

## Greenhouse Effect

**Learning goal:** Learners can collect data and model the atmospheric greenhouse effect. The goal is to understand the impact different greenhouse gasses have on surface temperature.

**Purpose:** This is meant to be an activity learners can do in small groups. Learners will set up the experiment, make predictions, run an experiment, gather evidence, and make a claim.

Materials needed:

1. 1 bulb per group
2. 1 heat lamp with clamp per group
3. 1 ring stand per group
4. 2 thermometers per group
5. 2 stoppers with hole per group
6. 2 flasks per group
7. N<sub>2</sub>O dispenser
8. CO<sub>2</sub>
9. Graph paper

Procedure:

1. Place each thermometer in each rubber stopper.
2. Fill one flask with N<sub>2</sub>O and quickly attach the stopper.
3. Attach the other stopper to the flask containing just air.
4. Place both flasks in front of the light and turn it on (start the stopwatch).
5. Every 5 minutes record the temperature in each flask.
6. When the temperature in both flasks is no longer increasing, turn the light off and continue recording the temperature every 5 minutes until the temperature in each flask no longer decreases.

## Discussion:

This activity can be difficult to get working properly, however when students are done they should see that temperatures in each flask increase at a similar rate, but decrease at different rates after the lamps are turned off. This is a very important distinction for students to make, because greenhouse gasses are **NOT** impacted by incoming solar radiation. They are impacted by the outgoing infrared radiation (i.e., heat).