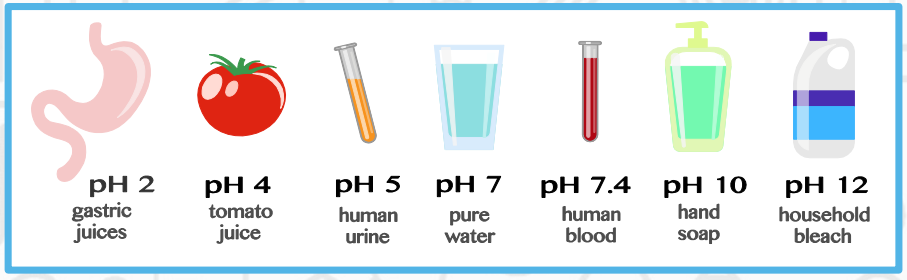
OpenUpScience

Welcome to OpenUpScience, the new magazine from Cambridge Science Centre. In this issue, we're thinking about Chemistry, and we have experiments, quizzes and challenges to explore pH.

You've probably eaten quite a few acidic things, like oranges or sour sweets, that make your tongue tingle. But, some acids are so strong they are dangerous to even touch. So what's the difference?



It's all to do with something called **pH**. pH is a measure of how acidic something is - whether it is an **acid** or a **base**, or if it's **neutral**.

The pH scale goes from 0 to 14. A low pH (less than 7) means that something is **acidic** and high pH (more than 7) means it's **basic**. If it has a pH of 7, it's **neutral**.

Find out more with the fun activities inside!

Spark, Ignite, Fuel, Illuminate

Cabbage Indicator

Make your own pH indicator from red cabbage to use in the other experiments in this issue.

What you'll need

- ¼ red cabbage (cut up into strips)
- A sieve
- A jug
- A bowl
- A knife
- A cutting board
- A helpful adult

pH is a measure of how acidic something is - whether it is an acid or a base, or if it's neutral. If a base dissolves in water, it's called an alkali.

What to do

1. Gather your kit, making sure the bowl is heat proof.

2. Ask an adult to chop up the cabbage for you - you can help scoop it into the bowl once the knife is safely out of the way.

3. Ask an adult to pour around 200 ml of hot water (doesn't need to be boiling) into the bowl.

4. Leave the cabbage to soak until the water becomes a strong purple colour and the water is cool. Pour the cabbage and water mixture through the sieve into a jug.

Homemade Erupting Volcano

Volcanos are one of the most powerful and impressive features of our planet. Make your own mini volcano out of things you can find at home.

What you'll need

- 200 ml plastic water bottle
- 120 ml vinegar
- 1 tbsp washing up liquid
- 2 tbsp water
- 1 tbsp sodium bicarbonate
- 1 tbsp red food colouring (optional)

The chemical reaction between the sodium bicarbonate/baking soda (which is a base) and vinegar (which is an acid) creates carbon dioxide, or CO_2, gas. The gas spreads out, but there's not enough room in the bottle, so it leaves through the top.

Remember this isn't how a real volcano erupts – it's just for fun!

What to do

1. (Optional) Decorate your plastic bottle so that it looks like a volcano about to erupt.
2. In a bowl, combine the sodium bicarbonate, washing up liquid and water. Mix thoroughly and pour this mixture into your bottle.
3. In a cup mix together the white vinegar and food colouring.
4. When you're ready, pour the coloured vinegar into the plastic bottle and watch your volcano erupt!
5. Try experimenting with different amounts of baking soda and vinegar and see how the eruption changes.

Chemistry Quiz

(Answers on back page)

1. If something has a pH less than 7, it is...
   - A. Acidic
   - B. Basic
   - C. Neutral
   - D. Organic

2. What gas is made when you add vinegar to sodium bicarbonate?
   - A. Oxygen
   - B. Carbon dioxide
   - C. Hydrogen
   - D. Nitrogen

3. Which of these foods is acidic?
   - A. Cheese
   - B. Fizzy drinks
   - C. Oranges
   - D. All of these!

4. Wasp stings are…
   - A. Acidic
   - B. Neutral
   - C. Basic
   - D. None of these

Did you know…?

Red cabbage water contains anthocyanins which change colour when pH changes. You can experiment with different acidic and basic substances and the different colours they give you – the colour you get will depend on their pH.

Q. What should you do if no one laughs at your chemistry jokes?

A. Keep telling them until you get a reaction.

Hidden Words

There are 14 words to do with pH hidden in this grid. Can you find them all?

To help you, the words are listed below.

