Experiment 16: Finding a Solubility Product

Name _____ Per ___

Purpose: To find the K_{sp} for Silver Acetate, $AgC_2H_3O_2$.

In a saturated solution of a slightly soluble salt at equilibrium with its solution, the rate at which ions are leaving the solid crystal is equal to the rate at which they are returning to the crystal. Here is our reaction:

$$AgC_2H_3O_{2(s)} \text{ <------> } Ag^+_{(aq)} + C_2H_3O_2^-{}_{(aq)}$$

and K_{sp} = [Products] / [Reactants], but because the reactant is a solid, we shall omit it from the expression: so

$$K_{sp} = [Ag^+_{(aq)}]\,[C_2H_3O_2^-{}_{(aq)}]$$

and we remember that **[ ]** means **concentration in mol/L, and L = ml/1000ml/L**

Procedure:

a. Carefully measure 100 ml of saturated $AgC_2H_3O_2$ from the stock bottle and pour it into a 250 ml beaker.

b. Obtain a Cu wire from the Boom, clean it with steel wool and wind it into a loose coil around a test tube. See Fig 7-1.

c. Mass the Cu coil to the nearest 0.01g _____ g. Now place it into the beaker of silver acetate solution at equilibrium. Observations over the next few minutes:

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Place the system into your locker until next time.

Next Time:

d. Shake the silver crystals free from the Cu wire into the beaker. A spatula will help remove the recalcitrant crystals. Wash the wire in a stream of water from the tap. Wipe it off with a paper towel and mass it to the nearest 0.0lg _____ g.

e. Decant the solution off of the Ag crystals into the sink and rinse the crystals with distilled water. Place the crystals into the Boom's recycle beaker.

Do your Calculations on the back showing the Hup, Two, Three, Four:

1. Find the number of moles of $Cu_{(s)}$ which reacted with the silver ions, $Ag^{+}_{(aq)}$, in the solution. Hint: mol = m / MM. And the **m = the loss of mass** of the wire in the reaction (see your masses in c & d above). Show your method, Hup, Two, Three, Four:

2. Remembering that there is a **ratio of 2** $Ag^{+}_{(aq)}$ **for every 1 Cu** found in Experiment 7, find the number of **moles** of $Ag^{+}_{(aq)}$ present in the 100 ml sample.

3. Find the $[Ag^{+}_{(aq)}]$ ions in mol / L. Hint: M = mol / L, and L = ml / 1000ml/L, and ml = 100 in this lab.

4. Find the $[C_2H_3O_2^{-}{}_{(aq)}]$. Hint: From the equation above, we see that the ratio of $Ag^{+}_{(aq)}$ to $C_2H_3O_2^{-}{}_{(aq)}$ is 1 to 1.

5. Using the formula, $K_{sp} = [Ag^{+}_{(aq)}]\,[C_2H_3O_2^{-}{}_{(aq)}]$, calculate the value of K_{sp} for $AgC_2H_3O_{2(s)}$

Question:

Why do you think that we found the moles of Cu wire instead of the Ag crystals and then had to use the ratio to find the moles of Ag? Hint: Look at the condition of the wire and the crystals that would have to be massed.

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Write a critique of this lab.