

# How acidic is the $\approx$ ? and the ?

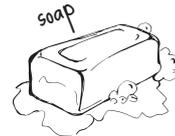
## SMART KIDS LAB Step by Step

### SMART KIDS LAB

How clean is the air you breathe? Is swimming water the same as drinking water? How many microbes live in the soil beneath your feet? And what does it all mean? DISCOVER how healthy your neighbourhood is and what you can do to improve it. SMART KIDS LAB lets you examine the water, noise, air, earth and light around you with homemade measuring instruments. On the [smarkidslab.nl](http://smarkidslab.nl) website, you'll find out how to make the measuring instruments (meters) and how you can GET STARTED.

ACIDIC  
PH = 0  
NEUTRAL PH = 7  
PH = 14  
BASIC

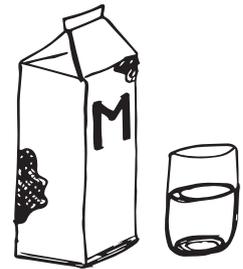
### HOW ACIDIC IS THE SOIL? AND THE WATER?



YOU'LL BE INVESTIGATING THE ACIDITY (pH) OF THE SOIL OR THE WATER IN YOUR AREA. Lemons and soft drinks are acidic. You can tell because they taste sour on your tongue. But how acidic is the soil? Or the water in that ditch?! Fortunately, you don't need to test it with your tongue ... you can use RED CABBAGE! First, a few facts: ACID is bad for your teeth. It softens your tooth enamel and hard enamel protects your teeth from cavities. Acidic soil is vulnerable soil because harmful substances sink into the groundwater faster. However, acidic soil can also be very GOOD for certain plants. The more acidic the soil, the bluer the hydrangea's flowers will be. A BASE is the opposite of an acid. A liquid that is basic often feels slippery and if you were to put it on your tongue (don't do it!), it would taste bitter. Most cleaning products, like soap, are basic.

### HOW DOES IT WORK?

It all begins with the QUESTION: What do you want to measure? Do you already know? GREAT! Now you can GET GOING.



#### STEP 1.

You start by making the MEASURING INSTRUMENT. \*What you'll need: [Smart Kids Lab / making meters](#). There you'll find all the information you need to get started.

#### STEP 2.

Now it's time to go do RESEARCH and experiment. Before you start, think about what you want to investigate in your area and how to go about doing it.

For example, do you want to investigate the soil's acidity and what it means? Or do you want to find out which drink is best for your teeth?

You'll find more facts on the compare-o-meter.

\*What you'll need: the [Smart Kids Lab / experiments](#) worksheet. This explains how to use your homemade meter to collect data.

#### STEP 3.

Collect the measurement DATA on the Smart Kids Lab worksheet. \*What you'll need: the [Smart Kids Lab / experiments](#) worksheet. You can record your measurements here.

#### STEP 4.

Go grab the COMPARE-O-METER so you can compare your measurement data to that of others. You'll also find a lot of interesting information here. \*For this you'll need: [Smart Kids Lab / compare-o-meter](#) worksheet.

#### STEP 5.

Take a picture of your measurement data and put it on the GREAT DATA MAP. You can find it at [smarkidslab.nl](http://smarkidslab.nl).

\*What you'll need: You can take a photo with a phone or digital camera. THE GREAT DATA MAP can be found at [smarkidslab.nl](http://smarkidslab.nl) (in the menu bar).



This project has been co-funded by the European Commission within the Call H2020 ICT2015 Research and Innovation action. The grant agreement number is 688620



Making Sense



waag society



Stichting Educatie en Cultuur



Rijksinstituut voor Volksgezondheid en Milieu  
Ministerie van Volksgezondheid, Welzijn en Sport

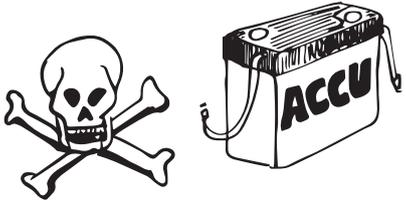
How acidic is the  $\approx$ ? and the  $\triangle$ ?

SMART KIDS LAB  
compare-o-meter

ACIDIC



GROSS!



Acid is bad for your teeth. It makes your tooth enamel soft ... and enamel protects against cavities. Yikes!



