Mixtures Revision Summary

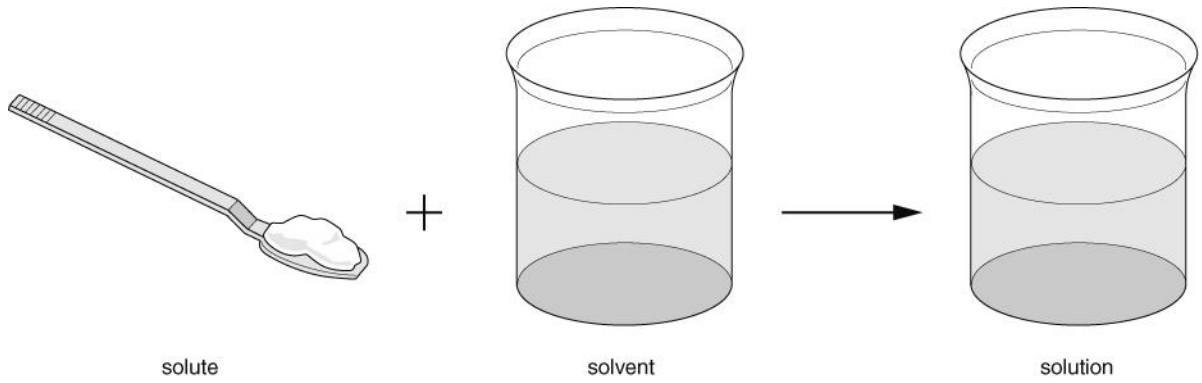
Mixtures

A **mixture** contains two or more substances jumbled together. There are different kinds of mixture:

- **suspension**: the solids settle out of the mixture over time.
- **colloid**: the solid pieces are smaller so they don't settle out, and the mixture looks cloudy or **opaque**.
- **solution**: the solids break up into such small pieces that they are not visible, and the mixture is **transparent**.

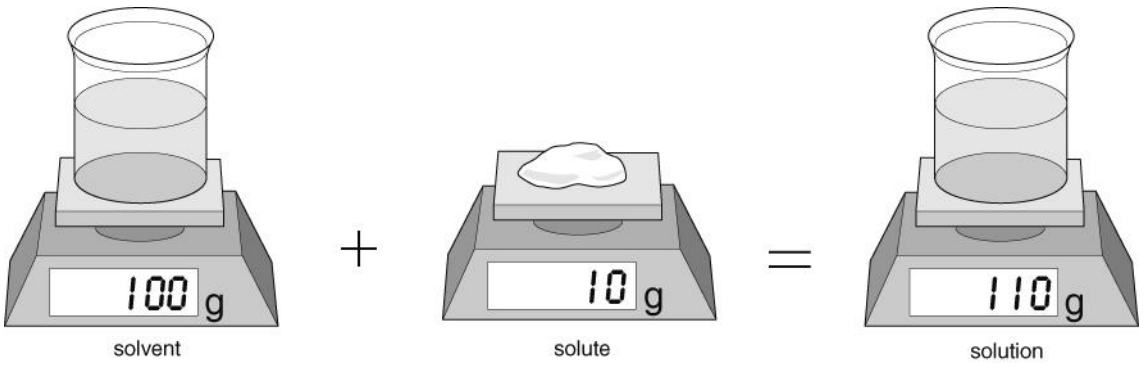
Solutions

Some solids **dissolve** in water to make a solution. These solids are **soluble**. A solution is made from a **solute** (usually a solid) and a **solvent** (liquid). Some gases, such as oxygen and carbon dioxide, can also dissolve in water.



Substances that do not dissolve in a solvent are **insoluble**. When an insoluble substance is mixed with water, the mixture formed may be a suspension or a colloid.

The total **mass** of a solution equals the mass of solvent added to the mass of solute.

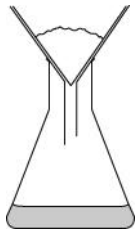
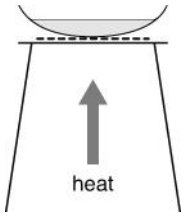
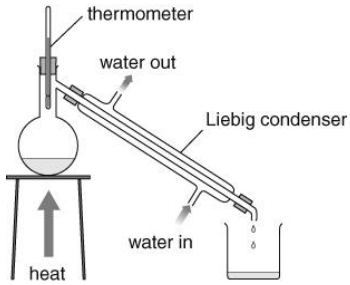
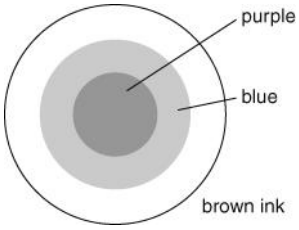


Water dissolves many different solutes. Other liquids (e.g. white spirit, ethanol) can also be used as solvents. Solutes that are insoluble in water may dissolve in other solvents.

If you keep adding solutes to a solvent, you will get to a point where no more will dissolve. The solution is **saturated** with solute. More solid may dissolve if you add more solvent (e.g. water) or increase the temperature.

The **solubility** of a solute is the amount that will dissolve in a fixed amount of solvent at a particular temperature.

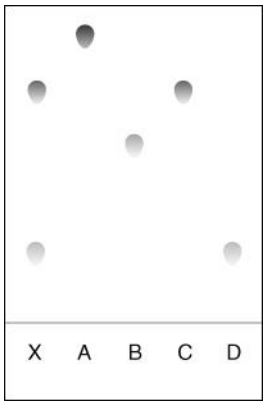
Mixtures and solutions can be separated using different methods.

