

RADICAL REACTIONS

Acids & Alkalis

Watch the video here:
youtu.be/G3HCe9rjj94

Name:



Swansea University
Science for
Schools Scheme

ACIDS & ALKALIS

Chemistry lesson

WHAT ARE WE LEARNING?

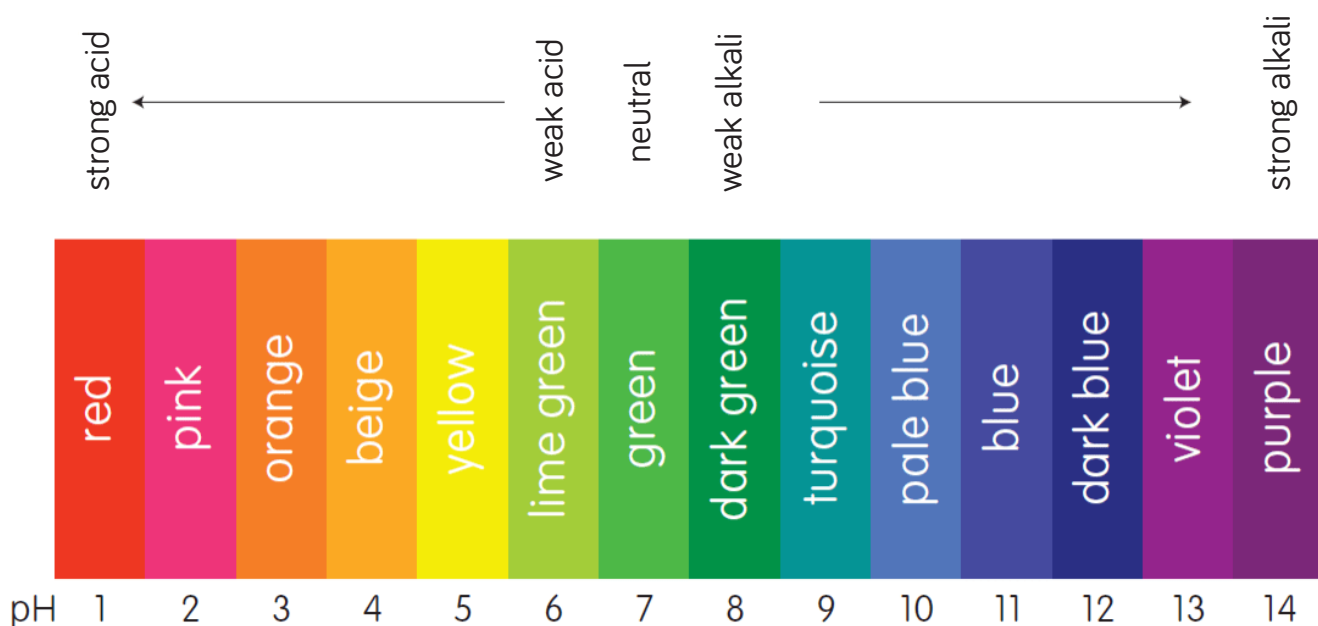
We'll be learning about **ACIDS** and **ALKALIS**.

Acids and alkalis have different chemical properties.

Some common household foods are weak acids and alkalis. Acidic foods like oranges and vinegar taste sour, while things that are alkaline, like baking soda and toothpaste, taste bitter.

When we want to know whether something is an acid or an alkali, we don't taste it, we measure its pH.

PH SCALE



To find out the pH of substances we use a pH INDICATOR solution. pH indicators are liquids which change colour to show whether something is acidic or alkali.

The picture above shows the colours that universal indicator solution goes when it is added to acids and alkalis, and the pH number that each colour indicates.

There are many as pH indicators. Different indicators turn different colours in acids and alkalis.

- The pH scale goes from 1 to 14.
- Substances with a pH number of 1 - 6 are **acidic**. The lower the pH number, the stronger the **acid**.
- Substances with a pH of number 8 - 14 are **alkali**. The higher the pH number, the stronger the **alkali**.
- Substances with a pH number of 7 are **neutral**, they are neither acidic or alkali.

EXPERIMENT

RED CABBAGE pH INDICATOR SOLUTION

Red cabbage has a strong purple colour because it contains a molecule called **anthocyanin**. The molecule changes color to red-pink when mixed with **acids**, and to bluish-green or yellow when mixed with **alkalis**. Red cabbage is a pH indicator.

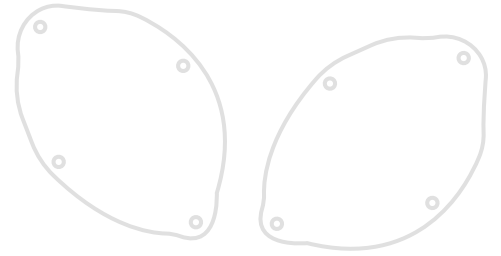
SAFETY

- You will be using boiling water. Be careful not to touch any hot surfaces or spill the water.
- Ask an adult to help you with the chopping.

