scitech

At Home Activities

Test Mystery Powders

Watch on YouTube | Ideal for 8-13 years | Adult involvement recommended

Overview

In this activity, you'll use red cabbage solution to test mystery powders.

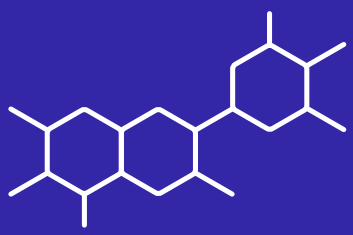
Scientists routinely examine the chemical and physical properties of substances collected as evidence at a crime scene. They do this so they can identify the substance and determine if it's relevant to their investigation. Red cabbage solution can be used to test a mystery powder to see if it's an acidic or alkaline. You'll then identify the mystery powder by comparing it to a panel of known powders, also tested for acidity or alkalinity. This activity uses household samples of similar physical appearance (they're all white powders) but with chemical differences.

Materials

- 5 white powders
  These are your known substances (e.g. sherbet, washing powder, cornflour, cream of tartar and baking powder)
- 6 small containers
  These could be small clear bowls or clearplastic shot glasses
- 1/2 red cabbage
- Water
- Kettle
- Large heat safe bowl
- Sieve
- Jug or other container for cabbage juice
- Eyedropper or teaspoon
- Glass or cup
- Pen and paper
- Marker pen

Did you know?

Anthocyanin is the purple coloured water-soluble pigment in red cabbage that changes colour.



Method

Prepare the evidence

Before conducting this experiment, ask an adult to:

1. Select one of the five white powders to use as a mystery white powder or “evidence” from a crime scene.
2. Place a small amount (1 teaspoon) of this white powder into a bowl.
3. Using a marker, label the bowl ‘E’ for evidence.

Note: The next step requires active adult involvement to make red cabbage solution

Prepare the red cabbage solution

1. Boil a kettle of water.
2. Chop the red cabbage into pieces.
3. Place the red cabbage pieces into a large heat safe bowl.
4. Add the boiling water to the red cabbage so all the cabbage is covered by water.
5. Leave the cabbage and hot water to stand for about 10 minutes.
6. Place a kitchen sieve over the storage container (jug or jar).
7. Pour the cabbage mixture through the sieve into the storage container.
8. Discard the cabbage leaves.
9. Put a lid or cover on the jug or jar and leave at room temperature.
10. This is your red cabbage solution.

Mystery powder analysis

1. Place a small amount (1 teaspoon) of each white powder into individual small bowls.
2. Label each of the five bowls with the name of powder it contains.
3. These are samples of your known substances.
4. Take the pre-prepared evidence sample, in the bowl labelled ‘E’.
5. Fill a small glass halfway with the red cabbage solution.
6. Using an eye dropper or teaspoon, add 1ml of red cabbage solution to the evidence sample.
7. Record the colour change.
8. Next, add 1ml of red cabbage solution to each of the five known substances.
9. Record the colour change of each of these substances.
10. Compare the resulting colours to determine which known substance most closely matches the mystery powder.
11. You can now identify your mystery white powder.

For discussion

How does the red cabbage solution work? Red cabbage contains a water-soluble pigment called anthocyanin that changes colour when it comes into contact with acidic or alkaline substances. When it’s mixed with an acid it turns pink-red and when mixed with an alkali it turns blue-green. This property makes red cabbage solution useful for telling us something about the chemical composition of other substances.

Could we test liquids rather than powders using the red cabbage solution?

Yes, red cabbage solution can be added to liquids. Similar to the powders, liquids will change colour based on whether it’s acidic or alkaline or stay the same colour if it’s pH neutral.

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