Chromatography: pigments in leaves – transcript

Plant leaves contain a mixture of coloured pigments. Most leaves are green due to the presence of the pigment chlorophyll. This substance is important in photosynthesis − the process by which plants make their food.

In chemistry, finding out the content of mixtures is important and chromatography is a technique that can be used to find the individual components in a mixture.

In this experiment, the pigments in a leaf will be separated by paper chromatography. A table like this one should be constructed for the results.

First, a strip of chromatography paper is placed on a clean and dry flat surface.

A horizontal line is drawn using a ruler and a pencil about three centimetres from the base of the paper strip. A single dot is added to the middle of the horizontal line.

The chromatography paper should look like this before any leaf extract is added.

To make a leaf extract, a leaf is first cut up into small pieces using scissors and then the leaf pieces are added to the mortar.

Next, a pinch of sand is added to the mortar. This is used to break open the tough plant cells, releasing the pigments.

Ten centimetres cubed of propanone is measured out using the measuring cylinder and is then added to the mortar.

The mixture is ground with the pestle for at least two minutes.

Next, a fine glass tube is used to put the leaf extract liquid onto the pencil spot on the paper. The spot should be as small as possible. A hair-dryer is used to dry the spot for about twenty seconds. This procedure is repeated so that a total of six spots are applied to the paper strip.

Now the paper is attached to a pencil using sticky tape.

Twenty centimetres cubed of propanone is measured out using a measuring cylinder and poured into a large beaker.

The paper strip is carefully lowered into the beaker of propanone. The propanone should be below the horizontal line.

Moving the paper strip should be avoided once it is in position.

As the propanone moves up the paper, the pigments will initially move with the propanone and eventually the propanone will move ahead of the pigments, which should have separated.

When the propanone line approaches the top of the paper strip it is removed.

A pencil is used to mark how far the propanone has moved up the paper. This is called the solvent front. The paper is dried with the hair-dryer.

The number and colour of any pigments is recorded in the results table.

A ruler is used to measure the distance travelled by the solvent front from the horizontal pencil line. This is recorded in the results table.

The distance travelled by any pigments found on the strip is also measured and recorded in the results table.

These two values can be used to calculate the individual retention factors for each pigment.
Here is a completed table for five different leaves.

In this experiment, paper chromatography was used to separate the individual pigments found in the leaves of a variety of plants. Chromatography is a powerful analytical technique.

Chromatography experiments are often used to assess the quality of medicines and to identify substances found by crime scene investigators.