MATERIALS

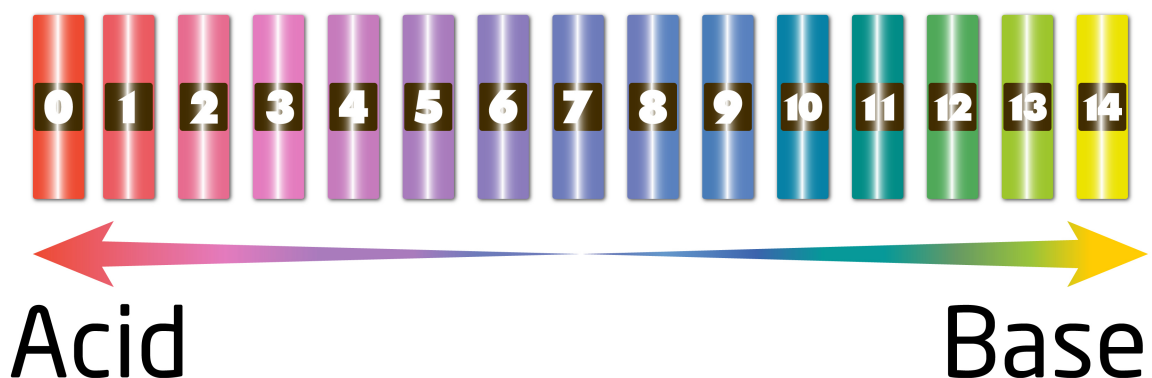
- Red cabbage
 - Baking soda*
 - Vinegar*
 - Lemon*
 - Lime*
 - Toothpaste*
 - Soda water*
 - Sweets*
 - Heatproof jug
 - Spoon
 - Scissors or knife
 - Kettle
 - Small containers
 - Small spoons or stirrers
- *Optional.

METHOD



1. Cut some red cabbage into small and place the pieces in a heatproof jug or bowl. Add boiling water until the cabbage pieces are covered.
2. Leave the cabbage in the hot water for a couple of minutes to brew (like tea). Carefully stir the mixture occasionally.
3. After 2-3 minutes the water should turn dark purple.
4. Leave it to cool. The liquid is your indicator solution.
5. Pour a small amount of the purple liquid into some small containers. Try not to get any cabbage pieces in the container - but if a few fall in, that's OK.
6. Add different household substances, like lemon, vinegar, baking soda or toothpaste, to each container. Add a bit at a time, stirring until the mixture changes colour.
7. What colour do the different mixtures turn the red cabbage pH indicator
Record the colours of all the mixtures.

