

Questacon at HOME

Activity sheet

Paper Chromatography

Background

Many substances we encounter are interesting and complicated mixtures. For example, a cup of coffee has more than 1000 different chemical compounds in it! *Chromatography* is a technique that scientists use to help separate a mixture so that we can find out what it is made up of. *Paper chromatography* is a fun way to explore this technique using coloured mixtures! In this experiment, we will investigate what different coloured inks or pigments make up the colours we see.

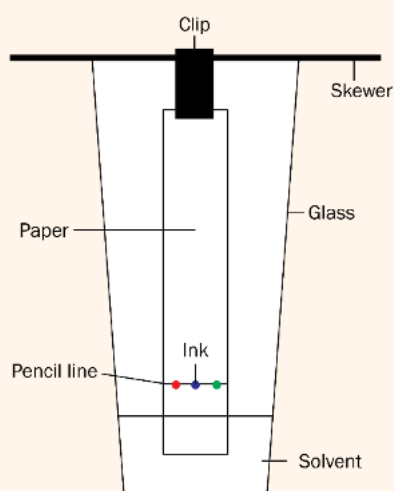
Materials

- Tall glass or cup
- Strips of printing paper or paper towel
- Coloured inks (such as pens, colouring pens or food dye)
- Solvents (such as water, methylated spirits or acetone)
- Skewers
- Bulldog clips or paper clips

Safety

This activity uses liquids, which may become slip hazards. If using methylated spirits or acetone, follow the safety instructions on the label. Adult supervision is recommended for young experimenters.

Procedure



Set up your paper: Draw a pencil line across a strip of paper, about 2cm from the bottom. Along the pencil line, put some dots of ink. Using a clip, attach the paper to a skewer, so that the end with the ink dots is furthest away from the skewer.

Set up your chromatography container: Put a small amount of solvent in the glass. Put your paper in the glass, so that the skewer rests on top and supports the paper, and the solvent just touches the paper, but does not cross the pencil line.

Run the chromatography experiment: Watch the pigments from your ink move up the paper as the paper absorbs the solvent!



Tips & Tricks

- Make sure your solvent does not cover the pencil line on your piece of paper - if it does, it will wash away your pigment, and you won't get to see the colour travel up the paper.
- If you are having trouble seeing the colours, try using a darker pigment or making a more concentrated spot of ink.
- Experiment with different papers (printer paper, tissue paper, paper towel) to see which ones work the best.

What's the Science?

Chromatography is a process used to separate mixtures into their components. Chromatography always uses a stationary phase (e.g. paper) and a mobile phase (e.g. solvent). The mobile phase is used to carry the mixture through the stationary phase, separating it as it goes!

In *paper chromatography*, the solvent is absorbed and travels through the paper. As the solvent moves, it carries some of the coloured components with it! These components will move at different rates, depending on their attraction to the solvent and the paper. If a component is more attracted to the solvent than to the paper, it will move a large distance up the paper. If a component is more attracted to the paper than to the solvent, it will travel a small distance up the paper. This separation allows us to see the coloured components individually, instead of how they appear mixed together!

What Questions should I ask?

- What coloured pigments do you think might be found in a black or brown pen?
- Can you find a coloured pen that does not separate into different colours?
- Do different types/brands of markers of a similar colour contain the same pigments?
- What do you think might happen if you use a different solvent?

What's Next?

- **Pigment challenge:** Can you extract pigments from foods or plant materials to test? You could test the food dye off M&Ms or a spot of strongly brewed tea. You could also extract coloured pigments from leaves or flower petals by crushing in a solvent like methylated spirits, or by gently boiling in water!
- **Design challenge:** Can you make a cool design or pattern using different coloured markers?
- **Solvent challenge:** Which solvent makes your pigment travel the furthest? Can you find another solvent that makes the pigment travel even further?

