Buffer and Titration Problems

1. a. What is the pH of a solution that is made when 200.0 mL of a 10.0M $HC_2H_3O_2$ is added to 100.0 mL of a 10.0M $NaC_2H_3O_2$? (Ka of $HC_2H_3O_2$ is $1.8 * 10^{-5}$)

   b. What is the pH when 100.0 mL of a 5.00M NaOH are added to the buffer?

   c. What is the pH when 200.0 mL of a 5.00M HCl are added to the buffer?

2. 100.0 mL of a 2.00 M HClO is titrated with a 1.00 M NaOH. If $K_a = 2.8 * 10^{-8}$ what is the pH…

   a. before titration begins?
   b. when 50.0 mL of the NaOH has been added?
   c. 1/2 way to the equivalence point?
   d. when 100.0mL of the NaOH has been added?
   e. at the equivalence point?

3. 100.0 mL of a 1.00 M HCl is titrated with a 2.00 M KOH. What is the pH…

   a. before titration begins?
   b. when 10.0mL of the KOH has been added?
   c. 1/2 way to the equivalence point?
   d. when 40.0 mL has been added?
   e. at the equivalence point?
   f. when 100.0 mL of the KOH has been added?

4. 100.0mL of a 2.00M NH_4Cl (Ka = $5.6 *10^{-10}$) solution is titrated with 1.00M KOH. What is the pH…

   a. Before titration begins?
   b. When 75.0mL of KOH are added?
   c. When 100.mL of KOH are added?
   d. When 200.0mL of KOH are added?
   e. Which indicator would be used for this titration?

5. 200.0 mL of a 2.00M NH_3 solution is titrated with a 1.00M HI solution. If the Kb of NH_3 is $1.8 * 10^{-5}$ what is the pH…

   a. Before titration begins?
   b. ½ way to the equivalence point?
   c. When the equivalence point is reached?
   d. Which indicator would be used for this titration?

6. If 500.0mL of a 1.00M NaCN is mixed with 200.0mL of a 2.00 M HCN, what is the pH of the solution if the Ka of HCN= $5.8 * 10^{-10}$?

   a. What is the pH of the solution above if 100.mL of a 1.00M HCl are added to it?
   b. What is the pH of the solution above if 100.0 mL of 3.00M LiOH are added to it?
   c. What is the pH when 0.100 mol of HBr is added to 500.0 mL of the buffer solution?