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

Assignment #4: Buffer Problems With Henderson-Hasselbalch **Period _____**

Do the following problems using the Henderson-Hasselbalch equation.

1) A buffered solution is made by adding 50.0 grams NH_4Cl to 1.00 L of a 0.75 *M* solution of NH_3. Calculate the pH of the final solution.

2) Calculate the pH after 0.15 moles solid NaOH is added to 1.00 liters of each of the following buffered solutions.
    a. 0.050 *M* propanoic acid ($HC_3H_5O_2$, $K_a = 1.3 \times 10^{-5}$) and 0.080 *M* sodium propanoate ($C_3H_5NaO_2$)
    b. 0.50 *M* propanoic acid and 0.80 *M* sodium propanoate.
    c. Is the solution in part a still a buffered solution after the NaOH has been added? Explain.

3) A buffer solution contains 0.10 moles of acetic acid ($HC_2H_3O_2$) and 0.13 moles of sodium acetate ($NaC_2H_3O_2$) in 1.00 liters.
    a. What is the pH of this buffer?
    b. What is the pH of the buffer after the addition of 0.02 moles of KOH?
    c. What is the pH of the buffer after the addition of 0.02 moles HNO_3?

4) A buffer solution contains 0.12 moles of propanoic acid ($HC_3H_5O_2$, $K_a = 1.3 \times 10^{-5}$) and 0.10 moles of sodium propanoate ($NaC_3H_5O_2$) in 1.50 liters.
    a. What is the pH of this buffer?
    b. What is the pH of the buffer after the addition of 0.01 moles of NaOH?
    c. What is the pH of the buffer after the addition of 0.01 moles of HI?