#11-16

13. a) $[H^+_{(aq)}] = 10^{-pH}$

$[H^+_{(aq)}] = 10^{-5.00}$

$\boxed{[H^+_{(aq)}] = 1.0 \times 10^{-5} M}$

15. a) $[OH^-_{(aq)}] = 4.3 \times 10^{-5} M$

pH = ?

$pH = -\log [H^+_{(aq)}]$

$pH = -\log [2.3 \times 10^{-10}]$

$\boxed{pH = 9.64}$

$K_w = [H^+_{(aq)}][OH^-_{(aq)}]$

$[H^+_{(aq)}] = \dfrac{K_w}{[OH^-_{(aq)}]}$

$[H^+_{(aq)}] = \dfrac{1.0 \times 10^{-14}}{4.3 \times 10^{-5} M}$

$[H^+_{(aq)}] = 2.3 \times 10^{-10} M$

Sample Problem 2

IONIC HYDROXIDES (STRONG BASE)

Calculate the hydrogen ion concentration, pH and pOH of a 0.25 mol/L solution of barium hydroxide.

$Ba(OH)_{2(s)} \longrightarrow Ba^{2+}_{(aq)} + 2OH^-_{(aq)}$

0.25 mol/L 0.50 mol/L

$[H^+_{(aq)}] = ?$

pH = ?

pOH = ?

$K_w = [H^+_{(aq)}][OH^-_{(aq)}]$

$1.0 \times 10^{-14} = [H^+_{(aq)}][0.50]$

$[H^+_{(aq)}] = \frac{1.0 \times 10^{-14}}{0.50}$

$[H^+_{(aq)}] = 2.0 \times 10^{-14}\ M$

$pH = -\log[H^+_{(aq)}]$

$pH = -\log[2.0 \times 10^{-14}]$

pH = 13.70

$pOH = -\log[OH^-_{(aq)}]$

$pOH = -\log[0.50]$

pOH = 0.30

$pH + pOH = 14.00$

$HCl_{(aq)} \rightarrow H^+_{(aq)} + Cl^-_{(aq)}$

0.15 mol/L 0.15 mol/L 0.15 mol/L

$H_2SO_{4(aq)} \rightarrow 2H^+_{(aq)} + SO_4^{2-}{}_{(aq)}$

0.15 mol/L 0.30 mol/L

Water Equilibrium Worksheet