

Name: \_\_\_\_\_

Period: \_\_\_\_

### Lab: Testing for Gases

**Purpose:** To test for the presence of hydrogen, oxygen, and carbon dioxide following a chemical reaction.

#### Procedure:

##### I. Testing for Hydrogen

- (1) Obtain hydrochloric acid, one piece of magnesium ribbon, and a piece of sand paper.
- (2) Carefully pour about 2 cm of hydrochloric acid into a small test tube.
- (3) Using the sand paper, polish the surface of the magnesium ribbon.
- (4) Add the magnesium ribbon to the hydrochloric acid. In this reaction, the hydrochloric acid (HCl) reacts with magnesium to produce magnesium chloride and hydrogen gas.
- (5) Put the reaction test tube in the test tube rack and invert a large test tube over the reaction. This test tube will collect any gases that form.
- (6) Watch the solution for 1 minute and record your observations in the table below.
- (7) Bring a burning wood splint to the opening of the test tube used to collect the gas. A "pop" indicates the presence of hydrogen gas. Record your observations in the table below.
- (8) Discard the contents of the test tube into the appropriate waste container

##### II. Testing for Oxygen

- (1) Obtain hydrogen peroxide solution and manganese (IV) oxide.
- (2) Carefully pour about 2 cm of hydrogen peroxide into a small test tube.
- (3) Add a small amount of manganese (IV) oxide to the hydrogen peroxide. In this reaction, the hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) decomposes into water and oxygen gas. The manganese (IV) oxide is only added to increase the rate of the reaction.
- (4) Watch the solution for 1 minute and record your observations in the table below.
- (5) Bring a glowing wood splint to the opening of the test tube. A glowing splint that bursts into flame indicates the presence of oxygen gas. Record your observations in the table below.
- (6) Discard the contents of the test tube into the appropriate waste container

##### III. Testing for Carbon Dioxide

- (1) Obtain acetic acid solution and solid sodium hydrogen carbonate.
- (2) Carefully pour about 2 cm of acetic acid into a small test tube.
- (3) Put a scoopful of sodium hydrogen carbonate into the bottom of a small test tube. In this reaction, acetic acid (HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>) reacts with sodium hydrogen carbonate (NaHCO<sub>3</sub>) produce water, sodium acetate, and carbon dioxide.
- (4) Put the reaction test tube in the test tube rack and invert a large test tube over the reaction. This test tube will collect any gases that form.
- (5) Watch the solution for 1 minute and record your observations in the table below.
- (6) Bring a burning wood splint to the opening of the test tube used to collect the gas. A burning flame that is extinguished indicates the presence of carbon dioxide gas. Record your observations in the table below.
- (7) Discard the contents of the test tube into the appropriate waste container

#### Observations:

Change	Observations of Reaction	Results of Gas Test
I. Testing for Hydrogen		
II. Testing for Oxygen		
III. Testing for Carbon Dioxide		

#### Questions:

- (1) (a) Write the formula for the gas that is produced in the reaction of magnesium with hydrochloric acid.  
(b) Write a balanced chemical equation for the reaction of magnesium with hydrochloric acid (HCl).
- (2) (a) Write the formula of the gas that is produced in the decomposition of hydrogen peroxide.  
(b) Write a balanced chemical equation for the decomposition of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>).
- (3) (a) Write the formula of the gas that is produced in the reaction of acetic acid with sodium hydrogen carbonate.  
(b) Write a balanced chemical equation for the reaction of acetic acid (HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>) with sodium hydrogen carbonate (NaHCO<sub>3</sub>).

#### Conclusion:

Summarize how to test for hydrogen, oxygen, and carbon dioxide.