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**Formation of Calcium Carbonate**

**Introduction:**

In this experiment you will be observing the reaction between calcium chloride and sodium carbonate. Both substances are soluble in water, so the reaction will be produced by the combining solutions of the substances. The products of the double replacement reaction are calcium carbonate and sodium chloride. The sodium chloride is soluble(dissolves in water), so it will remain in solution. The calcium carbonate is insoluble, so it will form a precipitate, which can then be collected and dried to determine the mass of product produced.

**Objectives:**

To observe the reaction between solutions of calcium chloride and sodium carbonate, determine the theoretical amount of calcium carbonate that could be produce and calculate the percent yield obtained in the reaction.

**Prelab Questions: (Answer before coming to class!)**

1. What type of reaction is observed in this lab?
2. Write a balance equation for the reaction demonstrated in this lab.

Read the procedure and answer the following questions.

1. There are several washings of the solid with water. What is the purpose of these washings?
2. Why is it important that the solid be dry before the final mass measurement?

**Procedure:**

1. Rinse the inside of a clean 100 mL graduated cylinder with a small amount of water. Pour about 50. mL of 0.60M sodium carbonate solution into the graduated cylinder. Record the volume of the nearest 0.5 mL. Pour the solution into a clean 250 mL beaker.
2. Carefully rinse the graduated cylinder two or three times with distilled water. Pour approximately 35. mL of 0.40M calcium chloride solution into the graduated cylinder. Record the volume to the nearest 0.5 mL. Pour the calcium chloride solution into beaker. Describe the resulting reaction in the data table. Stir the contents of the beaker for about 1 minute, then allow the solid to settle.
3. While waiting for the solid to settle, write you names on the edge of a piece of filter paper and determine its mass to the nearest 0.01 g and record the mass in you data table.(Do this in pencil!)
4. Set up a funnel holder, funnel, and filter paper of known mass. Use a 250 mL beaker under the funnel.
5. Wet the filter paper with a small amount of water. Pour the contents of the beaker slowly into the funnel. (use the stirring rod like you did when decanting). Be careful as you pour so none of solid flows out of the filter paper or funnel. Use the rubber scraper to remove as much of the solid from the beaker as possible. Rinse the inside of the beaker with some distilled water to remove an more solid. Rinse the beaker two or three times into the funnel.
6. Once all of the solid is on the filter paper, and the liquid has all drained through into the beaker, carefully remove the filter paper and product from the funnel, and put the filter paper on a watch glass. Dry the filter paper and product.
7. After the filter paper and calcium carbonate are thoroughly dry, find the mass of the precipitate and filter paper and record it in the data table.

**Data Table:**

**Calculations/Results:**

1. Determine the moles of sodium carbonate added.
2. Determine the moles of calcium chloride added.
3. What is the mass of the calcium carbonate produced?
4. Rewrite the balanced equation. Using this and a BCA chart determine which reactant is limiting and which is excess. Then determine the amount of calcium carbonate that could theoretically form from the limiting reactant. (Theoretical yield)
5. Calculate your percent yield.
6. Predict what would happen to the percent yield (greater, less, or no change) if the following occurred. (Be sure to explain your answer!)
   1. The solid were not completely dry.
   2. The balance read a value that was too large by 0.12 grams each time it was used.
   3. You mixed up the volumes of the two liquids and added 50. mL of CaCl2 and 35 mL of Na2CO3 while thinking you had done the lab in the proper way.
   4. Assume that it was determined that sodium carbonate was the limiting reactant. When preparing the solution of calcium chloride for the lab you heated the solution of calcium chloride to a boil in order to dissolve all the solid. What affect will this have on the actual yield of the calcium carbonate?

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*This lab can be used for your Quarterly Lab Conclusion\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*