AP CHEMISTRY • EXERCISE SHEET

3.9 Separation of Solutions and Mixtures

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on the **separation of solutions and mixtures**.

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

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

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.

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.

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.

Choosing a method

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

2 Practice

Now apply the methods above.

2.1 Which method separates sand from water? [1]

2.2 Which method would you use to get pure water from salt water? [1]

2.3 What property does distillation exploit? [1]

3 Exam-style questions

3.1 Chromatography separates substances based on differences in [1]

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

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

(a) State how to remove the sand. [1]

(b) State how to then recover the salt from the salt water. [2]

3.3 In a chromatography experiment, dye X travels further up the paper than dye Y. Explain what this tells you about the two dyes. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **3.9 Separation of Solutions and Mixtures** lesson on the **Learn** page;
- read the **Separation of Solutions and Mixtures** section of the AP Chemistry handout on the **Know** page.

Solutions

2.1 Filtration.

2.2 Distillation.

2.3 Difference in boiling points.

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

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

3.3 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.