**Name: Period: Seat#:**

**Worksheet #9**

**Perform the following calculations, be sure to include units and show work to an AP level.**

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| 1. The molar solubility of NiCO3 is 3.74 x 10-4 mol/L. Find the Ksp value. *1.4 x 10-7*
 | 1. The molar solubility of Ca(OH)2 is 6.875 x 10-3 mol/L. Calculate the Ksp value.  *1.3 x 10-6*
 |
| 1. The Ksp of Ag3PO4 is 1.8 x 10-18.What is the [Ag+] in a saturated solution? *4.82 x 10-5 M*
 | 1. Mg3(AsO4)2(s) ⇌ 3 Mg2+(aq) + 2 AsO43–(aq) The solubility of magnesium arsenate is very low. Based on this, which of the following is/are true?

a) There is a significant [AsO43-] in solutionb) Almost all of the salt remains in its solid form c) At equilibrium, there is almost no Mg3(AsO4)2 left |
| 1. The Ksp for lead (II) phosphate is 1.0 x 10-54. Calculate:
	1. Molar solubility
	2. The [PO43-] in a saturated solution
	3. and the solubility in grams per liter.

*6.21 x 10-12 mol/L, 1.24 x 10-11 M, 5.04 x 10-9 g/L* |
| 1. The Ksp for PbF2 is 4.0 x 10-8. Calculate:
	1. Molar solubility in a solution of 0.5 M NaF
	2. Molar solubility in water.
	3. Explain the difference in solubility that you calculated.

*1.6 x 10-7 mol/L, 2.15 x 10-3 mol/L* |
| 1. The Ksp of Mg(OH)2 is 1.8 x 10-11. What effect would each of the following changes will have on the solubility of Mg(OH)2 in an aqueous solution? Explain.
2. Decrease the pH
3. Increasing the pH
4. Adding NH3 to the solution
5. Adding Mg(NO3)2 to the solution
 |
| 1. Based on Le Chatelier’s principle, explain what will happen to the solubility of AgCN when  a) HClO4 is added to the solution b) NaCN is added to the solution
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| 1. Based on Ksp values, which has a greater molar solubility between MgF2 (Ksp = 5.16 x 10-11) and PbI2 (Ksp = 9.8 x 10-9)? Justify your answer.
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| 1. Based on Ksp values, which has a greater molar solubility between MgF2 (Ksp = 5.16 x 10-11) and MgCO3 (Ksp = 3.5 x 10-8). Justify your answer.
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| 1. Based on the Ksp values in the table below, a saturated solution of which of the following would have the highest concentration of chloride ions? Justify your answer.
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| 1. Identify the compound that has the smallest Ksp value from the following general ionic compounds and their molar solubilities in pure water.  a) M2X, molar solubility = 3.52 x 10-4 M b) MX3, molar solubility = 2.54 x 10-4 M c) MX, molar solubility = 4.23 x 10-4 M
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| 1. What is the required minimum pH to completely precipitate Cd(OH)2 (Ksp = 2.5 x 10-14) so that the remaining concentration of Cd2+(aq) is less than 1.0 part per billion (1 ppb = 1 μg/L, 1 μg = 1x10-6 g)? *pH 11.22*
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| 1. The [Pb2+] and [AsO43-] in a certain saturated Pb3(AsO4)2 solution are both equal to 8.3 x 10-8. In a saturated solution with [Pb2+] = 0.0200 M, what is [AsO43-]? *7.0 x 10-16 M*
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| 1. Lead (II) chloride, PbCl2, is a sparingly soluble salt with a solubility product (Ksp) of 1.60 x 10-5 at 25°C. Calculate the molarity of a saturated solution of PbCl2 at 25°C. *0.0159 M*
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| 1. The images below show solutions of Cu2CO3 where the grey spheres represent the Cu+ ions, and white spheres represent the CO32- ions. Note that other ions may be present in the solution but are not shown. Image (i) shows the solution in equilibrium with solid Cu2CO3.
2. Using diagram (i) calculate the value of Ksp for Cu2CO3
3. Calculate the Q values for diagrams (ii) – (iv)
4. Which of the solutions shown in images (ii) – (iv) will form a solid Cu2CO3 precipitate? Explain.

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| 1. The curve below represents the concentrations of Ag+(aq) and Cl-(aq) for which the product [Ag+][Cl-] is equal to the value of Ksp for AgCl. Which of the following provides the correct comparison of Q and Ksp, and describes the overall process that occurs at any point in the unshaded region Y of the graph?
	1. Q > Ksp and dissolution of AgCl(s) occurs
	2. Q < Ksp and dissolution of AgCl(s) occurs
	3. Q > Ksp and precipitation of AgCl(s) occurs
	4. Q < Ksp and precipitation of AgCl(s) occurs
 |
| 1. Three saturated solutions (X, Y, and Z) are prepared at 25°C. Based on the information in the table above, which of the following lists the solutions in order of increasing [Ag+]?
	1. X < Z < Y
	2. Y < X < Z
	3. Z < Y < X
	4. Z < X < Y
 |
| 1. Which of the following ranks the compounds listed in the table above in order of increasing solubility?
	1. Cu(OH)2 < Co(OH)2 < FeOH
	2. FeOH < Cu(OH)2 < Co(OH)2
	3. Co(OH)2 < FeOH < Cu(OH)2
	4. Cu(OH)2 < FeOH < Co(OH)2
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