

EQUILIBRIUM LESSON-9 QUIZ: **CALCULATING pH OF ACIDS**

Clearly show your process.

1. Calculate the pH of a 0.020 mol/L solution of hypochlorous acid, $\text{HClO}(\text{aq})$
2. Calculate the pH of a 0.020 mol/L solution of perchloric acid, $\text{HClO}_4(\text{aq})$

ANSWERS

1.

	$\text{HClO}(\text{aq})$	$\rightleftharpoons$	$\text{H}^+(\text{aq})$	+	$\text{ClO}^-(\text{aq})$
I	0.020		~ 0		0
C	$-x$		$+x$		$+x$
E	$0.020-x$		x		x

$$K_a = \frac{[\text{H}^+(\text{aq})][\text{ClO}^-(\text{aq})]}{[\text{HClO}(\text{aq})]}$$

$$2.9 \times 10^{-8} = \frac{(x)(x)}{0.020-x} \quad \{K_a = 2.9 \times 10^{-8} \text{ from data table in the information package}\}$$

$$2.9 \times 10^{-8} = \frac{x^2}{0.020-x}$$

$$2.9 \times 10^{-8} = \frac{x^2}{0.020} \quad \{\text{small } K_a; \text{ assume } 0.020-x = 0.020\}$$

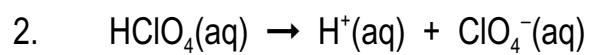
$$5.8 \times 10^{-10} = x^2 \quad \{\text{multiply by } 0.020\}$$

$$2.4083 \times 10^{-5} = x \quad \{\text{square root}\}$$

$$\begin{aligned} [\text{H}^+]_{\text{eq}} &= x \text{ mol/L} \\ &= 2.4083 \times 10^{-5} \text{ mol/L} \end{aligned}$$

$$\begin{aligned} \text{pH} &= -\log [\text{H}^+] \\ &= -\log (2.4083 \times 10^{-5}) \\ &= 4.6182 \dots \end{aligned}$$

Therefore, the pH of the solution is 4.62



strong acid – ionizes completely

$$[\text{H}^+] = 0.020 \text{ mol/L}$$

$$\text{pH} = -\log [\text{H}^+]$$

$$= -\log (0.020)$$

$$= 1.6989\dots$$

Therefore, the pH of the solution is 1.70