

ACTIVITY

5



CHEMISTRY AT HOME

# COOL CHROMATOGRAPHY FOR AUTUMN

● ○ ○ EASY



6-12



30 MINS

*plus drying time*



1

Learn the basic technique of chromatography

2

Find out how mixtures can be separated using chromatography

3

Discover why leaves change colour in autumn

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# COOL CHROMATOGRAPHY

## Chromatography is a technique used to separate mixtures.

Did you know felt tip pens often have several different ink colours which make up the colour you see when you draw or write with them?

This activity uses filter paper, or a paper towel and water to separate different inks in coloured felt tips pens. The more soluble (most easily dissolved) inks travel further up the filter paper than less soluble inks.

The extra challenge uses red, green, yellow and orange inks so the filter paper can be turned into colourful autumn leaves.

## You will need

- Filter paper / coffee filter / paper towel
- Different colour felt tip pens — non washable but not permanent
- Scissors
- Wide glass or plastic jar
- Pencil
- Water
- Ruler
- Sticky tape or clip
- Washable and permanent pens *optional*



## Safety

Take care using permanent felt tips pens as these may stain skin and clothes.

This activity should be supervised at all times.

If using the nail varnish remover as mentioned in Activity 2 make sure that there are no open flames nearby.

Make sure not to breathe in the fumes as the nail varnish remover can cause light-headedness.

## Instructions

### Activity 1 Separate the colours

- Pour about 1cm of water into the jar.
- Cut the filter paper so it fits neatly inside the jar.
- Keeping the filter paper out of the jar, draw a straight pencil line 1cm from the bottom of the filter paper horizontally. You can use the ruler for this.
- Colour a small circle of ink for each colour pen on the pencil line about 1cm apart. Label the spots in pencil so you remember which pen is which!
- Using a clip or a piece of tape, attach the top of the filter paper to the pencil so the paper suspends into the jar. The water needs to touch the bottom of the filter paper but don't let the water come above the 1cm line you have drawn.
- Leave the experiment for about 10 minutes and then take the paper out from the water when it is about 1cm from the top.
- Draw a line on the filter paper where the water has reached. This line acts as a marker so you can compare the different inks.
- Different colour inks move up the paper at different speeds.
- Leave the filter paper as long as is needed for the paper to dry.

## Activity 2

### Washable and permanent pens

- Try the chromatography again with a new piece of filter paper.
- Follow steps from the previous method.
- This time colour small circles of ink for a washable pen and a permanent pen and remember to label the circles with a pencil. What happens this time?
- The permanent pen colour will not move up the filter paper as it isn't water soluble.
- What could you change so that the ink from the permanent pen moves up the filter paper? Try changing the water to a different solvent such as acetone nail varnish remover.

## Challenge

Jasmine wants to find out whether black or red felt tips pens contains the most different colour inks.

Set up a chromatography investigation to find out.

### Things to keep the same

- Non washable felt tip pens
- Type of filter paper (chromatogram)

### Things to change

- Colour of the felt tip pen

### What to measure

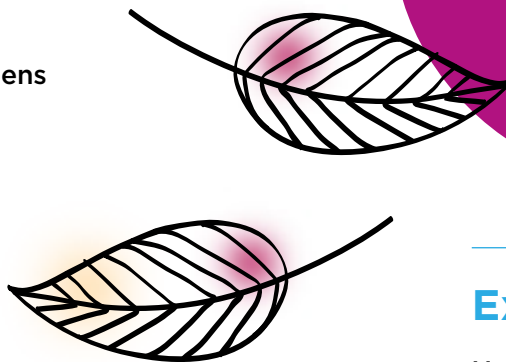
- The number of different colours that can be seen on the chromatogram (filter paper) from each felt tip pen.

## What's happening?

Different dyes travel through the filter paper at different speeds. The more soluble a dye is the faster and further it travels.

## Did you know?

Leaves change colour in autumn when the green colour (chlorophyll) starts to break down revealing the other colours in the leaves!



## Extra challenges

Use orange, red and yellow felt tips and repeat the experiment. Do this twice then cut the filter papers into a leaf shape and create autumn leaves once they are dry.