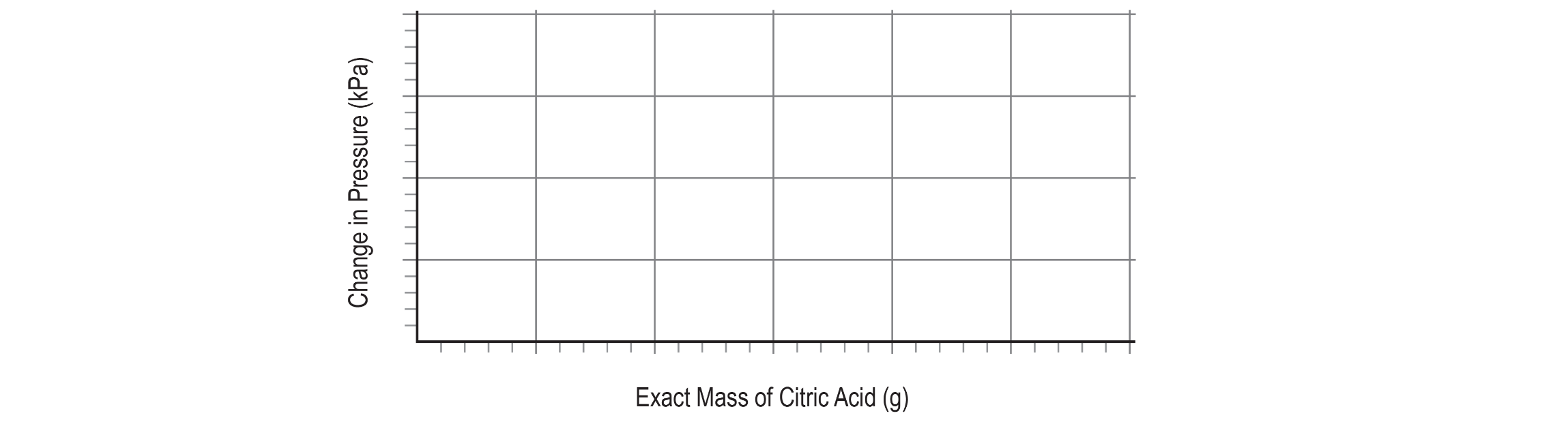
# 8D – Determining Limiting Reactants

Analysis

Table 1 – Pressure change

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trial # | Approximate Mass of C6H8O7 (g) | Exact Mass of C6H8O7 (g) | Initial Pressure (kPa) | Final Pressure (kPa) | Change in Pressure (kPa) |
| 1 | 0.10 |  |  |  |  |
| 2 | 0.20 |  |  |  |  |
| 3 | 0.30 |  |  |  |  |
| 4 | 0.40 |  |  |  |  |
| 5 | 0.50 |  |  |  |  |

* 1. Navigate to Page 2 in SPARKvue. Enter the change in pressure for each run to create a graph of Change in Pressure (kPa) on the y-axis and Exact mass of citric acid (g) on the x-axis. Scale the graph and then reproduce the graph on your paper. Add a title to your graph.



* 2. Each 40-mL sample of sodium bicarbonate you measured contained 0.41 g of dissolved sodium bicarbonate. Calculate the number of moles of sodium bicarbonate for each trial. Show one sample calculation and record your answers in Table 2.
* 3. Calculate the number of moles of citric acid in each trial. Show one sample calculation below and record your answers in Table 2.

Table 2 – Analysis of pressure change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trial # | Mass of  NaHCO3 (g) | Moles of  NaHCO3 (mol) | Exact mass of  C6H8O7 (g) | Moles of C6H8O7 (mol) |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

Questions

* 1. Each trial used the same amount of NaHCO3. What happened to the pressure as you added increasing amounts of citric acid? Why did this happen?
* 2. Based on the graph, what is the ideal amount (in grams) of citric acid required to react with 0.41 g of NaHCO3? Explain how you determined this answer.
* 3. Based on the graph, which trial is closest to the ideal amounts of reactants? Explain how you chose this trial and eliminated the others.
* 4. In Table 2, find the moles of each reactant for the ideal trial you identified above. According to the table, what is the ideal NaHCO3 : C6H8O7 mole-to-mole ratio, in simplified whole number coefficients?
* 5. When citric acid and sodium bicarbonate react, the products are sodium citrate (Na3C6H5O7), water, and carbon dioxide. Write the balanced chemical equation including state-of-matter symbols in your balanced chemical equation. How does the NaHCO3 : C6H8O7 mole ratio in the balanced equation compare to the ratio that you determined in question #4?
* 6. Which reactant, if any, was a limiting reactant in each trial? Enter your responses in the table. Support your answers with evidence from the lab.

Evidence for the Limiting Reactant

|  |  |  |
| --- | --- | --- |
| Trial # | Limiting Reactant | Supporting evidence |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |