

12.3 Chromatography

Name: _____ Class: _____ Date: _____

Total: 6 marks

KEY WORDS chromatography • paper chromatography • value
 • chromatogram • locating agent

Objective

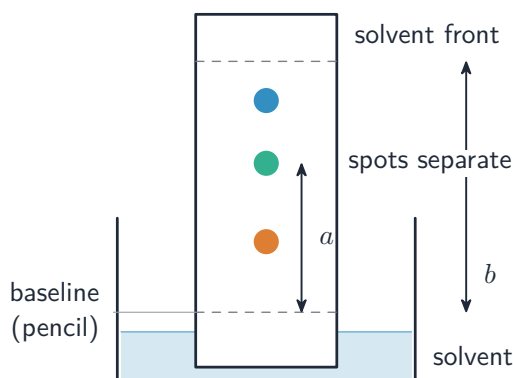
Build the skills to answer exam questions on **chromatography** – separating a mixture, the R_f **value**, and using a **chromatogram**.

You must be able to:

- describe paper chromatography and the use of a locating agent
- calculate an R_f value
- use a chromatogram to identify substances and check purity

1 Key knowledge and worked examples

■ Chromatography and R_f



$$R_f = \frac{a}{b} = \frac{\text{spot}}{\text{solvent}}$$

Substances travel different distances as the solvent rises; $R_f = \frac{\text{spot distance}}{\text{solvent distance}}$

- **colourless** substances need a **locating agent** to show the spots.
- a **pure** substance gives only one spot.

2 Practice

2.1 State what a single spot on a chromatogram tells you about a substance. [1]

2.2 State why a locating agent is sometimes needed. [1]

3 Exam-style questions

3.1 The R_f value of a spot is the distance moved by the spot divided by the distance moved by the: [1]

- ☐ **A** paper
☐ **B** solvent
☐ **C** baseline
☐ **D** beaker

3.2 On a chromatogram, a spot moves 3.0 cm while the solvent moves 12.0 cm.

(a) Calculate the R_f value. [2]

(b) State how a chromatogram can be used to identify an unknown substance. [1]

Solutions

Each answer shows the steps, then the **result**.

2.1

- a single spot means the substance is **pure**

2.2

- a locating agent makes **colourless spots show up**

3.1 B

- R_f is the distance moved by the spot divided by the distance moved by the **solvent**
- A, C and D are not the denominator

3.2

(a)

$$R_f = \frac{\text{distance moved by the spot}}{\text{distance moved by the solvent}} = \frac{3.0 \text{ cm}}{12.0 \text{ cm}} = \mathbf{0.25}$$

(b)

- compare its spot / R_f with **known substances** run alongside