

## Chemistry of Gases Lab Activity – Student Edition

### Making Carbon Dioxide

#### Background Information:



Carbon dioxide is another invisible gas found in our air. However, there is only a very tiny amount of it – 0.03%. Even so, carbon dioxide is important and has many uses. When yeast and sugar are mixed to make bread or pizza dough carbon dioxide is released. The holes in the bread are produced by bubbles of carbon dioxide. Likewise, when making beer and wine the yeast changes the sugar to alcohol and carbon dioxide in a process called fermentation. This reaction gives beer its foamy appearance. The bubbles in soda drinks are also carbon dioxide.

When carbon dioxide gas cools to about  $-80^{\circ}\text{C}$  it forms a white solid called dry ice. Unlike other substances which have a ‘wet’ liquid state, carbon dioxide skips this state and becomes a solid. Dry ice is much colder than regular ice that you can find in your freezer, so it is used in industry to keep substance very cold. It is also used to create mists or fog on stage.



Green plants use up carbon dioxide from the air through photosynthesis. They then return oxygen to the air, which other living things such as humans and animals inhale, we then exhale carbon dioxide. Carbon dioxide is also released into the air when fuels are burnt in a process known as combustion.

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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## Learning Objectives

By the end of this lab, you will be able to:

1. Make and test carbon dioxide gas.
2. Describe the properties of carbon dioxide gas.

## Time allowance:

60 mins

## Part 1: Teacher Demo

Watch as your teacher exhales through a straw into a test tube of limewater. Record any observations and answer the questions on page 3 of this lab handout.

## Part 2: Student Activity

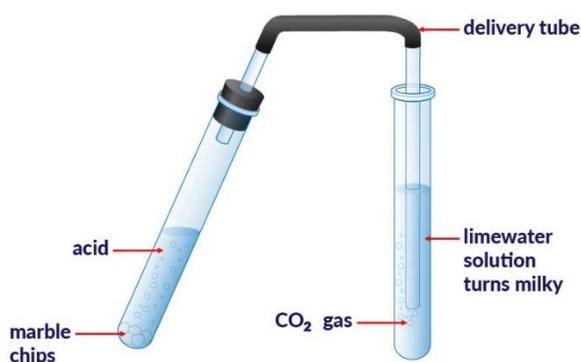
### Equipment:

- 2 x test tubes
- Delivery tube with stopper
- Plastic drinking straw
- Marble chips (calcium carbonate)
- Dilute hydrochloric acid (1M)
- Limewater solution  $\text{Ca}(\text{OH})_2$

### Method:

1. Measure 5ml of limewater into the first test tube and set aside in a test tube rack.
2. Place the marble chips into the other test tube.
3. Add 5 ml of hydrochloric acid to the marble chips and seal with the stopper. Place the end of the delivery tube into the limewater so that the gas bubbles form in the limewater.

### Diagram of Setup:



Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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## Tasks and Questions:

1. Record your observations in the space below for the teacher demo:

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2. Based on your observations from the teacher demo, what can you infer about exhaled air?

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3. Record your observations in the space below for your lab activity:

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4. Identify the gas that is produced when marble chips react with hydrochloric acid.

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5. Predict what would happen if you were to place a lit taper/splint into the mouth of the test tube with the marble chips and acid. Explain your answer.

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6. Why does the limewater turn milky when carbon dioxide is directly piped into it, yet it does not turn milky when it is exposed to air, even though air contains carbon dioxide gas?

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