**IN-Class Group QUIZ spring 2017 Name: \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_**

1. **Consider titrating 100.0 mL of 0.200 M acetic acid (Ka = 1.8 x 10-5) with 0.100 M NaOH. Calculate the pH of the resulting solution at the following points of the titration:**
2. **0.0 mL of NaOH have been added**
3. **50.0 mL of NaOH have been added**
4. **half-way point**
5. **equivalence point**
6. **250.0 mL of NaOH have been added**
7. **Which of the following would be the best indicator to use for this titration? Justify your answer.**

**Methyl red Ka = 1.0 x 10-5**

**Thymol blue Ka = 1.3 x 10-9**

**Alizarin yellow Ka = 6.3 x 10-12**

**2. If 25.0 mL of 0.10 M NH3(aq) (Kb for NH3 is 1.8 x 10-5 at 25 °C) and 60.0 mL of 0.20 M NH4Cl(aq) are mixed, determine:**

## A. the pH of the resulting solution

## B. the pH of the resulting solution after 10.0 mL of 0.20 M HCl(aq) is added

**3. Exactly 0.400 L of 0.50 M Pb2+ & 1.60 L of 2.5 x 10-8 M Cl- are mixed together to form 2.00L. Calculate Q and predict if a ppt will occur. What if 2.5 x 10-2 Cl- was used? Ksp = 1.17 x 10-5**

**4. What is the molar solubility of lead(II) chloride in 1.0 L of solution that contains 2.0 x 10-2 mol of HCl?**

**5. Consider zinc hydroxide, Zn(OH)2, where Ksp = 3 x 10-17.**

**A. Determine the solubility of zinc hydroxide in pure water.**

**B. How does the solubility of zinc hydroxide in pure water compare with that in a solution buffered at pH 6.00? Quantitatively demonstrate the difference (if any) in solubility. Is zinc hydroxide more or less soluble at pH 6.00?**

**C. If enough base is added, the OH- ligand can coordinately bind with the Zn+2 ion to form the soluble zincate ion, [Zn(OH)4]-2. The formation constant, Kf, of the full complex ion [Zn(OH)4]-2 can be calculated from the following successive equilibrium expressions shown:**

**Zn2+ (aq) + OH-  ↔ ZnOH+ (aq) K1 = 2.5 x 104**

**ZnOH + (aq) + OH-(aq) ↔ Zn(OH)2(s) K2 = 8.0 x106**

**Zn(OH)2(s) + OH-(aq) ↔Zn(OH)3-(aq) K3 = 70**

**Zn(OH)3-(aq) + OH-(aq) ↔ Zn(OH)42-(aq) K4 = 33**

**Determine the value of Kf for the zincate ion.**

**6. Calculate the free ion concentration of Cr3+ when 0.01 moles of chromium(III) nitrate is dissolved in 2.00 liters of a pH 10 buffer.**

**7. Calculate the pH required to precipitate out ZnS from a solution mixture containing 0.010 M Zn2+ and 0.01M Cu2+. Will CuS precipitate out under these conditions?**

**8. Will a precipitate of silver carbonate form (Ksp = 8.46 x 10-12) when 100.0 mL of 1.00 x 10-4 M AgNO3(aq) and 200.0 mL of 3.00 x 10-3 M Na2CO3(aq) are mixed? What will be the remaining concentration of ions present in solution?**