**Problem Set # 8 Common Ion Effect**

## Consider the following equilibrium system: PbCl2 (s) ⇄ Pb2+(aq) + 2 Cl -(aq)

Describe what happens to the solubility of PbCl2(s) (increase or decrease) after each of the changes below is made.

1. PbCl2 (s) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Pb(NO3)2 (aq) is added

3. NaCl (aq) is added

4. H2O (l) is added

5. AgNO3 (aq) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. NaBr (aq) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Consider the following equilibrium system: AgBr (s) ⇄ Ag+(aq) + Br -(aq)

Describe what happens to the solubility of AgBr (s) (increase or decrease) after each of the changes below is made.

7. AgBr (s) is added

8. Pb(NO3)2 (aq) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. NaCl (aq) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. H2O (l) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. AgNO3 (l) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. NaBr (aq) is added \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. Explain why more Zn(OH)2(s) dissolves when 3 M HCl is added to a saturated solution of Zn(OH)2. Start by writing the correct equilibrium equation.

14. In an experiment, 0.1 M AgNO3 is added to 0.1 M NaCl, resulting in the formation of a white precipitate. When 0.1 M NaI is added to this mixture, the white precipitate dissolves and a yellow precipitate forms.

The formula for the white precipitate is \_\_\_\_\_\_\_\_\_\_\_.

The formula for the yellow precipitate is \_\_\_\_\_\_\_\_.

The net ionic equation for the first equilibrium is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The net ionic equation for the formation of the yellow precipitate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Explain why the white precipitate dissolves. Start by writing the equilibrium equation for the white precipitate and clearly explain how adding NaI affects this equilibrium.

**Problem Set #9 Titrations and Maximum Ion Concentration**

1. In a titration, 25.0 mL of a 0.250 M AgNO3 solution was used to precipitate out all of the Br -

in a 200.0 mL sample. Calculate [Br -].

2. In a titration, 26.5 mL of 0.100M Pb(NO3)2 was used to precipitate out all of the Cl - in a

30.0 mL sample of water. Calculate [Cl -].

**Maximum Ion Concentration**

3. Calculate the maximum [OH -] that can exist in a 0.200 M Mg(NO3)2 solution.

4. Calculate the maximum of [CO3 -2] that can exist in a 0.500 M AgNO3 solution.

5. Calculate the maximum [IO3 -] that can exist in a 0.200 M Cu(NO3)2 solution.

6. Calculate the maximum [Ca+2 ] that can exist in a 0.200 M Na2CO3 solution.

7. Calculate the minimum number of moles of Pb(NO3)2 required to start precipitation in

50.0 mL of 0.15 M ZnCl2.

8. In a titration 12.5 mL of 2.00 x 10-5 M HCl is required to neutralize 250 mL of saturated

AgOH solution. Calculate the [OH -] and then determine the Ksp for AgOH.