ANSWER KEY

EXTRA PRACTICE: pH & Concentration Name:_____

pH = -log [H⁺]	**[H⁺] = 10 ⁻ᵖᴴ**	**[H⁺] x [OH⁻] = 1.0 x 10 ⁻¹⁴**
pOH = -log [OH⁻]	**[OH⁻] = 10 ⁻ᵖᴼᴴ**	**pH + pOH = 14**

Part A: Table

Use the equations above to fill out the chart below. Use appropriate units in your answer when necessary.

	[H⁺]	pH	Acid/Base	[OH⁻]	pOH
1.00×10^{-4} *M* HCl	1.00×10^{-4} *M*	4.00	A	1.00×10^{-10} M	10.00
----------	1.00×10^{-11} M	11.0	B	1.00×10^{-3} M	3.00
----------	1.00×10^{-8} M	8.00	B	1.00×10^{-6} *M*	6.00
0.0316 *M* HCl	0.0316 M	1.50	A	3.16×10^{-13} M	12.5
0.00794 *M* HCl	0.00794 M	2.10	A	1.26×10^{-12} M	11.90
----------	4.00×10^{-5} *M*	4.40	A	2.51×10^{-10} M	9.60
0.0501 *M* NaOH	2.00×10^{-13} M	12.70	B	0.0501 M	1.30
----------	4.37×10^{-7} M	6.36	A	2.30×10^{-8} *M*	7.64
----------	2.00×10^{-7} M	6.70	A	5.01×10^{-8} M	7.30
1.05×10^{-5} *M* NaOH	9.50×10^{-10} *M*	9.02	B	1.05×10^{-5} M	4.98

Part B: Calculations

Solve the following problems by showing all work, including equations used. Use appropriate units in your answer when necessary.

1) What is the molar concentration of HNO_3 in a solution that has a pH of 4.50?

$HNO_3 = [H^+]$

$[H^+] = 10^{-pH} \rightarrow [H^+] = 10^{-4.50} \rightarrow [H^+] = [HNO_3] =$ **3.16×10^{-5} M HNO_3**

2) What is the molar concentration of $Ca(OH)_2$ in a solution that has a pOH of 3.50?

$Ca(OH)_2 = [OH^-]$

$[OH^-] = 10^{-pOH} \rightarrow [OH^-] = 10^{-3.50} \rightarrow [OH^-] = [Ca(OH)_2] =$ **3.16×10^{-4} M $Ca(OH)_2$**

☆ 3) What is the pH of a 2.00 *M* solution of H_2SO_4? (Assume that both H^+ protons dissociate)

Impractical Scenario (IGNORE)

$H_2SO_4 = [H^+]$

$pH = -\log[H^+] \rightarrow pH = -\log[2.00M] \rightarrow$ **$pH = -0.301$** * pH cannot be negative!

4) What is the pOH of a 0.100 *M* solution of LiOH?

$LiOH = [OH^-]$

$pOH = -\log[OH^-] \rightarrow pOH = -\log[0.100\,M] \rightarrow$ **$pOH = 1.00$**

5) What concentration of H_2SO_4 has a pH of 1.00, assuming that both protons dissociate?

$H_2SO_4 = [H^+]$

$[H^+] = 10^{-pH} \rightarrow [H^+] = 10^{-1.00} \rightarrow [H^+] = [H_2SO_4] =$ **0.100M H_2SO_4**