Hands On! Doing the pH Test

Year levels 5–6

Curriculum Links

Science

- With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS231).

Resources

- red cabbage (½ or more of one small cabbage)
- knife
- chopping board
- kettle for boiling water
- a large bowl, jug and strainer that can handle boiling water
- several very clean clear glass jars (same size is best)
- measuring spoons
- ½ tsp each of bicarbonate of soda, lemon juice, vinegar and other materials to test
- torch (optional)
- white paper (optional)

Location

The kitchen, garden or classroom

Duration:
20–30 minutes

Before the lesson

- First, chop ½ a red cabbage into small pieces. Shredded, as for coleslaw, works well. You can use the other half of the cabbage in cooking.
- Boil a litre of water and pour the boiling water on the cabbage. (Try a large pyrex bowl.)
- Let it sit until it cools. You will see that the water is a rich purple-red colour.
- Strain the cabbage, keeping the purple-red liquid in another bowl or a jug. You could do the preparation to this point before class. The pale cabbage can go in the compost now.
- Make sure you keep all the purple water – it's best if it's in a white or see-through jug so that the students can see what colour you started with (plastic should be okay because it's cool now). You can keep this cold purple water in the fridge for 2–3 days if you need to.

Doing the demonstration

- Set up your clean, clear glass jars or cups in a space where students can see them.
- You can put white scrap paper under them so that the colour change will be obvious, and you can also write the substance on the paper next to each jar – e.g. 'Bicarbonate of soda'.
- In each jar, measure ½ teaspoon of each of the substances that you want to test: ½ tsp bicarbonate of soda, ½ tsp lemon juice, ½ tsp tartaric acid etc.
- Add 1 tablespoon of fresh water and stir until the powder has become a paste. (**Important**: Use a clean spoon for each one, otherwise you will contaminate each substance and ruin the results!)

Predicting results

- Ask students to predict what will happen before you mix each one in.
- Measure 60 mL of the purple cabbage water and add it to each of the cups or jars in sequence. You will see a sudden change of colour in each one as the purple liquid mixes in.
  - Pink is acid; red slightly acid.
  - Dark blue is neutral.
  - Greenish yellow is alkaline.
- Get the students to arrange the jars in a row according to how acidic they think they are. Don't show them the full scale just yet.
- If they need prompts, talk about mixing light or paint colours (blue and yellow make green, therefore a green liquid goes between a yellow and a blue liquid).
- Below is the scale for the class to check their assumptions.
- Discuss the process and how they made decisions.

pH scale for Red Cabbage Water

pH number	1–2	3–4	5–6	7–8	9–10	11–12
Colour	Pink	Dark Red	Violet	Blue	Blue–Green	Greenish–Yellow

Notes

The activity works best if you have a variety of substances with varying levels of acidity.

Try these as the basic set:

- bicarbonate of soda
- lime or lemon juice
- vinegar
- tartaric acid (not cream of tartar).

Try also:

- powdered chalk
- a crushed clove of garlic
- mashed or puréed apple, banana, potato
- a dash of milk
- garden soil, compost from the worm farm, soil from under a native plant or tree.

Mix powders with a bit of water by stirring or shaking well just before adding the cabbage water.

To test soil, put about ¼ cup soil in the bottom of the jar, add ¼ cup water and shake vigorously. Add red cabbage water, shake again and let it settle until you can see the colour of the liquid. (This settling can take about half an hour so you might prepare and label these first. Hold them up to the light or shine a torch through them on a white background to show the colour clearly.)

Try testing more than one spot of the garden and discussing with students why it would vary.