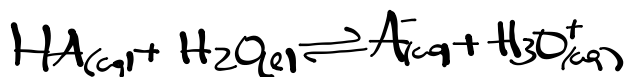


Worksheet

$$pH = -\log[H_3O^+]$$

③ LACTIC ACID

0.034M

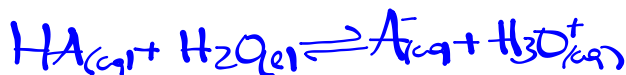
$$K_a = \frac{[A^-][H_3O^+]}{[HA]}, \quad [A^-] = [H_3O^+]$$

$$K_a = \frac{[H_3O^+]^2}{[HA]}$$

$$1.4 \times 10^{-4} = \frac{[H_3O^+]^2}{[0.0034]}$$

$$[H_3O^+] = \sqrt{(1.4 \times 10^{-4})(0.0034)}$$

$$[H_3O^+] = 6.9 \times 10^{-4} M$$

PROPIONIC ACID

$$K_a = \frac{[A^-][H_3O^+]}{[HA]}, \quad [A^-] = [H_3O^+]$$

$$K_a = \frac{[H_3O^+]^2}{[HA]}$$

$$1.4 \times 10^{-5} = \frac{[H_3O^+]^2}{[0.056]}$$

$$[H_3O^+] = \sqrt{(1.4 \times 10^{-5})(0.056)}$$

$$[H_3O^+] = 8.9 \times 10^{-4} M$$

$$\underbrace{\quad + \quad}_{1.6 \times 10^{-3} M}$$

$$pH = -\log[H_3O^+]$$

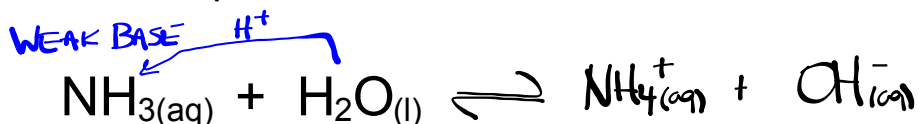
$$pH = -\log[1.6 \times 10^{-3}]$$

$$pH = 2.80$$

Weak Bases

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

Find the pH of a 0.319 mol/L solution of ammonia



0.319 M

base dissociation constant

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

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

$$K_a K_b = K_w$$

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

$$1.72 \times 10^{-5} = \frac{[\text{OH}^-(\text{aq})]^2}{[0.319]}$$

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

$$[\text{OH}^-(\text{aq})] = \sqrt{(1.72 \times 10^{-5})(0.319)}$$

$$[\text{OH}^-(\text{aq})] = 2.34 \times 10^{-3} \text{ M}$$

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

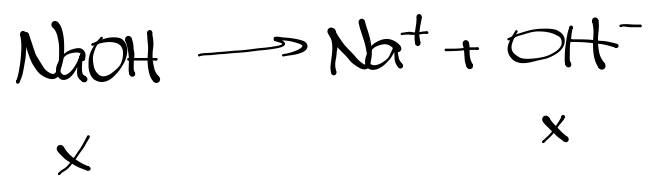
$$\text{pH} + \text{pOH} = 14.000$$

$$\text{pOH} = -\log[2.34 \times 10^{-3}]$$

$$\text{pH} = 14.000 - 2.631$$

$$\text{pOH} = 2.631$$

$$\boxed{\text{pH} = 11.369}$$



$$K_a K_b = K_w$$

Worksheet