softdrink



milk



coffee

NEUTRAL

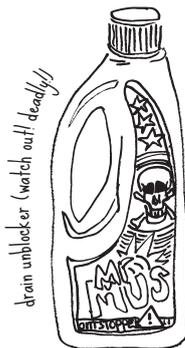


soap

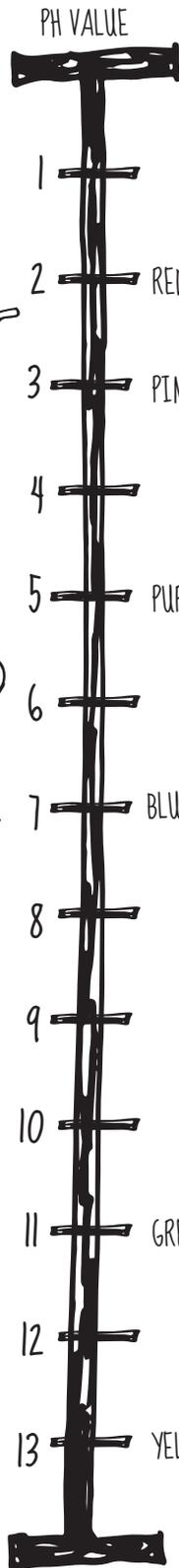
A BASE is the opposite of an acid. Basic liquids often feel slippery to the touch and taste bitter (but DON'T TASTE THEM!). Most cleaning products are basic.

Leftover RED CABBAGE from your dinner will turn BLUE when you soak it in soapy (basic!) dishwater.

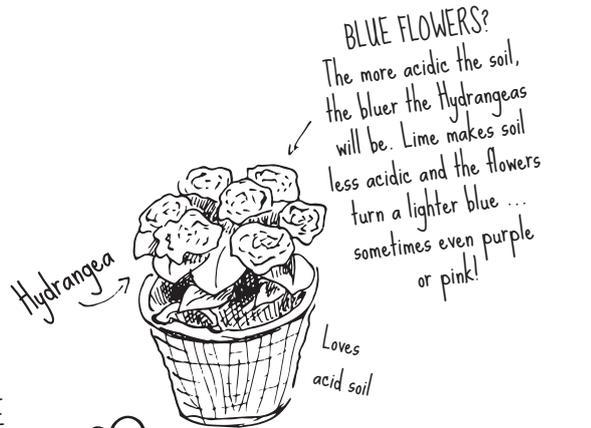
BAH!



drain unblocker (watch out! deadly!)



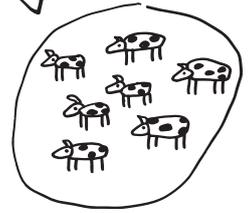
BASIC



Trees and flowerbeds like soil with a pH value between 5.5 and 6.5



Over-fertilizing farmland makes the soil acidic!



ACIDIC soil is vulnerable soil. Harmful substances can sink faster into the GROUNDWATER



... and our drinking water!

# How acidic is the $\approx$ ? and the ?

## SMART KIDS LAB making meters

DISCOVER HOW HEALTHY YOUR NEIGHBORHOOD IS AND WHAT YOU CAN DO TO IMPROVE IT!  
Lemons are acidic. You can tell because they taste sour on your tongue. But how acidic is the soil or water? Fortunately, you don't need to test it with your tongue ... you can use RED CABBAGE!

just waiting for you at the nearest supermarket!

Make your ACIDITY (pH) METER quickly and easily with RED CABBAGE...

### WHAT DO YOU NEED?

- Fresh red cabbage
- Blender
- Funnel
- Coffee filter
- Ruler
- Waterproof marker
- Transparent plastic cups
- Kitchen scale



For testing WATER and other liquids: follow steps 1, 2, 3 and 4.



For testing SOIL: follow steps 1, 2, 5 and 6.

You measure ACIDITY LEVELS with pH values.  
pH 1 is SUPER ACIDIC, pH 7 is NEUTRAL (tap water)  
pH 14 is VERY BASIC (the opposite of acidic).

1.



Pour 2 glasses of water into the blender and add 4 leaves of red cabbage. Blend it as smoothly as possible. Make sure there aren't any big pieces left.

2.



Put a coffee filter in the funnel and pour the cabbage mixture from the blender into it. Catch the cabbage juice in a bottle.

3.



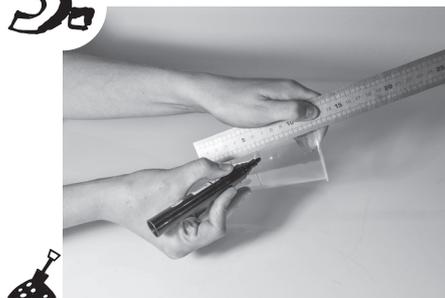
Draw two lines on the plastic cups. One at a height of 3 cm and the other at 6 cm. Also remember to write which fluid you're testing on the cup.

4.



Pour red cabbage juice to the first line. Now pour the liquid you want to test to the second line.

5.



Draw a line on the plastic cup at a height of 6 cm. Now weigh 5 grams of soil and place it in the cup.

6.



Pour the red cabbage juice to the line and stir with a plastic spoon. Wait until the soil settles to the bottom to see the color.



THE RED CABBAGE JUICE CHANGES COLOR DEPENDING ON THE ACIDITY LEVEL

Does your red cabbage juice turn...

RED or PINK? Then it's acidic.

PURPLE or BLUE? Not very acidic / neutral.

GREEN or YELLOW? It's pretty basic.

