

# Acidic, neutral or basic? Ask the cabbage

## What You Need:

### To make indicator:

Blender

Red cabbage

Strainer

Water

### Substances to test:

Vinegar

Baking soda

Cola

Shampoo

Juice



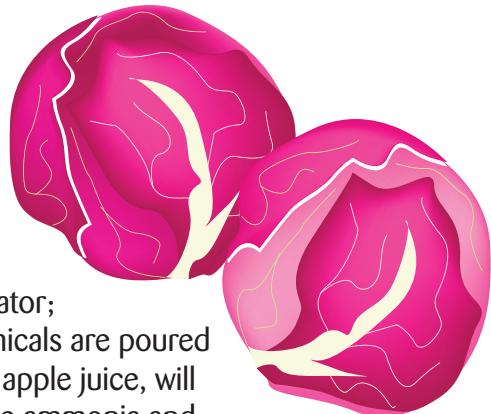
## What To Do:

1. Put 6-7 red cabbage leaves in blender and fill about half way with warm water. Mix until well blended.
2. Pour the juice through a strainer to remove the chunks of cabbage. Your indicator is ready!
3. To test, in separate cups add small amounts of the substance to be tested and then add your indicator. What color did it turn?

**Red: Acidic, pH 0~6**

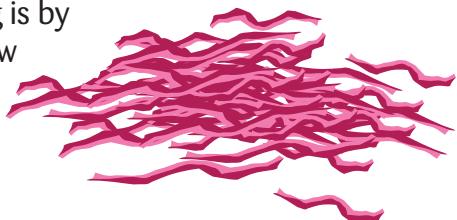
**Purple: Neutral, pH 6~8**

**Green: Basic, pH 8~14**



## What's Going On?

Red cabbage juice is an acid-base indicator; it will change colors when various chemicals are poured into it. Acids, such as vinegar, cola and apple juice, will turn the juice a reddish color. Bases, like ammonia and baking soda, will turn the juice a greenish color. We can measure how acidic something is by determining its pH. Acids will have a low pH, from 0-6. Bases will have a high pH, from 8-14. Something that is neutral will have a pH around 7.



Check out the next page for another way to play with pH!



## What You Need:

Red cabbage indicator

Glass

Straw



## What To Do:

1. Pour a small amount of red cabbage indicator into a glass. Hint for success: make sure your cabbage indicator is purple or green (neutral or basic) If not, add a sprinkle or two of baking soda until it is.
2. Blow bubbles! Using the straw, blow bubbles into the indicator for a few minutes. Safety first: don't drink it!
3. Observe what happens!

## What's Going On?

Your cabbage indicator should have turned red after blowing bubbles into it! Why did that happen? Your breath contains carbon dioxide gas ( $\text{CO}_2$ ). When carbon dioxide is dissolved in water ( $\text{H}_2\text{O}$ ), a chemical reaction occurs that produces carbonic acid ( $\text{H}_2\text{CO}_3$ ). The more bubbles you blow, the more acid is produced, and it changes the pH of the indicator and the color to the acid state, red!

We see the effects of this reaction every day. Ever drink anything carbonated? Soda and seltzer water are all slightly acidic because of the dissolved  $\text{CO}_2$ . Normal rain water is slightly acidic as well because of the  $\text{CO}_2$  in our atmosphere. The Earth's oceans are impacted by this chemical reaction. As carbon dioxide has increased in the atmosphere, the oceans are becoming more acidic in a process called ocean acidification. The ocean is usually slightly basic with an average pH of about 8.2. A more acidic ocean can cause the shells of animals that make their structures from calcium carbonate such as corals and shellfish including clams, oysters and snails to dissolve.

