Assigned Problems From Last Class

Kw-Ionization of Water

Water has H_2O molecules and H_3O^+ and OH^- ions

Recall- H_2O is amphoteric (both acidic + basic).

$$H_2O + H_2O \rightleftharpoons H_3O^+ + OH^-$$

$$K_{eq} = \frac{[H_3O^+][OH^-]}{[H_2O][H_2O]}$$

Constants

new constant

$$K_w = [H_3O^+]\cdot[OH^-]$$ for all dilute solutions

$K_w = (1.0\times10^{-7})(1.0\times10^{-7})$

$K_w = 1.0 \times 10^{-14}$

Example-

What is $[OH^-]$ of a solution with pH = 2.5

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

$2.5 = -\log[H_3O^+]$

$[H_3O^+] = 0.0032$ mol/L

$1.0\times10^{-14} = (0.0032)[OH^-]$

$\frac{1.0\times10^{-14}}{0.0032} = [OH^-] = 3.1\times10^{-12}$

Text P.566 #12,14

Example- weak acid/base

An acid, HX, has $K_a = 4.6\times10^{-8}$ what is $[OH^-]$ if the $[HX] = 0.10$ mol/L

(1)

	HX	+ H_2O ⇌	H_3O^+	+ X^-
I	0.10		0	0
C	−x		+x	+x
E	0.10−x		x	x

$$K_a = \frac{[H_3O^+][X^-]}{[HX]} \rightarrow 4.6\times10^{-8} = \frac{x^2}{0.10-x}$$ (assume....)

$6.8\times10^{-5} = x = [H_3O^+]$

(2) $K_w = [H_3O^+][OH^-]$

$1.0\times10^{-14} = 6.8\times10^{-5}[OH^-]$

$1.6\times10^{-10} = [OH^-]$

Text – p. 591 #5-10

p. 595 #11-16

Worksheet - #5,6 + any others