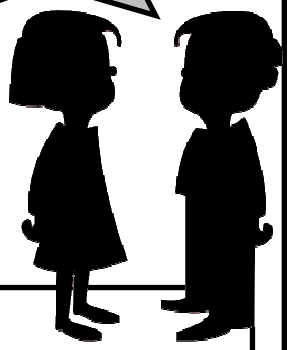
Acids and Bases

4
3
2
1
Level

Big Idea
pH is a measure of acidity/alkalinity.

Red cabbage can be used to test the pH level of substances.

The activity is aimed at this level but can be modified to suit other levels.



Learning Intentions

- ✓ We are learning how to make red cabbage indicator paper.
- ✓ We are learning to use red cabbage indicator paper to test the pH of some common products to determine if they are acidic or basic.

Success Criteria

- ✓ I can explain whether a substance is an acid or base and why I know.

Other Resources

Assessment Resource Bank
MW5109 Acids and bases
MW5097 Acids and bases
MW5645 Acids and bases

What you need to know

- Some of the most important kinds of chemicals in science are acids and bases. You use acids and bases in your home everyday. You can recognise an acid because it makes food and drinks taste sour. If you have ever tasted something chalky or ever felt a liquid that feels slippery like soap, those substances are probably bases.
- The pH scale is used to measure acidity or alkalinity of a solution. It measures the concentration of hydrogen ions in a solution.
- A pH of less than 7 = acidic, a pH greater than 7 = basic/alkaline, pH 7 = neutral.
- Litmus paper is a piece of paper with a chemical on it that changes colour if mixed with acids or bases. Some fruits and vegetables contain this chemical (eg – red cabbage).
- The cabbage juice will change colours if it is mixed with an acid or a base. The colours you get can be matched to the chart to see what pH the substance is.

Curriculum Links

Nature of Science
Investigating in science – Build on prior experiences, working together to share and examine their own and others' knowledge. (L3/4)

Material World
Properties and changes of matter – Compare chemical and physical changes. (L3)

Key Competencies
Using language, symbols and texts – Communicate ideas in recognised scientific language of symbols.

What you need

- One red cabbage
- Measuring cup
- Sharp knife
- Blender
- Boiling water
- Strainer
- Large bowl
- Jar with a lid
- Coffee filter paper
- Eye droppers
- Scissors
- Household products to test (eg - orange juice, vinegar, milk, soap, baking soda, lemon juice, antacid tablets, window cleaner, bleach, washing powder, aspirin tablet, water, shampoo)

Note: to test solids or powders with your pH paper, you will first need to dissolve them in a small amount of water.

What to do

Hint – You could prepare the cabbage juice indicator paper ahead of time and just do the pH testing with your students.

Make red cabbage juice

1. Chop the cabbage into small pieces – you need about 1 cup of cabbage.
2. Put the cabbage into a blender with 1 ½ cups of boiling water. Blend until the cabbage is finely chopped.
3. Strain the cabbage and keep the purple water.
4. The cabbage juice can be stored in the fridge in an airtight container until you are ready to use it.

Make red cabbage indicator paper

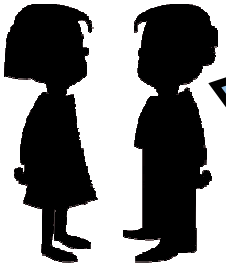
5. Soak coffee filters in the cabbage juice and allow them to dry.
6. Cut the coffee filters into strips about 2 x 6cm.

Testing the pH of household substances

1. Use a clean dropper and add 2 or 3 drops of the substance onto a strip of the pH paper. What colour did the paper turn? Is the substance an acid of base?
2. Record the results.
3. Repeat for other substances.
4. Students could now order the substances according to their pH levels.

Colours expected when testing with red cabbage indicator.

pH	1-2	3-4	5-6	7-8	9-10	11-12
Colour	pink	dark red	violet	blue	blue-green	green-yellow
	acid	acid	acid	neutral	base	base



What's Next?

- Find out which other vegetables can be used to measure pH.
- Use litmus paper to test pH.
- Find out about ocean

Safety

- Always use household chemicals with adult supervision.
- **Never** mix cleaning products together.
- Always test each substance separately.
- Do not eat or drink any of the substances.
- Chemicals used can be washed down the drain with water.

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