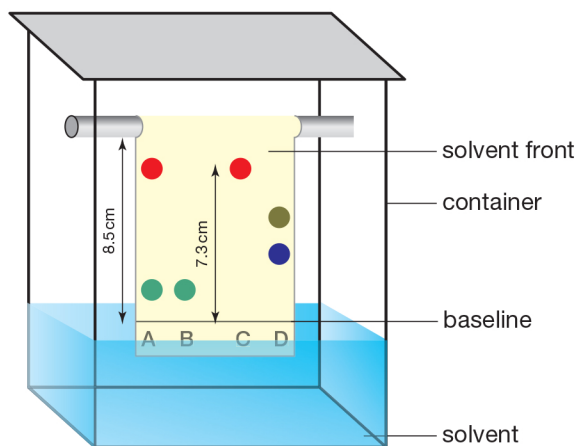




SNAPIT!

A typical chromatogram using paper chromatography



WORKIT!

In a chromatography, experiment the spot for a substance X moved 12 cm and the solvent front moved 15 cm.

- a What is the R_f value for X using this solvent?

$$\text{The } R_f \text{ value} = 12/15 = 0.8$$

- b In a second experiment under the same conditions, the solvent front moves 25 cm. What distance would the spot move in this second experiment?

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

Rearrange this formula so that distance moved by spot = $R_f \times$ distance moved by solvent.

$$\text{This means that the distance moved by spot} = 0.8 \times 25 \text{ cm} = 20 \text{ cm.}$$

Rearrange the formula



STRETCHIT!

Thin-layer and **gas chromatography** are two other types of chromatography. Thin-layer chromatography is similar to paper chromatography but with silica or alumina being the stationary phase. The solvent is the stationary phase. It has the advantage that more of the substance to be separated or identified can be loaded onto the thin-layer plate. It is also reproducible and you can compare between different plates. However, in paper chromatography there are more errors and we can only compare spots on the same chromatogram, not between different paper chromatograms.

Gas chromatography separates the components of a mixture by heating them so that they are gases. Then using an inert (unreactive) carrier gas like nitrogen (the **mobile phase**) they are pushed through a column containing a substance like silica which is coated with a liquid (the **stationary phase**).

If a substance has a high attraction for the stationary phase it stays on the column for a longer time than a substance that has a weaker attraction and the substances in the mixture separate. The time from when the mixture is injected onto the column to when it comes off the column is called its **retention time**. The **retention time** of a substance can be used to identify it in the same way as R_f values.



CHECKIT!

- In paper chromatography what is the stationary phase and what is the mobile phase?
- Explain why pencil is used to draw the baseline on a chromatogram.
- This question concerns the chromatogram shown in the Snap It! box. Which of the three substances B, C and D is/are a pure substance? Explain your answer.