

# Colorful Chemistry

## Collect

- Head of red cabbage
- Chef knife
- Cutting board
- 6-quart (or larger) stock pot
- Collander
- A collection of liquids to test:
  - 1 tablespoon fruit juice
  - 1 tablespoon sports drink
  - 1 tablespoon carbonated drink
  - 1 tablespoon bleach
  - 1 tablespoon window cleaner
  - 1 tablespoon baking soda
  - 1 tablespoon laundry detergent
- 6-8 white or clear cups
- Adult safety partner

## Prep the indicator

1. With your adult safety partner, chop the red cabbage into 1 – 2 inch chunks. Place the pieces of cabbage into the large stock pot.
2. Fill the stock pot with water until all cabbage pieces are covered. This should be around 6 cups of water, but the exact amount will depend on the size of the cabbage.
3. Place the stockpot on the stove and bring the water to a boil. Once boiling, lower the heat to simmer for 10 minutes.
4. Turn off the stove and allow the cabbage to steep for 30 – 60 minutes. The goal is for the water to turn a deep reddish-purple color—this is your chemical indicator!
5. Once the liquid has cooled, strain the cabbage pieces out. Store the indicator for up to two weeks in the refrigerator or use right away.

## Start testing

1. Measure 1/4 cup of cabbage juice indicator into each of your clear or white cups.
2. Mix one tablespoon of each test liquid into each cup and observe the color change.

- What do you notice about the colors that appeared? Did any of the liquids that you tested turn similar colors? What might have caused this?

**Heads up!** To avoid mixing chemicals that could make harmful fumes—like ammonia and bleach, make sure to only add one ingredient to the indicator in each cup.

## What happened?

Color change is one way we know a chemical reaction has happened. Indicator chemicals, like the *anthocyanin* that gives the cabbage its red color, will change color when it comes in contact with a material of a differing pH. pH stands for “potential hydrogen” and is a scale we use to know how acidic or basic a material is—the more positively charged hydrogen ions, the more acidic.

There are other observable properties of high and low pH materials. Foods that are sour are acidic; like tomatoes, lemons, and green apples. Cleaning solutions that feel slippery on our skin are basic; like ammonia, bleach, and baking soda.