Unit 9 – Chapter 15: Acid-Base Equilibrium & Buffers **Name _____**

Assignment #2: Buffer Problems **Period _____**

1) Calculate the pH after 0.020 mol NaOH is added to 1.00 L of each of the solutions below.
   a. 0.100 *M* $HONH_2$ (K_b = 1.1 X 10^{-8})
   b. 0.100 *M* $HONH_3Cl$
   c. pure H_2O
   d. a mixture containing 0.100 *M* $HONH_2$ and 0.100 *M* $HONH_3Cl$

2) Calculate the pH of a buffer solution prepared by dissolving 21.46 g of benzoic acid ($HC_7H_5O_2$) and 37.68 g of sodium benzoate in 200.0 mL of solution.

3) A buffered solution is made by adding 50.0 g NH_4Cl to 1.00 L of a 0.75 *M* solution of NH_3. Calculate the pH of the final solution. (Assume no volume change.)

4) Calculate the pH after 0.01 mol gaseous HCl is added to 250.0 mL of each of the following buffered solutions.
   a. 0.050 *M* NH_3/0.15 *M* NH_4Cl
   b. 0.50 *M* NH_3/1.50 *M* NH_4Cl

   Do the two original buffered solutions differ in their pH or their capacity? What advantage is there in having a buffer with a greater capacity?

5) An aqueous solution contains dissolved $C_6H_5NH_3Cl$ and $C_6H_5NH_2$. The concentration of $C_6H_5NH_2$ is 0.50 *M* and the pH is 4.20.
   a. Calculate the concentration of $C_6H_5NH_3^+$ in this buffer solution.
   b. Calculate the pH after 4.0 g of $NaOH_{(s)}$ is added to 1.0 L of this solution. (Neglect any volume change).