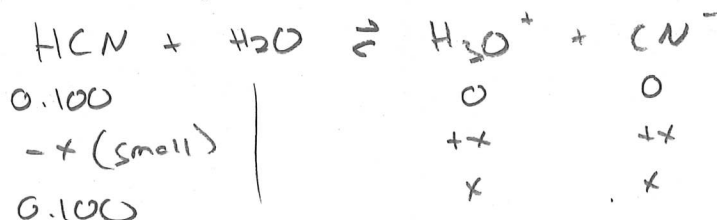


1. What is the pH of a 0.100 M hydrocyanic acid solution if $K_a = 4.9 \times 10^{-10}$?

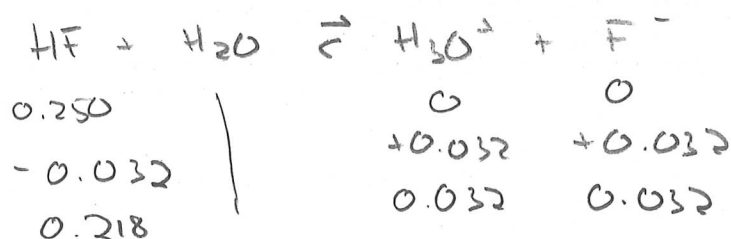


$$4.9 \times 10^{-10} = \frac{[x]^2}{[0.100]}$$

$$x = [\text{H}_3\text{O}^+] = 7.0 \times 10^{-6} \text{ M}$$

$$\boxed{\text{pH} = 5.15}$$

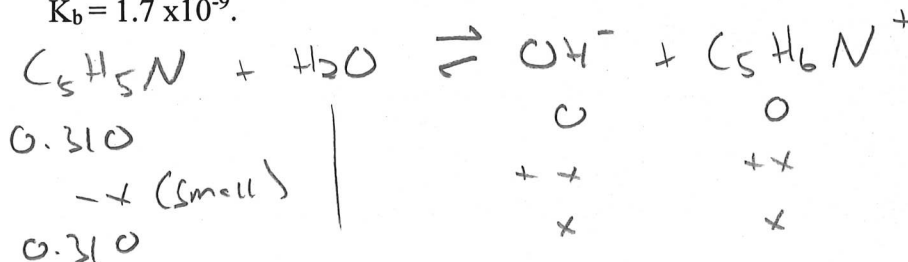
2. The pH of a 0.250 M hydrofluoric acid solution is 1.50. Determine the K_a .



$$[\text{H}_3\text{O}^+] = 10^{-1.50} = 0.032 \text{ M}$$

$$K_a = \frac{[0.032]^2}{[0.218]} = \boxed{4.7 \times 10^{-3}}$$

3. Pyridine ($\text{C}_5\text{H}_5\text{N}$) is a weak base. What is the pH of a 0.310 M solution if $K_b = 1.7 \times 10^{-9}$?



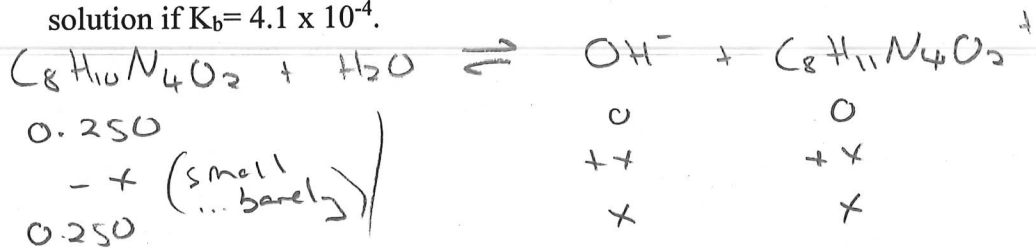
$$1.7 \times 10^{-9} = \frac{[x]^2}{0.310}$$

$$x = [\text{OH}^-] = 2.3 \times 10^{-5} \text{ M}$$

$$\text{pOH} = 4.64$$

$$\boxed{\text{pH} = 9.36}$$

4. Caffeine ($C_8H_{10}N_4O_2$) is a weak base. What is the pOH of a 0.250 M caffeine solution if $K_b = 4.1 \times 10^{-4}$.

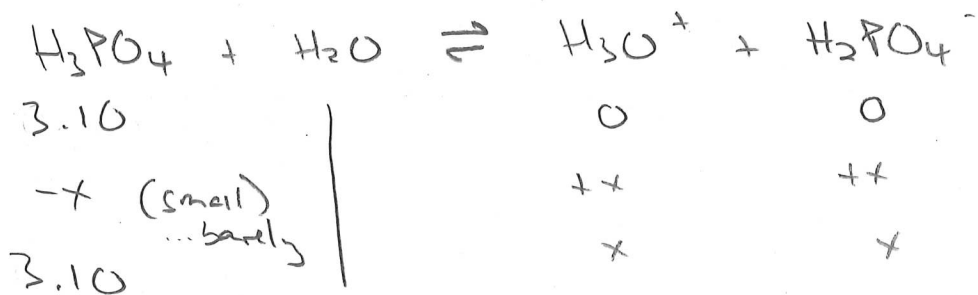


$$4.1 \times 10^{-4} = \frac{x^2}{0.250}$$

$$x = 0.010 = [OH^-]$$

$$pOH = 1.99$$

5. What is the pOH of a ^{3.10}~~0.310~~ M solution of phosphoric acid? $K_a = 6.9 \times 10^{-3}$.



$$6.9 \times 10^{-3} = \frac{x^2}{3.10}$$

$$x = 0.15 \text{ M} = [H_3O^+]$$

$$pH = 0.83 \rightarrow pOH = 13.17$$