

## Quiz 16.3 - Weak Acids and Weak Bases

Name: Key

## Question 1

Find the pH for each of the following solutions:

o 1.5 F  $\text{NH}_3$ 

$$1.8 \cdot 10^{-5} = \frac{x^2}{1.5 - x} \quad \leftarrow \begin{array}{l} \text{assume } x \text{ is} \\ \text{small} \end{array}$$

$$x = 5.196 \cdot 10^{-3}$$

$$[\text{H}_3\text{O}^+] = \frac{10^{-14}}{x} = 1.925 \cdot 10^{-12} \quad \text{pH} = 11.72$$

o 0.25 F HF



$$6.6 \cdot 10^{-4} = \frac{x^2}{0.25 - x} \quad \leftarrow \text{small} \quad [\text{H}_3\text{O}^+] = x$$

$$x = 0.0128 \quad \leftarrow 5.12\% \quad \text{pH} = 1.90$$

$$x = 0.0125 \quad \leftarrow \begin{array}{l} \text{solve} \\ \text{graphically} \end{array}$$

## Question 2

Find the pH,  $[\text{H}_2\text{C}_4\text{H}_4\text{O}_5]$ ,  $[\text{HC}_4\text{H}_4\text{O}_5^-]$ , and  $[\text{C}_4\text{H}_4\text{O}_5^{2-}]$  for a 0.300 F solution of malic acid

$$K_{a1} = 4.0 \cdot 10^{-4}$$

$$K_{a2} = 6.3 \cdot 10^{-6}$$

$$\text{pH} = 1.959$$

$$6.3 \cdot 10^{-6}$$

$$4.0 \cdot 10^{-4} = \frac{x^2}{0.3 - x} \quad \leftarrow \text{small}$$

$$x = 1.10 \cdot 10^{-2} \quad \leftarrow 3.7\%$$

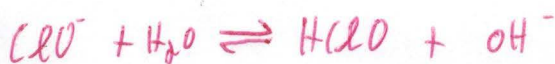
$$6.3 \cdot 10^{-6} = \frac{y(0.0109 + y)}{0.0109 - y} \quad \leftarrow \text{small}$$

$$y = 6.3 \cdot 10^{-6}$$

## Question 3

Find the pH for a 1.5 F solution of NaClO

$$\text{For } \text{HClO}, K_a = 4.0 \cdot 10^{-8}, \text{ so for } \text{ClO}^- \quad K_b = \frac{10^{-14}}{K_a} = 2.5 \cdot 10^{-7}$$



$$2.5 \cdot 10^{-7} = \frac{x^2}{1.5 - x} \quad \leftarrow \text{small}$$

$$x = 6.12 \cdot 10^{-4}$$

$$[\text{H}_3\text{O}^+] = \frac{10^{-14}}{x} = 1.63 \cdot 10^{-11}$$

$$\text{pH} = 10.79$$