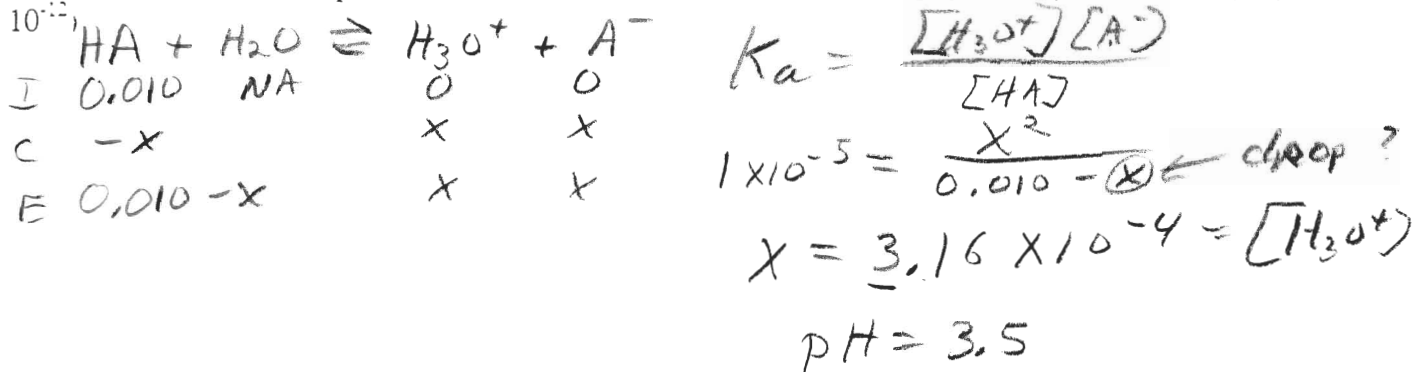


1. (5 Pts) Determine the pH of a 0.010 M solution of Ascorbic acid, $H_2C_6H_6O_6$. ($K_{a1} = 1 \times 10^{-5}$, $K_{a2} = 3 \times 10^{-12}$)



2a. (5 Pts) Determine the pH of a solution that is 0.010 M in Ascorbic acid, $H_2C_6H_6O_6$, and 0.010 M in $NaHC_6H_6O_6$. ($K_{a1} = 1 \times 10^{-5}$, $K_{a2} = 3 \times 10^{-12}$)

Buffer solution, use H.H. Eq.

$$pH = -\log 1 \times 10^{-5} + \log \frac{0.010}{0.010} = 5$$

$$pH = 5 + 0 = 5$$

b. (5 Pts) If 0.002 mole of NaOH are added to the above solution, what would be the resulting pH?

Base will react with acid to form more salt.

$$pH = 5 + \log \frac{0.010 + 0.002}{0.010 - 0.002}$$

$$pH = 5 + 0.176 = 5.18$$

3. (5 Pts) Find the pH of a buffer that consists of 0.25 M NH_3 and 0.10 M NH_4Cl ($pK_b = 4.75$)

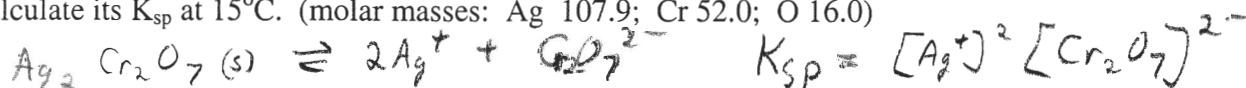
$$pH = pK_a + \log \frac{\text{base}}{\text{acid}}$$

$$pK_a = 14 - 4.75$$

$$pK_a = 9.25$$

$$pH = 9.25 + \log \frac{0.25}{0.10} = 9.65$$

4. (5 Pts) The solubility of silver dichromate ($Ag_2Cr_2O_7$) at $15^\circ C$ is 8.3×10^{-3} g/100 mL of solution. Calculate its K_{sp} at $15^\circ C$. (molar masses: Ag 107.9; Cr 52.0; O 16.0)



$$\frac{8.3 \times 10^{-3} \text{ g } Ag_2Cr_2O_7}{100 \times 10^{-3} \text{ L}} \left| \frac{\text{mol}}{431.8 \text{ g}} \right. = 1.92 \times 10^{-4} M_{Ag_2Cr_2O_7}$$

$$K_{sp} = [2(1.92 \times 10^{-4})]^2 [1.92 \times 10^{-4}] = 2.8 \times 10^{-11}$$