

Exercise walk-through

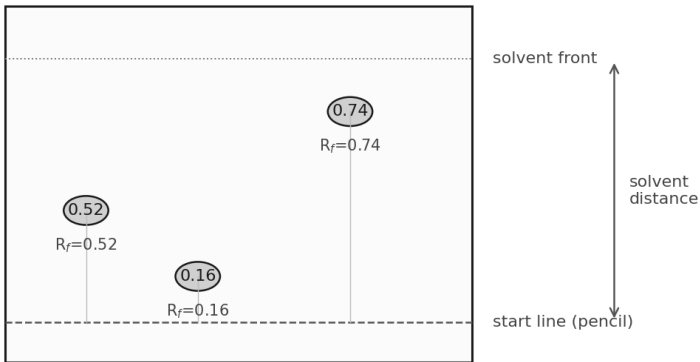
8.1

Purity, formulations and chromatography (4.8.1.1–4.8.1.3)

AQA · GCSE · Chemistry

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.
- $R_f = \text{spot distance over solvent distance}$.

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.

Exercises 2.1·2.3

2.1 What happens to the melting point of a substance when it is impure? [1]

2.2 Give two examples of formulations. [2]

2.3 Which phase in paper chromatography is the water? [1]

Exercises 2.1·2.3

2.1 What happens to the melting point of a substance when it is impure? [1]

2.1 It melts over a range of temperatures, not sharply.

2.2 Give two examples of formulations. [2]

2.2 Any two of: fuels, cleaning agents, paints, medicines, alloys, fertilisers, foods.

2.3 Which phase in paper chromatography is the water? [1]

2.3 The mobile phase – the solvent moving up the paper.

Exercises 3.1·3.3

3.1 Explain how melting point data distinguishes a pure substance from a mixture. [3]

3.2 Describe how paper chromatography separates the dyes in an ink, and explain why the dyes stop at different heights. [5]

3.3 A chromatogram shows two spots for dye X. What does this prove, and what would one spot in every solvent prove instead? [3]

Exercises 3.1·3.3

3.1 Explain how melting point data distinguishes a pure substance from a mixture. [3]

3.1 A pure substance melts completely at a single sharp temperature; an impure substance begins melting lower and over a range; so a measured melting range indicates impurity – or purity if sharp at the literature value.

3.2 Describe how paper chromatography separates the dyes in an ink, and explain why the dyes stop at different heights. [5]

3.2 A spot of ink is placed on the start line on paper; the paper's lower edge dips into solvent below the line; solvent rises, carrying the dyes; each dye distributes between the moving solvent and the stationary water bound to the paper; dyes that attach more strongly to the paper travel less far, so the dyes separate into spots at different heights.

3.3 A chromatogram shows two spots for dye X. What does this prove, and what would one spot in every solvent prove instead? [3]

3.3 Two spots in one run show dye X is a mixture of at least two substances; one spot in a single solvent does not prove purity – two substances could move together; one spot in every solvent tested shows a pure compound.