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Chem 1045 Lab

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Synthesis of Calcium Carbonate

I. Introduction

Determining the limiting reactant and percentage yield of Calcium Carbonate and Sodium Chloride.

II. Procedures

1. Obtain a bottle of 0.110 M sodium carbonate solution and a bottle of 0.100 M calcium chloride solution.

2. Add approximately 50.0 mL of 0.110 M calcium carbonate to a clean 250 mL beaker. Record the actual volume.

3. Add approximately 50.0 mL of 0.110 M calcium chloride to a different clean 250 mL beaker. Record the actual volume.

4. Using a hotplate, gently warm both beakers for 5-10 minutes. Do not let them boil.

5. After the solutions are warmed- remove both from the hot plate using gloves or beaker tongs. The glass is hot.

6. Pour the contents of one beaker into another. The solutions are warmed so that when mixed, the solid particles formed will increase in size. The warmer the solutions are, the faster this process will occur.

7. Allow the mixture to cool down to room temperature. Do not place in ice.

8. While the mixture is cooling, set up the vacuum filter apparatus.

9. Label a piece of filter paper with your initials.

10. Place the filter paper on a watch glass and record the mass.

11. Vacuum filter the mixture once it reaches room temperature.

12. Place filter paper on watch glass in over for 10 minutes to evaporate any remaining water.

III. Data/ Results

Sodium Carbonate Solution

Volume of Sodium Carbonate solution used- 50 mL

Moles of Sodium Carbonate solution used- 0.47 mol

Calcium Chloride Solution

Volume of Calcium Chloride Solution- 50 mL

Moles of Calcium Chloride Solution- .45 mol

Solid Formed

Mass of watch glass and filter paper (g)= 38.141 g

Mass of precipitate, watch glass, and filter paper (g)= 38.571g

Mass of precipitate (g)- 0.44 g

Actual moles of precipitate (mol)= .0044 mol

Theoretical moles of product formed (mol)= .0045 mol

Percentage Yield= 97 %

IV. Conclusion

Since we obtained a 97% yield we were very close to getting the theoretical yield of this experiment. Some factors could have been letting the solution cool down more before placing it in the vacuum filter.

Post Lab Questions

1. Write out the balance equation

CaCl2 + Na2CO3 -🡪CaCO3 + NaCl2

2. Write out the full ionic equation

Ca+2 (aq) + 2CL +2 (aq)+ 2 Na (aq) + CO3 (aq) 🡪 CaCO3 (s) + 2 Na (aq) + 2 Cl (aq)

3. Write out the net ionic equation

Ca (aq)+ CO3 (aq) 🡪 CaCO3 (s)

4. Have you used either products in a previous experiment?

NaCl (s)- Separating the Components of a mixture

CaCO3 (s)- Separating the Components of a mixture

5. Could ammonium carbonate solution have been used in lieu of sodium carbonate solution?

(NH4)2CO3 could have been used.

6. Could aluminum carbonate solution have been used in lieu of calcium chloride solution?

Al2(CO3)3 could NOT have been used as this is much less soluble than either Na2CO3 or (NH4)2CO3

7. Could calcium bromide solution been used in lieu of calcium chloride solution?

Yes because calcium bromide is soluble.