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| **Chemistry 11**  **Lab 6D**   * **Limiting Reactant & Percent Yield** | **Name: Date: Block:** |

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| PRE-LAB |

1. This is the chemical reaction that we are investigating in this lab. Balance the reaction.

\_\_\_\_\_ Na2CO3 (aq) + \_\_\_\_\_ CaCl2 (aq) 🡪 \_\_\_\_\_ NaCl (aq) + \_\_\_\_\_ CaCO3 (s)

1. What is a precipitate?
2. What is the difference between a limiting reactant and an excess reactant?
3. For Part I, you will create your own Na2CO3 and CaCl2 solutions. Determine the moles and mass of each reactant that you will need to dissolve in water by filling in the chart below.

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|  | **Sodium carbonate solution**  **(Na2CO3)** | **Calcium chloride solution**  **(CaCl22H2O)** |
| **Molar Concentration** | 0.70 M | 0.50 M |
| **Volume** | 100. mL | 100. mL |
| **Moles** |  |  |
| **Mass** |  |  |

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| PROCEDURE |

Day 1:

1. Put on your safety goggles.
2. Obtain two clean, dry 100 mL volumetric flasks with rubber stoppers, two weigh boats, and a wash bottle.
3. Rinse out both volumetric flasks with water and label both with a water-soluble marker.
4. Based on your pre-experiment calculations, weigh out the amount of Na2CO3 and CaCl2 you will need to make a 0.70 M solution of Na2CO3 and a 0.50 M solution of CaCl2 in the two weight boats and then carefully transfer into each volumetric flask.
5. Top up each volumetric flask with water. Be careful not to go over the line. If you do, you will have to make the solution again.

Teacher Initials:

1st try 2nd try 3rd try

1. Swirl each volumetric flask until all of the solid has dissolved.
2. Show Ms. Popov/Ms. Sandhu your accurately filled volumetric flasks.
3. Transfer some of each of the solution into a clean, dry beaker.
4. Measure out 25.00 mL of each solution using a pipette.
5. Combine the solutions in third beaker. Record qualitative observations in your experimental results.
6. Obtain a piece of filter paper and label it with your name (use pencil).
7. Weigh and record the mass of the filter paper.
8. Using a funnel, filter the content of the beaker. Use the wash bottle to rinse the remaining precipitate from the beaker.
9. After the filtering is complete, remove the wet filter paper, and place it in the fume hood to dry.
10. Wash your hands thoroughly with soap and water.
11. Give your awesome lab partner(s) a high five and thank your teacher.

Day 2:

1. Obtain your sample of dried filter paper and residue and weigh it. After recording its mass, it may be discarded in the garbage.

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| OBSERVATIONS |

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| **Part I** | | |
|  | Sodium Carbonate (Na2CO3)  Solution | Calcium Chloride (CaCl22H2O) Solution |
| Mass of solid used to make 100. mL solution |  |  |
| Molarity of 100. mL solution |  |  |
| Volume of solution Used | 25.00 mL | 25.00 mL |
| Qualitative Observations |  | |
| Mass of filter paper |  | |
| **Part II** | | |
| Mass of filter paper + solid CaCO3 |  | |

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| LAB REPORT |

*On a separate sheet of paper, create a lab report with the following sections:*

* *Objective*
* *Observations (include table above)*
* *Follow Up Questions*

1. Using your observations, calculate the moles of Na2CO3 that were used in this reaction.
2. Using your observations, calculate the moles of CaCl2 that were used in this reaction.
3. From #1 and #2, along with your balanced chemical reaction, determine which chemical is the limiting reactant.
4. Determine the theoretical mass of CaCO3 precipitate that should have formed.
5. From your part II observations, calculate the actual mass of CaCO3 precipitate that formed.
6. Calculate the percent yield of CaCO3.

* *Conclusion*

Did you achieve the objective of this lab? Why or why not? What are potential experimental errors and how they could have impacted your results? If you list human error, please explain what you will do to reduce/eliminate that problem in the next lab.

This lab report is due on: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_