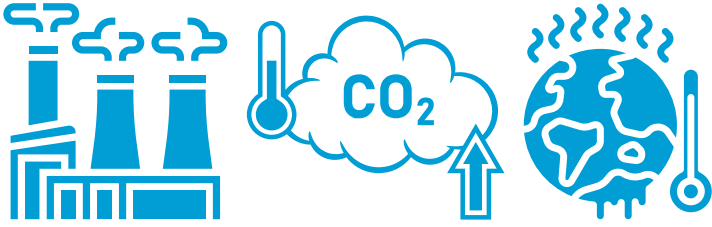


## ACTIVITY 3: MODELING GLOBAL WARMING



The purpose of this experiment\* is for students to model the impact that increased levels of carbon dioxide have on temperatures in the atmosphere.

### **Materials:**

- Two clear plastic containers (such as jars/cups)
- A thermometer
- A light source (such as a lamp or direct sunlight)
- A source of baking soda and vinegar OR instead, optionally, a block of dry ice (optional)

*Note: this experiment takes several hours of light exposure in order to provide useful data. In a self-contained classroom setting, students can set the experiment up at the beginning of the day and take data at the end of the day. In a period-switching bell schedule, earlier classes can set up the experiment and later classes can take (and share) data.*

First, inform students that they will be working with their groups to create a microsystem atmosphere to model the impact that increased levels of carbon dioxide have on temperatures. If they do not already have the concept of a system/surroundings construct for examining situations in science, discuss what a system (both closed and open). Draw particle diagrams (e.g., squares with dots inside and outside of the square) to illustrate. After reaching group understanding, distribute the materials for the experiment to groups.

Next, have students execute the steps of the following procedure:

### **Procedure:**

- Fill both containers with equal amounts of water.
- Place the thermometer in each container and record the starting air temperature.

- In one container, add a small amount of baking soda and vinegar to simulate increased CO<sub>2</sub> levels. Be careful not to spill or overflow the container.
- Place both containers under the light source and let them sit for several hours.
- Record the air temperature of each container after the designated time(s).
- Optional: If you have access to dry ice, have some groups place a small amount in each container instead of using baking soda and vinegar, and observe the results as compared to the vinegar and baking soda combination. (Remember to use oven mitts or ski gloves when handling dry ice.)

Then, provide students with chart paper and markers, or large dry-erase boards and whiteboard markers, to summarize their group's data and experimental results. Be sure to have them include a particle diagram to show what is happening at the smallest possible level in the system at the beginning and ending times.

Last, engage the students in a "board meeting" where all students sit/stand in a circle facing one another with their chart paper or dry-erase boards facing inward for all to see to discuss their collective results. Facilitate this discussion by selecting and sequencing groups to share about their data and answer probing questions so that any of the following discussion goals are accomplished:

- How did the temperature of the two containers compare before and later?
- Note: if you had any groups use dry ice, also compare the results of dry ice vs. vinegar and baking soda
- Discuss the implications of this experiment. How did increased CO<sub>2</sub> levels contribute to temperature change in the system? What do our particle diagrams illustrate is happening?
- How does this microsystem model what is happening at the scale of our planet with global warming?
- What is the main thing that needs to happen in order to combat climate change? Brainstorm some ways we can accomplish this in our everyday lives.