Name_____

Molar Volume of Hydrogen

Data Table

	Trial 1	Trial 2
Length of Mg Ribbon (cm)		
Mass of Mg (g)		
Evidence of Chemical Reaction		
Volume of H_2 Gas (mL)		
Corrected Volume of H_2 (mL)		
Temperature of Water Bath (°C)		
Barometric Pressure (mm Hg)		

Post-Lab Calculations and Analysis *(Use a separate sheet of paper to answer the following questions.)*

Construct a Results Table to summarize the results of the following calculations (Questions #1–5).

1. Calculate the theoretical number of moles of hydrogen gas produced in Trials 1 and 2.

2. Consult Table 1 in the *Background* section to find the vapor pressure of water at the temperature of the water bath in this experiment. Use Dalton's law (Equation 4) to calculate the partial pressure of hydrogen gas produced in Trials 1 and 2.

3. Use the combined gas law to convert the measured volume of hydrogen to the volume the gas would occupy at STP for Trials 1 and 2. *Hint:* Remember the units!

4. Divide the volume of hydrogen gas at STP by the theoretical number of moles of hydrogen to calculate the molar volume of hydrogen for Trials 1 and 2.

5. What is the average value of the molar volume of hydrogen gas? Look up the literature value of the molar volume of a gas in a textbook and calculate the percent error in the experimental determination of the molar volume of hydrogen gas.

$$\text{Percent error} = \frac{|\text{ Experimental value } - \text{ Literature value }|}{\text{Literature value}} \times 100\%$$

6. In setting up this experiment, a student noticed that a bubble of air leaked into the graduated cylinder when it was inverted in the water bath. What effect would this have on the measured volume of hydrogen gas? Would the calculated molar volume of hydrogen gas be too high or too low as a result of this error? Explain.

7. A student noticed that the magnesium ribbon appeared to be oxidized—the metal surface was black and dull rather than silver and shiny. What effect would this error have on the measured volume of hydrogen gas? Would the calculated molar volume of hydrogen gas be too high or too low as a result of this error? Explain.

8. *(Optional)* Your teacher wants to scale up this experiment for demonstration purposes and would like to collect the gas in an inverted 50-mL buret. Use the ideal gas law to calculate the maximum length of magnesium ribbon that your teacher should use.