Lose the Blues with CO2!

Carbon dioxide (CO_2) is essential for life on Earth. Scientists have ways of testing the amount of CO_2 in the atmosphere. In the activity below, you can do your own test for CO_2!

Materials:

Red cabbage leaves
Zip-closing plastic bag
Water
White piece of paper
2 clear plastic cups
Baking soda
Vinegar
Teaspoon
Tablespoon
Disposable plastic juice bottle (with wide mouth about ½ liter)

Procedures:

1. Tear up two leaves of red cabbage and place the pieces in a zip-closing plastic bag. Add about 3/4 cup 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. Place 2 clear plastic cups on a white piece of paper. Pour about 2 tablespoons of the blue indicator solution into each cup.

4. Place about 3 teaspoons of baking soda in the bottle. Add about 1 tablespoon of vinegar. Hold your hand gently over the top of the bottle and swirl to mix the vinegar and baking soda which should produce bubbles of carbon dioxide (CO_2) gas.
5. Very carefully tilt the bottle over one cup so that only the CO_2 pours out of the bottle and into the indicator. Be sure that none of the liquid pours into the cup. The CO_2 is invisible, but since it is heavier than air, it should pour out of the bottle and into the cup of indicator.
6. Use a straw to stir the indicator solution in both cups. What did you notice? What must have caused the change you observed?

Think about this …

If the indicator solution changes color when CO_2 is mixed in with it, what do you think would happen if you used a straw to bubble your own breath into some fresh red cabbage indicator solution? Try it and see!

Where's the Chemistry?

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.