**Molar Volume of Hydrogen Gas and Percentage Purity of Magnesium Ribbon**

You have now spent some time becoming familiar with the experiment.

**Aim:** To obtain values for Molar Volume of Hydrogen Gas and Percentage Purity of Magnesium Ribbon

**Background:**

At this point you would have completed the Pre-Lab questions.

Discuss your answers with other group members if you haven’t already.

Your teacher may also discuss these and demonstrate some of the techniques you are required to use.

**Practice Task:** With water only, practise inverting, placing and securing a gas collection tube.

1. Secure a full tube in place as you would for the experiment.

2. Repeat with a ¾ filled tube. Secure in the burette clamp.

Read off the scales and determine the volume of gas in the tube.

Make sure everyone in your group agrees. Repeat with ½ and ¼ filled tubes.

3. Practise removing the stopper underwater, sealing with a finger or thumb and

transferring to the large measuring cylinder to equilibrate the pressure.

What is the volume now? Do you agree?

**Conduct the Experiment as Outlined in the Procedure:**

|  |  |  |
| --- | --- | --- |
| **Results:** | Mass of Mg Reacted  ( +/- 0.001g ) | Volume of H2 Produced  ( +/- 0.05mL) |
| Trial 1 |  |  |
| *\*Trial 2* |  |  |
| *\*Average* |  |  |

\* **If time permits do a second trial.** (Check with teacher)

In the processing of results, it is valid to use the average mass consumed and the average volume produced.

Classroom temperature: \_\_\_\_\_\_\_ +/- 0.5oC

Barometric pressure: \_\_\_\_\_\_\_\_\_\_ hPa (at Albany Airport) **= \_\_\_\_\_\_\_\_\_\_\_\_ kPa**

*(Note: 1 hPa = 100 Pa = 0.1 kPa* ***and*** *1 kPa = 1000Pa)*

**Processing of results and post-practical questions**

In your laboratory notes complete the following. Your answers should be in full sentences and show all working for calculations.

**Molar Volume of Hydrogen Gas**

1. Write a balanced equation for the reaction between magnesium and hydrochloric acid.
2. Calculate the number of moles of magnesium used in your experiment (**assume** the Mg was pure)
3. What volume of Hydrogen gas did **your mass** of Magnesium produce?
4. Determine the number of moles of H2 gas that **you** produced. (**Assume** gas was collected at STP.)
5. Copy and Complete the following statement.

In our Experiment \_\_\_\_\_\_\_\_\_\_\_ g of Mg produced \_\_\_\_\_\_\_\_\_\_\_\_mL of H2

1. Use your completed statement to calculate the Volume of Hydrogen gas you would have produced if you had completely reacted 24.31 g (1.00 mol) of Magnesium.
2. From the equation how many moles of hydrogen are formed by the reaction of one mole of magnesium?
3. This means that the stoichiometric ratio of *moles of Mg reacted: moles of H2 produced* is 1:1 .

Hence, your answer to Question 6 is the Molar Volume of Hydrogen at classroom conditions according to your experimental results.

1. Copy and Complete the following statement.

Our Experimental value for Molar Volume of H2 Gas is \_\_\_\_\_\_\_\_\_\_L

1. The **Molar Volume** of a gas is the volume that one mole of a gas occupies at STP.

The Gas Law tells us that, ideally, this is 22.71 L .

How does your experimental value compare with the established value of 22.71L at STP?

**Percentage Purity of the Magnesium**

1. a. How many moles of H2 gas did you produce? (**Refer to your answer to Q4)**
2. How many moles of Mg must have reacted to produce this number of moles of gas?

**(Use Stoichiometry)**

1. What mass of Magnesium is this?
2. What was the mass of the Magnesium ribbon that you weighed out and reacted?
3. Compare your answers to Questions 1(c) and 2.
4. Determine the **percentage** purity of the supplied Magnesium ribbon. Comment on your result.

**Evaluation**

1. Evaluate your experiment and the discrepancy between your result and the established theoretical figure. Check the assumptions that were made and suggesting three possible sources of error. Explain how this source of error or assumption would affect your value for the Molar Volume.