$HA \rightleftharpoons H^+ + A^-$

$K_a = \frac{[H^+][A^-]}{[HA]} = \frac{x^2}{F - x}$ ← $[HA] + [A^-]$

assume $F \gg x$

$[H^+] = \sqrt{K_a F} = 1.896 \times 10^{-3}\ M$

$x = 3.3\%\ F$ fails → quadratic

$0 = x^2 + K_a x - F K_a = x^2 + 6.309 \times 10^{-5} x - 3.6 \times 10^{-6}$

$x = 1.86 \times 10^{-3}\ M$

$pH = 2.73$

$pH \approx 4.20$

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

$pH = pK_a + \log \frac{[A^-]}{[HA]}$

moles OH^- = moles A^- = $0.073 \frac{mol}{L} \cdot 0.014L = 1.022 \times 10^{-3}$ mol

moles $HA + A^- = 0.057 \frac{mol}{L} \cdot 0.05L = 2.85 \times 10^{-3}$ moles

moles $HA = 2.85 \times 10^{-3}$ moles $- 1.022 \times 10^{-3}$ moles

$pH = 4.20 + \log \frac{1.022 \times 10^{-3}\ mol}{1.828 \times 10^{-3}\ mol} = 4.20 - 0.25 = 3.95$

$pH = pK_a = 4.20$