

Box 1: Keywords

boiling point	The temperature at which a substance rapidly changes from a liquid to a gas.
dissolved	A substance is said to be dissolved when it breaks up and mixes completely with a solvent to produce a solution.
condensation	A change of state in which gas becomes liquid by cooling
evaporation	The process in which a liquid changes state and turns into a gas.
insoluble	Unable to dissolve in a particular solvent. For example, sand is insoluble in water.
mixture	Two or more substances that are not joined together.
soluble	Able to dissolve in solvent.
solute	The dissolved substance in a solution.
solution	Mixture formed by a solute and a solvent.
solvent	The liquid in which the solute dissolves to form a solution.
vapour	Gas formed below the boiling point of a substance.

Box 2: Key skills

- Make accurate observations and systematically record several observations and measurements from a range of experiments.
- Write a practical method that can be easily followed

Box 3: Separating mixtures

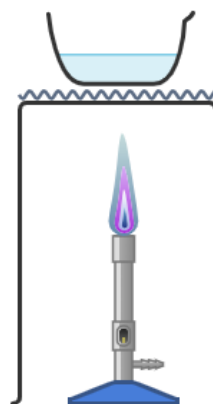
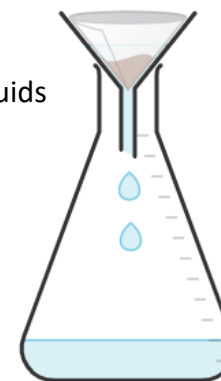
Mixtures can be separated using physical processes

The separation techniques do not use chemical reactions



Filtration – separates insoluble solids and liquids

Filtration works because the filter paper has tiny holes in it. These are large enough to let dissolved substances through, but not big enough to let larger insoluble solids through.



Crystallisation – soluble solid from a solution

Crystallisation is used to produce solid crystals from a solution.

When the solution is warmed, some of solvent evaporates leaving crystals behind.

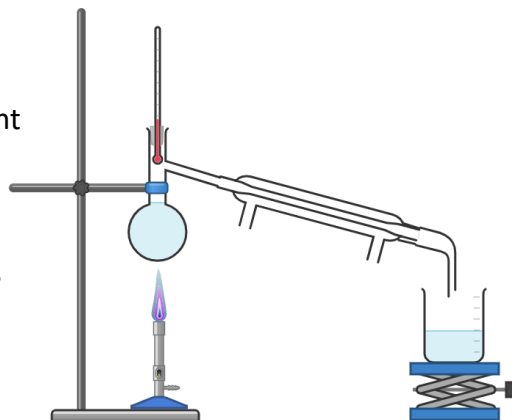
Box 4: Distillation

Simple distillation is used to separate a solvent from a solution.

Simple distillation works because the dissolved solute has a much higher boiling point than the solvent.

When the solution is heated, solvent evaporates and leaves the solution.

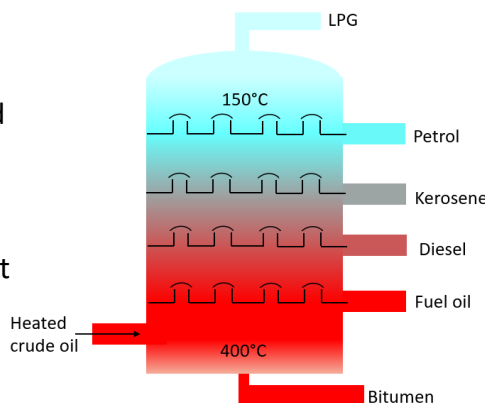
The vapours move to the condenser and condense back to a liquid and are collected



Fractional distillation is used to separate liquids with different boiling points

The mixture is heated:

- vapours rise through a column which is hot at the bottom and cold at the top
- vapours condense when they reach a part of the column that is below the temperature of their boiling point
- each liquid is taken from the column

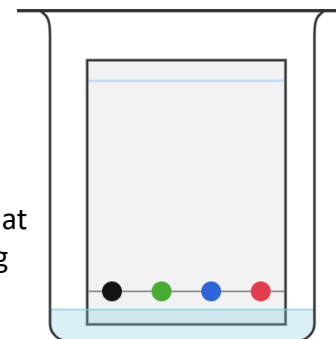


Box 5: Chromatography

Paper chromatography is used to separate mixtures of soluble substances. These are often coloured substances such as food colourings, inks, dyes or plant pigments

Chromatography has two different phases:

- the stationary phase, is the paper
- the mobile phase is the solvent that moves through the paper, carrying different substances with it



Box 6: Pathway

Previous knowledge: Particle model, atoms, elements and compounds, separating mixtures

Future links: Chemical analysis, chromatography required practical, crude oil separation, water purification

Careers: chemical engineers, water treatment workers, brewers, chemical analysts, workers for the Environment Agency, chefs

Box 7: Cross curricular links

Physics: changing state

Art and Design: chromatography to make art work

Food studies: separation techniques in food preparation