

7: pH Painting at Home

How does pH painting work?

The purple colour of the red cabbage is due to a mixture of natural dyes present.

Under different conditions of pH the dyes have different structures and therefore absorb different wavelengths of light resulting in different colours.



wear gloves to avoid staining of hands



avoid skin or eye contact

What you will need

To make the purple pH paper:

1 small red cabbage
white blotting paper
cheese grater and bowl
sieve
a large bowl
eye dropper (or similar) if available
access to a warm oven or hair dryer (optional)

To make the pH 'paints':

concentrated lemon juice
baking soda
washing powder
some water-tight containers
paint brushes

protective clothing and household gloves to prevent staining of clothes and hands, eye protection if available, if not take extra care especially with concentrated lemon juice.

Written permission from your parent/guardian to carry out this experiment (see your teacher).

Safety advice

Although the chemicals involved are household items, if you do spill anything on your skin, wash it off with water and thoroughly rinse your eyes should you splash anything in them.

The work must be carried out under adult supervision.

Work on a stainless sink surface near a tap.

What you do

PREPARING THE PURPLE pH PAPER

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 Use a cheese grater to grate about half of the red cabbage. Place it in a bowl.
- Add about 150 cm³ of water and mix very thoroughly until the liquid has turned dark purple.
Be very careful with this purple cabbage juice as it will stain wood, plastic, hands and clothes.
- Pour the juice through the sieve, collecting the purple liquid in a large bowl. Throw away the cabbage left in the sieve.
- This could be quite messy! Take a piece of blotting paper, dip it in the purple liquid for about 20 seconds and then leave it to dry. If it is a nice day you could leave it outside. Alternatively, you could dry it in a warm oven or gently with a hairdryer.

7: pH Painting at Home (contd)

PREPARING THE pH 'PAINTS'

The colour of the dye extracted from red cabbage varies according to the pH as shown in the following chart.

Red cabbage indicator colour chart

	acidic				neutral				alkaline					
pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
colour	red		pink			purple		blue		green		yellow		

You can use this chart to work out the pH of various household materials (in other words, whether it is acid, neutral or alkaline).



Some things you might like to try are: lemon juice, vinegar, washing powder and shampoo.

Simply place small drops on the dry purple paper and watch the colour change.

The table below shows how to make up colourless 'paints' which will make the purple dye turn a specific colour.

Colour (when dry)	Ingredients
RED	concentrated lemon juice
PINK	2 teaspoons (5 cm ³) concentrated lemon juice in 300 cm ³ of water
BLUE	1 teaspoon (0.5 g) baking soda in 300 cm ³ of warm water
GREEN	6 teaspoons (3 g) baking soda in 300 cm ³ of warm water
GREEN/YELLOW	1 dessert spoon of washing powder (5 g) in 300 cm ³ of warm water

It is important to use a clean and dry container to make up each of the different 'paints'.

It is also important to use **clean** brushes for each 'paint' and **not** to use the same brush for different paints. This is because if two paint solutions are mixed together, the pH and therefore the colour produced will change.

You will find that the paints often dry to a different colour. This is because pH is a measure of the **concentration** of acid or alkali. As the 'paint' dries the water evaporates, and the concentration of the acid or alkali effectively increases. This means that a 'paint' which is blue when wet may dry to a green colour. Similarly, a 'paint' which is green when wet may appear yellow when dry.



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