

Laboratory Experiment

“Formation of a Precipitate; Reaction of Na_2CO_3 and $\text{Ca}(\text{NO}_3)_2$ ”

Introduction:

A substance which is soluble in water will sometimes separate into ions in the water and will therefore be available to bond with any ion that might be in the solution. If two such solutions are formed, each containing its own particular ions, the two can be then mixed together so that the ions in each solution are available to bond with one another. A precipitate is formed if the two solutions, when mixed together, can form a new substance which is not soluble in water. Each time the two ions of this compound come together, they will bond and form a solid which will fall to the bottom of the solution vessel.

Objective: _____

Materials:

*0.1 M Na_2CO_3
0.1 M $\text{Ca}(\text{NO}_3)_2$
funnel
ring stand
iron ring
stirring rod
filter paper
wash bottle
10 mL graduated cylinder
(if applying stoichiometry)
balance
weighing box or weighing paper*

Procedure:

- 1. Pour 10 mL of each solution into the two 100 mL beakers.*
 - 2. Attach the iron ring to the ring stand, place the funnel into the ring and place the 250 mL beaker underneath. Fold the filter paper so that it will fit into the funnel. Place the filter paper in the funnel and slightly wet it using the wash bottle.*
 - 3. Mix the two solution together in either one of the beakers.*
 - 4. A white precipitate should immediately be visible upon mixing of these two solutions because CaCO_3 is not soluble in water.*
 - 5. Decant the mixture into the funnel. Wash the beaker with several washings of water to loosen any calcium carbonate which is still in the beaker. Pour these washings into the funnel.*
 - 6. Allow the mixture to completely separate. Remove the filter paper from the funnel and carefully open to view the precipitate formed.*
 - 7. Clean all equipment and replace on the cart or demonstration table.*
- Use these steps if you are applying stoichiometry to this experiment.*
- 8. Take the filter paper and place, as carefully as possible, on a paper towel placing it at your lab station to allow it to dry overnight.*
 - 9. Remove the dried precipitate from the filter paper, using a spatula to scrape it off into a weighing box or weighing paper. Record the mass of the product.*
 - 10 You may dispose of the filter paper and solid in the trash.*

Observations: _____

Calculations:

1. What is the equation for this reaction? _____

2. Calculate the number of moles of $\text{Ca}(\text{NO}_3)_2$ that you had to start.

$$0.1 \text{ M } \text{Ca}(\text{NO}_3)_2 = x \text{ mol } \text{Ca}(\text{NO}_3)_2 / 0.010 \text{ mL}$$

Since the molarities of the solutions are the same, the number of moles in the two 10 mL volumes will be the same. The ratio of calcium ions to carbonate ions is 1:1 so the number of moles of each for reaction is the same.

3. Calculate the number of moles of CaCO_3 that were produced in this reaction.

$$\text{_____ g } \text{CaCO}_3 \times 1 \text{ mol} / 100 \text{ g} = \text{_____ mol } \text{CaCO}_3$$

4. Calculate the number of moles which should have been produced in this reaction (theoretical yield).

$$\text{_____ mol } \text{Ca}(\text{NO}_3)_2 \times 1 \text{ mol } \text{CaCO}_3 / 1 \text{ mol } \text{Ca}(\text{NO}_3)_2 = \text{_____ mol } \text{CaCO}_3$$

5. Calculate the % yield of this experiment.

$$\text{_____ mol } \text{CaCO}_3 \text{ actual} / \text{_____ mol } \text{CaCO}_3 \text{ theoretical} \times 100\% = \text{_____ \% yield}$$

Conclusion:

RUBRIC FOR LABORATORY REPORTS

All lab reports must contain the following items;

- 1. Name of lab*
 - 2. Objective*
 - 3. Procedure*
 - 4. Observations*
 - 5. Calculations (if any are necessary)*
 - 6. Conclusion*
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- 1. Excellent – lab report contains all necessary parts, well developed, in complete sentences and submitted on time. 25 points*
 - 2. Good – lab report contains all necessary parts, partially developed, in complete sentences and submitted on time. 23 points*
 - 3. Satisfactory – lab report has all necessary parts and is partially developed or has omitted one part but the included parts are well developed; submitted on time. 21 points*
 - 4. Average – lab report has missing parts, is partially developed, has incomplete sentences but is submitted on time. 19 points*
 - 5. Poor – lab report has missing parts, what is included is not developed and has incomplete sentences but submitted on time. 17 points*
 - 6. Unsatisfactory – lab report does not have most necessary parts, is not developed using incomplete sentences but submitted on time.*