

Nine Eight Systems

1. Strong acid $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$ $[\text{H}^+] = [\text{HCl}]$
2. Strong base $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$ $[\text{OH}^-] = [\text{NaOH}]$
3. Weak Acid $\text{HF} \rightleftharpoons \text{H}^+ + \text{F}^-$ $[\text{H}^+] = \sqrt{K_a \text{ [weak acid]}}$
4. Weak Base $\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$
 $[\text{OH}^-] = \sqrt{K_b \text{ [weak base]}}$
5. Salt of Weak acid/Strong Base NaF soln basic
 $\text{F}^- + \text{H}_2\text{O} \rightleftharpoons \text{HF} + \text{OH}^-$
 $[\text{OH}^-] = \sqrt{\frac{K_w}{K_a} [\text{F}^-]}$
hydrolysis constant
6. Salt of Weak base/strong acid NH_4Cl soln acidic
 $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$
 $[\text{H}^+] = \sqrt{\frac{K_w}{K_b} [\text{NH}_4^+]}$
7. Weak Acid Buffer $\text{HF} + \text{NaF}$
 $[\text{H}^+] = K_a \frac{[\text{HF}]}{[\text{NaF}]} = K_a \frac{\text{moles HF}}{\text{moles NaF}}$
8. Weak Base Buffer $\text{NH}_3 + \text{NH}_4\text{Cl}$
 $[\text{OH}^-] = K_b \frac{[\text{NH}_3]}{[\text{NH}_4\text{Cl}]} = K_b \frac{\text{mol NH}_3}{\text{mol NH}_4\text{Cl}}$
9. Salt of strong acid + strong base
 $\text{pH} = 7$