M	I	Z	V	C	S	O	A	P	U	A	C	I	D	I	C	B	Y
P	C	N	Q	F	O	K	H	R	D	D	D	B	V	V	A	P	Q
R	Q	J	D	I	A	O	Z	Z	N	A	Z	M	Q	X	H	K	K
O	G	S	B	I	P	L	K	V	U	W	B	L	J	G	T	A	D
T	L	P	L	L	C	W	K	I	I	H	P	S	M	K	S	F	N
O	P	B	E	K	S	A	E	A	N	N	L	M	G	K	C	O	E
N	S	N	A	G	P	O	T	V	L	G	E	E	I	V	A	O	U
S	I	C	C	S	O	R	I	O	I	I	D	G	M	J	L	D	T
M	P	Z	H	Q	I	F	M	L	R	R	N	D	A	O	E	I	R
X	G	J	K	T	R	C	R	S	O	M	K	E	R	R	N	Z	A
F	N	C	A	C	U	R	U	Y	U	K	K	Y	T	E	E	Z	L
D	C	O	L	O	U	R	O	R	H	V	L	H	R	O	Z	A	V

Acidic
Alkaline
Basic
Colour
Cooking
Food
Indicator
Lemon
Neutral
Protons
Scale
Soap
Soil
Vinegar

Did you know…?

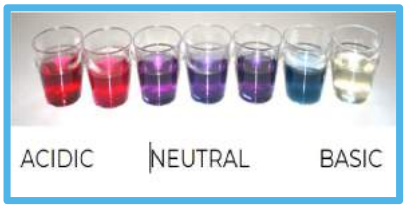
Bee stings are acidic while wasp stings are basic - ouch!

What's my pH?

Find out if household items are acidic or basic using your homemade cabbage indicator!

What you'll need

- A helpful adult
- Home made cabbage indicator
- A variety of household substances to test
- Small containers to hold the indicator
- Spoon or stirrer



A pH indicator tells you whether something has a high pH (basic) or a low pH (acidic) and sometimes it even tells you what pH something is. Our red cabbage water is a natural pH indicator.

What to do

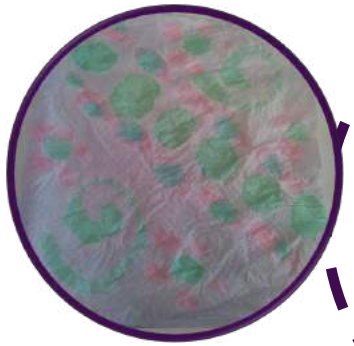
1. Spread out your containers and add a small amount of your indicator to each one.

2. Add a small amount of a different substance to each container, carefully mixing if necessary (make sure you clean the stirrer between each one).

3. Look at the colour of the solutions and see if you can work whether they are acidic, neutral or basic from the colours in the picture above – see if you can put the containers in order of pH.

Indicator Art

Get creative with chemistry and paint colourful pictures using a homemade pH indicator.



What you'll need

- A helpful adult
- Kitchen roll
- A few safe household acidic things (e.g. vinegar/lemon juice)
- A few safe household basic things (e.g. sodium bicarbonate, soap, toothpaste)
- A paintbrush/spoon/pipette
- A tray/table covering
- Some pots
- Homemade cabbage indicator

What to do

1. Pour some cabbage water into the jug. Add a few pieces of kitchen roll to your indicator and leave to soak for a few minutes.

2. Carefully take your pieces of kitchen roll out of the indicator and hang them up to dry. Make sure you put something underneath them to catch the drips - we don't want to make the floor purple!

3. Pour out a some of your acids/bases into the pots (a pot per acid/base) or dissolve a bit of it in water (for the solids - e.g. sodium bicarbonate or bicarbonate of soda).

4. When your kitchen roll is dry, put it on the tray and get creative! Add small amounts of your acids/bases with your paint brush /pipette/spoon and watch the colour change.

5. Let your finished picture dry, and admire!

This Week's Challenge

Using your cabbage indicator, how many things can you find in your house that are acidic, neutral or basic?
Let us know what you find, what pH you think it is, and send us a picture (if you can) to OpenUpScience@cambridgesciencecentre.org

Did you know…?

Acids taste sour, bases taste bitter - but don't taste anything without checking with an adult first!

Hey!

We'd love to see how you got on with our activities and puzzles. If you can, send us a picture, video, drawing, or written description.

And, do you have any questions for us? If you have a question about this week's theme, send it to us. We'll answer some of your questions in our Monday YouTube videos.

Send us things! - OpenUpScience@cambridgesciencecentre.org

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We are kindly supported by our Executive Council:

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Quiz Answers from Page 4: Q1 – A, Q2 – B, Q3 - D, Q4 - C