

Pure substances
A pure substance is a single element or compound, not mixed with any other substance.

Pure substances
Pure substances melt and boil at specific temperatures. Heating graphs can be used to distinguish pure substances from impure.

Melting point of a pure substance

Melting point of an impure substance

Flame tests (chem only)

Element	Colour flames
Lithium	Crimson
Sodium	Yellow
Potassium	Lilac
Calcium	Orange-red
Copper	Green

Metal hydroxides (chem only)

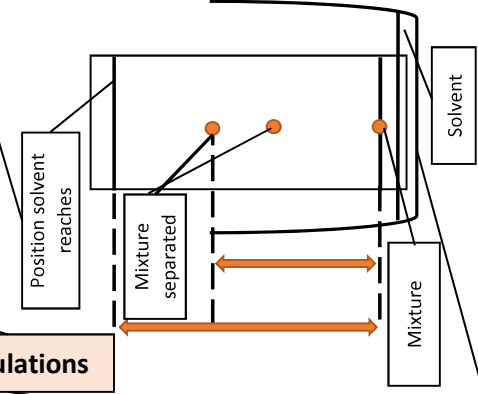
Sodium hydroxide	Is added to solutions to identify metal ions.
White precipitates	Aluminium, calcium and magnesium ions form this with sodium hydroxide solution.
Coloured precipitates	Copper (II) = blue Iron (II) = green Iron (III) = brown

Purity, formulations and chromatography

Formulations

Formulation	A formulation is a mixture that has been designed as a useful product.
How are formulations made?	By mixing chemicals that have a particular purpose in careful quantities.
Examples of formulations.	Fuels, cleaning agents, paints, medicines and fertilisers.

Chromatography



Chromatography	Can be used to separate mixtures and help identify substances.	Involves a mobile phase (e.g. water or ethano) and a stationary phase (e.g. chromatography paper).
R_f Values	The ratio of the distance moved by a compound to the distance moved by solvent.	$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$
Pure substances	The compounds in a mixture separate into different spots.	This depends on the solvent used. A pure substance will produce a single spot in all solvents whereas an impure substance will produce multiple spots.

Identification of ions (CHEMISTRY ONLY)

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Identification of common gases

Gas	Test	Positive result
Hydrogen	Burning splint	'Pop' sound.
Oxygen	Glowing splint	Re-lights the splint.
Chlorine	Litmus paper (damp)	Bleaches the paper white.
Carbon dioxide	Limewater	Goes cloudy (as a solid calcium carbonate forms).

Flame emission spectroscopy

Flame emission spectroscopy	An instrumental method used to analyse metal ions.	The sample solution is put into a flame and the light that is given out is put through a spectroscope. The output line spectrum, can be analysed to identify the metal ions in the solution. It can also be used to measure concentrations.
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Instrumental methods	Methods that rely on machines	Can be used to identify elements and compounds. These methods are accurate, sensitive and rapid.
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Carbonates, halides and sulfates (chem only)

Carbonates	React with dilute acids to form carbon dioxide.
Halide ions	When in a solution, they produce precipitates with silver nitrate solution in the presence of nitric acid.
Sulfate ions	When in a solutions they produce a white precipitate with barium chloride solutions in the presence of hydrochloric acid.