

12 Separating and purifying – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word *three times*.

English	Write it 3 times (English)		
solute	_____	_____	_____
solvent	_____	_____	_____
solution	_____	_____	_____
residue	_____	_____	_____
filtrate	_____	_____	_____
titration	_____	_____	_____
pipette	_____	_____	_____
indicator	_____	_____	_____
burette	_____	_____	_____
end-point	_____	_____	_____
filtration	_____	_____	_____
crystallisation	_____	_____	_____
simple distillation	_____	_____	_____
fractional distillation	_____	_____	_____
Paper chromatography	_____	_____	_____

English	Write it 3 times (English)		
R value	_____	_____	_____
Impurities	_____	_____	_____
melting point	_____	_____	_____
boiling point	_____	_____	_____

Recall

These words come up in every practical:

- A **solute** _____ dissolves in a **solvent** _____ to make a **solution** _____.
- The **residue** _____ is the solid left on the filter paper; the **filtrate** _____ is the liquid that passes through.

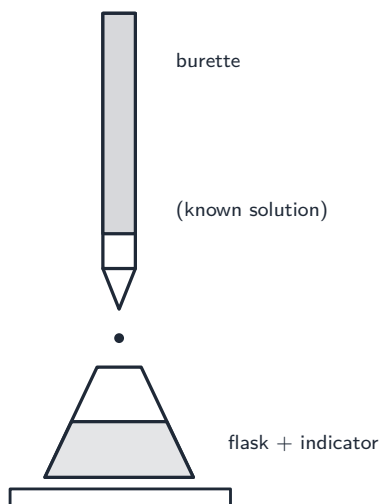
New ideas

Read these first, then do the Practice.

■ 1 Titration

A **titration** _____ finds the exact volume of one solution that reacts with another.

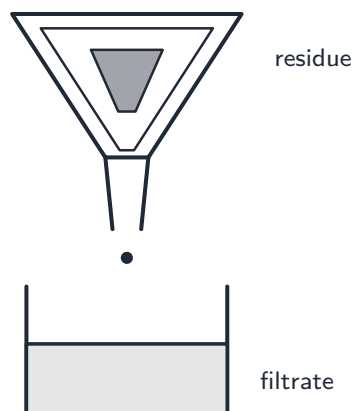
- Measure a fixed volume of one solution into a flask with a **pipette** _____, and add a few drops of **indicator** _____.
- Run the other solution in from a **burette** _____ until the colour just changes – the **end-point** _____.



■ 2 Separating mixtures

Choose the method to match the mixture:

Method	Separates
filtration	an insoluble solid from a liquid
crystallisation	a soluble solid from its solution
simple distillation	a solvent (liquid) from a solution
fractional distillation	two liquids with different boiling points

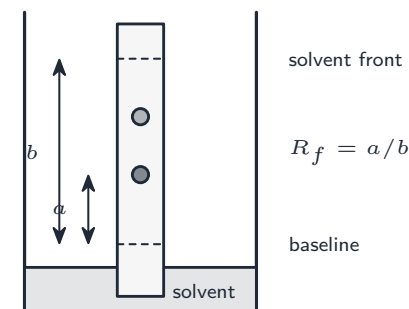


■ 3 Chromatography

Paper chromatography separates a mixture of soluble, coloured substances. A spot of the mixture is placed on a pencil baseline; as the solvent rises up the paper, each substance travels a different distance and so separates.

The spots are compared using the **R_f value** :

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



■ 4 Checking purity

A pure substance melts and boils at sharp, fixed temperatures. **Impurities** lower the **melting point** and raise the **boiling point** – so a thermometer can check purity.

Watch out: match the method to the mixture – **filtration** (insoluble solid from a liquid), **crystallisation** (soluble solid from solution), **distillation** (a liquid from a solution / two liquids). The R_f value is *substance distance ÷ solvent distance*, so it is always **less than 1**.

Practice

Try these in order.

12.1 Name the apparatus used to measure a fixed, accurate volume of solution into a flask. [1]

12.2 In a titration, what is the *end-point*? [1]

12.3 Which method would separate an insoluble solid from a liquid? [1]

12.4 In a chromatography run, a spot moves 4 cm while the solvent moves 8 cm. Work out the R_f value. [1]

12.5 How does the melting point change if a substance is impure? [1]

12.6 Challenge. In a chromatogram, substance A moves 3 cm and substance B moves 6 cm while the solvent moves 8 cm. Calculate the R_f of each, and state which travelled further. [3]