Curiosity Guide #605
Acids and Bases

Accompanies Curious Crew, Season 6, Episode 5 (#605)

Making and Testing pH Indicator Paper

STEM Challenge

Description

Make your own test strips for acids and bases!

Materials

- Red cabbage
- Pot
- Hot plate
- Water
- Knife
- Strainer
- Glass bowls
- White note cards
- Paper towels
- Hair dryer
- Scissors
- Plastic bags
- Eye dropper
- Wax paper
- Baking soda
- Vinegar
- Distilled water
- Liquids to test. Here are some to get you started: lemon juice, soda water, milk, shampoo, cola, vinegar

- Mix the following items with a small amount of distilled water before testing: normal aspirin, buffered aspirin, baking soda, vitamin C

Procedure 1: Prepare the test strips.

1) Slice the head of a red cabbage.
2) Place the cut cabbage into a large pot.
3) Add water to the cabbage so the leaves are covered.
4) Heat the pot on a hot plate to boiling.
5) Boil the cabbage for thirty minutes.
6) Strain and pour the liquid into glass bowls.
7) Allow the liquid to cool.
8) The cabbage can be eaten or disposed of.
9) Soak the notecards in the colored juice for an hour.
10) Remove the cards from the juice. Let the cards air dry on paper towels or dry them with a hair dryer.
11) Cut the stained cards into half inch strips and store them in a sealed plastic bag.
12) Bottle or dispose of the remaining juice. The juice will not last long.

Procedure 2: Use the test strips.

1) Place several drops of the cabbage juice on a piece of wax paper.
2) Leave one drop alone. Add a small amount of baking soda to a second drop and a small amount of vinegar to the third drop.
3) What do you notice?
4) Test different liquids with the pH paper.

My Results

Explanation

The juice from a red cabbage is a natural pH indicator. Normally, the liquid is blue-violet. The color changes when it interacts with either acids or bases. When the cabbage juice combines with a base like baking soda, the liquid turns green and possibly yellow. When the cabbage juice combines with an acid like the vinegar, the liquid turns red. The paper strips will last several months if sealed in a plastic bag, which slows down oxidation from the air.

Think about this. Engineers have developed many ways to take advantage of acids and bases. Car batteries use sulfuric acid to cause a chemical reaction with the lead in the battery to make electricity. Most of our cleaners and crop fertilizers are basic. There are different examples of acids and bases in nature, too. Some animals and insects use acids. For example, a black ant will release formic acid when it bites, while the carabid beetle can spray its formic acid. Plants use acids and bases, too. These substances can be found in leaves, fruit, seeds, or the sap of different species. Acids and bases are all around us!

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