

"Acids and Bases"

Overview:

Today, we're going to have fun with acids and bases. One way to tell an acid is by its sour taste, like lemon juice. One way to tell a base is by its bitter taste or slippery feel, like milk of magnesia.

Remember, taste ONLY acids and bases that are safe to eat!

Something not acidic or basic can be "neutral," like most water.

Since it's dangerous to taste many things, how can we tell acid from base? One way is to use an "indicator." An indicator can indicate, show, whether something is acid, neutral or base by changing color when the substance is added. If you know what color change to look for, you can tell how acidic, neutral, or basic something is. Today you will use a liquid indicator made from purple cabbage.

You are going to test whether food and other everyday stuff is acidic, neutral, or basic. When you add something neutral, the purple cabbage water stays purple. When you add an acid, the purple liquid turns pink (weak acids) or red (strong acids). When you add a base, the purple liquid turns blue (weak base) or even green or yellow (strong bases)! You can even change a solution from acidic to basic, basic to acidic, or back to neutral. **BE CAREFUL MIXING THINGS TOGETHER – THEY MAY REACT VIOLENTLY.** The color change will let you know how acidic or basic you've made the solution.

Advanced:

A technical way to talk about acids and bases is a number scale called the pH scale. The pH scale usually goes from 1 to 14. Things from 7 down to 1 are acidic. The **lower** the pH of something, the **more** acidic it is. An acid at 2 is **more** acidic than an acid at 6. Things right in the middle (7) are neutral. Things from 7 to 14 are basic. The **higher** the pH is, the more **basic** it is. A base at 13 is **more** basic than a base at 8. You can raise the pH of an acid by adding a base. You can lower the pH of a base by adding an acid.

Be careful mixing acids and bases: they can react violently!

Make Your Own Purple Cabbage pH Indicator

Remember:

Have a grown-up help if you'd like to try this at home!

You need:

Purple cabbage (usually sold as "red cabbage")

A knife and cutting board (get a grown-up to do this!)

A **heatproof** bowl such a Pyrex mixing bowl

Boiling water (get a grown-up to do this!)

Strainer (optional)

A bowl or bottle for cooled purple liquid & a ladle for transfer

Small test cups (clear plastic are best), spoons, etc.

Non-toxic household stuff to test (vinegar, baking soda, water, shampoo, etc.)

Newspaper or paper towels to clean up possible messes

Directions:

To make the indicator:

1. Have a grown-up cut the cabbage into large pieces.
2. Put the cabbage pieces into the **heatproof** bowl.
3. Have a grown-up pour the boiling water over the cabbage pieces.
4. Let the mixture sit at least ten minutes. **Wait for the mixture to COOL before touching.**
5. Carefully ladle out or pour out **just** the purple liquid into another container or strain out the cabbage over the large bowl. **You want to keep the liquid.** Eat or discard the cabbage itself. You can store the purple liquid in the bowl or in a bottle covered in the refrigerator until needed, or until it goes moldy.

To use:

6. Add purple liquid to small cups (clear plastic are best to see color change.)
7. Add **non-toxic** household stuff such as vinegar, lemon juice, mineral water, toothpaste, shampoo, tea, baking soda, milk of magnesia, etc. to separate cups of indicator, stir, and watch for a color change (Pink or red is acid. Purple is neutral. Blue, green or yellow is base)
8. Try mixing the non-toxic stuff together in the small cup of indicator and see what happens to the color! [**BE CAREFUL: things may react!**]
9. Predict if something will be an acid or base, and then try it.
10. Have fun and be safe.

Something a little unusual to try is pickling lime [the powdered stuff in the grocery store used to make pickles; **THIS CAN BE A LITTLE DANGEROUS, so have a grown-up help you**]

DR. JANET'S SCIENCE PLANET

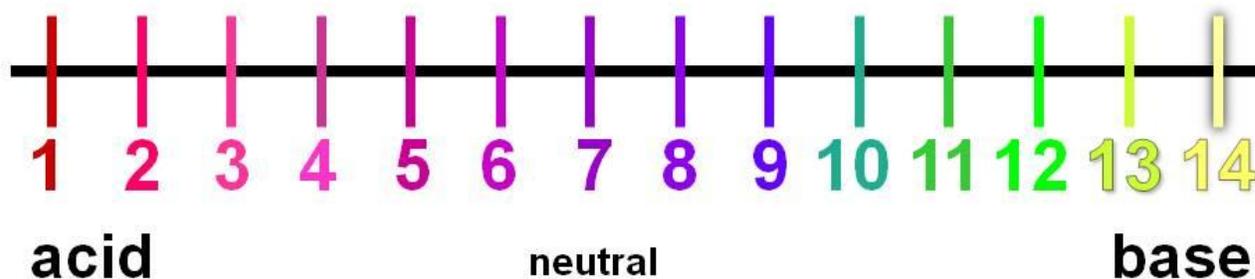


Science outreach for kids & their grown-ups

Have fun with science

The Purple Cabbage Water pH Scale!

What pH is your sample? Is it acidic, neutral, or basic?



<http://www.DrJanetsSciencePlanet.com>

Fun science led by Dr. Janet Painter,
host of "Dr. Janet's Science Planet"