# Exercise walk-through

## Gas/liquid chromatography ▪ 37.2

eXercise

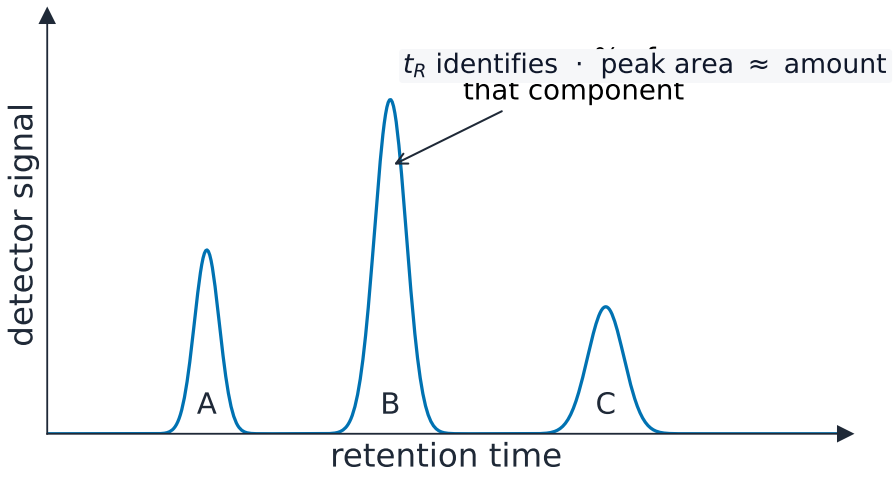
# You must be able to

- identify the stationary and mobile phases in GLC
- explain what retention time depends on
- use peak areas to find the composition of a mixture

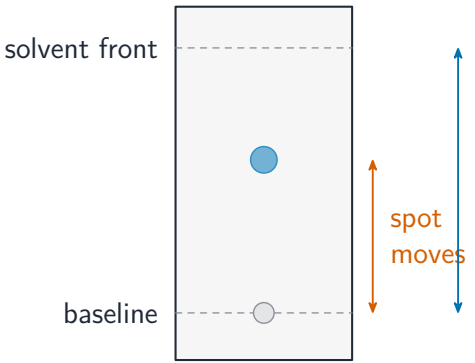
# Method — Reading a chromatogram

- **stationary phase:** a high-boiling non-polar liquid on a solid support; **mobile phase:** an unreactive carrier gas.
- **retention time** = how long a component takes to pass through; more interaction with the stationary phase → **longer** retention time.
- **peak area** = the proportion (percentage) of that component.

# Method — Reading a chromatogram



# Method — Reading a chromatogram




$$R_{\mathrm{f}} = \frac{\text{distance moved by the spot}}{\text{distance moved by the solvent}}$$

always between 0 and 1

*GLC alongside TLC as a chromatographic method*

## Practice 2.1 ▪ 1 mark

Name the mobile phase in GLC.

# Solution 2.1

Method: Reading a chromatogram

**Worked steps**

an unreactive carrier gas B1.

## Practice 2.2 ▪ 1 mark

State what the **area** of a GLC peak tells you.

# Solution 2.2

Method: Reading a chromatogram

**Worked steps**

the percentage (proportion) of that component in the mixture B1.

# Exam-style 3.1 ▪ 1 mark

In GLC, a component that interacts **more** with the stationary phase has a:

**A** shorter retention time

**B** longer retention time

**C** larger $R_f$

**D** smaller peak area

# Solution 3.1

Method: Reading a chromatogram

**A** shorter retention time

**B** longer retention time ✓

**C** larger $R_f$

**D** smaller peak area

## Worked steps

**B**. More interaction with the stationary phase → longer retention time.

## Exam-style 3.2 ▪ 1 mark

The **percentage** of each component in a mixture is found from the:

**A** retention time

**B** number of peaks

**C** area under each peak

**D** height of the baseline

# Solution 3.2

Method: Reading a chromatogram

**A** retention time

**B** number of peaks

**C** area under each peak ✓

**D** height of the baseline

## Worked steps

**C**. The area under each peak gives the percentage.

## Exam-style 3.3 ▪ 2 marks

A GLC trace of a three-component mixture has peak areas 5, 3 and 2 units.
(a) Calculate the percentage of the first component.
(b) State which component left the column **last**, given it interacted most with the stationary phase.

# Solution 3.3

Method: Reading a chromatogram

**Worked steps**

(a) total area $= 5 + 3 + 2 = 10$; first component $= \dfrac{5}{10} \times 100$ M1 $= 50\%$ A1.

(b) the component with the **longest** retention time / smallest $R_f$-type behaviour — the one that interacts most strongly B1.

## Exam-style 3.4 ▪ 2 marks

Explain why different components of a mixture have different retention times.

# Solution 3.4

Method: Reading a chromatogram

**Worked steps**

each component interacts to a different extent with the stationary phase M1; the more it interacts, the more it is held back, so it takes longer to pass through A1.