

Decomposition of Sodium Bicarbonate

Background and Purpose:

Sodium bicarbonate (sodium hydrogen carbonate) decomposes at around 50 C. One of the products of the decomposition is carbon dioxide, which makes baking soda a popular ingredient in baking. Why would the production of carbon dioxide make it popular?

The other ingredients of the decomposition could be sodium hydroxide, sodium oxide and water, or sodium carbonate and water. So, the equations would be:

Sodium hydrogen carbonate yields sodium hydroxide + carbon dioxide

or

Sodium hydrogen carbonate yields sodium oxide + water + carbon dioxide

or

Sodium hydrogen carbonate yields sodium carbonate + water + carbon dioxide.

In the lab, determine the correct equation.

Equipment: Crucible without lid, Baking Soda, Balance, Crucible tong, Cupcake holder, scoopula, burner, ring stand, ring and clay triangle.

Write-up

1. Write the three possible chemical equations:

1.

2.

3.

2. Determine what raw data is needed. There will be three masses.

1. Mass of Empty Crucible 11.00 grams

2. Mass of Crucible and NaHCO₃ 14.13 grams

3. Mass of Crucible and Product 12.97 grams

3. Derived data--SHOW YOUR WORK FOR EACH BLANK.

a. Mass of baking soda _____

b. Mass of product _____

c. Moles of Baking Soda (NaHCO_3) _____

d. Predicted moles of NaOH _____
(based on moles of NaHCO_3)

e. Predicted grams of NaOH _____

f. Predicted moles of Na_2O _____
(based on moles of NaHCO_3)

g. Predicted grams of Na_2O _____

h. Predicted moles of Na_2CO_3 _____
(based on moles of NaHCO_3)

i. Predicted grams of Na_2CO_3 _____

4. What was the actual mass of product? _____ Which predicted mass (e.g,i) was the closest? _____

5. Write the correct equation for the decomposition of baking soda below: