Chapter 15
Acids-Base Equilibria: Proton Transfer in Biological Systems
Learning Objectives

To satisfy the minimum requirements for this course, you should be able to:

1. Explain the difference between weak and strong acids/bases and:
   ● be able to give the names and formulas of common strong acids and bases. (see Chemistry Reference Sheet)
   ● write chemical equations to show how amines act as weak bases and how carboxylic acids act as weak acids in aqueous solution.
   ● rank a series of weak acids or weak bases by acid or base strength given their K_a or K_b values (K_a found in Table A5.1, K_b found in Table A5.3; Appendix 5, pp. APP-25 - APP-27).

2. Use molecular structure to determine the relative acid strength of:
   ● hydrogen halides
   ● oxoacids

3. Discuss the general properties of Brønsted acids and bases by:
   ● identifying Brønsted-Lowry acids and bases.
   ● identifying the conjugate base associated with a given Brønsted acid.
   ● identifying the conjugate acid associated with a given Brønsted base.

4. Explain what is meant by the autoionization of water and write the K_w expression for the process.

5. Define pH, pOH, $[H^+]$, and $[OH^-]$ and given one variable, be able to calculate the other three variables.

6. Determine the relationship between the strength of an acid and that of its conjugate base and be able to calculate K_b using a given K_a and vice-versa.

7. Generate a RICE table and:
   ● calculate the pH for a weak acid solution in water, given the initial acid concentration and K_a.
   ● calculate K_a given the initial acid concentration and pH.
   ● calculate the pH for a weak base solution in water, given the initial base concentration and K_b.
   ● calculate K_b given the initial base concentration and pH.

8. Write stepwise ionization equations and the corresponding equilibrium-constant expressions for polyprotic acids.

9. Predict whether a salt solution will be acidic, basic, or neutral and be able to calculate its pH.

10. NavApp: Boiler Water
    ● understand the effect of varying pH on corrosion