

## Experiment 10, Precipitation

Name \_\_\_\_\_ Per \_\_\_\_\_

**Purpose:** To prepare two solutions, react them, and calculate the chemistry involved.

**Procedure:**

**Part I. The Preparation of Solutions.**

a. Before coming to the laboratory, each partner must calculate the mass of each of the compounds lead nitrate,  $\text{Pb}(\text{NO}_3)_2$  and sodium iodide,  $\text{NaI}$ , needed to make **25.0 ml** of a **0.50 M** solution of each.

The Formula is...  $g = (M)(MM)(L)$ . And  $L = \text{ml}/1000\text{ml/L}$  Do the calculations on the back of this page:

Boom will now check your calculations **BEFORE** you proceed to step b.

b. **One partner** will weigh out the  $\text{NaI}$  crystals into a 100 mL beaker, **another partner** will weigh out the  $\text{Pb}(\text{NO}_3)_2$  crystals into another 100 mL beaker. **Here's how:** Place a 100 mL beaker onto the electronic balance, and press **Zero** (or **Tare**) to zero it. Using a **spatula**, *carefully* add crystals to the beaker on the balance until the correct mass is achieved. **Replace the reagent bottle cap immediately.**

c. **In each of the TWO beakers**, dissolve the crystals in 20 ml of DISTILLED water. Pour the resulting solution into a 25 ml graduated cylinder and add just enough DISTILLED water from a wash bottle to make the volume 25.0 ml. Pour the solution back into the same beaker used to dissolve the solid, and stir the solution gently until it is uniformly mixed.

Rinse the graduate well and repeat the above for the second solution. Label each solution.

**Part II. A qualitative Study of the Amounts of Precipitate Formed When Various Volumes of the Solutions are Mixed.**

The following table gives the volumes which are to be carefully measured into clean 13 X 150 mm test tubes: **Follow the directions below.**

Test Tube	ml of NaI	ml of $\text{Pb}(\text{NO}_3)_2$	Drops
1	4.0	0.5	10
2	4.0	1.0	20
3	4.0	2.0	40
4	4.0	3.0	60
5	4.0	4.0	80

a. Carefully measure exactly 4.0 ml of your sodium iodide solution into each of five test tubes labeled 1 - 5 (see table above).

b. Using a medicine dropper and the fact that **20 drops equals one milliliter**, add the designated number of milliliters (dropwise) of your lead nitrate solution to each of the test tubes of sodium iodide solution (see table above).

**OBSERVATIONS:**

c. After the precipitates have settled, measure the heights in millimeters of the yellow solid, lead iodide, in each test tube: DO NOT discard the precipitates in the sink, bring them to your instructor for disposal.

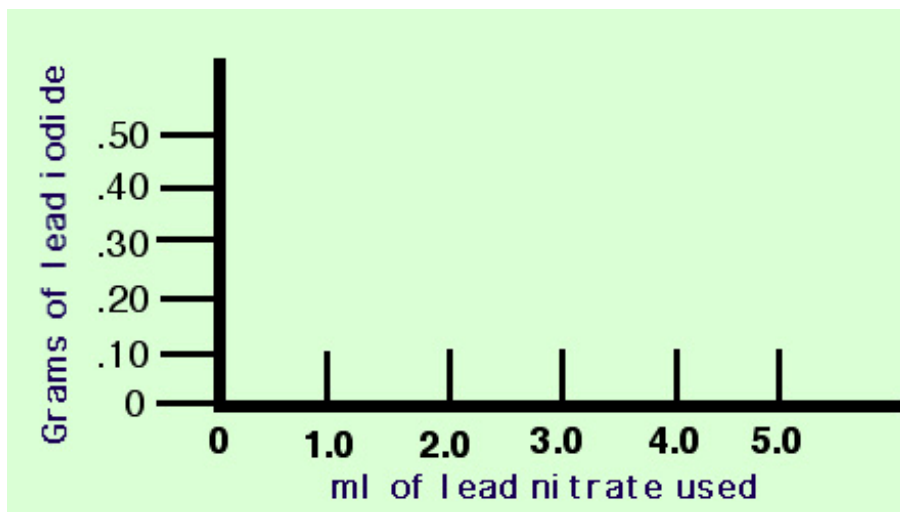
Test Tube	Height ppt.
1	mm
2	mm
3	mm
4	mm
5	mm

### Calculations and Questions:

1. Use this chart to get the mass of each lead iodide precipitate formed in the reactions in order to plot the graph below:

Test Tube	Grams of ppt
1	0.12
2	0.24
3	0.36
4	0.36
5	0.36

2. Using the graph below, plot a graph of **grams of lead iodide ppt** on the y-axis and the **number of ml of  $\text{Pb}(\text{NO}_3)_2$**  used on the x-axis. (See the tables above).



3. Explain the shape of the curve formed by connecting the points (dot to dot).

4. On the back, calculate the number of moles of  $\text{Pb}(\text{NO}_3)_2$  and of  $\text{NaI}$  used in each of the five test tubes. Hint: For solutions,  $\text{mol} = \text{ML}$ , and  $\text{L} = \text{ml}/1000\text{ml/L}$ . (See the above tables for the ml used in each tube, and **all of the solutions are 0.50 M**). Two entries have been made to get you started. Fill in the table below:

Test Tube	Mol $\text{Pb}(\text{NO}_3)_2$	Mol of $\text{NaI}$
1	0.00025	0.0020
2	.	.
3	.	.
4	.	.
5	.	.

5. Refer to your **graph** and select the combination in which there was just enough of the **lead nitrate** solution to react with all of the **sodium iodide**. (No leftovers).

Tests tube number \_\_\_\_\_

6. Refer to Question 4 and determine the ratio of the moles of **sodium iodide** to the moles of **lead nitrate** for the combination selected in Question 5.

**Ratio = mol of  $\text{NaI}$  / mol of  $\text{Pb}(\text{NO}_3)_2$**  (show calculation here):

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Ratio = \_\_\_\_\_

Use this ratio to determine the formula for **lead iodide**.

So the formula is .... \_\_\_\_\_

7. Use the masses of the precipitates obtained in the combination referred to in Question 5 to calculate the number of moles of lead iodide produced in this test tube.

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**The Grande Critique of this lab.**