

Practice test problem 11

- ① Find K_b for conjugate base given the K_a of the acid using $K_a \times K_b = K_w$
- ② Use this to plug into K_b expression & solve for $[OH^-]$.
- ③ Use $[OH^-]$ to find pOH & subtract from 14.

$$K_a \times K_b = K_w \Rightarrow K_b = \frac{K_w}{K_a} = \frac{1 \times 10^{-14}}{1.8 \times 10^{-4}} = 5.6 \times 10^{-11}$$

$$K_b = 5.6 \times 10^{-11}$$

$$\text{so } 5.6 \times 10^{-11} = \frac{x^2}{.35} \Rightarrow x = \sqrt{(5.6 \times 10^{-11})(.35)} \Rightarrow$$

$$4.4 \times 10^{-6} = x = [OH^-]$$

$$pH = 14 - (-\log 4.4 \times 10^{-6}) = \boxed{8.6}$$

Check for valid assumption $\Rightarrow \frac{4.4 \times 10^{-6}}{.35} \times 100 = .0012\%$ so it is good.