

# Second Quarter Laboratory Evaluation: Analysis of Alka Seltzer<sup>®</sup>

## The Task:

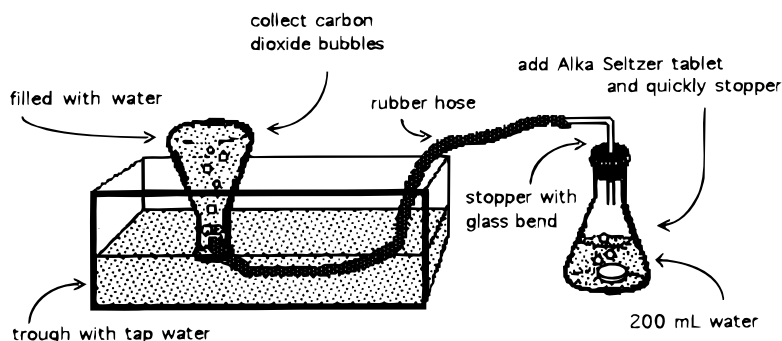
Reviewing the Ideal Gas Law and stoichiometry, determine the percent composition by mass of sodium hydrogen carbonate in Alka Seltzer<sup>®</sup>

## You should:

- 1) Know that the formula for citric acid is  $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$  and sodium bicarbonate is also called sodium hydrogen carbonate
- 2) Write and balance the equation for the reaction of the citric acid and sodium bicarbonate which are in a tablet of Alka Seltzer<sup>®</sup> (water, carbon dioxide and sodium citrate are the products)
- 3) Assemble the apparatus shown below
- 4) Collect the gas produced by reacting one tablet and make all necessary measurements to determine the number of moles of gas produced at the room conditions (be sure to find the mass of the tablet before the reaction)
- 5) Assume that citric acid is in excess and using stoichiometry, calculate the moles and then the mass of sodium bicarbonate in the tablet
- 6) Calculate the percent by mass of the sodium bicarbonate in a tablet
- 7) Prepare and submit a single report from you group giving
  - a) a detailed description of the procedure,
  - b) safety precautions you followed,
  - c) balanced equation for the chemical reaction,
  - d) a data table with all the necessary accurate qualitative and quantitative observations of the process,
  - e) an analysis of possible errors, and
- 8) Since you have only a limited amount of time, your team of two to three individuals should divide up the task giving different members specific responsibilities.
  - f) In your report describe the role each member played in the task.

## Your grade will be determined by:

- 1) the degree of individual and group acceptance of responsibilities in carrying out the task
- 2) the degree of individual and group adherence to safety regulations and housekeeping practices
- 3) the completeness of your group report
- 4) the accuracy of your group's results
- 5) the timeliness and neatness of your group's report



# Alka Seltzer Task Grading Rubric

Group members:

score: area:	Highest quality (5)	above average (4)	average (3)	below average (2)	lowest quality (1)	no effort (0)
<b>a) procedure</b>	complete & detailed	complete	sketchy but complete	some omissions or errors	major error	missing
<b>b) safety</b>	materials & procedure	procedure or materials	goggles only	nothing in write up, but few warnings in lab	many warnings issued in class	expelled from lab
<b>c) equation</b>	complete & balanced	complete but not balanced	extra or incorrect balanced	incorrect formulas	incomplete	missing
<b>d) observations-qualitative</b>	complete pre & post reactions	complete pre & post reactions	complete reaction only	incomplete reaction	barely mentioned	not mentioned
<b>d) observations-quantitative</b>	complete, highly organized	complete, somewhat organized	recorded	some data missing	much data missing	no data
<b>e) errors</b>	five or more errors identified	four errors identified	three errors identified	two errors identified	one error identified	no errors identified
<b>f) roles</b>	fully described	individuals named	described briefly	generic all worked	barely mentioned	not described
<b>g) neatness, timeliness</b>	on-time & typed with minimal	on-time with only a few	one day late or several	2 days late	barely legible, >2 days	illegible
<b>h) accuracy</b>	errors 15.5% ±1	errors 15.5% ±3	errors 15.5% ±5	15.5% ±10	late values given	values missing
<b>i) group work</b>	worked together effectively	worked together	worked as individuals	only one did the work	argued about who should work	group expelled from school