CHM 112 Chapter 14 Extra Credit Part 2 **Name: _____**

Look up the values of $K_{a,\ or}$ K_b in your book.

1. Calculate the concentration of all species as well as the pH for a 0.150 M solution of $H_2CO_3(aq)$.

2. Calculate the pH of a 0.0100 M solution of sulfurous acid.

3. Using an ICE table, calculate the pH of a solution that is 0.175 M in $NaNO_2(aq)$ and 0.145 M in $HNO_2(aq)$.

4. Use the Henderson equation to calculate the pH of the 0.175 M in $NaNO_2(aq)$ and 0.145 M in $HNO_2(aq)$. Compare your answer to that obtained with a traditional ICE table.

5. (A) Which of the following combinations will give a buffered solution that has a pH of about 5? Explain clearly the reason for your choice.

a) NH_3 mixed with NH_4Cl (K_b for NH_3= 1.8 x10^{-5}) or b) C_5H_5N mixed with C_5H_5NHCl (K_b for C_5H_5N = 1.7x10^{-9})

(B) What ratio of the concentrations of the conjugate acid/base pair from Part A will be needed to form a buffer solution with a pH of 6.2?

6. Calculate the pH of a solution made by mixing 50.0 mL of 0.10 M benzoic acid and 100. mL of 0.15 M potassium benzoate.

7. Explain how our blood buffer system works. Use the reactions of $H_2PO_4^-$ /HPO_4^-.

8. Calculate the pH of a 1.00 L solution that is 0.250 M in trimethylamine and 0.350 M in trimethylammonium chloride.

9. Calculate the pH after 0.100 moles of NaOH are added to the solution in 8.

10. A solution contains 0.400 moles acetic acid and 0.600 moles potassium acetate in 1.50 L of solution.

a) Calculate the pH of this solution.

b) What will be the pH of the solution after 0.100 mol of NaOH(s) is added to the solution in (a)

c) What will be the pH of the solution after 0.100 mol of HCl(g) is added to the solution in (a)

11. 40.0 ml of 0.100 M HCl is titrated with 0.100 M KOH. Calculate the pH of the solution at each of the following steps in the titration.

a) Initially before any KOH has been added.

b) 20.0 ml of KOH has been added

c) 39.0 ml of KOH has been added

d) 40.0 ml of KOH has been added

e) Sketch the titration curve

12. Consider the titration of 40.0 mL of 0.500 M NH_3 with 1.00 M HCl

a) What is the initial pH of the NH_3(aq)?

b) What is the pH halfway to the equivalence point?

c) What is the volume of HCl needed to reach the equivalence point?

d) What is the pH at the equivalence point?

e) Sketch the titration curve.
Label the point(s) where there is a A) a weak base B) weak acid C) Buffer D) Strong acid in excess,

13. A solution is 0.155 M in Na_2HPO_4 and 0.200 M in NaH_2PO_4. What is the pH of this solution?