

Lesson plan for *The Greenhouse Effect* : <http://phet.colorado.edu>

Learning Goals: Students will be able to

- Compare and contrast “light photons” and “infrared photons”.
- Identify what happens to light photons when they get to Earth and why the temperature of the earth and its atmosphere changes.
- Design experiments to observe how clouds change the photons behavior
- Design experiments to observe how greenhouse gases change the photons behavior
- Compare and contrast cloud behavior and greenhouse gas behavior.
- Use the Photon Absorption tab to identify if molecules are Greenhouse Gases and give the microscopic evidence that supports your ideas.
- Explain why inside a building or car sometimes is a different temperature than outside.

Extension:

- Discover when the “Ice Age” was and what has changed about the composition of the greenhouse gases.

Background:

My students are in a regular chemistry course and most have not had physics. They were introduced to the photon representation for light in an activity [Models of the Hydrogen Atom](#) after which I used Neon Lights and Other Discharge Lamps as part of the post lab discussion. We did this activity as part of a unit about covalent compounds where they had built models of several compounds.

The Greenhouse Effect Introduction:

I did not demonstrate anything about how to use the sim. There is no PhET Teacher Tips for this sim. I had my students start with investigating what clouds do and then relate how greenhouse gases act. My students in general had no problems except for a few students. I encouraged them to move the slider on amount of gas to “lots” and then had them describe their observations. I was happy to see that students were able to make good observations and conclusions on the **Photon Absorption** tab.

Lesson: My students mostly worked in pairs. This was an activity that followed a test on Covalent Compounds. We have 95 minute blocks, so I often have a PhET activity to do that relates to the test unit or helps introduce the next unit.