

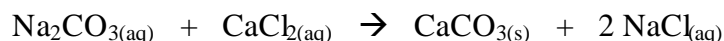
Planning an Experiment (Stoichiometry of a precipitation reaction)

Introduction

A crucial part of being a scientist is planning experiments. Sometimes data has to be acquired, while other experiments need to test hypotheses. Whatever its purpose, a good experiment should provide the necessary information in an efficient, practical and safe way. Today, you are going to plan an experiment that will help solve a stoichiometry problem. You will not perform the experiment today.

Task

In the lab, there is approximately 250 mL of an aqueous solution of sodium carbonate decahydrate ($\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$). The exact concentration of the solution has been lost but we know that it is less than 1.0 M. We do not want to waste it so you are going to plan an experiment that will accurately determine its concentration. You will use your knowledge of stoichiometry and the fact that Na_2CO_3 reacts with calcium chloride, CaCl_2 , to produce an insoluble precipitate:



Take your time and **think** carefully about how the concentration of the sodium carbonate could be found. Your “lab report” for this planning lab will be an instruction sheet like the ones that you usually receive. It should allow someone with a reasonable knowledge of chemistry to do the experiment. Keep it **simple** but ensure that all of the necessary information is included. Your planning lab should include the following:

1. The **purpose (aim)** of the experiment.
2. The **theory** behind your experiment (including any relevant equations).
3. Variables: manipulated, controlled and responding.
4. A detailed list of **materials** that is required.
5. A detailed description of the **method**.
6. Suitable **data tables**
7. A detailed **data analysis**. This should explain fully and clearly how the results of the experiment would be used to obtain the unknown concentration.