

## Introduction

In this experiment you are to determine the composition of a mixture containing unknown proportions of

barium chloride dihydrate ( $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ )  
anhydrous barium chloride ( $\text{BaCl}_2$ )

An experimental procedure is given for the dehydration reaction of  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ .

In this reaction, the mixture is heated, which leads to loss of the waters of hydration from  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ . The anhydrous  $\text{BaCl}_2$  is not affected by the procedure. In this experiment, the only thing that changes is that the waters of hydration are removed.

## Before You Start

Your goal is to identify the percent of each compound in the mixture. The idea here is that by performing the procedure given and taking appropriate measurements at the appropriate points, you can determine everything you need to arrive at the percentages.

Before you begin, you must decide what you will measure during the experiment and how that will lead to the percentages you are looking for. Mark what you will measure at the appropriate spots in the procedures and show them to your instructor before you begin. You will be expected to be able explain verbally what you will do with those measurements before obtaining a sample to analyze.

## What To Report

Your job is to determine the percentages of each component in the sample. Part of your job is to decide how sure you are of your answers and to convince others that you really have the correct answer, or at least indicate how sure you are of those results. If you decide that your experiment did not give reasonable results and that you can draw no useful conclusion, then that is what you must report.

Before beginning, you must decide what information to collect and what to do with it. Following the experiment, write a brief report that states the conclusions you have reached and presents the evidence for those conclusions. The report for this experiment can be done on a single page.

Do not include the experimental procedures but do reference them. For example, "7.5 mL of sulfuric acid were used in Step "d" of Procedure B."

Do include all measurements you made and any calculations that you make with a short explanation of what those calculations tell you. Finally, end the report with your conclusions and a statement of how much you trust those conclusions.

## Procedure A. Dehydration of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$

### 1. Preparation of the Crucible

Thoroughly clean and dry your porcelain crucible and its cover. To ensure dryness, place the crucible and its cover on the triangle mounted thoroughly with a burner. Let this assembly cool completely to room temperature.



**Figure** The bottom of the porcelain crucible will glow cherry red when it is heated properly.

2. Obtain an unknown from your instructor. Use a sample that has a mass of about 2 grams. Then:

- a) Place the crucible with the sample in the triangle mounted on a ring stand.
- b) Adjust the height of the ring so that the bottom of the crucible is only a few centimeters above the top of the burner barrel. Displace the cover carefully slightly to one side to allow water vapor to escape.
- c) Light the burner and, holding the burner so that the flame just brushes the bottom of the crucible, heat the crucible gently for 5 to 10 minutes.
- d) After the initial heating, place the burner directly under the crucible and heat until the bottom of the crucible glows a cherry red. Heat in this manner for at least 5-6 minutes, then remove the flame and allow the assembly to cool to room temperature.
- e) When the crucible is no longer warm to the touch, the dehydration is complete.

3. Repeat the above procedure with a second sample of the same unknown.

4. Calculate the percentage of mass lost during the reaction for the two experiments. If they differ by more than 10%, then repeat the experiment a third time.