5/16/16

Acids + Bases - Determining pH

1 —— 6.9 – 7.0 – 7.1 —— 14

Acid | Neutral | Base

Acids increase the hydrogen in water when they dissociate - this forms H_3O^+ hydronium ion

water self-ionizing

$$H_2O + H_2O \longleftrightarrow H_3O^+(aq) + OH^-(aq)$$

$$a\,A + b\,B \longleftrightarrow c\,C + d\,D$$

$$K_{eq} = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

[ ] "concentration of"

$$K_w = \frac{[H_3O^+]^1 [OH^-]^1}{[H_2O]^1 [H_2O]^1} = [H_3O^+][OH^-] = 1.0 \times 10^{-14}$$

at room temp

pure water $K_w = [H_3O^+][OH^-] = 1.0 \times 10^{-14}$

[ ] = concentration calculated by Molarity

pure H_2O $[H_3O^+][OH^-] = 1.0 \times 10^{-14}$ $\quad X^2 = 1.0 \times 10^{-14}$

$[H_3O^+] = 1.0 \times 10^{-7}\ M$

$[OH^-] = 1.0 \times 10^{-7}\ M$

$pH = -\log [H_3O^+]$

$pH = -\log [1.0 \times 10^{-7}] = (7)$

$pOH = -\log [1.0 \times 10^{-7}] = (7)$

pH problems:

1. identify the solute (is it an acid or base)
2. calculate molarity
3. Determine pH or pOH based on problem

Practice:

1. $K_w = [H_3O^+][OH^-] = 1.0 \times 10^{-14}$

$(1 \times 10^{-5}\ M)[OH^-] = 1.0 \times 10^{-14}$

$[OH^-] = \dfrac{1.0 \times 10^{-14}}{1.0 \times 10^{-5}}$

$[OH^-] = 1.0 \times 10^{-9}\ M$