KS3 SCIENCE · CHEMISTRY

# Separating mixtures revision sheet

Name _____



## 1. Pure substances and mixtures

- In science, a **pure substance** is made of only one substance: a single element or compound. Gold, oxygen and distilled water are pure.
- A **mixture** has two or more substances mixed together. Air, sea water, milk and fruit juice are mixtures.
- A pure substance melts and boils at **one fixed temperature**. A mixture melts over a range of temperatures.



## 2. Dissolving

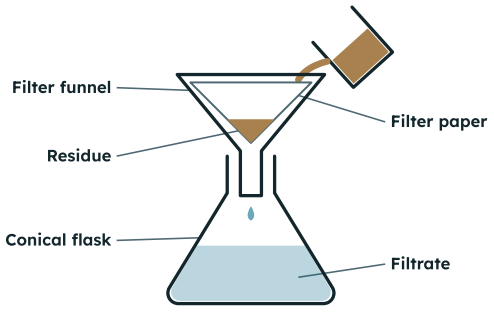
- When a solid dissolves, its particles spread out between the particles of the liquid. It is still there.
- The **solute** is the substance that dissolves. The **solvent** is the liquid it dissolves in. Together they make a **solution**.
- **Mass is conserved:** 100 g of water and 5 g of salt make 105 g of solution.
- **Soluble** means it dissolves. **Insoluble** means it does not. Bits of insoluble solid hanging in a liquid make a **suspension**.



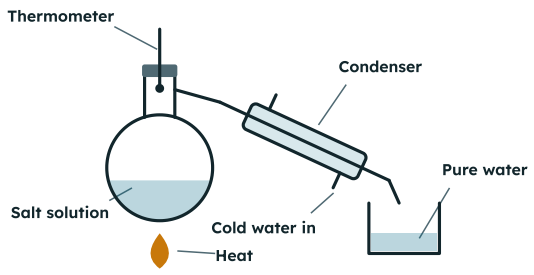
## 3. Solubility

- A **saturated** solution is one in which no more solute will dissolve.
- **Solubility** is the most solute that will dissolve in 100 g of water at a given temperature.
- Most solids are more soluble in hot water than in cold water. A **solubility curve** is a graph that shows this.
- Example: 20 g of copper sulfate dissolves in 100 g of water at 20 °C, and 40 g at 60 °C.

## 4 and 6. Filtration and distillation




Filtration




Distillation

- **Filtration** separates an insoluble solid from a liquid. The **residue** stays in the paper and the **filtrate** runs through. It does not work on a solution, because dissolved particles pass through the paper.
- **Distillation** lets you keep the solvent. The liquid **evaporates** in the flask, and its vapour **condenses** in the condenser. The dissolved solid stays in the flask. This is how to get pure water from sea water.

## 5. Evaporation and crystallisation



**Step 1**
Pour the solution into an evaporating basin.

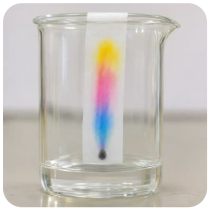


**Step 2**
Heat it gently until crystals start to form.



**Step 3**
Leave it to cool. Crystals form as it cools and the last of the water evaporates.

- The water evaporates and the dissolved solid is left behind. Slow evaporation gives bigger crystals.



## 7. Chromatography

- **Chromatography** separates dissolved coloured substances, such as the dyes in an ink.
- Put a spot of ink on a **pencil line** near the bottom of the paper, just above the level of the solvent. The solvent soaks up the paper and carries the dyes with it.
- Each dye travels a different distance. On the same paper, the same dye always travels the same distance. One spot means a single dye. More than one spot means a mixture.
- Two inks that give the same pattern of spots contain the same dyes.

## 8. Choosing a method

| METHOD | USE IT WHEN | EXAMPLE |
|---|---|---|
| **Filtration** | One substance is an insoluble solid and the other is a liquid | Sand from water |
| **Evaporation** | A solid is dissolved, and you want the solid | Salt from salt solution |
| **Distillation** | A solid is dissolved, and you want the liquid | Pure water from sea water |
| **Chromatography** | Several coloured substances are dissolved together | The dyes in an ink |

**Sand, salt and water:** filter out the sand, then evaporate the water from the filtrate to leave the salt.

## Key words

**Pure substance:** made of only one substance

**Solute:** the substance that dissolves
**Solution:** a solute dissolved in a solvent
**Insoluble:** not able to dissolve

**Solubility:** how much solute will dissolve in a set amount of solvent
**Filtration:** separates an insoluble solid from a liquid
**Filtrate:** the liquid that passes through the filter paper
**Crystallisation:** crystals forming from a solution
**Condenser:** cools a gas so that it turns back into a liquid

**Mixture:** two or more substances mixed together, not joined
**Solvent:** the liquid that does the dissolving
**Soluble:** able to dissolve
**Saturated solution:** a solution that can dissolve no more solute
**Suspension:** bits of insoluble solid hanging in a liquid

**Residue:** the solid left in the filter paper
**Evaporation:** a liquid turning into a gas
**Distillation:** evaporating a liquid and then condensing it
**Chromatography:** separates dissolved coloured substances

Pictures are illustrations made for this sheet, not real photographs.