

## Exercise walk-through

### Separation of Solutions and Mixtures ■ 3.9

eXercise

## You must be able to

- match a separation method to a mixture (**filtration** 过滤, **distillation** 蒸馏, **chromatography** 色谱)
- explain the property each method exploits
- describe **chromatography** separating by attraction

## Method — Filtration

**Filtration** separates an **insoluble solid** from a liquid: the solid stays on the filter paper (residue), the liquid passes through (filtrate). Use it for sand in water.

## Method — Distillation

**Distillation** separates a dissolved solute from its solvent, or two liquids with different **boiling points**. The lower-boiling component evaporates first, then condenses and is collected.

## Method — Chromatography

**Chromatography** separates dissolved substances by how strongly they are **attracted** to a stationary phase vs a moving solvent. Components that stick less travel **further**.  
Used to separate dyes or pigments.

## Method — Choosing a method

Match the method to the difference you can exploit: solubility (filtration), boiling point (distillation), or relative attraction/solubility (chromatography).

## Practice 2.1 ■ 1 mark

Which method separates sand from water?

## Solution 2.1

Method: Filtration

### Worked steps

Filtration **B1**.

## Practice 2.2 ■ 1 mark

Which method would you use to get pure water from salt water?

## Solution 2.2

### Worked steps

Distillation **B1**.

## Practice 2.3 ■ 1 mark

What property does distillation exploit?

## Solution 2.3

Method: Choosing a method

### Worked steps

Difference in boiling points **B1**.

## Exam-style 3.1 ■ 1 mark

Chromatography separates substances based on differences in

- A** boiling point
- B** particle size
- C** attraction to the stationary phase
- D** density

## Solution 3.1

Method: Chromatography

- A boiling point
- B particle size
- C attraction to the stationary phase 
- D density

### Worked steps

C — attraction to the stationary phase (vs the moving solvent).

## Exam-style 3.2 ■ 1 mark

A student has a mixture of salt, sand, and water.

- (a) State how to remove the sand.
- (b) State how to then recover the salt from the salt water.

## Solution 3.2

Method: Filtration

### Worked steps

(a) Filter the mixture — sand stays as the residue **B1**. (b) Evaporate or distil the salt water to leave/collect the salt **M1** **A1**.

## Exam-style 3.3 ■ 2 marks

In a chromatography experiment, dye X travels further up the paper than dye Y. Explain what this tells you about the two dyes.

## Solution 3.3

Method: Chromatography

### Worked steps

Dye X is less strongly attracted to the paper (or more soluble in the solvent), so it travels further; dye Y is held back more strongly **M1** **A1**.