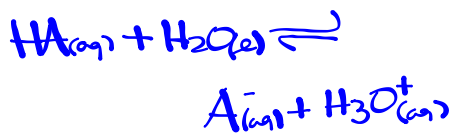


Worksheet

③ LACTIC



$$K_a = \frac{[\text{A}^-]_{(aq)} [\text{H}_3\text{O}^+]_{(aq)}}{[\text{HA}_{(aq)}]}, \quad [\text{A}^-] = [\text{H}_3\text{O}^+]$$

$$K_a = \frac{[\text{H}_3\text{O}^+]^2}{[\text{HA}_{(aq)}]}$$

$$[\text{H}_3\text{O}^+] = \sqrt{(1.4 \times 10^{-4})(0.0034)}$$

$$[\text{H}_3\text{O}^+] = 6.90 \times 10^{-4} \text{ M}$$

PROPIONIC



$$K_a = \frac{[\text{A}^-]_{(aq)} [\text{H}_3\text{O}^+]_{(aq)}}{[\text{HA}_{(aq)}]}, \quad [\text{A}^-] = [\text{H}_3\text{O}^+]$$

$$K_a = \frac{[\text{H}_3\text{O}^+]^2}{[\text{HA}_{(aq)}]}$$

$$[\text{H}_3\text{O}^+] = \sqrt{(1.4 \times 10^{-5})(0.056)}$$

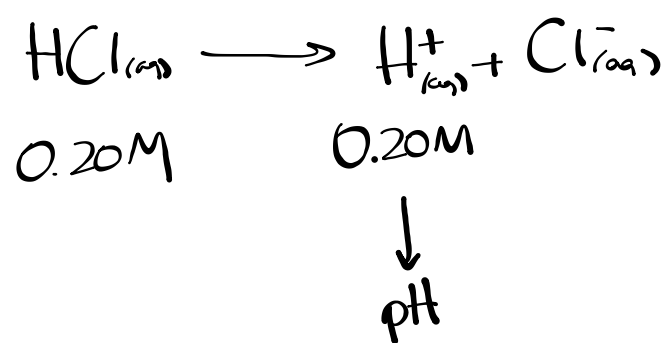
$$[\text{H}_3\text{O}^+] = 8.85 \times 10^{-4} \text{ M}$$

$$[\text{H}_3\text{O}^+] = 1.6 \times 10^{-3} \text{ M}$$

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

$$\text{pH} = -\log[1.6 \times 10^{-3}]$$

$$\boxed{\text{pH} = 2.80}$$

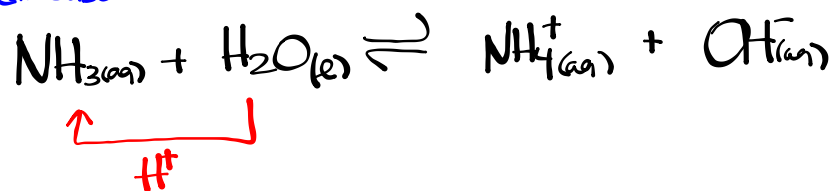


Weak Bases

Weak bases react with water to form the hydroxide ion and conjugate acid of the base.

Ex. Calculate the pH of a 0.176M solution of ammonia

weak base



base dissociation constant

$$K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]}, \quad [\text{NH}_4^+] = [\text{OH}^-]$$

$$K_b = \frac{[\text{OH}^-]^2}{[\text{NH}_3]}$$

$$[\text{OH}^-] = \sqrt{(1.72 \times 10^{-5})(0.176)}$$

$$[\text{OH}^-] = 1.7 \times 10^{-3} \text{ M}$$

$$\text{pOH} = -\log[1.7 \times 10^{-3}]$$

$$\text{pOH} = 2.77$$

$$K_a K_b = K_w$$

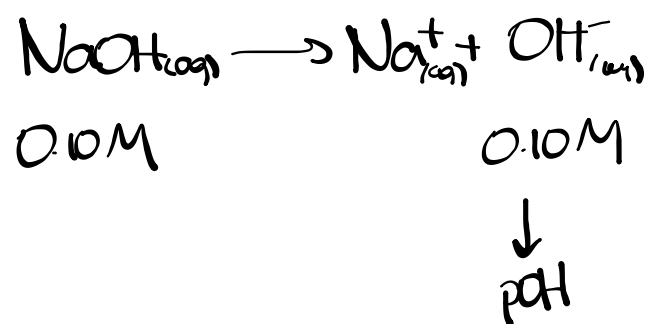
$$K_b = \frac{K_w}{K_a} = \frac{1.0 \times 10^{-14}}{5.8 \times 10^{-10}}$$

$$K_b = 1.72 \times 10^{-5}$$

$$\text{pH} + \text{pOH} = 14.00$$

$$\text{pH} = 14.00 - 2.77$$

$$\text{pH} = 11.23$$



$$K_a K_b = K_w \quad 1.0 \times 10^{-14}$$

$$K_b = \frac{K_w}{K_a}$$

Worksheet