

AP Lab 0 - Decomposition of Baking Soda

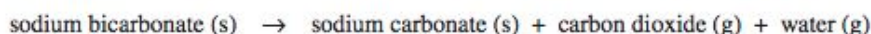
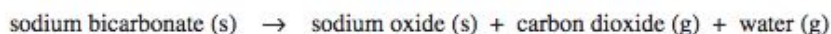
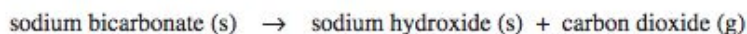
Background

Due to the widespread use of sodium bicarbonate (commonly called baking soda) in many food products, the thermal decomposition reaction has been studied extensively by food chemists. Baking soda is used to prepare cakes in order to ensure that cakes “rise” as they bake.

As the temperature of the cake batter reaches approximately 50 °C, the baking soda decomposes and carbon dioxide is released. The use of baking soda is especially popular in pancakes and waffles since the high cooking temperatures of 350–450 °F (175–230 °C) cause the carbon dioxide to be liberated before the dough has set. Thus, the batter rises before it sets, and we get a light and tasty finished product.

There are three possible chemical reactions that could be occurring during the baking process. All three of these reactions shown below are theoretically possible, yet only one reaction actually occurs.

Possible Decomposition Reactions



Materials

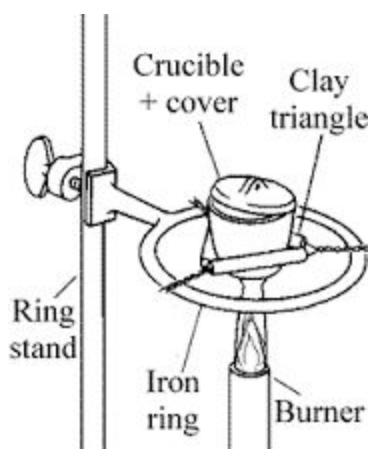
Baking soda, 2 g	Ring stand
Balance, 0.01-g precision	Ring support
Bunsen burner	Spatula, micro
Clay triangle	Spoon
Crucible	Weighing dish
Crucible tongs	

Safety Precautions

Exercise caution when using the Bunsen burner and when handling objects that have been heated. Do not touch the crucible or any metal that may remain hot. Use heat-resistant gloves if necessary. Wear safety goggles while performing this demonstration. Please review all Material Safety Data Sheets for additional safety, handling and disposal information.

Pre-Lab Questions:

1. Write the balanced equation for each possible decomposition reaction.
2. What is the theoretical yield of the solid product for each reaction?
3. What safety reasons might there be to heat with the lid on? Why is the lid a bit off kilter (there's an opening)?
4. What is the purpose of making sure the mass remains constant in step 5?



Procedure:

1. Measure the mass of the empty crucible.
2. Measure 2.00 g of baking soda in the crucible. Record the exact measurement.
3. Assemble the ring stand with a circular ring support. Place the clay triangle on top of the ring support and place the crucible containing the baking soda on top of the clay triangle. The lid should be tilted.
4. Heat the crucible and its contents with the bunsen burner for 10 minutes. Use a metal spatula to carefully break up any “clumps” that form during heating. Clumps need to be broken only once during heating.
5. Mass the crucible and its contents. Make sure the mass is constant before you are done. Heat the crucible for 2 more minutes and mass again. Repeat this process until the mass remains constant and record all masses.

****In your conclusion, make sure to use percent yield as a potential piece of evidence. There is more you can use as you desire. There are no reading and reflection questions.****