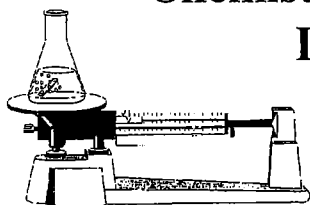


Chemistry 12 - Lab 19C

Determination of a Solubility Product Constant



NAME _____

Partner _____

DATE _____ BLOCK _____

Carefully, complete the following table as you go through the lab procedure.

TEST TUBE #	1	2	3	4	5	6
Volume of 0.010 M $\text{Pb}(\text{NO}_3)_2$ (mL)	10.0	8.0	6.0	4.0	3.0	2.0
Volume of water (mL) added	0.0	2.0	4.0	6.0	7.0	8.0
Volume of 0.020 M KI (mL)	10.0	8.0	6.0	4.0	3.0	2.0
Volume of water (mL) added	0.0	2.0	4.0	6.0	7.0	8.0
Precipitate or no precipitate? (at room temperature)						
Temperature at which precipitate dissolves ($^{\circ}\text{C}$)						

Questions and Calculations. . . .

1. For each of the final mixtures, calculate the $[\text{Pb}^{2+}]$. Each of the starting volumes is given in the above chart - i.e. 10.0 mL, 8.0 mL, 6.0 mL Remember that the final volume of each of your mixtures is the same - 20.0 mL. In the same fashion, calculate the $[\text{I}^-]$ in each final mixture.

Test Tube #	$[\text{Pb}^{2+}]$	$[\text{I}^-]$
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____

2. Write the net ionic equation for the precipitation of PbI_2 . Include phase subscripts.

3. Write the K_{sp} expression for the formation of PbI_2 .

$$K_{sp} =$$

4. According to the information from question #2, calculate the Trial K_{sp} values for each of your six test tube mixtures. Trial $K_{sp} = [\text{Pb}^{2+}] [\text{I}^-]^2$

Test Tube #	Trial K_{sp}
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____

5. From your answers to question #4, state the range of values in which your experimental K_{sp} must lie. This will be between the trial ion product of the last test tube giving a precipitate and the trial ion product of the first test tube not giving a precipitate.

6. What trend do you notice concerning the solubility of PbI_2 as the temperature is increased?

7. If you were given a saturated solution of lead iodide and asked to determine the K_{sp} of PbI_2 from it, how would you proceed?

8. After doing this experiment, a student finds that the test tubes have a coating of yellow lead iodide on the inside which doesn't wash off easily. On the basis of your experimental results, suggest the best method for removing this coating.

Chemistry 12 Lab

Solubility Trends and Precipitate Formation

NAME _____

Partner _____

DATE _____ Block _____

Pre-lab Questions:

1. What causes a precipitate to form?

2. What do we call ions in a mixture that do not participate in a chemical reaction?

Procedure:

- Obtain a set of 10 small (13 mm × 100 mm) test tubes and a test tube rack.
Make sure the test tubes are clean (they don't have to be dry).
- Get a set of dropper bottles for each of three sets of chemicals.
(You don't have to start with set #1.)
- Pour in about one-half centimetre of each reacting chemical into each test tube according to the following charts: Indicate no reaction with a "-" and a "+" with a word or two word description to indicate the positive reactions.

Set #1

Solution	K ⁺ Cl ⁻	Na ⁺ NO ₃ ⁻	K ⁺ CrO ₄ ²⁻	Na ⁺ CrO ₄ ²⁻	Ba ²⁺ Cl ⁻
Ba ²⁺ NO ₃ ⁻					
Ba ²⁺ Cl ⁻					
Na ⁺ CrO ₄ ²⁻					
K ⁺ CrO ₄ ²⁻					
Na ⁺ NO ₃ ⁻					

Four of your mixtures should have formed precipitates. The precipitate in each of the four positive test tubes is the same chemical. Pick any one of the positive results and write the formula, overall ionic, and net ionic equation for the mixture.

formula = _____

over- = _____
all ionic

net ionic = _____

Set #2

Solution	Al ³⁺ Cl ⁻	Ba ²⁺ NO ₃ ⁻	Ba ²⁺ Cl ⁻	Sr ²⁺ NO ₃ ⁻	Al ³⁺ SO ₄ ²⁻
Na ⁺ SO ₄ ²⁻					
Al ³⁺ SO ₄ ²⁻					
Sr ²⁺ NO ₃ ⁻					
Ba ²⁺ Cl ⁻					
Ba ²⁺ NO ₃ ⁻					

Six of your mixtures should have formed precipitates. There are two different precipitates among the six positive results. Pick any two of the positive results (producing the two different ppts) and write the formula, overall ionic, and net ionic equation for the mixture.

formula = _____

over- = _____
all ionic

net ionic = _____

formula = _____

over- = _____
all ionic

net ionic = _____

Set #3

Solution	Na ⁺ NO ₃ ⁻	K ⁺ OH ⁻	Na ⁺ OH ⁻	Co ²⁺ Cl ⁻	Co ²⁺ NO ₃ ⁻
Fe ³⁺ Cl ⁻					
Co ²⁺ NO ₃ ⁻					
Co ²⁺ Cl ⁻					
Na ⁺ OH ⁻					
K ⁺ OH ⁻					

Six of your mixtures should have formed precipitates. There are two different precipitates among the six positive results. Pick any two of the positive results (producing the two different ppts) and write the formula, overall ionic, and net ionic equation for the mixture.

formula = _____

over- = _____
all ionic

net ionic = _____

formula = _____

over- = _____
all ionic

net ionic = _____