reduce the potentially devastating effects of the greenhouse effect, it will involve the work of various types of engineers.

Keywords

Solar energy, green house effect

Educational Standards

- Science: 3.7, 3.1.5, 3.2.5
- Math: Graphing

Pre-Requisite Knowledge

Learning Objectives

After this lesson, students should be able to:

- Explain what the green house effect is.
- Explain the green house effect and how it relates to the environment.

Introduction / Motivation

Ever wonder why when we leave a car parked in the sun with the windows up, it gets really hot? Any ideas what a greenhouse is? What is a greenhouse used for, what is it made out of, etc...? How does the sun which is millions of miles away heat the earth and once heated, how does the earth stay warm?

Sun's rays travel to the earth in the form of the electromagnetic spectrum (i.e. infrared, ultraviolet, light, etc.). When the rays hit the earth, or any object for that matter, some of the rays are converted into heat. The heat will be emitted back into the atmosphere unless there is something to contain it. For example, the glass windows of a car keep the heat trapped within the car, the plastic or glass covering of a greenhouse keep the heat within the greenhouse. Surrounding the earth is a layer of gas, specifically carbon dioxide, that works like the glass in a car window. Carbon dioxide provides a layer around the earth that keeps heat in. As we, as humans, continue burn things, such as gasoline, the emissions are composed primarily of carbon dioxide. The increased burning of fuels, coal, etc. has led to an excessive and overwhelming release of carbon dioxide into the atmosphere which is causing more and more heat to become trapped in the earth's atmosphere, the end result being, global warming.

Vocabulary / Definitions

Word	Definition
Greenhouse effect	Process in which the emission of infrared radiation by the atmosphere warms a planet's surface. Gases in the earth's atmosphere trap in this warmth.
Absorb	To take in, retain

Associated Activities

Materials

- Tap water
- Desk lamp
- Clear plastic cup (6-12 oz)
- Thermometer
- Clear plastic bag

Pre-Activity Preparation

- Chill the water so that the temperature change will be more dramatic

With the Students

1. Start by asking the students general questions about greenhouses, heat within a car, etc... and reviewing with them the greenhouse effect.
2. Have the students break into groups (no more than 4 per group) and designate who the temperature readers and recorders are going to be.
3. Each group will get one desk lamp and two cups filled with cold water. Place a thermometer in each cup and cover one of the cups with the plastic bag. Note, the thermometer may need to stick out of the bag, but it is important for the bag to remain closed and not to let heat escape. Students like to take the thermometer out of the water when reading the temperature, this is not advised. Suggestion would be to tape the thermometer to the bag to prevent air from escaping.
4. Place the cups so they are equally under the desk lamp.
5. In their lab books, students will make a table with four columns. The first column is the actual time (i.e. 10:00), the second column is the amount of minutes the cups have been under the light (should just be the recorded time minus the first recorded time), and the next two columns are temperature for each cup.
6. Have the students record the first temperatures than turn on the lights.
7. Record temperatures every couple of minutes for about a half hour.
8. Make two time vs. temperature graphs (one for each cup).

Lesson Closure

Investigating Questions

- Any difference in the temperatures?
- If so, what caused the differences?
- If not, what went wrong with the experiment and/or what could be done to emphasize the temperature change?

- How is the baggie representative of greenhouse gases?
- What can be done to lower the emission of greenhouse gases?

Lesson Extension Activities

Students may have found little temperature difference between the cup with the bag vs. the cup without. This is probably because the students didn't keep the bag closed or because the experiment wasn't run long enough. The other possibility could be that the clear bag, clear cup, and clear water did not allow for the absorbance of the rays from the desk lamp. Go over with students what color absorbs the most heat (i.e. black) and think about how to improve the experiment. What if black food coloring was added to the water? What if the cups were placed on a black background? Potentially repeat the experiment to determine the results.

References

www.wattsonschoools.com

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