Determining the Molar Volume of Hydrogen Gas

SCH3U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

What molar volume of hydrogen gas can be determined experimentally from the reaction of magnesium and hydrochloric acid after correcting for water vapour and standard conditions?

Learning goal: use the virtual model to gather evidence, explain determining the molar volume of hydrogen gas and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

Required procedure

• Read the background and identify the gas-collection assumptions.

• Set magnesium mass, acid concentration and volume, temperature, and atmospheric pressure.

• Run and record at least three trials with different magnesium masses.

• Calculate moles of hydrogen, corrected dry hydrogen pressure, volume at STP, and molar volume for each trial.

• Calculate the mean experimental molar volume and percentage error relative to 22.414 L/mol.

• Explain at least two potential experimental errors and submit your completed report.

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

Trial / item	Mg (g)	T (°C)	P atm (kPa)	P H_2O (kPa)	Wet V (mL)

Data table 1 — continued (2)

Trial / item	Dry P (kPa)	STP V (mL)	H_2 (mol)	L/mol

Qualitative observations / sample calculation (show units where applicable)

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Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Analysis: Compare the mean with the accepted value (K/U, A)

6. Compare two contrasting observations from your investigation of Determining the Molar Volume of Hydrogen Gas. Explain the difference using the background information. (K/U, A)

7. Use a specific recorded result to answer the research question. Explain the scientific reasoning behind it. (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

K/U: accurate concepts /10	T/I: method, data, reasoning /12	C: clear tables, units, report /8	A: explanation, conclusion, transfer /10

Total: /40