

# Carbon Dioxide — What a Gas!

## Data Sheet

Procedure Part #	Materials Used	Observations
1		
2		
3		
4		
5		

## Post-Lab Questions *(Answer the following questions on a separate sheet of paper.)*

### Part 1. Preparation of Carbon Dioxide Gas

1. Write the balanced chemical equation for the reaction occurring in the syringe.
2. When using 0.22 g of  $\text{NaHCO}_3$  and 5.0 mL of 1.0 M  $\text{HCl}$ , which reactant is the limiting reactant? Show all work.
3. What type of reaction is occurring in the syringe—oxidation–reduction, acid/base, or precipitation?

### Part 2. Classic Test for Carbon Dioxide

4. Write the balanced chemical equation for the reaction occurring between the carbon dioxide and the limewater [a saturated solution of calcium hydroxide,  $\text{Ca}(\text{OH})_2$ ].
5. What was observed after adding the carbon dioxide gas to the limewater?

### Part 3. Carbon Dioxide and pH

6. Write the chemical equation for the reaction occurring between the carbon dioxide and the ammonia gas.
7. What is the pH of the distilled or deionized water in the laboratory? Explain why it has this pH.
8. Is ammonia gas soluble in water? Explain.
9. From lab observations, is ammonia an acid or a base? Is carbon dioxide an acid or a base? Explain.
10. What changes occurred to the indicator in this experiment? What is the cause of the changes?
11. Explain how indicators can be useful to scientists.

### Part 4. Reaction of Carbon Dioxide and Sodium Hydroxide

12. Write the balanced chemical equation for the reaction that occurred in the syringe.
13. Suggest an explanation for what was observed in this experiment.
14. What change in pressure was observed? Explain.
15. Solutions of bases such as sodium hydroxide or calcium hydroxide are not “stable” if they sit in the air for an extended period of time. Based on your experiments with  $\text{CO}_2(\text{g})$ , suggest a reason for this.

### Part 5. Does Carbon Dioxide Support Combustion?

16. What happened to the burning candle? Could this gas be used as a fire extinguisher?
17. Why is the syringe held upright in the experiment? Will the carbon dioxide quickly escape?
18. Which gas has a greater density, carbon dioxide or air? How can you tell? (Hint: Compare the molar masses of oxygen and nitrogen with that of carbon dioxide.)
19. Design an experiment to determine whether carbon dioxide or air has the greater density.
20. Suggest an experiment to determine how long the  $\text{CO}_2(\text{g})$  will remain in an open syringe that is held upright. Will the  $\text{CO}_2(\text{g})$  remain in the syringe for five minutes?