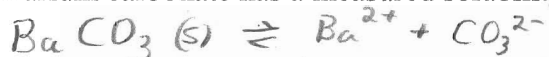


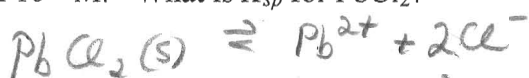
1. Barium carbonate has a measured solubility of $4.04 \times 10^{-5} M$ at $25^\circ C$. Determine K_{sp} .



$$K_{sp} = [Ba^{2+}][CO_3^{2-}]$$

$$K_{sp} = [4.04 \times 10^{-5}]^2 = 1.63 \times 10^{-9}$$

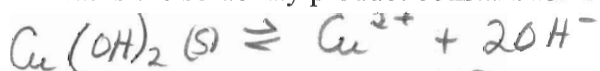
2. It is found that the concentration of Pb^{2+} in a saturated solution of lead(II) chloride is $1.6 \times 10^{-2} M$. What is K_{sp} for $PbCl_2$?



$$K_{sp} = [Pb^{2+}][Cl^-]^2$$

$$K_{sp} = [1.6 \times 10^{-2}][2(1.6 \times 10^{-2})]^2 = 1.6 \times 10^{-5}$$

3. The hydroxide-ion concentration of a saturated solution of $Cu(OH)_2$ is $8.0 \times 10^{-7} M$. What is the solubility product constant for $Cu(OH)_2$?



$$K_{sp} = [Cu^{2+}][OH^-]^2$$

$$K_{sp} = \left[\frac{8.0 \times 10^{-7}}{2} \right] [8.0 \times 10^{-7}]^2 = 2.6 \times 10^{-19}$$

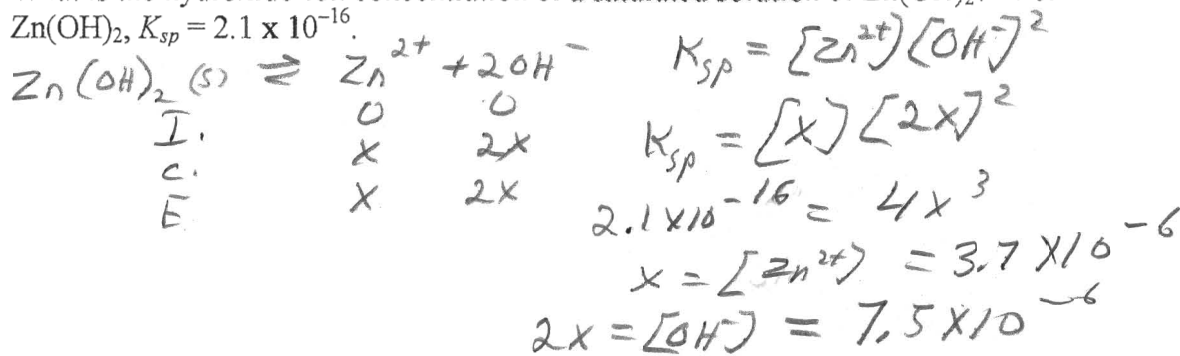
4. Rank the following salts in order of increasing molar solubility.

Salt	K_{sp}
2 $BaSO_4$	1.1×10^{-10}
3 $AgCl$	1.8×10^{-10}
4 $BaCO_3$	9.1×10^{-9}
least \rightarrow 1 CdS	8×10^{-27}
5 $PbSO_4$	1.8×10^{-8}

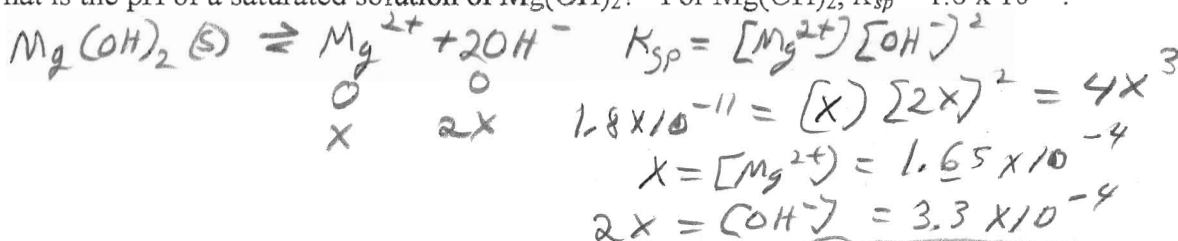
- A) $CdS < AgCl < BaCO_3 < BaSO_4 < PbSO_4$
 B) $PbSO_4 < BaCO_3 < AgCl < BaSO_4 < CdS$
 C) $CdS < AgCl < BaSO_4 < BaCO_3 < PbSO_4$
 D) $PbSO_4 < BaCO_3 < BaSO_4 < AgCl < CdS$
 E) $CdS < BaSO_4 < AgCl < BaCO_3 < PbSO_4$

