

Analytical Chemistry
Problem Set 8—due Wednesday, April 27, 2005 (at 5 p.m.)

This final (yeah!) problem set of the semester covers (a) topics from Unit 3 (on volumetric analysis) that were not on Test 3, and (b) some important calculations from Unit 4 (on separations). (As always, material from lecture that does not appear on a problem set can still be covered by an essay or multiple-choice question on the next test.)

We will spend the rest of the semester almost entirely on Chapter 23 in Harris. Chapter 23 should be the focus of your reading. We will touch only briefly (if at all) on Chapters 22, 24, and 25.

1. (5 points) Harris 7-12
2. (12 points) Harris 11-14
3. (5 points) Harris 11-23. Briefly justify each answer.
4. (3 points) Harris 23-7 and 23-8.
5. (10 points) Butanoic acid (C_3H_7COOH) shows the following phase equilibrium behavior:
$$C_3H_7COOH(\text{benzene}) \rightleftharpoons C_3H_7COOH(\text{aq}) \quad K = 0.33_3$$

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.
6. (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.