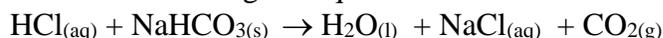


Name _____

Stoichiometry Lab

Reaction of Hydrochloric Acid with Sodium Bicarbonate

In this lab we will be using the equation



The subscript letters will become very important for this lab. HCl is only sold as an aqueous solution, so it is HCl dissolved in water. When HCl is added to the solid sodium hydrogen carbonate three things are produced; water, sodium chloride and carbon dioxide. Carbon dioxide is a gas, so it will escape instantly. We can calculate the mass of *carbon dioxide* mass by checking the difference in mass of the products and reactants. We should now have a container of water and sodium chloride. Some of that water is produced from the reaction, the rest came in with the dissolved HCl. We will boil off the remaining water and determine the mass of *NaCl*. We will then check our experimental answers with our calculated answers.

Procedure:

1. Wash an evaporating dish and watch glass and thoroughly dry it.
2. Determine the mass of the evaporating dish and watch glass and record it in your data table.
3. Obtain 2-3 grams of sodium bicarbonate.
4. Add the sodium bicarbonate to the evaporating dish and determine the mass of the evaporating dish, watch glass and sodium bicarbonate. Record this mass in your data table.
5. Clean and dry a separate beaker. Add approximately 50 mL of 1 M HCl to the beaker, place the pipette in the beaker and obtain the mass of the beaker and the HCl. Record this mass in your data table.
6. Add about 20 mL of HCl to the sodium bicarbonate in the evaporating dish, and stir it until it stops bubbling. Then, using a pipette **slowly** add drops of HCl to the evaporating dish. The mixture should bubble. Gently stir the mixture and continue to add drops of HCl to the evaporating dish until no more bubbling occurs. **Do NOT add more HCl than is needed!** It will not only cause errors in your lab, but it will produce a HIGHLY POISONOUS gas later in the lab.
7. Record the mass of the remaining HCl and beaker and the pipette in your data table.
8. Record the mass of the watch glass, evaporating dish and product in the data table.
9. Set up a ring stand with a wire triangle. Place the evaporating dish, watch glass and product in the wire triangle. Place the watch glass over the evaporating dish

to prevent any NaCl from “popping” out but leave an edge open so steam can escape.

10. Light the Bunsen burner and heat the evaporating dish to dryness.
11. Allow the evaporating dish to cool and record the mass of the evaporating dish, watch glass, and heated product in the data table.

Data Table

1	Mass of evaporating dish and watch glass		g
2	Mass of Evaporating Dish, watch glass and NaHCO ₃		g
3	Mass of beaker and 1 M HCl		g
4	Mass of beaker and 1 M HCl after bubbling stops		g
5	Mass of Evaporating Dish, watch glass and products before heating		g
6	Mass of Evaporating Dish, watch glass and products after heating		g

Experimental Calculations

1. Calculate the mass of sodium bicarbonate used (#2 - #1).
2. Calculate the mass of HCl used (#3 - #4)
3. Calculate the mass of CO₂ produced (mass of sodium bicarbonate used + mass of HCl used - {#5 - #1})
4. Calculate the amount of NaCl produced (#6 - #1)

Mass of sodium bicarbonate used		g
Mass of HCl used		g
Mass of carbon dioxide produced		g
Mass of sodium chloride produced		g

Stoichiometry

Use the balanced equation $\text{HCl} + \text{NaHCO}_3 \rightarrow \text{H}_2\text{O} + \text{NaCl} + \text{CO}_2$

Use **your mass** of sodium bicarbonate to determine the mass of carbon dioxide that will be produced and the amount of sodium chloride that will be produced by using stoichiometry. (Use your data for NaHCO_3 to calculate the mass of NaCl and then use your mass of sodium bicarbonate to calculate the mass of CO_2)

You should now have two different values for NaCl and CO_2 . A calculated value that you got directly above this writing, and an experimental value you got from your measurements in this lab.

Calculate your percent yield for the mass of sodium chloride and mass of carbon dioxide. Although percent yield should never be higher than 100%, your experimental error may possibly result in a value higher than 100.

Percent Yield = Actual Yield / Theoretical Yield x 100