

Name _____ Date _____ Hour _____

Molar Volume Lab

Objective: Determine the volume of one mole of gas at STP.
Determine the percent error.
Suggest a source of error.

Procedure:

1. **Safety goggles must be worn at all times in the lab to prevent injuries.**
2. Record the length of Mg ribbon and convert to mass of Mg ribbon.
3. Fill a large graduated cylinder with water.
4. Add about 5mL of 6M HCl to the eudiometer tube.
5. Use a beaker to completely fill the eudiometer with water.
6. Roll up the piece of Mg. Place it in the eudiometer and quickly, but carefully, stopper the tube.
7. Put the eudiometer in the graduated cylinder stopper side down.
8. When the reaction is completed, level the water inside the tube with the water level outside the tube and record the volume. (This will equalize atmospheric pressure.)
9. Record the water temperature.
10. Record the atmospheric pressure.
11. Look up the vapor pressure of water in your text.

Data:

Mass of Mg _____

Atmospheric Pressure _____

Temperature of Water in Graduated Cylinder _____

Volume of gas collected _____

Vapor Pressure of Water _____

Calculations:

1. Write a balanced equation for the reaction between Mg and HCl.

2. Calculate the moles of Mg consumed in the reaction from recorded mass.

3. How do the moles of hydrogen produced in the reaction compare to the moles of magnesium consumed? (Convert moles of Mg into moles of H_2 .)

4. Calculate the pressure of the dry hydrogen gas by subtracting the vapor pressure of the water from the atmospheric pressure of the gas. (use $P_{\text{total}} = P_{\text{H}_2} + P_{\text{H}_2\text{O}}$)

5. Determine the volume of dry H_2 collected adjusted to STP using the Combined Gas Law.

P_1 = from #4 _____
 V_1 = from data _____
 T_1 temp. of water _____

P_2 = 1 atm
 V_2 = ?
 T_2 = 273K

6. Based on your volume of H_2 to mole ratio, calculate the volume of one mole of hydrogen gas at STP.
(Divide volume found from question #5 by moles found in question #3)

7. Determine the percent error. (actual value = 22400mL/mol)

Conclusion: What did you *prove*? What were some sources of possible error and what would be the result of those errors?