

INCREDIBLE CABBAGE COLORS

Move over, coleslaw—cabbage is key for this colorful chemistry activity! Combine easy-to-make red cabbage juice with various household liquids and watch as the mixtures turn every color of the rainbow.

Materials:

- 1 liter of cabbage juice (see below for instructions)
- 5 or more clear glasses
- Household liquids including:
 - Baking soda solution (teaspoon of baking soda in 8 oz. water)
 - Vinegar
 - Lemon juice
 - Washing soda solution (teaspoon dissolved in 8 oz. water)
 - Dish soap
 - Clear lemon-lime soda
 - Bleach (*with an adult's help)
 - Window cleaner (*with an adult's help)



Cabbage Juice Materials and Instructions:

- A few leaves of red (sometimes called "purple") cabbage
- 2-quart (or larger) cooking pot
- Liter of water (approx. 4 cups)



Tear or cut the cabbage leaves into several pieces and place in the cooking pot. Pour in 1 liter of water. With an adult's help, place the pot over medium-high heat until it boils. Then reduce to a simmer for at least 15 minutes. Let the liquid cool, then strain it into a pitcher, leaving the cabbage pieces behind. The remaining liquid should be a pretty purple-ish color.



Procedure:

Pour about a teaspoon of one of your household liquids (try baking soda solution) into a glass. Slowly pour a little of the cabbage juice on top. What color does the mixture turn?

Try vinegar next. Pour a little vinegar into a glass and see what color it turns when combined with the cabbage juice. What happens when you pour some vinegar into the mixture of baking soda and cabbage juice? Why do you think the color changes the way it does?

In a well-ventilated room, have a grown-up pour a little bleach into a glass. Add some cabbage juice. Why do you think the colors change so quickly? What do you know about bleach that might explain why the color fades? Do you think bleach is acidic or basic?

Try adding cabbage juice to a variety of other household liquids. If you like, experiment by using more or less of a substance. What effect does that have on the color?

What's Going On?

Have you ever eaten vinegar or lemon juice? They probably make you pucker up! That tart taste is caused by the **acid** in a food. In chemistry terms, an acid gives away its hydrogen ions, so we say acids have a low power of hydrogen, or low **pH**, (generally 1-6 on the pH scale). On the other side are **bases**—these are substances that feel slippery, such as soap and baking soda. These accept hydrogen ions, so we say they have a high power of hydrogen, or high pH, (generally 8-14 on the pH scale). Substances that have neither a high nor low pH are called **neutral**, (about 7 on the pH scale).

One way to test the pH of a substance is to combine it with a **pH indicator**. Red cabbage contains a pH indicator called **anthocyanin**—the same pigment that turns leaves red in the fall!

Try This:

Use these charts to make predictions and test your hypotheses. What color do you think each mixture will turn? What number is that color on the pH scale?

The pH Scale with Cabbage Water



Substance Name	Predicted Color	Predicted pH	Actual Color	Actual pH	Acid/Base?
Baking soda solution					