Experiment 11 – Molar Volume of a Gas Makeup **Name _____**

Date _____

Read the introduction to this lab to understand the background. Then, using the theoretical data provided, answer the questions.

DATA TABLE OF MEASURED VALUES

Length of Magnesium ribbon	**2 cm**
Mass of Magnesium ribbon	**0.0282 g**
Volume of hydrogen gas collected (at laboratory conditions)	**23.2 mL**
Temperature of water in cylinder	**22^{0}C**
Temperature of hydrogen gas collected	**22^{0}C**
Vapor pressure of water at observed temperature (from data table)	**19.8 mm Hg**
Barometer reading (atmospheric pressure)	**770.4 mm Hg**

CALCULATIONS – Show all work, include units, and place your answers in the calculations table on the reverse side.

1. Write a balanced equation for magnesium reacting with hydrochloric acid.

2. Determine the mass of your magnesium ribbon.

3. Calculate the number of moles of magnesium consumed.

4. Determine the number of moles of hydrogen gas produced…***From the balanced equation!*** Assume 100 % yield.

5. Since the hydrogen was collected over water, two gases were actually collected: hydrogen (H_2) and water vapor (H_2O). **Calculate the partial pressure of the hydrogen gas collected.** Since the pressure of the gases inside the tube equals the pressure of the gases outside of the tube, the total atmospheric pressure equals the sum of the two partial pressures.
   $P_{atm} = P_{H_2O} + P_{H_2}$

6. Calculate the volume the dry hydrogen gas would have at standard pressure and temperature.
   Use combined gas law $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

7. Using your answer from question # 4, calculate the volume of 1.0 mole of dry hydrogen gas at STP. ***This is your experimental molar volume***.

8. Calculate percent error.
   % Error = $\frac{\textbf{actual – experimental}}{\textbf{actual}}$

9. Discuss possible sources of error.

DATA TABLE OF CALCULATED VALUES

Moles of magnesium ribbon that reacted	_____
Moles of hydrogen gas produced (100% yield)	_____
Pressure of hydrogen gas (P_{H_2})	_____
Volume of hydrogen gas at STP	_____
Volume of 1.0 mole of hydrogen gas at STP	_____
% Error	_____