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# GCSE Chemistry required practical activity 6: Chromatography

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## Student sheet

Required practical activity	Apparatus and techniques
Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate $R_f$ values.	AT 1, AT 4

### Investigation into the use of paper chromatography to separate and identify a mixture of food colourings.

In this investigation you will use paper chromatography to separate the different colours present in an unknown mixture of food colourings. You will then measure the distance travelled by each colour and the solvents to calculate  $R_f$  values.

Learning outcomes
1
2
Teachers to add these with particular reference to working scientifically

## Method

You are provided with the following:

- 250cm<sup>3</sup> beaker
- Glass rod
- A rectangle of chromatography paper
- Four known food colourings labelled A to D
- An unknown mixture of food colourings labelled U
- Glass capillary tubes

## Risk assessment

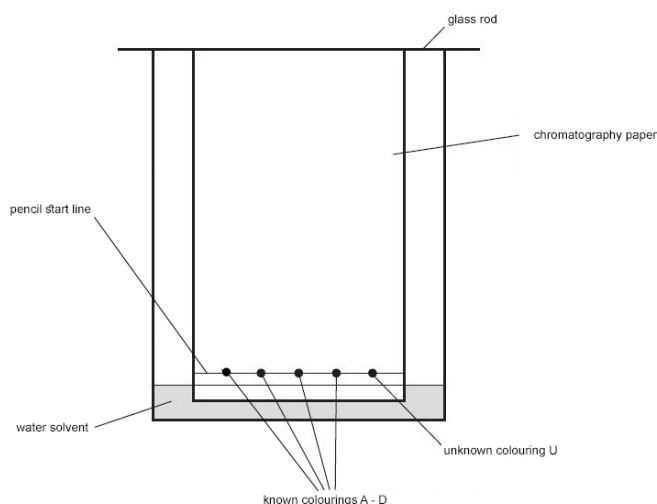
Safety goggles must be worn throughout.

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**You should read these instructions carefully before you start work.**

1. Using a ruler, draw a horizontal pencil line 2cm from a short edge of the chromatography paper. Mark five pencil spots at equal intervals across the line, keeping at least 1cm away from each end.
2. Use a glass capillary tube to put a small spot of each known colouring and the unknown one on the five pencil spots. Try to make sure each spot is no more than 5mm in diameter. Label each spot **in pencil**.
3. Pour water into the beaker to a depth of **no more than 1cm**.
4. Attach the edge of the paper furthest from the spots to the glass rod so that when the rod is rested on the top edge of the beaker, the bottom edge of the paper dips into the water.

**Ensure that the pencil line is above the water surface, and that the sides of the paper do not touch the beaker wall.**



5. Without disturbing the beaker, wait for the water solvent to travel at least three quarters of the way up the paper. Carefully remove it and draw another pencil line on the dry part of the paper as close to the wet edge as possible.
6. Hang the paper up to dry thoroughly.
7. Measure the distance in mm between the two pencil lines. This is the distance travelled by the water solvent. Write the same distance in the table below for each colouring.
8. For each of the four known colours, measure the distance in mm from the bottom line to the centre of each spot. Write each measurement in the table.
9. Use the equation:

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

to calculate the  $R_f$  value for each of the known colours. Write them in the table.

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10. Match the spots in the unknown sample U with those from A – D using the colour and distance travelled to help you. Which of colourings A – D are in mixture U? Are there any other colourings in U which do **not** match A – D?

Food colouring	Distance travelled (mm)		Rf value
	Solvent	Spot	
A			
B			
C			
D			

11. Match the spots in the unknown sample U with those from A – D using the colour and distance travelled to help you. Which of colourings A – D are in mixture U? Are there any other colourings in U which do **not** match A – D?