ACID-BASE EQUILIBRIA

Chapter 18 Outline

Text Problems: # 15, 16, 18, 20, 45, 48, 50, 54, 55, 65, 67
+ Supplementary Questions (attached)

Text Sample Problems: The text has a number of excellent sample problems (solved in detail) in each section. I would recommend that you study these problems + the "follow up" problems, which have brief solutions at the end of the chapter.

Sect.	Title and Comments	Required?
1.	Acids and Bases in Water	YES
2.	Autoionization of Water and the pH Scale	YES
3.	Proton Transfer and the Bronsted-Lowry Acid-Base Definition	YES
4.	Solving Problems Involving Weak-Acid Equilibria	YES
5.	Weak Bases and Their Relation to Weak Acids	YES
6.	Molecular Properties and Acid Strength	NO
7.	Acid-Base Properties of Salt Solutions	YES
8.	Electron-Pair Donation and the Lewis Acid-Base Definition	NO

Chapter 18

Supplementary Homework Questions

S1. Which of the following is not a conjugate acid-base pair?

a. CH_3COOH and CH_3COO^-

b. $CH_3NH_3^+$ and CH_3NH_2

c. H_2SO_3 and HSO_4^-

d. HPO_4^{2-} and PO_4^{3-}

e. $HCOOH$ and $HCOO^-$

S2. Which of the following represents the most acidic solution?

a. $[H^+] = 0.15$ M

b. $[H^+] = 1.0 \times 10^{-14}$ M

c. pH = 3.6

d. $[OH^-] = 1.0 \times 10^{-13}$ M

e. pOH = 13.4

S3. Arrange the solutions in order of increasing acidity:

I a solution with $[H_3O^+] = 4.2 \times 10^{-6}$ M

II lemonade, pH = 2.65

III 0.25 M nitric acid

IV pickle juice, pH = 3.10

a. I-IV-II-III

b. II-IV-III-I

c. III-II-IV-I

d. IV-I-II-III

e. III-II-I-IV

S4. Write the acid ionization constant expression for the ionization of the hydrogen sulfate ion, HSO_4^-, in aqueous solution.

S5. Lactic Acid is a weak acid with $K_a = 1.4 \times 10^{-4}$. Calculate the pH, pOH and percent protonation of a 0.05 M solution of sodium lactate. Also calculate the percent protonation of the lactate.

S6. Aniline is a weak base with $K_b = 4.3 \times 10^{-10}$. Calculate the pH, pOH and percent dissociation (of the Anilium ion) of a solution of 0.07 M Anilinium Bromide. Also calculate the percent dissociation of the Anilinium ion.

S7. Tellurous Acid, H_2TeO_3, is a diprotic acid with acid dissociation constants, $K_a' = 3.0x10^{-3}$ and $K_a'' = 2.0x10^{-8}$

a) Calculate the pH and pOH of a 1.20 M solution of Tellurous Acid (H_2TeO_3).

b) Calculate the pH and pOH of a 0.25 M solution of potassium tellurite (Na_2TeO_3)

S8. The pH of a 0.15 M solution of Morphine ($C_{17}H_{19}O_3N$) is 10.5. Calculate the Base Equilibrium Constant, K_b, for Morphine.

Answers to the Supplementary Homework Questions are posted on the course web site. Questions about these Problems will be answered in Recitation