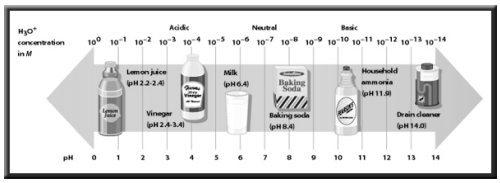
Acids & Bases Part 2



Strong Acids & Bases

- The strength of an acid or a base is based on the percent of units dissociated

Weak Acids & Bases

- Weak acids and bases only ionize partially
- A solution of weak acid contains a mixture of un-ionized acid molecules, hydronium ions, and the corresponding negative ions.
- $HCH_3COO + H_2O \leftrightarrow CH_3COO^- + H_3O^+$

Strength Is Not Concentration

- Although the terms *weak* and *strong* are used to compare the strengths of acids and bases, *dilute* and *concentrated* are terms used to describe the concentration of solutions.
- Molarity is the most widely used unit for concentration
- When we talk about strength (or degree of ionization) we will use Ka or Kb

Calculating Solutions of Strong Acids and Bases

- 0.10 M NaOH

Calculating Solutions of Strong Acids and Bases

- 7.5×10^{-4}M $Ca(OH)_2$

Calculating Solutions of Strong Acids and Bases

- Calculate the pH of a 1.0 M solution of HI

Calculating Solutions of Strong Acids and Bases

- Calculate the pH of a 0.050 M solution of HNO_3.

Calculating Solutions of Strong Acids and Bases

- Calculate the pH of a 2.4 x 10^{-5} M solution of $Mg(OH)_2$.

pH of dissolved solids

- Calculate the pH of a solution with 0.566 g of HI dissolved in 0.500 L of solution.

pH of Diluted Solutions

- Calculate the pH of a solution if 10.0 ml of 2.0 M HBr is diluted to 50.0 ml.

Acid & Base Ionization Constants

- A weak acid or base produces a reaction that only partially goes forward.
- The acid or base ionization constant measures the degree of ionization (or the strength)
- The smaller the Ka, the weaker the acid
- The smaller the Kb, the weaker the base
- $K_{eq} = \frac{[products]}{[reactants]}$

Acid & Base Ionization Constants

- $HCN + H_2O \leftrightarrow H_3O^+ + CN^-$
- Write the Keq expression

Acid & Base Ionization Constants

- Write the Ka expressions for the following reactions:
- $HClO_2 + H_2O \leftrightarrow H_3O^+ + ClO_2^-$
- $HIO + H2O \leftrightarrow H_3O^+ + IO^-$

Acid & Base Ionization Constants

- Write the Kb expression
- CH_3NH_2

Using pH to Calculate Ka

- Suppose you measure the pH of a 0.100 M solution of HCOOH (formic acid) and found it to be 2.38. Calculate the Ka.

Using pH to Calculate Ka

- Calculate the Ka of a 0.220 M solution of H_3ASO_4 with a pH of 1.50.

% Ionization

- A 0.10 M solution of a weak acid (HX) is 17.5% ionized. Calculate Ka.

Another Example

- A sample of a weak acid HX has a pH of 3.5. If the Ka = 2.7×10^{-5}, calculate the initial concentration of HX.