

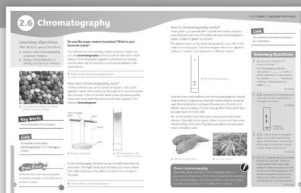
2.6 Chromatography

Chemistry NC link:

- simple techniques for separating mixtures: chromatography.

Working Scientifically NC link:

- interpret observations and data, including identifying patterns and using observations, measurements, and data to draw conclusions.



Band	Outcome	Checkpoint	
		Question	Activity
Developing	State what happens to mixtures when they undergo chromatography (Level 4).	A, 1	Lit, Main 2, Plenary 1
	Describe what a chromatogram looks like (Level 4).	2	Main 1, Plenary 1
	Identify the pen used to write a forged cheque by comparing chromatograms (Level 4).		Main 1
Secure	Explain how chromatography separates mixtures (Level 5).	A, 1	Lit, Main 2, Plenary 1, Plenary 2
	Analyse chromatograms to identify substances in mixtures (Level 6).	3	Main 1
	Explain how a chromatogram can be used to identify a suspect's pen (Level 6).	4	Main 1
Extending	Explain how chromatography can be used in different scenarios (Level 7).	3, 4	Lit, Main 1, Plenary 2
	Consider how chromatography can be used to monitor the progress of reactions (Level 8).		Main 1, Plenary 2
	Suggest possible issues with using chromatography (Level 8).	4	Main 1

Literacy

Students use scientific terminology when explaining what happens during chromatography, and in relation to how it can be used to aid crime-solving in the practical.

Students must also decide on the appropriate level to pitch their explanation of chromatography when writing to the general public for homework.



APP

Students will interpret chromatograms and draw conclusions from their observations (AF5).

Key Words

chromatography, chromatogram

Answers from the student book

In-text questions	<p>A Chromatography separates substances in a mixture that are soluble in the same solvent.</p> <p>B The result from a chromatography experiment, where different colours have travelled up the chromatography paper by different amounts.</p>
Activity	<p>Clever chromatography</p> <p>Answers must include three uses of chromatography, for example, separating mixtures in solution, identifying coloured dyes, identifying the presence of vitamins and minerals, matching an unknown sample to a known specimen, and checking the progress of a reaction against a known product. Credit detailed descriptions of how chromatography is used, and check that scientific terminology has been used correctly.</p>

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● C2 Chapter 2: Separation techniques

Summary Questions

- a mixture, the same solvent, a chromatogram (3 marks)
- Some substances are more soluble than others, and some stick to the chromatography paper more/better than others (better retention rate). (3 marks)
- Plant A – all the pigments in the unknown plant match all the constituent pigments in plant A. (2 marks)
- Example answers (6 marks):

Place a sample of the unknown ink onto chromatography paper. Obtain samples from the three possible pens. Place dots of sample inks along a line with the unknown sample on the same piece of chromatography paper. Carry out the chromatography procedure to obtain a chromatogram. Compare chromatograms obtained and one of the samples will match the unknown ink.

Possible issues:

Obtaining the sample of the unknown ink from the note.

If more than one person uses the same ink (same brand) then their chromatograms will look the same. Chromatography tests the ink for the soluble substances inside it, not the pen itself.



Starter	Support/Extension	Resources
<p>How are different colours made? (5 min) Ask students to recall the primary colours and use these to explain how other colours can be made. Discuss how coloured felt-tip pens are made from a combination of dyes, and ask students to suggest ways in which we can separate the different coloured dyes. Students will most likely suggest methods they have met, such as filtration, evaporation, and distillation.</p> <p>Colourful sweets (10 min) Place a coloured sugar-coated chocolate in the middle of a piece of filter paper. Place one drop of water on it very slowly using a pipette. Show students how the dyes in the sugar coating separate out. Discuss that the shell contains a mixture of colours and they dissolve in the water and travel outwards with the water. Discuss what this method of separation can be used for.</p>	<p>Extension: Students should explain why each of filtration, evaporation, and distillation, will not work for this problem.</p> <p>Extension: Students should predict colours they expect to see on the chromatogram based on previous knowledge about primary and secondary colours.</p>	
Main	Support/Extension	Resources
<p>Who stole the money? (25 min) Students carry out a short investigation using chromatography to solve a mystery involving a fraudulent cheque, before answering questions that follow.</p> <p>Modelling chromatography (15 min) Give each student a different coloured ball or coloured piece of paper. Working in small groups, ask students to make a role play to model chromatography, which they will perform and explain to the rest of the class.</p>	<p>Extension: Students should offer strengths and weaknesses of the models demonstrated.</p>	<p>Practical: Who stole the money?</p>
Plenary	Support/Extension	Resources
<p>Colourful sweets – part two (10 min) Students explain chromatography in terms of what they saw with the sugar-coated sweet using key ideas and scientific terminology used in this lesson. This can be done as a game of pair-share consequences, where each pair adds the next step in the chromatography procedure or explanation.</p> <p>Describing chromatography (5 min) Students re-order sentences on the interactive resource to explain what happens during chromatography.</p>	<p>Extension: Students share how chromatography is useful in determining whether a reaction has gone to completion or not.</p>	<p>Interactive: Describing chromatography</p>
Homework		
<p>Students prepare a newspaper article on how the fraudster from the practical was caught using chromatography.</p> <p>An alternative WebQuest homework activity is also available on Kerboodle where students research the use of chromatography in forensic science.</p>		<p>WebQuest: Chromatography and crime</p>

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