Method	Used to separate	Apparatus used	Examples
filtering (filtration)	solids from a suspension (i.e. large pieces of solids that have not dissolved in a liquid)		• sand from a mixture of sand and water
evaporation	solid substances from a solution or colloid		• salt from a salt solution
distillation (evaporation followed by condensation)	liquid from a mixture		• pure water from a salt solution
chromatography	individual solutes from a mixture of solutes in a solvent		• colours found in ink

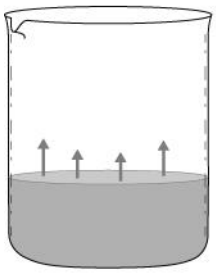
Interpreting a chromatogram

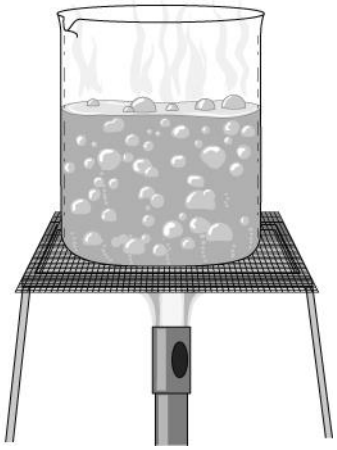
Chromatograms help to identify substances in a mixture.

This paper chromatogram shows that A, B, C and D are all single substances and that X is a mixture of C and D.



Evaporation and boiling





Evaporation is when a liquid turns to a gas at its surface.

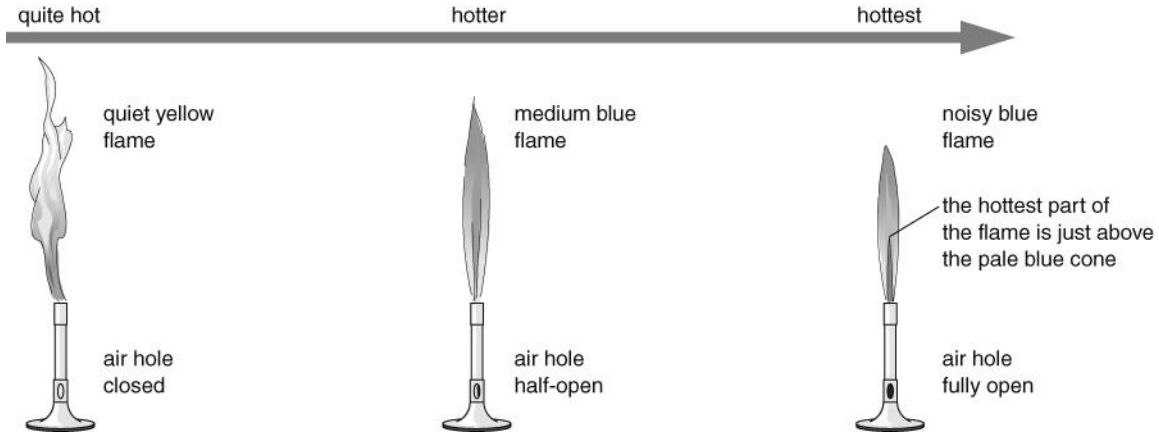
- It happens at any temperature.
- It is faster when the temperature is higher.

When a liquid **boils**, all the liquid is trying to turn into a gas at the same time.

- Boiling happens at the liquid's **boiling point**.
- Gas formed inside the liquid makes bubbles that rise to the surface.
- The boiling point of pure water is 100 °C.

Heating with a Bunsen burner

The air hole of a Bunsen burner can be adjusted to give different kinds of flame. Each kind is useful for different things.



Safety flame: should always be used when not heating.

This flame is used for gentle heating.

This flame is used for rapid heating.

Hazards and risks

- A **hazard** is something that could cause harm.
- A **risk** is how likely it is that the hazard will cause harm.
- You should always plan to minimise risks in experiments.

Example of hazard	How to reduce the risk from the hazard
Burns or scalds from apparatus heated by a Bunsen burner.	Use heat-resistant gloves or tongs to touch apparatus.
Spitting liquid when heating to dryness.	Wear eye protection and make sure heat is turned off before the solution is completely dry.
Shaking of distillation flask by bubbling liquid.	Add anti-bumping granules to liquid to prevent large gas bubbles forming.

Writing a good method

Here is a **method** for lighting a Bunsen burner safely. The labels on the right show how to write a good method.

Method

A Check the gas hose for breaks or holes and return the Bunsen burner and hose to your teacher if it is damaged.

B Tie back loose hair and any loose clothing, such as a tie or scarf.

C Remove everything except what is needed for the experiment from your working area.

D Wear eye protection.

E Place the burner on a heat-resistant mat 30–40 cm from the edge of the bench.

F Make sure the air hole of the Bunsen burner is closed.

G Hold a lit splint or a long-armed sparker or lighter about 2 cm above the top of the Bunsen burner.

H Turn on the gas at the gas tap to light the burner.

The instructions are written as a set of steps in the correct order, or **sequence**, for carrying out the experiment.

Each step describes one action during the experiment.

Use **imperative verbs** (command words) to keep the sentence structure simple and the language clear.

Use the correct names for apparatus, and correct science terms where appropriate.

When you write up your method in your report at the end of the experiment, change the verbs to the past tense. For example:

- I made sure the air hole of the Bunsen burner was closed.