

Unit 4 - Chemical Reactions - Free Response VI**Question** ____**Name:** _____

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|---|----------------|
| Mass of a Na_2CO_3 sample containing soluble impurities | 0.543 g |
| Mass of dry filter paper | 1.365 g |
| Mass of filter paper and precipitate (1 st drying) | 1.709 g |
| Mass of filter paper and precipitate (2 nd drying) | 1.700 g |
| Mass of filter paper and precipitate (3 rd drying) | 1.700 g |

In this laboratory experiment, a 0.543 g sample of Na_2CO_3 containing soluble impurities was dissolved in 60.0 mL of distilled water. Excess $\text{Ca}(\text{NO}_3)_2$ was added to the solution and a precipitate formed. The mixture was then filtered and dried. The table above provides that data that was collected during the experiment.

- Write the balanced net ionic equation for the precipitation reaction that takes place.
- Explain why a net ionic equation is the best way to represent this reaction.
- Explain why the precipitate and filter paper was dried three times and why the mass was measured and recorded after each drying.

d) Is the $[\text{Na}^+]$ greater than, equal to, or less than the $[\text{NO}_3^-]$ in the filtered solutions. Justify your answer.

e) Calculate the number of moles of precipitate in the sample.

f) Calculate the mass percent of Na_2CO_3 in the original sample.

g) If the 0.543 g sample of Na_2CO_3 containing some impurities was dissolved in 98.0 mL of distilled water instead of 60.0 mL, would the experimentally determined mass percent of Na_2CO_3 be greater than, equal to, or less than the value calculated in part f. Justify your answer.

h) PbCO_3 is not soluble in water. Could $\text{Pb}(\text{NO}_3)_2$ be used instead of $\text{Ca}(\text{NO}_3)_2$ in this experiment? Justify your answer.

i) If one started with the same sample of Na_2CO_3 and a balance that measures to the nearest 0.01 g, would it be possible to obtain the mass of precipitate with three significant figures? Justify your answer.