CHAPTER OVERVIEW

3: Acid-Base Chemistry

Learning Objectives

- Understand the Brønsted and Lewis definitions of acids and bases.
- Identify conjugate acids and bases, and rules for strong & weak acids/bases, in both Brønsted and Lewis acid-base systems.
- Use Pauling's rules to predict the pK_as of oxoacids.
- Understand the periodic trends of acidic, basic, and amphoteric compounds
- Predict, describe, and rationalize acid/base chemistry in non-aqueous systems, including acidic and basic solvents, aprotic solvents, and molten salts.
- Apply the principles of acid-base chemistry to the design of molecules and Lewis acids with target functions.
- Understand the connection between acid-base chemistry and the stabilization of oxidation states.
- Predict favorable and stable compounds using hard-soft acid-base (HSAB) theory.
- Understand the applications of the ECW model.

Acid-base reactions form the basis of the most common kinds of equilibrium problems which you will encounter in almost any application of chemistry. There are three major classifications of acids and bases: (1) The Arrhenius definition states that an acid produces H^+ in solution and a base produces OH^- and the (2) Brønsted-Lowry and (3) Lewis definitions of acids and bases. Of particular importance in inorganic chemistry is the "hard and soft (Lewis) acids and bases" (HSAB) theory that is widely used for explaining stability of compounds, reaction mechanisms, and reaction pathways.