

Forms part of the Gr 10 Physical Sciences 3-in-1 Class text and Study Guide.
See p. 7 MODULE 1 TOPIC 1 Unit 3 for the theory.



PRACTICAL ACTIVITY

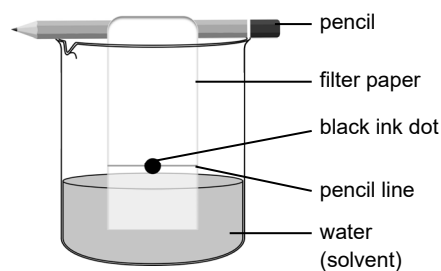
Paper chromatography

Aim

To separate black ink into its constituent colours using paper chromatography.

Materials

- glass beaker with a small amount of water (no more than 2 cm deep)
- 1 cm strips of filter paper
- black ink pen
- ruler
- pencil
- Smarties



Method

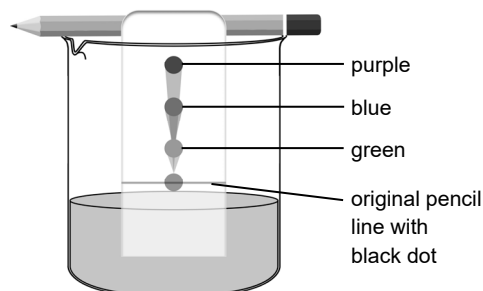
- 1 Use the pencil and ruler to draw a line, about 2,5 cm from the end, across the bottom of the filter paper strip.
- 2 Make a small dot with the black ink pen in the centre of the pencil line.

PRECAUTION

The pencil line and ink dot must be just above the surface of the water.



- 3 Put the marked end of the filter paper into the water and hang the other end over the edge of a pencil to keep it from falling into the water.
- 4 After a few hours observe the different coloured dots that have appeared on the filter paper and note how far each has moved from the original pencil line.
- 5 Repeat the activity with 2 or 3 different coloured Smarties. Dip the Smarties into water to make a dot on the pencil line.



Observations and discussion

- After a few hours, a few dots of different colour ink molecules can clearly be distinguished on the filter paper.
- The different colours (pigments) of ink present in the black ink mixture, travel up the filter paper at different rates and bond to the paper at different distances from the starting line.
 - The difference in solubility of these molecules cause them to leave the solution at different positions as the solvent (water) continues to move up the paper.
 - A colour that is more soluble will move further up the paper than one that is less soluble.
- The ink pigments present in the black ink mixture are now separated and can be identified.

NOTE

If only the black dot travels upwards and appears on the chromatogram, the black ink is a pure substance and not a mixture.



- With some Smarties, only the colour of the smartie spreads out/travels up the paper. These food colours therefore consist of only one type of particle and are **pure** substances.
- With a few others, the colour of the Smarties separates into different colours. These food colours are therefore **mixtures** of different substances.

Conclusion

A mixture of pure substances can be separated into its constituent substances by means of paper chromatography, e.g. the different colours (pigments) in black ink will appear as separate dots on a chromatogram and can be identified in this way.