RED CABBAGE INDICATOR

USE THE POWER OF CABBAGE TO CREATE COLOURFUL SOLUTIONS

SAFETY:

- Have an adult help with the hot water and cutting the cabbage.
- If you spill water, clean it up straight away… we aren't aiming for slippery science today!
- While you SHOULDN'T get wet, don't do this experiment in a place where water would be dangerous e.g. near electrical cords.
- Be careful with which chemicals you are testing. Read their packet for safety instructions, and wear gloves and/or safety glasses if needed. Do not test bleach, as it can react dangerously with acids.
- Don't eat or drink any materials you use in this activity.

WHAT YOU NEED

- Red cabbage (sometimes called purple cabbage)
- Knife and chopping board
- Hot water
- Two heat-resistant containers
- Strainer
- Clear cups for testing your substances
- Substances to test; for example, vinegar, washing powder, antacid, ammonia, bicarbonate soda, lemon juice, soft drink, etc.

WHAT TO DO

1. Roughly chop up your cabbage - enough to fit into one container. The finer you chop it, the more indictor you will be able to extract from the cabbage.
2. Pour the hot water over your cabbage and allow it to sit for 10-15 minutes. The water should become a rich purple colour.
3. Strain the liquid into a new container and dispose of the cabbage. This liquid is your indicator! It will last up to a fortnight in the fridge, or you can use it immediately.
4. Pour even amounts of your red cabbage indicator into the clear cups, so that you have one for each substance you are testing.

5. Start with a control, water. If you add a small amount of water to your red cabbage indicator, does anything happen?
6. Test your substances in the same way in their own individual cups of indicator. Try to keep the amount of substance you are adding, and the amount of red cabbage indicator consistent across tests. How does the colour change?
    a. Try grouping the substances into groups of similar colours. Do these substances have anything in common?
    b. Pick two chemicals that produced different colours and add them both to the red cabbage indicator. Is the colour change what you expected?

WHAT'S HAPPENING?

The colour changes we see are due to a molecule found inside the red cabbage, called anthocyanin. This is what gives the cabbage its usual purple colour, but when it is mixed with other chemicals, it will change colour depending on the substance's pH – how acidic or basic it is.

The pH scale ranges from 0 to 14. A chemical with a pH of 7 is neutral – neither an acid nor a base. Neutral substances, like water, will not change the colour of our cabbage indicator – it will stay that rich purple colour. Chemicals that are acids have a pH less than 7 and change our indicator to a pink or red colour. Many foods are acidic; you can often tell which ones by their sour taste. Chemicals that are bases have a pH greater than 7, and change our indicator to a blue, green or yellow colour. Many cleaning products are basic, and they can have a slimy or soapy feel to the skin.

Acids and bases react together to produce a salt and water; they neutralise each other. You may have seen this before when mixing vinegar and bicarbonate soda together for other experiments. If you mixed and acid and a base together in this experiment, you would have seen the colour change again, towards that more neutral purple.

MORE WAYS TO EXPLORE THIS SCIENCE!

- Add a fizzy tablet (such as soluble aspirin) to a cup of the indicator. As it dissolves, it will slowly turn the solution more acidic, and you can watch the colour change over time.
- Play with your food! Make dinnertime a science experiment by cooking rice noodles in your red cabbage indicator. Squeeze a lemon over the noodles (or an acidic sauce) to change the noodles from purple to pink. Alkaline substances are unfortunately not as tasty.