Celebrating Chemistry
National Chemistry Week · American Chemical Society

Exploring Acids and Bases

You have probably heard of acid rain but what exactly is it? In fact, what is an acid? Are they dangerous? Will they burn your skin off? What's a base? Here is a fun way to experiment with stuff from your home to see if they are acids or bases. You will first make a solution with red cabbage that will allow you to test things from around your house. This indicator solution will let you discover if a product or food is an acid, a base, or neutral.

CAUTION! HEALTH & SAFETY: Do this activity with an adult! Do not taste anything you are using. Cabbage juice can be poured down the drain. Use caution when using harsh household cleaners!

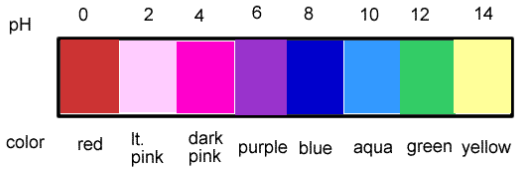
Materials:

- Red cabbage
- Knife/Food processor
- Plastic wrap
- Strainer
- 2 large bowls
- Cleaner to remove lyme-scale
- Vinegar
- Soda pop (light colored)
- 1 tbs. Baking soda (mix with 2.5 cups water)
- Ammonia based cleaner

Procedure:

1. Chop 1/2 of a red cabbage in a food processor and place in a microwaveable bowl. Cover the cabbage with water and plastic wrap and microwave for 5 mins. Let cool.
2. Place a strainer over a collection bowl and pour the mixture through the strainer to remove the pieces of cabbage. You should have a clear liquid that will either be purple or blue in color.
3. Next you will test various household solutions. Pour 3 tbs cabbage juice indicator into 2.5 cups of test solution. Record the color change. Match the color change with the pH.

Red Cabbage Color changes with pH



Where's the chemistry?

Substances can be classified according to their properties. Acids dissolve metals, and fizz when they react with limestone. They can be strong or weak, concentrated or dilute. For this reason, some can be dangerous while others are found in food. Bases are another class of substances that have similar properties. One of the properties of bases is they react with vegetable oils and fats to make soap. When you mix an acid and base together in the proper amounts, the neutralize each other. How do you tell if something is an acid or a base? Acids and bases can change the color of some materials called indicators. Indicators can be extracted from many different sources, including the pigment of many plants, such as the red cabbage in this investigation. Red cabbage juice is purple but turns red in an acid and green in a base. That's why we call it an indicator. If it doesn't change, the stuff you are testing is neutral!

References:

Fun With Chemistry: Volume 1, edited Sarquis, M, Sarquis, J, Cabbage Patch Detective, Institute for Chemical Education, 1991, Madison, Wisconsin.
http://www.coolscience.org

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