

Lose the Blues with CO₂!

Carbon dioxide (CO₂) is essential for life on Earth, but too much of it in the atmosphere is bad for the climate and for the oceans. Scientists have ways of testing the amount of CO₂ in the atmosphere. In the activity below, you can do your own test for CO₂!

What you'll need

- Red cabbage leaves
- Zip-closing plastic bag (Quart size)
- Water
- White piece of paper
- Clear plastic cups (2 small, 1 Medium, 2 Tall)
- Baking soda
- Vinegar
- Measuring spoons
- Straw

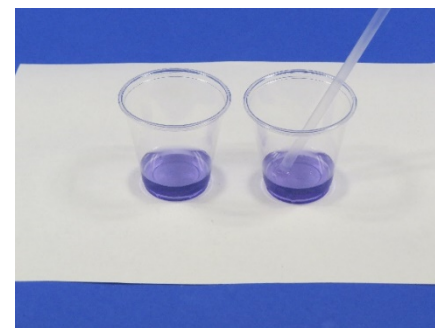


Be safe

Vinegar and baking soda may sting your skin and eyes. Always work with an adult to supervise and guide you. You and your adult partner should both wear properly fitting safety goggles. Wear gloves when pouring vinegar. Do not taste or eat any food items you are testing.

Here's what to do

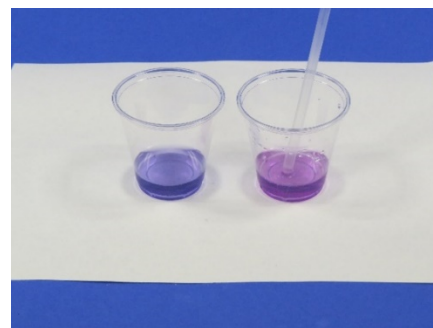
1. Tear up two leaves of red cabbage and place the pieces in a zip-closing plastic bag. Add about 1 cup of room temperature water. Get as much air out of the bag as you can and close the bag securely.
2. While holding the bag, use your other hand to squish the leaves in the water until the water turns a medium to dark blue. This is your indicator solution. It will change color when certain substances are added to it.
3. Open a corner of the bag and pour the indicator solution into a clean plastic cup.
4. Place 2 small clear plastic cups on a white piece of paper. Pour 1 tablespoon of the blue indicator solution into each cup.
5. Ask your adult partner to put a straw all the way down into one of the cups of indicator and blow air into the indicator as you watch from the side. What did you notice?



Save the unused indicator solution for the next part of the activity.

What to expect

As air is blown into the indicator, the color of the indicator should change from blue to purple. The carbon dioxide gas from exhaled breath makes the water slightly acidic which makes the indicator change color.



What else could you try?

If carbon dioxide is making the indicator change color, maybe more carbon dioxide would make it change color even more. Let's try it!

What you'll need

- Indicator solution
- White piece of paper
- Clear plastic cups (1 small, 1 Medium, 1 Tall)
- Baking soda
- Vinegar
- Measuring spoons

Be safe

Be sure to review the safety instructions on page 1 before proceeding.

Here's what to do

1. Pour 1 tablespoon of indicator solution into a clean empty small cup.
2. In the medium cup, add 1 tablespoon of vinegar.
3. Add 1 teaspoon of baking soda to the vinegar and quickly place the small cup with the indicator into the cup with the vinegar and baking soda.
4. Place a cup on top as shown so that the carbon dioxide gas is trapped inside the cups.
5. Gently swirl the entire set of cups and watch the color of the indicator. What did you notice?

What to expect

As you swirl the cups, the color of the indicator should change from blue to purple. The color should be more reddish purple than the color of the indicator when your adult partner blew into the indicator.

What's happening in there?

When the carbon dioxide mixes with the water in the red cabbage indicator, it creates a very weak acid called carbonic acid. This acid reacts with the red cabbage indicator and changes its color. The vinegar and baking soda reaction produced a lot more carbon dioxide than the exhaled breath, so more carbonic acid was produced which caused a greater color change.

