For Poly Protic Acid

$(K_{a_1} >> K_{a_2})$ So K_{a_1} diss. 100%.

$H_2SO_4 \rightleftharpoons H^+ + HSO_4^- \rightarrow K_{a_1}$

$HSO_4^- \rightleftharpoons H^+ + SO_4^{2-} \rightarrow K_{a_2}$

Salt of Strong Acid + S. Base.

[pH = 7] ex: $NaOH + HCl \longrightarrow NaCl$ → 100% diss. → $[H^+] \neq [OH^-]$

Salt of Weak Acid + Strong Base.

CH_3COONa

$H_2O + CH_3COONa \longrightarrow CH_3COO^- + Na^+$

$C(1-x) \qquad Cx \quad Cx$

$K_h = \frac{Cx \times Cx}{C(1-x)} = \frac{Cx^2}{1-x} \Rightarrow$

$\left(K_h = \frac{K_w}{K_a}\right) \Rightarrow [OH^-] = \frac{K_w}{K_a}\left(\frac{[CH_3COO^-]}{C[H_3COOH]}\right)$

$\log[OH^-] = \log K_w - \log K_a + \log \frac{Salt}{Acid}$

$-pOH = pK_w - pK_a + \log \frac{Salt}{Acid}$

$K_h = \frac{Ch^2}{(1-h)} \Rightarrow \left(h = \sqrt{\frac{K_h}{C}}\right)$

$[OH^-] = Ch = C\sqrt{K_h} = \sqrt{K_h C} = \sqrt{C\frac{K_w}{K_a}}$.