Key

Unit11: Problem Set 2 (chap. 19)

1. What are the concentrations of H^+ and OH^- ions in a neutral solution? 1×10^{-7} m/L $\quad 1\times10^{-7}\frac{m}{L} \times 1\times10^{-7}\frac{m}{L}$
2. What is Kw? = water constant $= 1 \times 10^{-14} \frac{m^2}{L^2}$
3. Calculate the OH- concentration if the H+ concentration is equal to 8.6 x 10-9 mole/liter. Is the solution acidic, basic, or neutral?

$$\frac{1\times10^{-14}\ \frac{m}{L}}{8.6\times10^{-9}\ m/L} = 1.2\times10^{-6}\ m/L$$

H^+ $\quad$ OH^-

4. Given the pH of Tide detergent is 9.4, what is the pOH, [H^+], and [OH^-] ? Is this an acid, base, or neutral substance?

pH = 9.4 $\quad [H^+] = 3.98 \times 10^{-10}$ M,

pOH = 4.6 $\quad [OH^-] = 2.51 \times 10^{-5}$ M

5. Given that the OH- concentration for orange juice is 6.3 x 10-8 moles/liter, what is the pOH, [H^+], and pH ? Is this an acid, base, or neutral substance?

$[OH^-] = 6.3\times10^{-8}$ m/L $\quad$ pOH = 7.2

$[H^+] = 1.6\times10^{-7}$ m/L $\quad$ pH = 6.8

6. How does a strong base differ from a weak base?

A strong base dissociates completely.

A weak base dissociates partially.

7. Identify each compound as a strong or weak acid or base.
   a. NaOH strong
   b. H_2SO_4 strong
   c. $Cu(OH)_2$ weak

10,000 (1 / 2A) $\quad$ 10,000

$NaOH \longrightarrow Na^+ + OH^-$

$CuOH \longrightarrow Cu^+ + OH^-$

10,000 $\quad$ 250 + 250

8. Write the Ka expression for the following reaction:

$HF_{(aq)} \leftrightarrow H^+_{(aq)} + F^-_{(aq)}$ $\quad K_a = \frac{[H^+][F^-]}{[HF]}$

9. If a .30000 M of HF solution is made, and the ion concentration is .00015M, calculate the Ka.

$HF \leftrightarrow H^+ + F^-$

.30000M $\leftrightarrow$ 0 + 0

−.00015M

.29985M = [.00015M] + [.00015M]

$K_a = \frac{[.00015][.00015M]}{[.29985M]}$

$K_a = 7.5\times10^{-8}$ M

10. If a .50000 M solution of AgOH is made and the ion concentration is .00078M, calculate the Kb.

$AgOH_{(aq)} \leftrightarrow Ag^+_{(aq)} + OH^-_{(aq)}$

.50000M $\leftrightarrow$ 0 + 0

−.00075M $\leftrightarrow$ .00075M + .00075M

.49925M

$K_b = \frac{[Ag][OH^-]}{AgOH}$

$K_b = \frac{[.00078M][.00078M]}{[.49922M]}$

$K_b = 1.22\times10^{-6}$ M