Percent Dissociation

$$\text{Percent dissociation} = \frac{\text{amount dissociated (mol/L)}}{\text{initial concentration (mol/L)}} \times 100\%$$

- For a given weak acid, the percent dissociation increases as the acid becomes more dilute.

Problem

- Calculate the percent dissociation of acetic acid ($K_a = 1.8 \times 10^{-5}$) in each of the following solutions.
- a) 1.00 M $HC_2H_3O_2$
- b) 0.100 M $HC_2H_3O_2$

Problem

- Lactic acid ($HC_3H_5O_3$) is a waste product that accumulates in muscle tissue during exertion, leading to pain and a feeling of fatigue. In a 0.100 M aqueous solution, lactic acid is 3.7% dissociated. Calculate the K_a for this acid.

Bases

Chapter 14

Bases

- Bases produce hydroxide by Arrhenius
- Hydroxides are not very soluble compounds.
- The only hydroxides that are soluble are group 1 elements, and calcium, barium and strontium.
- LiOH, RbOH and CsOH are significantly more expensive than the other hydroxide compounds so they are rarely used.
- Group 2 metal compounds are significantly less soluble than group 1.

Strong bases

- All of **group 1 and group 2 metals** (not H) make strong bases.
- Strong bases means the ones that dissolve completely dissociate.
- However, most of them are not very soluble, so they don't dissolve.
- For example, $Mg(OH)_2$ is a saturated solution at 1.6×10^{-4} M

Commonly used Strong Bases

these make a lightning bolt on the periodic table!

Name	Formula	Name	Formula
Sodium Hydroxide	NaOH	Calcium Hydroxide	$Ca(OH)_2$
Potassium Hydroxide	KOH	Strontium Hydroxide	$Sr(OH)_2$
		Barium Hydroxide	$Ba(OH)_2$

Base dissociation constant

- For some base B
- $B + H_2O \rightarrow BH^+ + OH^-$ (aq)
- The Base Dissociation Constant (K_b)

$$K_b = \frac{[BH^+][OH^-]}{[B]}$$

The pH of Strong Bases.

- This works the same as the pH of a strong acid.
- Calculate the pH of a 5.00×10^{-2} M NaOH solution.

pH of weak bases

- Calculate the pH for a 15.0 M solution of NH_3 (K_b = 1.8 x 10^{-5}).

More pH of a weak base

- Calculate the pH of a 1.0 M solution of methylamine (K_b = 4.38 x 10^{-4}).

Another problem

- Pyridine (C_5H_5N), an important solvent and base in organic syntheses, has a pK_b of 8.77. What is the pH of 0.10 M pyridine?