

Topic 8: Chemical analysis

AQA GCSE Chemistry 8462 · spec 4.8 · sheets 8.1–8.3

The analyst's eye

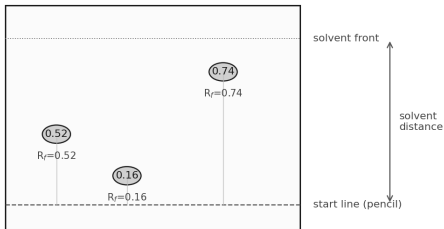
- Chemical analysis — proving what is there.
- Purity means one substance — sharp melting points prove it.
- Chromatography separates; R_f identifies.
- Gas tests and ion tests complete the toolkit.

Purity and formulations

- Pure — one substance; melts and boils at sharp temperatures.
- Mixtures melt over a range — the proof of impurity.
- Formulations — deliberate mixtures, measured for purpose.

Chromatography

$R_f = \text{spot distance (from start line)} / \text{solvent distance}$



- Stationary phase — the paper; mobile phase — the solvent.
- Separation by distribution between the two phases.
- $R_f = \text{spot distance over solvent distance}$.

The four gas tests

- Identification of common gases.
- Hydrogen — burning splint, squeaky pop.
- Oxygen — glowing splint relights.
- Carbon dioxide — limewater turns milky; chlorine — bleaches damp litmus.

Ion tests

reagent	ion	result
flame	Li / Na / K / Ca / Cu	crimson / yellow / lilac / orange-red / green
NaOH(aq)	Al ³⁺ / Ca ²⁺ / Mg ²⁺	white ppt; only Al dissolves in excess
NaOH(aq)	Cu ²⁺ / Fe ²⁺ / Fe ³⁺	blue / green / brown ppt
acid + AgNO ₃	Cl ⁻ / Br ⁻ / I ⁻	white / cream / yellow ppt
HCl + BaCl ₂	SO ₄ ²⁻	white ppt

- Identification of ions by chemical and spectroscopic means.
- Flame — Li crimson, Na yellow, K lilac, Ca orange-red, Cu green.
- NaOH — white for Al, Ca, Mg; only Al redissolves in excess.
- Halides with acidified silver nitrate; sulfate with acidified barium chloride.

Spectroscopy

- (HT) vaporise; each metal gives its own line spectrum.
- Line positions identify; line intensities measure concentration.
- Sensitive, rapid, and works on mixtures.

Check yourself

- Checklist before you call this topic done.
- Melting-point purity rule; R_f from any chromatogram.
- Gas tests, flame colours, precipitate colours, spectroscopy advantages.