
Gravimetric Analysis of a Base

Materials Required: Unknown base
 0.5 M calcium chloride

Safety Precautions:

Eye protection **MUST** be worn at all times in laboratory.

If you spill acid or base on your skin, immediately wash with water and notify the instructor

INTRODUCTION

Gravimetric analysis refers to the use of mass measurement to analyse a sample. In this experiment, you will weigh a small quantity of a base (a carbonate compound) and react it with a solution of calcium chloride according to the following equation:



By measuring the mass of CaCO_3 precipitated, the mass of CO_3^{2-} can be found, since it is the same as the mass in the original unknown. From this, the percent of CO_3^{2-} in the original sample can be calculated.

EXPERIMENTAL PROCEDURE

1. Weigh about 1g of the unknown base into a small beaker or on a piece of weighing paper. Record the actual sample mass used on the data sheet below.
2. Transfer the sample to a large beaker.
3. Add approx. 50 mL of deionized water (measuring cylinder) to the flask and swirl to dissolve the solid. If some of the solid remains undissolved, you can still continue with the next step.

4. Add 30 mL of 0.5 M calcium chloride solution using a measuring cylinder and cover the beaker with a watch-glass. Boil the mixture *gently* on a hot-plate for about 10 min.
5. Remove the beaker (hot!) from the hot-plate using the insulated gloves provided. Cool for several minutes.
6. Weigh a piece of filter paper and record its mass on the data sheet.
7. Fold the filter paper in half, then half again to make a cone-shape cup and place it in a funnel. Place the funnel in a flask and filter the solution through the filter paper. Make sure all the solid is transferred to the filter paper. (You can rinse out the beaker with a little of the filtrate to transfer all the solid).
8. When all the solution has been filter, place the filter paper in a evaporating dish, label it, and place in the oven. You will weigh the dried filter paper containing the calcium carbonate next lab period to complete the experiment.
9. Next lab period, record the mass of the dry filter paper plus calcium carbonate.
10. As always, show all steps in your calculations to receive full credit!

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DATA SHEET & REPORT

Name _____

Lab Partner's Name _____

Date _____

DATA

Mass of unknown sample (base):

Mass of filter paper:

Mass of dried filter paper + calcium carbonate:

Calculations

Question 1: Calculate the number of moles of calcium carbonate precipitated.

Question 2: Calculate the number of moles of carbonate in the calcium carbonate.

Question 3: Calculate the mass of carbonate in the calcium carbonate.

Question 4: Calculate the % of carbonate in the original unknown (remember, the mass of carbonate in the weighed calcium carbonate is the same as in the unknown).