Exam II CEM 142 WN 05 Name _____

$K_w = 1.0 \times 10^{-14}$ $pH_{buffer} = pK_a + \log \frac{[\text{conjugate base}]}{[\text{weak acid}]}$

1. (10) In order to buffer a solution at a pH of 4.57, how many grams of sodium acetate, $Na(CH_3COO)$ should you add to 500. mL of a 0.150 M solution of acetic acid, CH_3COOH? K_a of acetic acid is 1.8×10^{-5}.

2. (6) Give the conjugate acid and conjugate base (labeled) of the amphoteric species HPO_4^-.

3. (10)A 2.5×10^{-3} M solution of an unknown acid has a pH of 3.80 at 25 °C.
a. What is the H_3O^+ concentration?(4)

b. What is the K_a of the acid?(6)

4. (10) I take a beaker of water and add some $NaMnO_4$. Is the resultant solution acidic, basic, or neutral? Why? I add some DI H_2O to the solution. Does the pH increase, decrease or stay the same. Why?

5. (18) An experiment calls for you to mix 25.0 mL of 0.015 M $AgNO_3$ with 25.0 mL of 0.00120 M NaCl. Does AgCl precipitate? If so, how many g of AgCl are formed? What are the final concentrations of Cl^{-1}, Ag^{+1}, Na^{+1} and NO_3^{-1}? Box each answer. K_{sp} for AgCl is 1.8×10^{-10}.

6. (12) Explain how methylamine (CH_3NH_2) is an Arrehenius base, a bronsted-Lowry base and a Lewis base. Balanced chemical equations would oh-so help you.

7. (10) For each of the following, predict whether the solution is acidic, basic, or neutral. Explain why!

a. $SrNO_3$ b. NH_4I

8. (12) Consider a rxn where gaseous N_2O_4 is placed in a flask and allowed to reach equilibrium (reaction: $N_2O_{4(g)} \leftrightarrows 2\ NO_2(g)$ at a T where $K_p = 0.133$ atm. At equilibrium, the pressure of $N_2O_4(g)$ was found to be 2.71 atm. What is the equilibrium pressure of $NO_2(g)$? What was the initial pressure of $N_2O_4(g)$?

$(P_{NO2})_{equil}$ =	atm
$(P_{N2O4)initial}$ =	atm

9. (12) Sorbic acid $HC_6H_7O_2$ is a weak monoprotic acid with $K_a = 1.7 \times 10^{-5}$. It's salt (potassium sorbate) is added to cheese to prevent mold formation. What is the pH of a solution that contains 4.93 g of potassium sorbate in 0.500 L of solution?

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