Introduction to Physical Science

Strengths of Acids & Bases

Presented by Robert Wagner

Weak and Strong Acids and Bases

- Strength of acid or base depends on the level of ionization in water
  - Weak acid or base - little ionization
  - Strong acid or base - ionization essentially complete

6 Strong Acids		6 Strong Bases	
$HClO_4$	perchloric acid	LiOH	lithium hydroxide
HCl	hydrochloric acid	NaOH	sodium hydroxide
HBr	hydrobromic acid	KOH	potassium hydroxide
HI	hydroiodic acid	$Ca(OH)_2$	calcium hydroxide
HNO_3	nitric acid	$Sr(OH)_2$	strontium hydroxide
H_2SO_4	sulfuric acid	$Ba(OH)_2$	barium hydroxide

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Percent Ionization

- Percent ionization of a weak acid is given by
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Example

- Calculate the percent ionization of an 0.125 M solution of nitrous acid, with a pH of 2.09.

$$pH = 2.09\,;0.125\,M\,solution$$

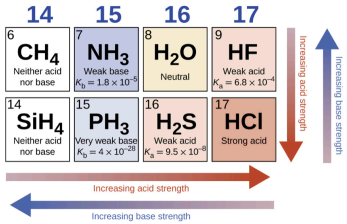
$$\%\,ionization = \frac{[H_3O^+]_{eq}}{[HNO_2]_0} x100$$

$$[H_3O^+] = 10^{-2.09} = 0.0081\,M$$

$$\frac{0.0081}{0.125} x100 = 6.5\,\%$$

Binary Acids and Bases

- Strength of acid compounds of hydrogen with nonmetals:
  - Increases to the right on the periodic table
  - Increases downward on the periodic table



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Summary

- The strength of an acid or base depends on the level to which it is ionized in water
- The percent ionization tells the amount of a weak acid that has been ionized
- Binary acids - strength will increase downward and to the right in the periodic table