

Problem Set #8  
Due 5/12/11

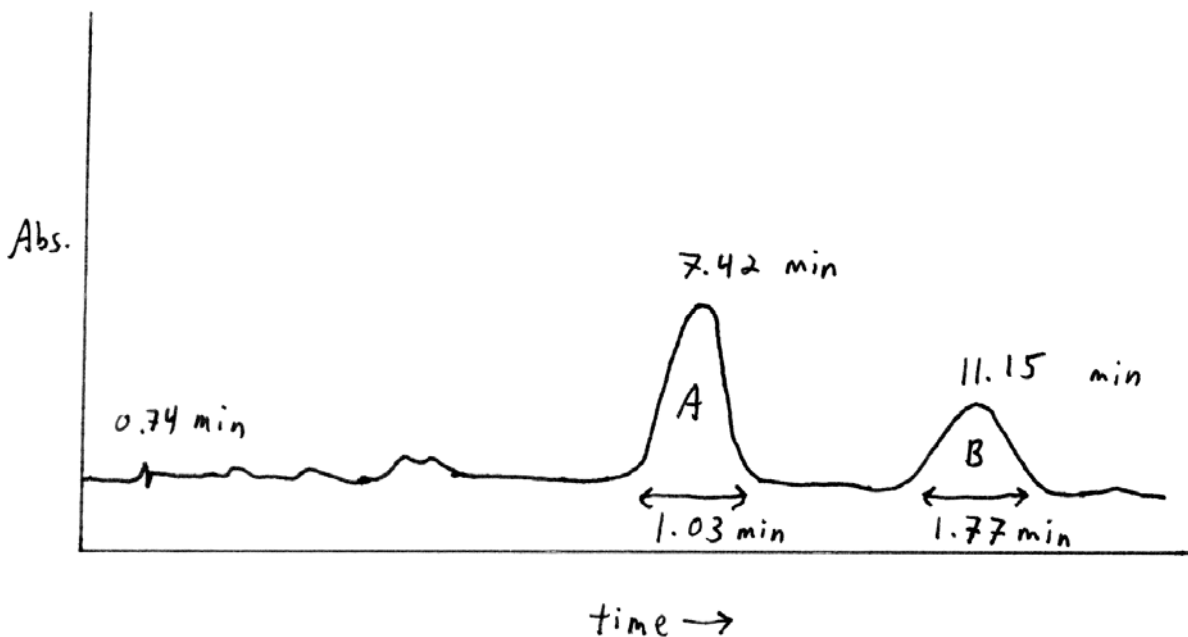
1. A new basic anti-arrhythmic ( $K_b = 3.27 \times 10^{-5}$ , mol. wt. = 472.6) is found to have a partition coefficient of 2.65 between blood and heart muscle tissue (favoring the blood). If  $1.25 \times 10^{-8}$  M is required to be delivered to the heart, how many milligrams must be administered? Recall that blood pH = 7.400. Assume that the conjugate acid is not soluble in heart muscle tissue and that the patient has a total of 4.00 L blood.
2. A gradient elution is used to separate a mixture on a C18 column. Initially, the mobile phase is 100% water, but the percent water is continuously decreased as the percent acetonitrile is increased during the separation. Predict the order of elution of the following compounds, and explain your reasoning: cholesterol, ibuprofen, ethanol.
3. A separation of two compounds using a 20.0 cm column gave the following results.

	Compound A	Compound B
Retention time (min)	4.638	6.023
Peak width (min)	0.274	0.356

- A. How many theoretical plates would be needed to achieve a separation with resolution of 6.00?
  - B. If the plate heights for both separations are the same, how long must the second column be?
4. The analytical scale separation of 1.15 mg of a mixture on a 20.0 cm column with a diameter of 0.400 cm must be scaled up to provide the same separation of 12.0 g of the same mixture.
    - A. What size (length and diameter) column should be used?
    - B. If the flow rate is 0.50 mL/min on the analytical column, what flow rate should be used on the larger column?

5. For the chromatogram below, calculate the following values:

- A. Relative retention
- B. Capacity factor for peak A
- C. Resolution
- D. Number of theoretical plates for peak B



6. Harris Chapter 23, Problem 9

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Suggested/Review Problems:

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|--|-----------------------------------|
| 1. Harris Chapter 22, Problem 1        | 9. Harris Chapter 24, Problem 1a  |
| 2. Harris Chapter 22, Problem 11       | 10. Harris Chapter 24, Problem 13 |
| 3. Harris Chapter 22, Problem 16       |                                   |
| 4. Harris Chapter 22, Problem 17       |                                   |
| 5. Harris Chapter 22, Problem 21       |                                   |
| 6. Harris Chapter 22, Problem 22       |                                   |
| 7. Harris Chapter 22, Problem 45 (a-f) |                                   |
| 8. Harris Chapter 23, Problem 18       |                                   |