

Lab: Experimental Determination of Calcium Carbonate in Tums

Introduction

- Experiment objective
- Reaction of Tums (active ingredient) with stomach acid:
 - $2 \text{HCl}_{(\text{aq})} + \text{CaCO}_{3(\text{s})} \rightarrow \text{H}_2\text{O}_{(\text{l})} + \text{CO}_{2(\text{g})} + \text{CaCl}_{2(\text{aq})}$
- Titration technique
 - Endpoint: moles of titrant = moles of analyte (titrant - NaOH, analyte - HCl)
- Acid-Base reaction during titration:
 - $\text{HCl}_{(\text{aq})} + \text{NaOH}_{(\text{aq})} \rightarrow \text{H}_2\text{O}_{(\text{l})} + \text{NaCl}_{(\text{aq})}$

Procedure

- Written in passive voice, past tense
- Omit Part 1 – it was just for practice!
- Remember, this is not the time to include specific data.

Results

Part 1 info is not required – it was just for practice!

Describe in complete sentences where these data came from:

- ☐ Mass of Tablet (g)
- ☐ Mass of Samples (g)
- ☐ Concentration of HCl (M)
- ☐ Volume of HCl added (mL)
- ☐ Concentration of NaOH (M)
- ☐ Volume of NaOH added (mL)

→ Include the averages you took!

Discussion

Contains calculations along with explanations in complete sentences!

- Calculations 2-5: Describing the acid-base reaction.
 - $\text{HCl}_{(\text{aq})} + \text{NaOH}_{(\text{aq})} \rightarrow \text{H}_2\text{O}_{(\text{l})} + \text{NaCl}_{(\text{aq})}$
 - Based on the endpoint of the titration, you determined how many moles of acid were neutralized when you put in a piece of the tablet.
- Calculations 6-8: Describing the reaction of HCl with CaCO_3
 - $2 \text{HCl}_{(\text{aq})} + \text{CaCO}_{3(\text{s})} \rightarrow \text{H}_2\text{O}_{(\text{l})} + \text{CO}_{2(\text{g})} + \text{CaCl}_{2(\text{aq})}$
 - Based on the reaction above, you determined how many moles of CaCO_3 must be in the piece of tablet. Then you determined the percentage of CaCO_3 and the mass in the full tablet.
- Calculation 9: Calculating percent difference from the label
 - Compared the mass of CaCO_3 from above to the value listed on the label of the Tums bottle

Conclusion

- Re-state objective
- Summarize the outcome
 - Include the final value: amount of CaCO_3 in tablet and percent difference from the Tums label