Edexcel Chemistry IGCSE

Practical 1.13: Investigate chromatography using inks/food colourings

Notes

Separating a mixture of food colourings

Aim

To use paper chromatography to separate a mixture of food colouring.

Equipment list

- Chromatography paper
- 100 cm^3 beaker with lid
- Capillary tube
- Pencil and ruler

Chemicals required

- Distilled water (solvent)
- 4 known food colouring
- Unknown food colouring mixture

Method

1. Draw a pencil line 2 cm from the bottom of chromatography paper. Mark 5 pencil spots along this horizontal line, making sure the marks are spread across the line.
2. Use a capillary tube to place one dot of 4 known food colourings and one dot of the unknown mixture onto each of the pencil spots. Record which dot is which.
3. Place the chromatography paper in a beaker containing 1 cm of water. Place a lid on the beaker to prevent evaporation of the solvent and wait for the water to travel most of the way up the paper.
4. Once the water has travelled 2/3 of the way up the paper, remove from the beaker and draw a line at the solvent front (this is the maximum height reached by the solvent). Leave to dry.
5. Once the paper has dried, calculate the Rf values. Compare the Rf values of the known food colorings with the unknown mixture.

Key points

- A pencil must be used to draw the line on the chromatography paper because pencil lead is insoluble in the solvent so will not travel up the chromatography paper.
- The depth of the water in the beaker must be below the substances on the chromatography paper to avoid submerging them and washing them away.
- If the Rf value of a known food colouring matches the Rf value of a spot in the unknown mixture, it's likely that this food colouring is one of the substances in the mixture.
- The stationary phase is the chromatography paper and the mobile phase is the water.

Safety precautions

- Take care when handling glassware, particularly capillary tubes which are very fragile and brittle. Clear up any broken glassware immediately.
- Avoid touching the food colourings as they will stain the skin. Gloves may be worn.
- Do not ingest the water or food colourings.

Diagram

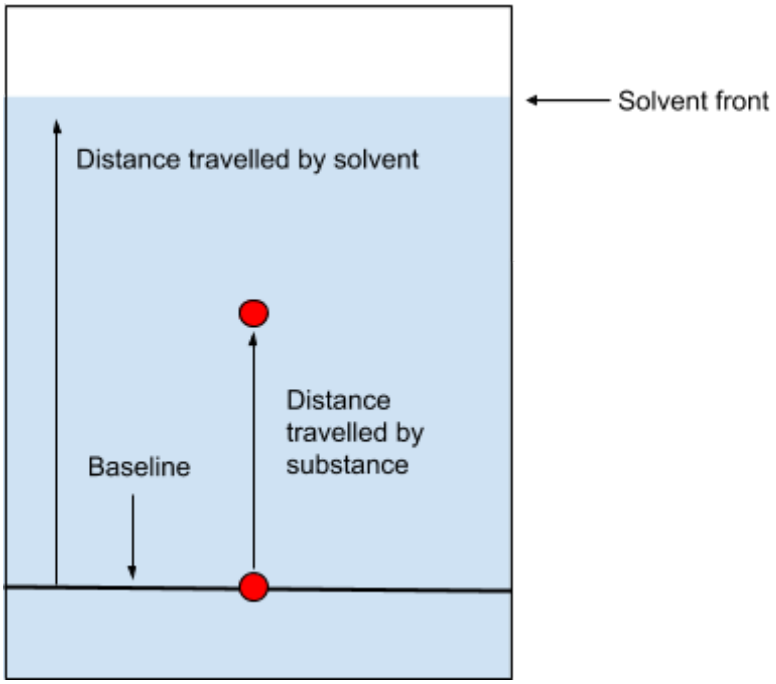

Figure 1 Chromatogram

Analysis of results

The Rf value of each spot on the chromatogram should be calculated. If the Rf value of a known food colouring matches the Rf value of one of the spots in the unknown mixture, it is likely that this food colouring is one of the components in the mixture. If two substances are the same, they will move the same distance on the chromatography paper.

Rf = distance travelled by substance ÷ distance travelled by solvent front

When measuring the distance travelled by a substance, you must measure from the baseline to the centre of the spot as these spots may elongate.