



Chromatography

Topic Summary

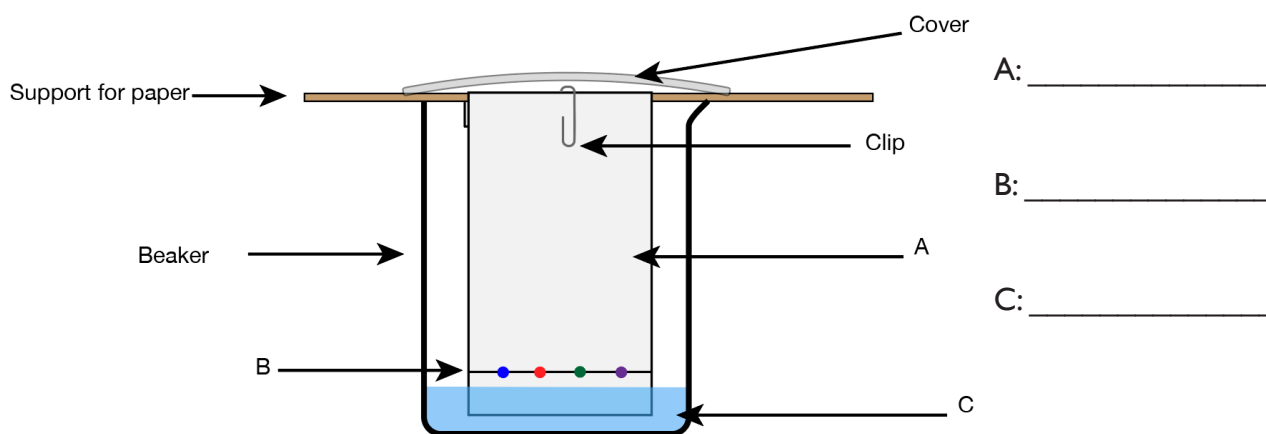
- Chromatography is a technique used to separate mixtures into their individual components.
- Analytical chromatography is used in forensics, food testing, and drug analysis to identify substances or check purity by separating (very) small sample of them to see the individual components that they contain.
- Chromatography works because different substances move at different speeds relative to the solvent front depending on their solubility in the solvent and their attraction to the stationary phase (e.g. the paper).
- The stationary phase does not move (eg paper/silica/aluminium oxide), while the mobile phase (solvents such as water or ethanol) moves through it carrying the mixture's components.
- Each component travels a different distance, creating a pattern that shows what substances are present. The distance travelled is reproducible and consistent for a given sample/solvent/substrate combination allowing it to be used to 'fingerprint' the mixture or identify the component.
- The R_f value (retention factor) compares how far a component travels relative to the solvent front.

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



Quick Checks to Build Recall

- In a chromatography experiment a piece of chromatography paper represents the [stationary / mobile] phase of the system and a solvent such as water is the [stationary / mobile] phase. (1 mark)
- Label this diagram of the equipment needed for distillation in the laboratory. (3 marks)
Use the terms: **baseline** , **solvent** and **substrate**



- Why must the baseline be drawn on the substrate using a pencil?

.....

.....(1 mark)



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Exam Style Questions

1. What **two** factors affect the distance that component will travel up a piece of chromatography paper relative to the distance travelled by the solvent?

.....
..... (2 marks)

2. A student completes a chromatography experiment comparing 3 different black inks. Their results are shown here. Answer the following 3 questions.

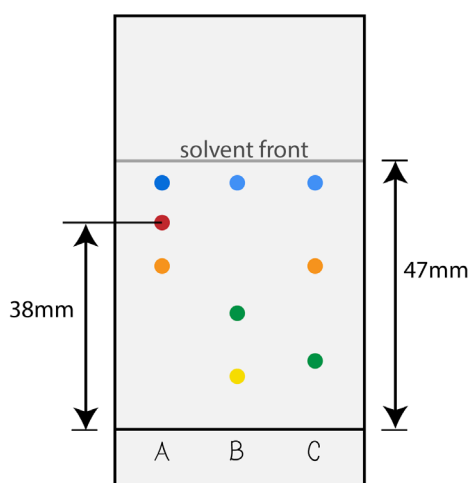
2a: How many components are present in ink A:

..... (1 mark)

2b: Which component seems to be present in all of the inks?

..... (1 mark)

2c: Find the Retention Factor (R_f value) of the RED component in ink A, give your answer to 2 decimal places.



R_f value = (3 marks)

3. A student uses water as the solvent in their chromatography experiment but finds that some dyes in the ink don't move from the baseline.

Explain why this happens and how the student could improve their experiment.

.....
.....(2 marks)



Do this later...

Give your brain a break and come back to these questions later. Cover the rest of the sheet while you have a go. By doing this 24-48 hours after watching the video you will boost your chances of remembering the key points in an exam. If you struggle with these questions, re-watch the video and then try again.

1. Draw a fully labelled diagram of the equipment required to carry out chromatography in a school laboratory.
2. A sample of yellow food colouring moves 22 mm up a piece of chromatography paper while the solvent travels 44 mm. Find the Retention Factor (R_f value) of this component.
3. After completing a chromatography experiment your teacher suggests you repeat it with a different mobile phase. Should you change the solvent that you used or the type of chromatography paper?