

37.2 Gas/liquid chromatography

Name: _____ Class: _____ Date: _____ Total: 21 marks

KEY WORDS retention time 保留时间 • mobile phase 流动相 • stationary phase 固定相
 • gas/liquid chromatography 气液色谱 • chromatography 色谱

Objective

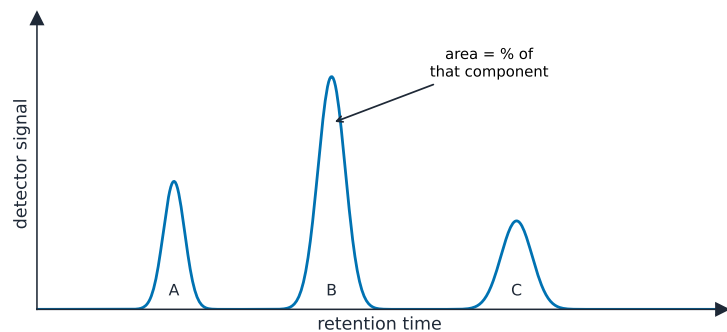
Build the skills to answer exam questions on **gas/liquid chromatography** 气液色谱 (GLC) — the phases, **retention time** 保留时间, and reading peak areas.

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

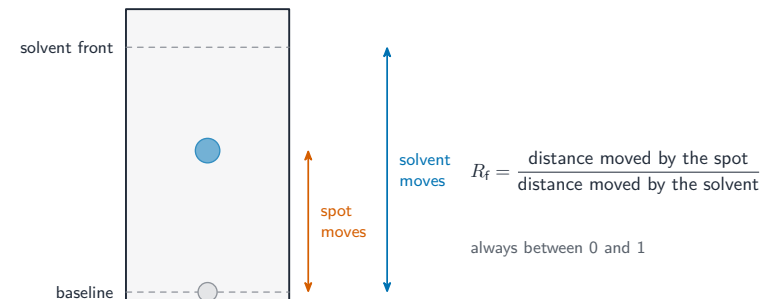
1 Worked examples

■ Reading a chromatogram



t_R identifies • peak area $\approx$ amount

Each component gives a peak at its own retention time; the peak area is its percentage in the mixture



GLC alongside TLC as a chromatographic method

- **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 $\rightarrow$ **longer** retention time.
- **peak area** = the proportion (percentage) of that component.

2 Practice

2.1 Name the mobile phase in GLC. [1]

2.2 State what the **area** of a GLC peak tells you. [1]

3 Exam-style questions

3.1 In GLC, a component that interacts **more** with the stationary phase has a: [1]

A	B
C	D

- A shorter retention time
- B longer retention time
- C larger R_f
- D smaller peak area

3.2 The **percentage** of each component in a mixture is found from the: [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** retention time
B number of peaks
C area under each peak
D height of the baseline

3.3 A GLC trace of a three-component mixture has peak areas 5, 3 and 2 units.

(a) Calculate the percentage of the first component. [2]

(b) State which component left the column **last**, given it interacted most with the stationary phase. [1]

3.4 Explain why different components of a mixture have different retention times. [2]

3.5 A mixture of three alcohols is analysed by gas/liquid chromatography. The chromatogram shows three peaks.

Peak	Retention time / min	Peak area / arbitrary units
1	1.8	132
2	3.4	396
3	5.9	132

(a) Name the mobile phase and the stationary phase in GLC, and state what each does.[3]

(b) Calculate the percentage composition of the mixture, stating the assumption you are making. [3]

(c) Explain why the component of peak 3 has the longest retention time. [3]

(d) The three peaks alone cannot identify the alcohols. Explain why, and name one technique that can be coupled to GLC to solve this. [3]
