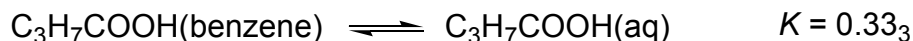


**Analytical Chemistry**  
**Problem Set 9—due Wednesday, April 26, 2006 (at 5 p.m.)**

Total points for this assignment = 20. Because this assignment is rather short, it will be worth only half of the other problem sets.

1. (3 points) Harris 23-7 and 23-8
2. (10 points) Butanoic acid ( $C_3H_7COOH$ ) shows the following phase equilibrium behavior:



Find the equilibrium concentrations of butanoic acid in each phase when 25 mL of 0.10 M  $C_3H_7COOH$  in benzene is extracted by 100. mL of water (a) at pH 4.00 and (b) at pH 10.00. Briefly explain the trend in the concentrations.

3. (4 points) The weak base B ( $K_b = 1.0 \times 10^{-5}$ ) really prefers the organic solvent toluene to water:



- (a) Using the form of the distribution coefficient we derived in class, calculate  $D$  at pH 8.00.
- (b) Based on the equation for  $D$ , it is obvious that  $D$  will be lower at pH 10 than at pH 8. Explain this mathematical prediction qualitatively.

4. (3 points) Harris 23-21

You should also know how to do Harris 23-27, but you do not need to turn in a solution for this problem.