

24/25

Chemistry 101 B CRN: 30084

Experiment 34: The Solubility Product of Silver Acetate

Partner:

**Purpose:** The purpose of this experiment was to determine the  $K_{sp}$  value for silver acetate and the common ion effect will be demonstrated.

**Results:** In part one  $2.01 \times 10^{-3}$  was the  $K_{sp}$  value for silver acetate in distilled water. For part two the  $K_{sp}$  value for silver acetate in  $0.100 M$  sodium acetate was  $3.20 \times 10^{-3}$ . The mean value for  $K_{sp}$  silver acetate was  $2.61 \times 10^{-3}$  and the standard deviation was  $0.0084$ . The present error was  $34.5\%$ .

**Procedure:** The procedure followed for this experiment is on pages 313-314 in *Experimental Chemistry* Lab Manual written by, James Hall.

**Results and Observations:**

1. Determination of Silver Acetate in Distilled water:  
mL standard KCL taken: 10mL each 30 mL altogether.

|                                 | Sample 1 | Sample 2 | Sample 3 |
|---------------------------------|----------|----------|----------|
| Initial Volume of AgAc          | 0mL      | 11.50mL  | 22.60mL  |
| Final Volume of AgAc            | 11.50mL  | 22.60mL  | 33.50mL  |
| Volume of AgAc used             | 11.50mL  | 11.10mL  | 10.90mL  |
| Molarity of Ag <sup>+</sup> ion | 0.0435 M | 0.0450 M | 0.0459 M |

Mean molarity of Ag<sup>+</sup> ion: 0.0448 M

K<sub>sp</sub> for silver acetate: 2.01\*10<sup>-3</sup>

alt - 0.0215

2. Determination of Silver Acetate in 0.100 M Sodium Acetate  
mL standard KCL taken: 25mL each sample: 75mL together.

|                                 | Sample 1 | Sample 2 | Sample 3 |
|---------------------------------|----------|----------|----------|
| Initial Volume of AgAc          | 0mL      | 0mL      | 0mL      |
| Final Volume of AgAc            | 49.50mL  | 48.70mL  | 48.80mL  |
| Volume of AgAc used             | 49.50mL  | 48.70mL  | 48.80mL  |
| Molarity of Ag <sup>+</sup> ion | 0.0253 M | 0.0257M  | 0.0256 M |

Mean molarity of Ag<sup>+</sup> ion: 0.0255 M

K<sub>sp</sub> for silver acetate: 3.20\*10<sup>-3</sup>

Based on your Part 1 and 2 results, calculate a mean value and the standard deviation for K<sub>sp</sub> for silver acetate.

Mean value: 2.61\*10<sup>-3</sup>

Standard Deviation: 0.0084 (Used easycalculation.com)

### Calculations:

1. Molarity of  $\text{Ag}^+$  ion (part one)

Sample one:  $10 \text{ mL} * 0.0500 \text{ M} = 0.5 \text{ mmol Ag}^+ / 11.5 \text{ mL Ag solution} = 0.0435 \text{ M Ag}^+$

Sample 2:  $0.5 \text{ mmol Ag}^+ / 11.10 \text{ mL} = 0.0450 \text{ M Ag}^+$

Sample 3:  $0.5 \text{ mmol Ag}^+ / 10.90 \text{ mL} = 0.0459 \text{ M Ag}^+$

$$K_{sp} (0.0448)^2 = 2.01 * 10^{-3}$$

2. Molarity of  $\text{Ag}^+$  ion (part two)

Sample one:  $25.00 \text{ mL} * 0.0500 \text{ M KCl} = 1.25 \text{ M}$

$1.25 \text{ M} / 49.50 \text{ mL} = 0.0253 \text{ M}$

Sample two:  $1.25 \text{ mmol} / 48.70 \text{ mL} = 0.0257 \text{ M}$

Sample three:  $1.25 \text{ mmol} / 48.80 \text{ mL} = 0.0256 \text{ M}$

$$K_{sp}: 0.0225 \text{ M} (.100 \text{ M} + 0.0255 \text{ M}) = 3.20 * 10^{-3}$$

### Discussion/Error:

The percent error in our experiment was 34.5%. One of our errors could be when we were filtering the silver acetate through a funnel and filter paper to remove cloudiness for the second part, we directly filtered it into the buret. When we were doing the second part I noticed that there was more solid in silver acetate. They could've caused an error and a miscalculation for the  $K_{sp}$ . Another error can be not able to properly read the buret in how many mL of silver acetate we used.

### Post Lab Questions:

2.  $(1.94 * 10^{-3})$  - Found on Google - Chempendix on Sapling.

$$[(2.61 * 10^{-3}) - (1.94 * 10^{-3})] / (1.94 * 10^{-3}) * 100 = 34.5\%$$

$$4. x^2 = 1.0 * 10^{-27} = 3.16 * 10^{-14} \text{ M} * 144 \text{ g} = 4.55 * 10^{-12}$$

### Conclusion:

The purpose of this experiment was met. The  $K_{sp}$  for the silver acetate was  $2.61 * 10^{-3}$ . We were also able to see the common ion effect which was seen in part two. The  $K_{sp}$  increased to  $3.20 * 10^{-3}$ . The two different titrations didn't have a huge difference in the  $K_{sp}$ . The sodium acetate did have a larger  $K_{sp}$  value versus in the distilled water.

*assigned  
# 4 from the lab  
(as a post-lab)  
- 1*