

Spooky Science

Written by: Sarah Tropp-Pacelli

COLOR-CHANGING Chemistry



With the weather turning colder and night falling earlier and earlier, it's easy to tell that fall is well underway. With fall comes some fun holidays, including a favorite at the Discovery Museum: Halloween! In preparation for Halloween, we have an activity for you to try to get into the spooky spirit!

For your experiment, you're going to need a red cabbage, water, vinegar, and baking soda to do color-changing chemistry. Put on your best mad scientist thinking cap and get ready to mix!

Red cabbage contains a chemical called anthocyanin that gives it its distinctive purple color. Anthocyanin isn't always purple--it changes color when it comes into contact with other chemicals that are acids or bases. Something is defined as an acid or as a base using a property (characteristic) called "pH."

A chemical's pH tells us a little about what it is like, including how it might interact with other chemicals. Chemicals with low pH values (under 7) are considered acids. Chemicals with high pH values (above 7) are considered bases. Chemicals with a pH of 7 are not considered acidic or basic, but rather are considered to be neutral.

Certain chemicals, known as indicators, change colors when they come into contact with different pH levels, and anthocyanin is one of them! Anthocyanin turns pink when in contact with acids, blue-green in contact with bases, and stays purple in contact with neutrals.

The Experiment

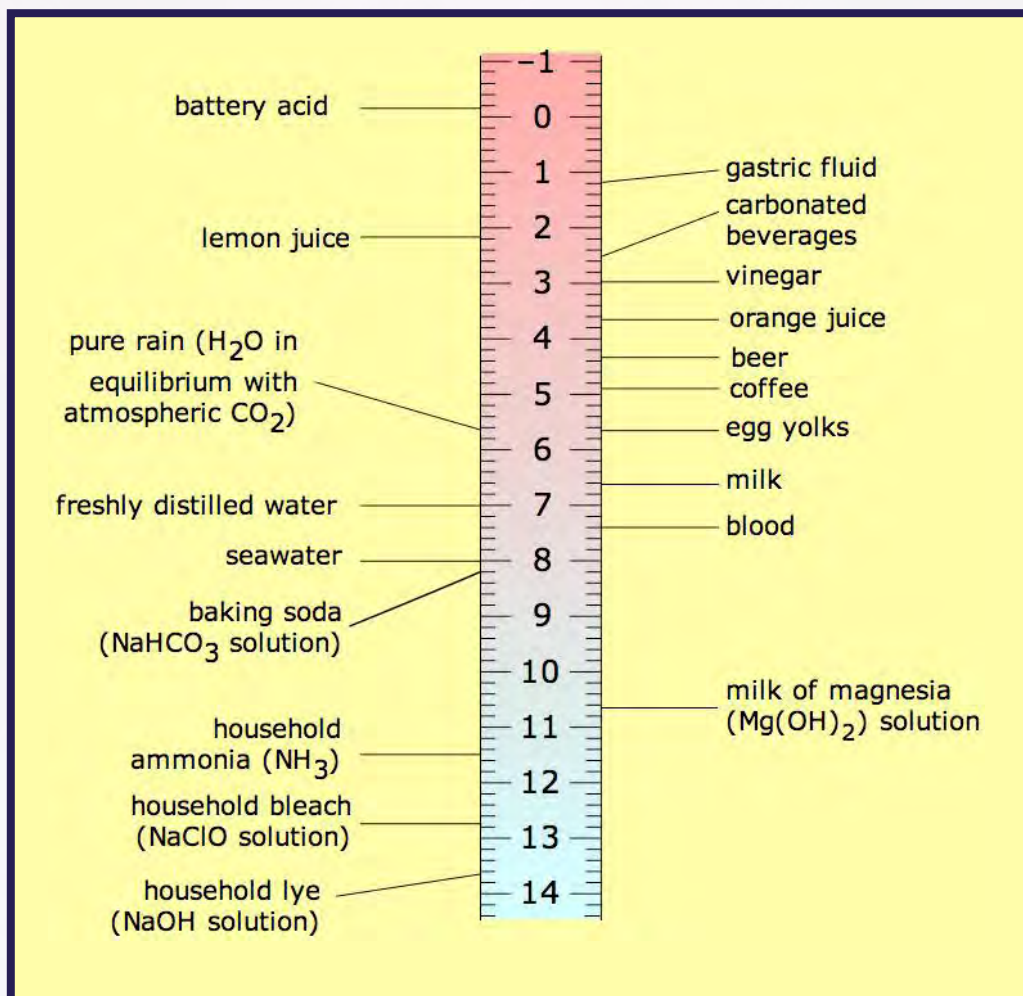
For your experiment, you'll need to create your pH indicator solution using the red cabbage and some water (warm or hot water works best). Tear up the cabbage leaves and soak them in the water until the liquid turns purple. Once it's purple throughout, your experiment will be ready. The hotter your water is, the faster this will happen.

Prepare your experiment by filling three clear cups with water. Put some vinegar into one of the cups and some baking soda into another, leaving the third cup as just water. Carefully pour a small amount of the purple anthocyanin water into each cup and note what color each container turns. (Hint: only one of them should stay purple!)

See what happens when you combine the cups with vinegar and baking soda. What do you see and hear when they mix? Do you think they are still acidic and basic after you've mixed them? Why or why not?

Now, take it a step further: research other common acids and bases and come up with a list of other chemicals you want to test. Keep in mind that you will want chemicals that are clear or light in color to begin with, so something like a cola, though it is acidic, won't make for a good experiment.

You can even take it a step further and research other items that contain anthocyanin. Think about other foods that are purple or blue in color and see if you can create another pH indicator compound that you could use in the experiment. How will you test whether these items have anthocyanin in them? (Hint: think about materials you can use to test them that you know react with anthocyanin!)



Standards Alignment:

NGSS: 5-PS1-4

Common Core: CCSS.ELA-LITERACY.RI.5.7