CHM 111: Chapter 15 study guide / learning objectives

Chapter 15 in the OpenStax text covers several more kinds of chemical equilibrium: solubility/dissolving and Lewis acids/bases. It also looks at what happens when several equilibria are present in a solution at once. Though section 15.3 shows calculations with certain kinds of multiple equilibria situations, we will discuss the effects of some other equilibria on solubility qualitatively by using Le Chateleir's principle/the common ion effect.

At the end of this chapter, you should be able to:

[Definitions / Terminology]
- Define: **solubility**, **solution**, **solute**, **solvent** (review these terms – they're not new for this chapter)
- Define a **saturated solution** and describe the chemical reactions taking place in a saturated solution.
- Define and write expressions for the **solubility product constant**.
- Define **precipitation**.
- Define an **acid** and a **base** using the **Lewis** definition.
- Define the **common-ion effect.**

[Solubility and the solubility product constant]
- Write the dissociation reaction of a given salt in water.
- Write the expression for the solubility product constant of a given salt in water.
- Calculate the solubility of a species from the K_{sp}.
- Calculate the K_{sp} of a solution from the solubility.

[Precipitation]
- Calculate the reaction quotient (or "ion product") Q for a salt.
- Use Q to determine whether precipitation occurs in a solution ($Q>K_{sp}$, precipitation occurs).

[The common-ion effect]
- Describe the effect of a common ion on the solubility of a salt.
- Calculate the solubility of a salt in the presence of a common ion.

[Lewis acids and bases]
- Label Lewis acids/bases in a given chemical reaction.
- Explain the differences between the Arrhenius, Bronsted-Lowry, and Lewis definitions.
- Identify species that can act as Lewis bases.

[Multiple equilibria - Things that affect solubility: pH and complex formation]
- Describe the effect of pH on solubility.
- Predict the effect of complex formation on the solubility of a substance.
- Predict the pH at which you expect a given salt to be most soluble (acidic or basic).

[*Practice exercises from the OpenStax text*]
- 1, 3, 9, 13, 15, 31, 75(a,c), 109