

Chromatography and Separation Evidence

g11_u06_w23

Purpose and boundary

Use original fictional separation tables and peak cards only. No chromatography, samples, chemicals, instrument operation, collection, or identification decision is requested.

Targets: I can interpret retention and peak data, calculate a stated resolution model, and limit an inference to separation evidence. **Vocabulary:** retention time, peak, resolution, baseline, coelution, selectivity.

Prerequisites: subtraction, ratios, graph reading, evidence limits.

For items 5–12 use the fictional model $R_s = 2(t_2 - t_1)/(w_1 + w_2)$, with all times and widths in min. This is a paper-data comparison, not a procedure.

1. Define retention time as a feature in a stated separation model.

2. What can two distinct peaks suggest about a fictional data card?

3. Why does one peak not prove that an unknown contains one pure substance?

4. What does a blank/separation-control card help question?

5. A card gives $t_1 = 2.10$, $t_2 = 2.40$, $w_1 = 0.12$, and $w_2 = 0.18$ min. Find R_s .

6. Use the stated threshold $R_s \geq 1.50$ to classify item 5 as resolved or not resolved in this model.

7. A second card gives $t_1 = 2.10$, $t_2 = 2.60$, $w_1 = 0.12$, and $w_2 = 0.18$ min. Find R_s .

8. Compare items 5 and 7. Which has stronger stated separation evidence?

9. Explain why the threshold is a model convention, not proof of identity.

10. A card gives two peak times but no widths. What calculation is unavailable?

11. A fictional reference peak is at 3.20 min; an unknown peak is 3.22 min. State one supported comparison and one unsupported conclusion.
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12. Why can matched retention times require additional evidence?
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13. Two repeated fictional runs list $R_s = 1.48$ and 1.56. Find their mean and state a cautious classification.
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14. Explain why averaging alone does not address systematic bias.
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15. A report calls a pair coeluted. What feature of a separation model does that describe?
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16. A student says the tallest peak must be the most concentrated component. Name one missing calibration condition.
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17. Identify one data feature that could signal unstable retention comparisons.
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18. Explain why a resolved pair of peaks does not determine chemical structure.
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19. Write one supported and one unsupported claim from $R_s = 1.67$.
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20. Write a two-sentence bounded conclusion using fictional retention and resolution data.
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