

Hydrogen — What a Bang!

Data Sheet

Procedure Part #	Materials Used	Observations
1		
2		
3		
4		

Post-Lab Questions (Answer the following questions on a separate sheet of paper.)

Part 1. Preparation of Hydrogen Gas

1. Write the balanced chemical equation for the reaction occurring in the syringe.
2. Determine the number of moles of magnesium used to prepare the hydrogen in this experiment. Show your work.
3. Use the molar concentration and volume of HCl used to determine the number of moles of HCl you used to make hydrogen gas.
4. Which is the limiting reactant, Mg or HCl?
5. Use the balanced equation to determine the number of moles of hydrogen gas expected.
6. What volume in mL of hydrogen is expected from the 0.07 grams of Mg? (*Hint:* Use the Ideal Gas Law and assume $P = 1.00$ atm, $T = 298$ K, and $R = 0.0821$ L·atm/mol·K).

Part 2. Classic Test for Hydrogen

7. Write the balanced chemical equation for the combustion of hydrogen. What is the familiar product that was formed when H_2 gas was ignited?
8. Which gas has the lower density, hydrogen or air? (*Note:* Air has an average molar mass of 29 g/mol.)
9. Why were the test tubes containing hydrogen gas stored upside down in the water?

Part 3. Hydrogen Bubbles

10. What are the two major gases found in air? Which one is reacting with the hydrogen?
11. Write the balanced chemical equation for the reaction occurring in this experiment.
12. What differences did you notice between pure H_2 bubbles and H_2 /air bubbles? Explain.
13. Propose a set of experiments to determine how to produce the loudest bang from a constant amount of H_2 gas added to soap bubbles.

Part 4. Candle Ka-Pow

14. Often there is an initial pop when the candle is raised into the syringe. Why?
15. How does the flame re-ignite?
16. After the initial “ka-pow,” what happened when the lighted candle was moved farther up the hydrogen-filled syringe? What happened when you lowered the syringe? Explain.
17. Does pure hydrogen burn in the absence of air? What is required in order to make hydrogen burn?