 Name:

Part A: Calculating the pH of a buffer

1) A 1.0L buffer solution is made to be 0.50 M NH_3 and 0.60 M NH_4Cl. K_b, NH_3 = 1.76×10^{-5}

   a) Write the neutralization reaction when strong acid is added to the buffer (hint: what in the buffer neutralizes the added acid?)

   b) Write the neutralization reaction when strong base is added to the buffer (hint: what in the buffer neutralizes the added base?)

   c) Calculate the pH of the above buffer using an ICE table approach.

   d) Repeat the calculation using the Henderson Hasselbalch equation.

e) Now! Determine the pH of the buffer after adding 10.00 mL of 0.50 M HCl. Hint: Did you take into account the total volume of the solution after adding the acid?

f) Would you expect a 0.050 M NH_3 and 0.060 M NH_4Cl to have a better or worse buffering capacity then the one above?

Part B: Making and using buffers

2) a) You need to prepare a buffer with pH = 5.00 for an experiment you are performing in lab. The conjugate acid-base pairs you have available are HClO/NaClO (K_a, HClO = 2.9 x 10^{-8}) and $HCHO_2$/$NaCHO_2$ (K_a, $HCHO_2$ = 1.8 x 10^{-4}) and $HC_2H_3O_2$/$NaC_2H_3O_2$ (K_a, $HC_2H_3O_2$ = 1.8 x 10^{-5}). Which of the acid-base pairs should you use to make your buffer? Briefly explain how you decided.

b) Determine the ratio of conjugate base to weak acid in an acetic acid-acetate buffer with pH of 5.00. K_a, $HC_2H_3O_2$ = 1.8 x 10^{-5}

c) If you had to make a 1.00L buffer solution with a pH = 5.00 from $HC_2H_3O_2$ and $NaC_2H_3O_2$, how would you do that? Discuss.