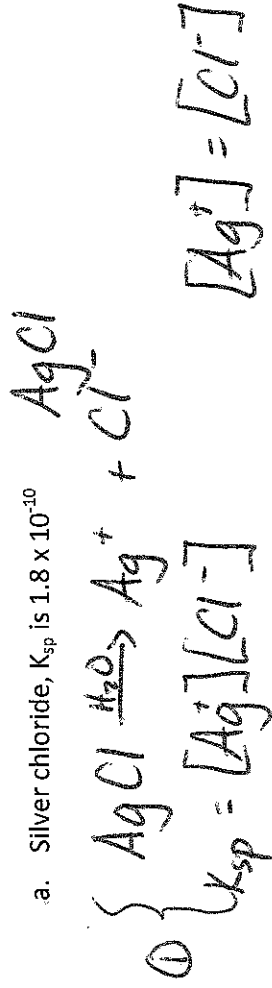


Name: Solutions Date: \_\_\_\_\_

Complete each of the following questions in the space provided. You must show ALL work to receive full value.

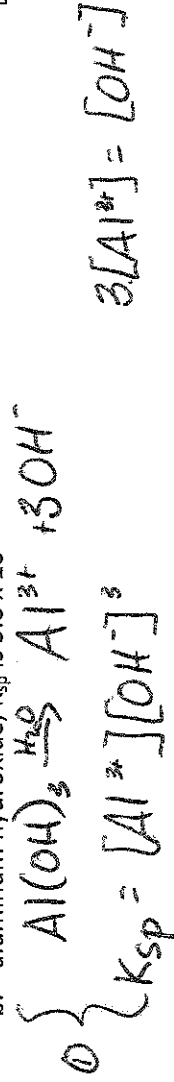
1. Determine the ion concentrations for each of the following:

a. Silver chloride,  $K_{sp}$  is  $1.8 \times 10^{-10}$  AgCl [3 pts]



$$\textcircled{1} 1.8 \times 10^{-10} = [\text{Ag}^+]^2 \quad [\text{Cl}^-] = 1.34 \times 10^{-5} \text{ M}$$

b. aluminum hydroxide,  $K_{sp}$  is  $3.0 \times 10^{-34}$  [4 pts]



$$\textcircled{1} K_{sp} = [\text{Al}^{3+}][3[\text{Al}^{3+}]]^3$$

$$K_{sp} = 27[\text{Al}^{3+}]^4$$

$$\textcircled{1} 3.0 \times 10^{-34} = 27[\text{Al}^{3+}]^4$$

$$[\text{Al}^{3+}] = 1.82 \times 10^{-9} \text{ M}$$

$$[\text{OH}^-] = 3(1.82 \times 10^{-9} \text{ M})$$

$$[\text{OH}^-] = 5.48 \times 10^{-9} \text{ M}$$

2. Will precipitation occur if 100.0 mL of  $5.0 \times 10^{-3}$  M barium nitrate is added to 100.0 mL of  $2.00 \times 10^{-2}$  M sodium fluoride if the  $K_{sp}$  of barium fluoride is  $1.05 \times 10^{-6}$  [4 pts]



$$\textcircled{1} \text{BaF}_2 \xrightarrow{H_2O} \text{Ba}^{2+} + 2\text{F}^- \quad \begin{cases} K_{sp} = [\text{Ba}^{2+}][\text{F}^-]^2 \\ K_{sp} = (2.5 \times 10^{-3})(\times 10^{-2})^2 \\ K_{sp} = 2.5 \times 10^{-7} < K_{sp}(\text{accepted}) \end{cases} \quad \begin{matrix} \text{Ba}^{2+} = 5.0 \times 10^{-3} / 2 = 2.5 \times 10^{-3} \\ [\text{F}^-] = 2.0 \times 10^{-2} / 2 = 1.0 \times 10^{-2} \end{matrix}$$

$\therefore$  ppt will form  $\textcircled{1}$  not form.

3. What is the concentration of barium ion in a 1.0 L solution of barium carbonate to which 0.25 mol of  $\text{K}_2\text{CO}_3$  has been added? [3 pts]



$$K_{sp} = [\text{Ba}^{2+}][\text{CO}_3^{2-}]$$

$$\textcircled{1} K_{sp} = [\text{Ba}^{2+}](x + 0.25)$$

$$K_{sp} = [\text{Ba}^{2+}](0.25)$$

$$5 \times 10^{-9} = [\text{Ba}^{2+}](0.25)$$

$$\textcircled{1} [\text{Ba}^{2+}] = 2.0 \times 10^{-8} \text{ M}$$