Stoichiometry Lab

Equipment:

balance	Bunsen burner	evaporating dish	watch glass
spatula	wire gauze	pipette	ring stand
iron ring	sodium bicarbonate	6 M HCl	

1. **Put on your apron and goggles!** We are using acid and fire in this lab, so it is important that your eyes and clothing are protected.
2. In this lab you will react sodium bicarbonate with hydrochloric acid (HCl) to form water, carbon dioxide and sodium chloride. Write a balanced equation depicting this reaction.

3. Use a balance to determine the mass of an empty evaporating dish. Record this value in your data table.
4. Add **approximately** 3 grams of $NaHCO_3$ to your evaporating dish. Determine the mass of the evaporating dish + $NaHCO_3$ and record this value in your data table.
5. Determine the mass of $NaHCO_3$. Record your result in your data table.
6. Calculate your theoretical yield of NaCl based upon how much $NaHCO_3$ you are reacting. Put a box around your answer. If you are doing multiple trials you will have to do a different calculation for each starting amount.

7. Place your evaporating dish + $NaHCO_3$ on the ring stand. Carefully add approximately up to 6 ml (6 pipettes full) of HCl to the dish. Add one pipette at a time and wait until all bubbling has stopped before adding more HCl. **CAUTION: HCl causes burns. Avoid skin contact**.
8. Continue to add HCl until the $NaHCO_3$ no longer produces CO_2 bubbles. Do not add more acid than what is needed.
9. Put the watch glass on top of your evaporating dish. Light the Bunsen burner and heat the liquid in the evaporating dish until it boils gently. Be careful not to let the liquid boil over. Continue to dry the solid slowly until all moisture appears to have evaporated.
10. Shut off your Bunsen burner and let the evaporating dish cool for **approximately five minutes.**
11. Once the dish has cooled, remove the watch glass from the top of the evaporating dish. Scrape all of the sodium chloride that has collected on the watch glass into the evaporating dish.
12. Reheat your evaporating dish (without the watch glass on top) for two more minutes or until all of the water has evaporated and you are left with a dry sodium chloride product.
13. Let your evaporating dish cool to room temperature.
14. Once your evaporating dish has cooled, measure it's mass and record this value in your data table.
15. Determine the mass of the NaCl produced. Record this value in your data table. This is your actual yield.
16. Using your theoretical yield value from above, calculate your percent yield below. Put a box around your answer. If you did multiple trials, you will need to do a percent yield calculation for each trial.

17. Clean your evaporating dish by rinsing it in water and return it to your station. Put away your goggles and apron.

Data Table:

	Trial 1	Trial 2
mass of evaporating dish:		
mass of evaporating dish + NaHCO₃:		
mass of NaHCO₃:		
mass of evaporating dish + NaCl:		
mass of NaCl:		

Post Lab questions.

1. What is the limiting reagent in your reaction?

2. Assuming you used exactly 3.00 g $NaHCO_3$, what mass of HCl would be needed to completely react with your sodium bicarbonate sample?

3. Assuming you used exactly 3.00 g $NaHCO_3$, what volume of carbon dioxide gas would be produced?

4. Assuming you used exactly 3.00 g $NaHCO_3$, what mass of water would be produced?

5. If your % yield is below 100%, explain several possible reasons why. If your % yield is above 100%, explain several possible reasons why.

6. What would you do differently if you were to do this lab again and wanted to get a percent yield closer to 100%?