*****There are more problems on the back*****

5. What is the hydroxide-ion concentration of a saturated solution of $Zn(OH)_2$? For $Zn(OH)_2$, $K_{sp} = 2.1 \times 10^{-16}$.

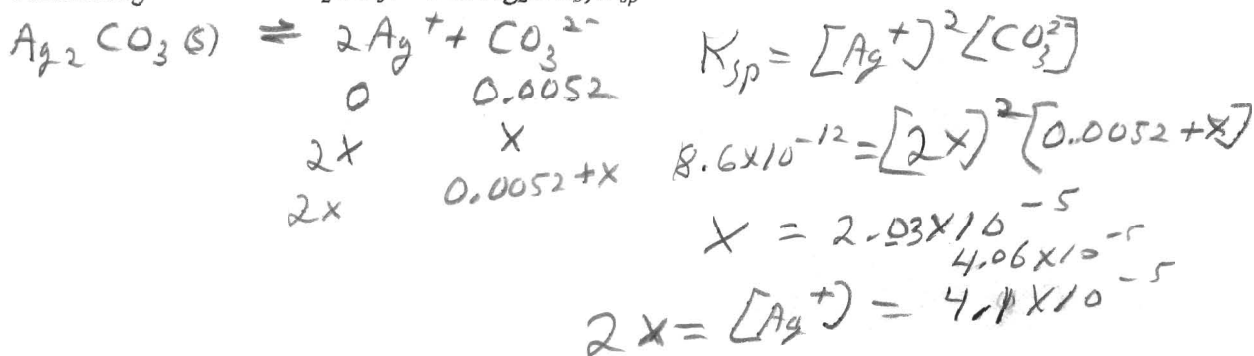


6. What is the pH of a saturated solution of $Mg(OH)_2$? For $Mg(OH)_2$, $K_{sp} = 1.8 \times 10^{-11}$.



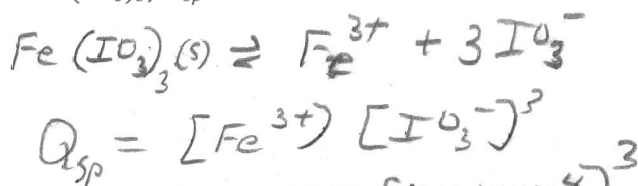
$pOH = -\log(3.3 \times 10^{-4}) = 3.48$ $pH = 10.52$

7. What is the concentration of silver(I) ion in a saturated solution of silver(I) carbonate containing 0.0052 M Na_2CO_3 ? For Ag_2CO_3 , $K_{sp} = 8.6 \times 10^{-12}$.



8. Suppose 50.00 mL of $2.0 \times 10^{-4} M Fe(NO_3)_3$ is added to 50.00 mL of $2.0 \times 10^{-4} M KIO_3$. Which of the following statements is true? For $Fe(IO_3)_3$, $K_{sp} = 1.0 \times 10^{-14}$.

- A) A precipitate forms because $Q_c > K_{sp}$.
- B) A precipitate forms because $Q_c < K_{sp}$.
- C) No precipitate forms because $Q_c > K_{sp}$.
- D) No precipitate forms because $Q_c < K_{sp}$.
- E) Nothing happens.



Take dilution into account.

$$M_1 V_1 = M_2 V \quad \rightarrow$$

$$(2.0 \times 10^{-4})(50.00 \text{ mL}) = M_2(100.00 \text{ mL})$$

$$Q_{sp} = [1.0 \times 10^{-4}][1.0 \times 10^{-4}]^3$$

$$Q_{sp} = 1.0 \times 10^{-16}$$

$$Q_{sp} < K_{sp}$$