

## Determining the Concentration of CO<sub>2</sub> in Seltzer



Objective: to determine the % by mass of the CO<sub>2</sub> in seltzer, the Parts Per Million of CO<sub>2</sub> in seltzer, and the Molarity of the CO<sub>2</sub> in the seltzer.

Procedure: **READ THIS ALL FIRST** then do what it says

- Get a CLEAN and dry a 80 mL beaker. Clean it if necessary, then dry it well.
- MASS the BEAKER WITH a STIRRING MAGNET
- POUR about 80 mL of seltzer CAREFULLY (lots of important bubbles) into the beaker
- MASS the seltzer and beaker and stirring magnet
- Put beaker onto the stirring machine on low, slowly increase the spin speed, but DO NOT SPILL A DROP.
- DO NOT RUSH — stir this up for 25 minutes minimum
- Slow down, then turn off the stirring magnets before picking up the beaker.
- Mass the beaker at the end, which contains water now (carbon dioxide has exited)
- Remember that the density of water = 1.0 g/mL, so our mass of water in grams = mL of water too
- Wash all glass with SOAP, upside down to drain please.

| DATA  | Measurement |
|---|-------------|
| mass beaker + stirring magnet   |             |
| mass beaker + stirring magnet + seltzer at START                      |             |
| ☼ Mass of the seltzer ONLY (subtraction)                              |             |
| mass beaker + stirring magnet + WATER at END                          |             |
| ☼ mass of water ONLY (subtraction)                                    |             |
| Volume of water: assume the mass of water in grams = the volume in mL |             |
| ☼ Mass of MISSING CO <sub>2</sub>                                     |             |

1.4 x 10<sup>1</sup> Lab Questions: show all work.

- Calculate the % by mass of CO<sub>2</sub> in your soda. (show math and formulas)
- Calculate the MOLARITY of CO<sub>2</sub> that your soda has. (show math and formulas)
- Calculate the PPM of CO<sub>2</sub> in your soda. (show math and formulas)
- The actual value for Molarity is 0.138 M. What is your percent error?
- The actual value for PPM CO<sub>2</sub> in seltzer is 5750 PPM. What is your percent error?
- You know that a particular solution of Co(NO<sub>3</sub>)<sub>2(AQ)</sub> is 3.25 M. When you measure out exactly 49.0 mL, how many grams of cobalt (II) nitrate do you have in it?
- A 4,250. mL solution of contains 395.0 grams of sodium hypochlorite. This is the white powder that non-chemists call the “chlorine” that they use in their pools. What’s the solution molarity?
- Would this NaClO<sub>(AQ)</sub> conduct electricity? Explain why or why not?
- If this solution in question #5 was your stock solution, explain how would you prepare 45.75 mL of a 0.975 Molar solution from it? Use a diagram, in addition to your calculations, to show how you would make this new solution.
- If you didn’t have any of this stock solution, how would you prepare 45.75 mL of a 0.975 Molar sodium hypochlorite solution from scratch?
- If you have 4.65 M calcium chloride stock solution, how do you prepare a new solution of 135 mL at 1.25 M from it? Show a diagram, label the ingredients. Write the formula.
- In one clean sentence, explain why you cannot prepare a 1.00 Molar solution of ammonium hydroxide using a 0.95 M NH<sub>4</sub>OH<sub>(AQ)</sub> stock solution.
- Skip.
- What is the molarity of a saturated solution at 30°C of potassium chloride?
- If you have a saturated solution of KI at 5°C and you warm it up to 15°C, does the molarity of this solution change? Math is always okay, but it’s not needed here.

|                           | This lab report requires   | points |
|---------------------------|--|--------|
| 1                         | Cover page + introduction + data table   | 2      |
| calculations              | 14 problems  | 14     |
| conclusion                | <p>Write an extended conclusion: Explain...</p> <ol style="list-style-type: none"> <li>Molarity - what is it, what is it used for, and write the formula is words and symbols.</li> <li>% composition by mass - what is it, what is it used for, and write the formula is words and symbols.</li> <li>Parts Per Million - what is it, what is it used for, and write the formula is words and symbols.</li> <li>The Dilution Formula used to dilute stock solutions - what is it, what is it used for, and write the formula is words and symbols.</li> <li>Make up one Molarity or Parts Per Million word problem, and <u>then solve it</u>. Be careful with the names and formulas, and the significant figures. Your problem must have 4 SF in the answer.</li> </ol> | 9      |
| This lab is due on: _____ |  | 25     |