

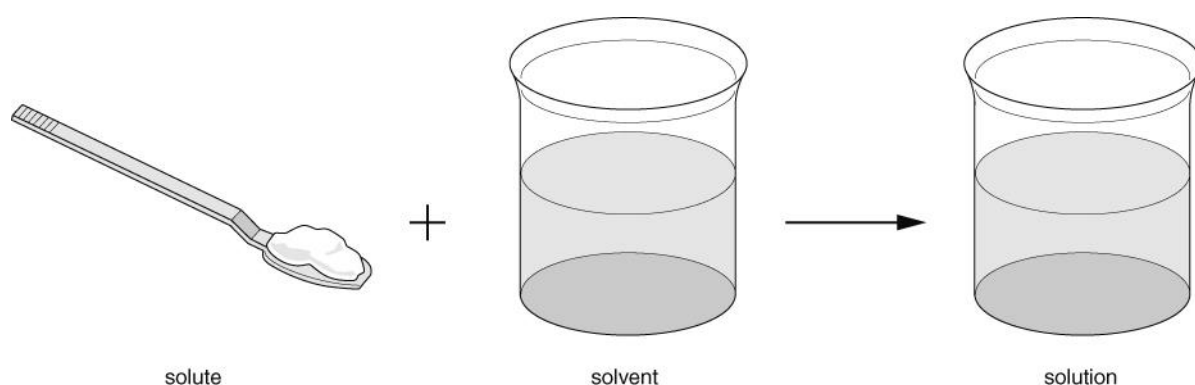
Mixtures

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**.

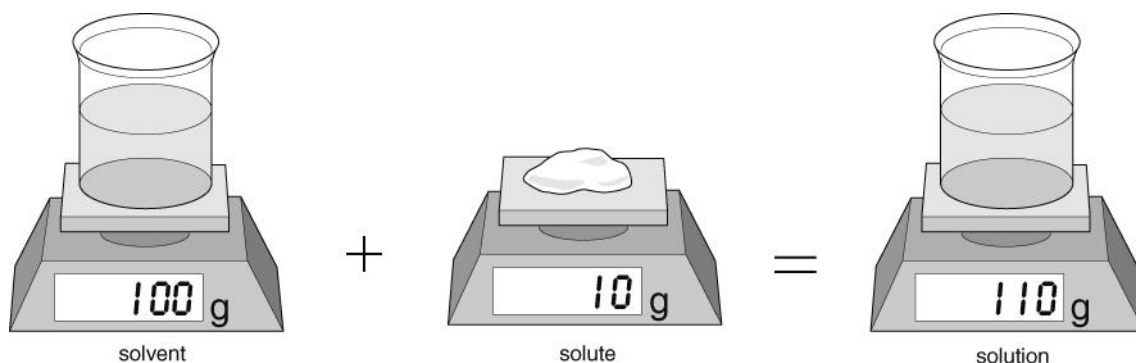
Solutions

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.

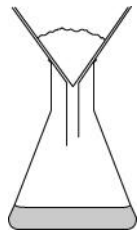
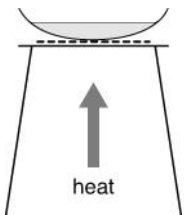
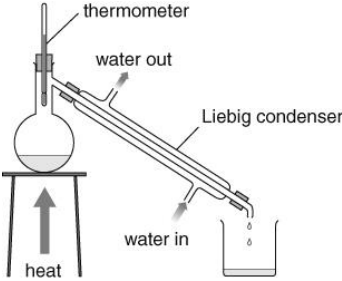
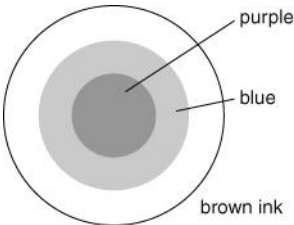


Water dissolves many different solutes. Other liquids (e.g. white spirit, ethanol) can also be used as solvents. Solute that are insoluble in water may dissolve in other solvents.

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.

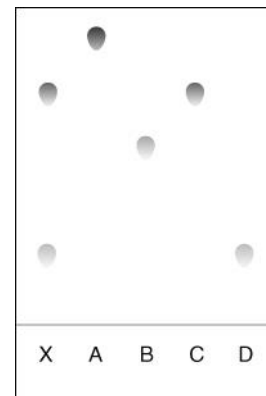
Mixtures and solutions can be separated using different methods.

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

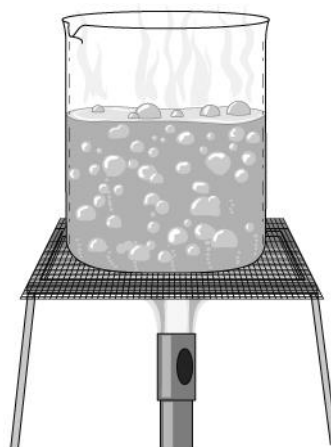
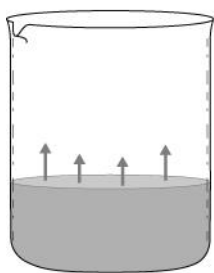
Interpreting a chromatogram

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.

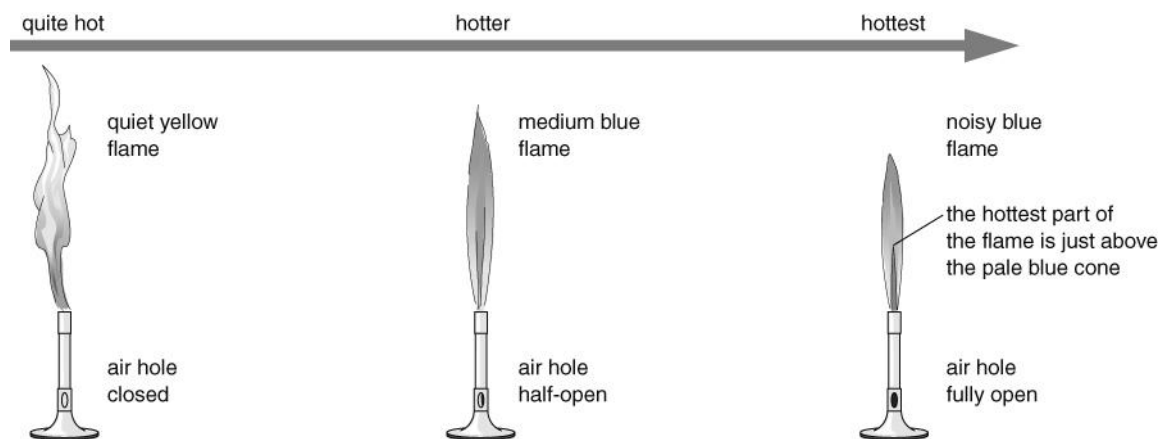
- It happens at any temperature.
- It is faster when the temperature is higher.

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.