Buffers

EQUILIBRIUM

$$HF + H_2O \rightleftharpoons H^+ + F^-$$

$HCl \rightarrow H^+ + Cl^-$

ADD ACID

$$HF + H_2O \rightleftharpoons \uparrow H^+ + F^-$$

ADD BASE

$$HF + H_2O \rightleftharpoons \downarrow H^+ + F^-$$

$H^+ + OH^- \rightarrow H_2O$

$$HA + H_2O \rightleftharpoons H_3O^+ + A^-$$

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

$$pH = pK_a + \log \frac{[Base]}{[Acid]}$$

Henderson–Hasselbalch Equation

What is the pH of a buffer that is 0.12 *M* in lactic acid, $CH_3CH(OH)COOH$, and 0.10 *M* in sodium lactate? K_a for lactic acid is 1.4×10^{-4}.

Henderson–Hasselbalch Equation

$$pH = pK_a + \log\frac{[base]}{[acid]}$$

$$pH = -\log(1.4 \times 10^{-4}) + \log\frac{(0.10)}{(0.12)}$$

$$pH = 3.85 + (-0.08)$$

$$pH = 3.77$$