

Chapter 6 Chemical Equilibrium

- I. Equilibrium Constant
- II. Review of Equilibrium Calculations
- III. Separation by Precipitation
- IV. Complex Formation
- V. Acids and Bases

I. Equilibrium Constant

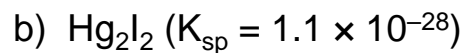
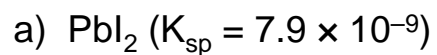
- *Expressing terms in K_{eq}*
Each term is actually a ratio
- *Equilibrium and Thermodynamics*
- *Equilibrium Constant Algebra*

II. Review of Equilibrium Calculations

Handout

III. Separation by Precipitation

Ex: Calculate the solubility of:

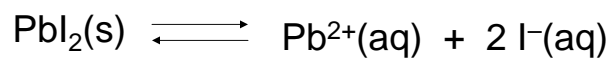


III. Separation by Precipitation (cont.)

Ex: Consider a solution of 0.010 M Pb^{2+} and 0.010 M Hg_2^{2+} . Is it possible to “completely” separate one from the other with solid KI? (completely = 99.99% of one ion is removed)

Ex: At what concentration of Hg_2^{2+} would a 99.99% separation no longer be allowed if $[\text{Pb}^{2+}]$ remains at 0.010 M?

IV. Complex Formation



$$K_{\text{sp}} = 7.9 \times 10^{-9}$$

Key to complex equilibrium calculations:

All equilibrium expressions must be satisfied simultaneously!!

Question:

If $[\text{I}^{-}]$ is known, what is the concentration of all the other species in solution?

V. Acids and Bases

- *Bronsted-Lowry Definitions:*
 - Acid – proton donor
 - Base – proton acceptor
- Water can act as either an acid or a base (*amphiprotic*)
 - Autoprotolysis of water
- Acid Dissociation Reaction
- Base Hydrolysis Reaction

V. Acids and Bases (cont.)

Relationship of K_a and K_b :

- Monoprotic Acids
- Diprotic Acids
- Triprotic Acids

Appendix G: ONLY K_a VALUES!!

- compound name is neutral species
- completely protonated species is shown