

What is CO2?

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**Educational Goals: The goal of this lesson is to educate students on the environmental impact that carbon dioxide has on our atmosphere. This lesson will introduce students to what carbon dioxide really is and that will in turn help them better understand future modules.**

**Description:** In this activity you will be helping students understand what carbon dioxide by producing some of it using vinegar and baking soda. You will then take a balloon full of the carbon dioxide produced and release it into a jar to demonstrate how it heats our atmosphere.

**Time:** Approximately one hour

**Materials Needed**

* Balloon
* Funnel
* Baking Soda
* Vinegar
* Empty Soda Bottle
* Clothespin
* Drinking Straw
* Thermometer
* Black Paper
* Large Glass or Plastic Jar
* Desk Lamp
* Matches

**Directions**

1. **Place the black construction paper on the bottom of the jar.**
2. **Lay the clothespin on top of the construction paper.**
3. **Lay the thermometer on top of the clothespin.**
4. **Record temperature on thermometer.**
5. **Turn on the desk lamp and shine it into the top of the jar to begin heating the air inside of the jar. Allow it to heat for 30-45 minutes. Begin the next steps while you allow it to heat.**
6. **Fill the plastic bottle about a fifth of the way with vinegar.**
7. **Insert the funnel into the neck of the balloon, and shake about a tablespoon of baking soda into.**
8. **Fasten the neck of the balloon securely over the bottle opening with the balloon hanging down so that no baking soda gets into the bottle.**
9. **Now lift the balloon so that all the baking soda falls into the bottle. It will react with the vinegar and release a lot of carbon dioxide and inflate the balloon. DO NOT ALLOW LIQUID TO ENTER THE BALLOON. Make sure to shake the bottle a little so that all the baking soda reacts. Leave the inflated balloon fastened to the top of the bottle for now.**
10. **After allowing the jar to heat for 30-45 minutes record the temperature on the thermometer.**
11. **Very carefully remove the balloon from the top of the bottle without letting any of the carbon dioxide escape. Take the drinking straw and insert it into the opening of the balloon and pinch it closed so the carbon dioxide does not escape.**
12. **Now lower the end of the straw as close as possible to the bottom of the jar and slowly begin to let the carbon dioxide escape into the jar so that it collects on the bottom and displaces the air out of the jar (carbon dioxide is heavier than air).**
13. **Demonstrate to the students that the carbon dioxide is in the jar by lowering a lit match into the jar from above. The match should be extinguished almost immediately by the carbon dioxide.**
14. **Now observe the thermometer. Within a few minutes the temperature reading should climb by several degrees – up to seven degrees, depending on the container.**
15. **Record this temperature and compare it to the other temperature readings. Now provide explanation as to why the carbon dioxide caused the temperature in the jar to increase and how something similar happens to the earth.**

**Additional Resources**

* CO2 **Power Point**

**Topics to Discuss**

* **Student’s prior knowledge of carbon dioxide.**
* **The effects of carbon dioxide on our atmosphere and the rest of the environment.**
* **Efforts to mitigate carbon dioxide output.**

**Mentor Notes**

* **It is crucial that you allow the lamp adequate time to heat the inside of the jar. Make sure it’s the first thing you set up before running through the power point and producing the carbon dioxide.**
* **If liquid does enter the balloon while producing the carbon dioxide, empty the balloon and bottle, rinse bother with water and start over again, using less baking soda and vinegar.**
* **Allow this module to be an introduction to carbon dioxide so that the students can see what the problem actually is before going further into the semester and presenting solutions such as, alternative energy sources and green house gas mitigation methods. A lot of the students have heard about** CO2 **and****they might even have some idea of what it does to the environment but since it is colorless and odorless its hard for them to understand how something they can’t see or touch or smell can have such drastic effects on the environment. This module will help them actually see carbon dioxide and understand how it impacts our environment.**