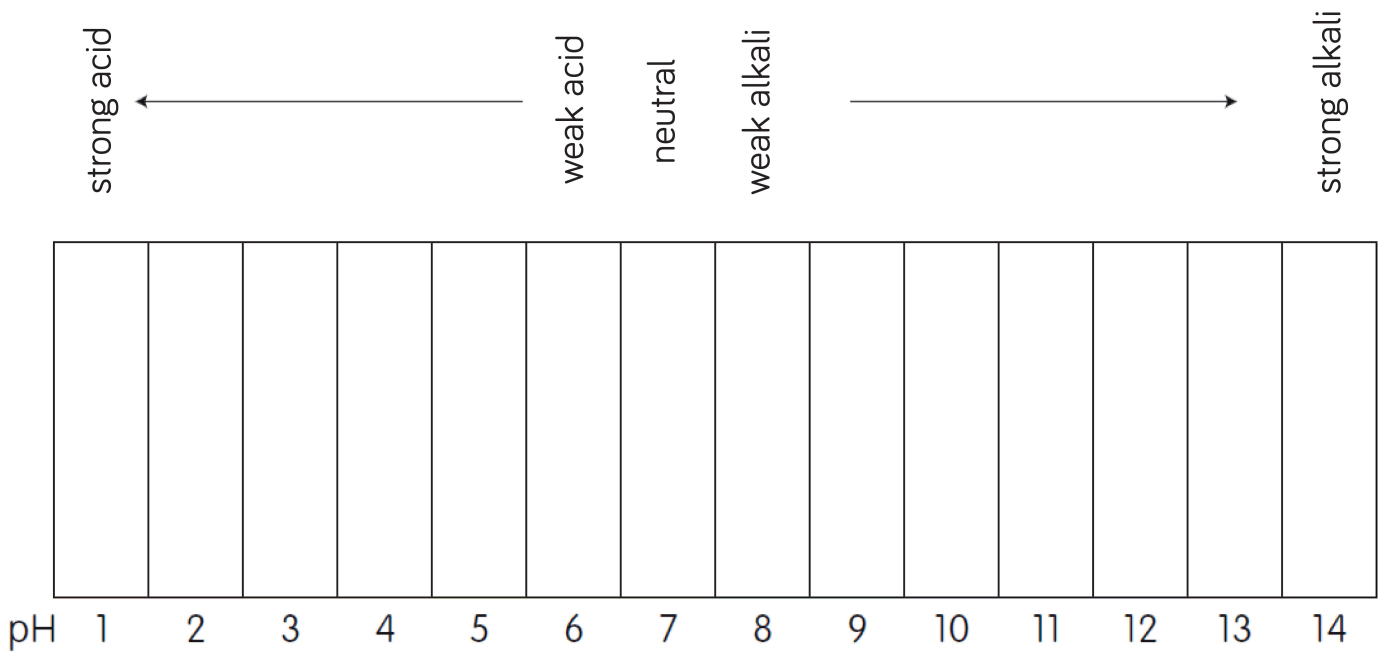
Red Cabbage Indicator



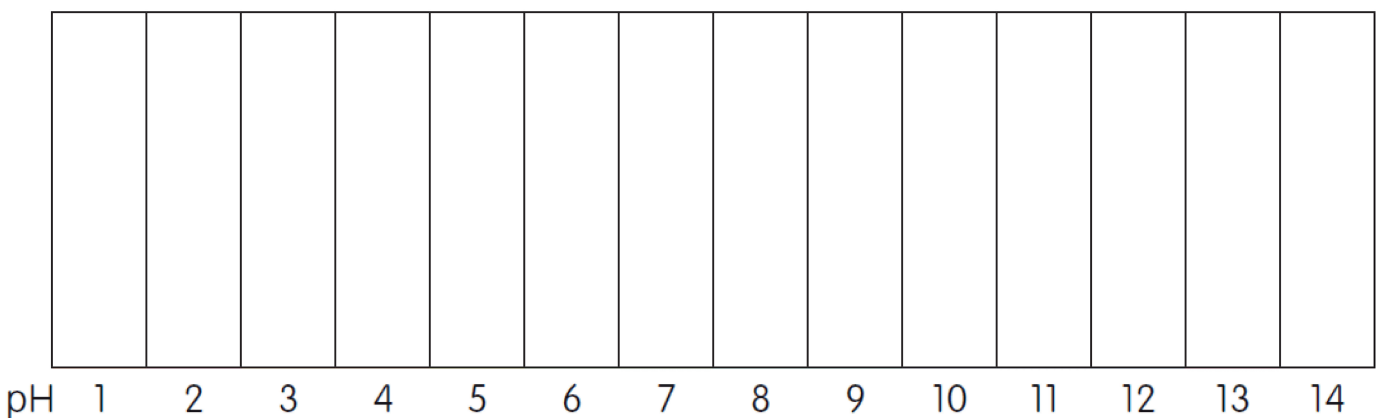
Colour in the pH scales



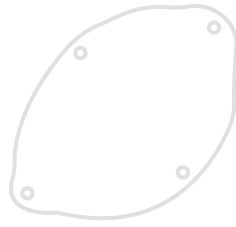
Universal Indicator pH Scale



Red Cabbage Indicator pH Scale



TESTING OUR RED CABBAGE pH INDICATOR SOLUTION



Substance tested	Colour at the end		Acid or alkali (tick the correct box)	
	What do you expect?	What did you see?		
Baking soda			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
Vinegar			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
Water			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
Lemon			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
Lime			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>
			ACID <input type="checkbox"/>	ALKALI <input type="checkbox"/>

Mix one of the acids with one of the alkalis.
What happens? Draw or write your answer

Go online and find out more about acids and alkalis. BBC Bitesize and Kiddle (The Kids Encyclopedia) are a good place to start). Use this box to tell us what new facts you found out about acids and bases. If you would like some feedback on your work, you can email it to us at S4Science@swansea.ac.uk

WHAT'S HAPPENING?

When we mix an acid and an alkali together, they react with each other. We call this a neutralisation reaction.

The pH of the mixture changes to somewhere between the pH of the acid and the pH of the alkali.

For example, if you added an equal amount of acid at pH 6 to an alkali at pH 8, the end mixture would have a pH of 7 and would be neutral.

Why does pH have a small p and a capital H?

Great question! The H is the chemical symbol for Hydrogen. The first letter of a chemical symbol is always capital.. Take a look at a periodic table of elements to learn more chemical symbols! The small p is a mathematical symbol that stands for a measurement of the concentration of hydrogen ions in the solution. It is sometimes called the 'power' of hydrogen.

QUICK QUIZ

Q1: A solution is determined to be an acid or alkali depending on the concentration of _____ ions in the solution.

Q2: What is a pH indicator solution?

Q3: What is the pH of a neutral solution (neither acidic or alkali)?

Q4: A liquid is considered to be acidic if it has a lot of _____

Q5: True or false – concentrated acids and alkalis are considered to be very dangerous.



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