LAB - IDEAL GAS LAW

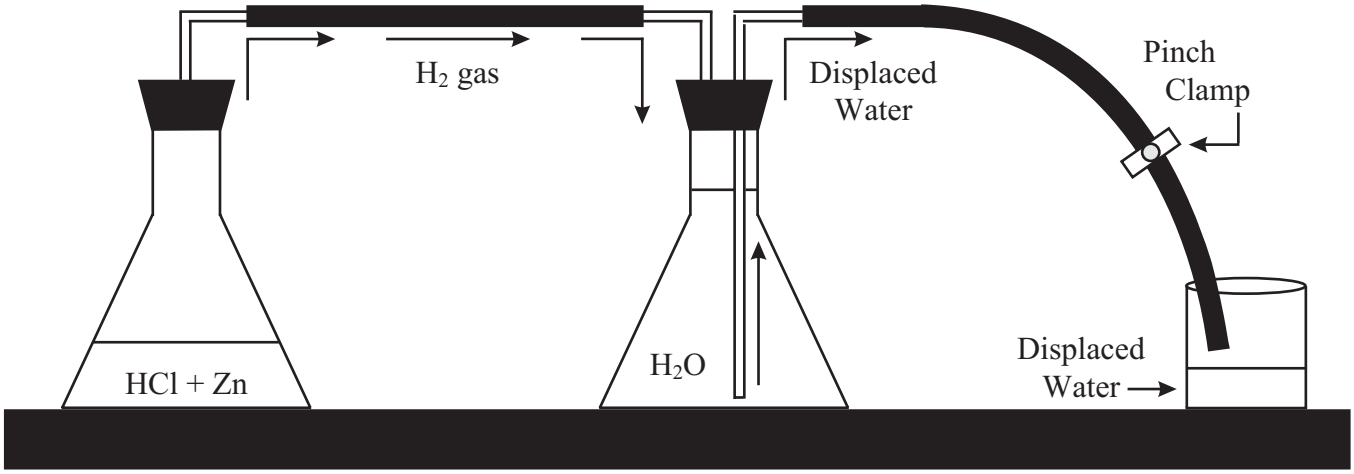
GOAL - The goal of this lab is to quantitatively verify the ideal gas law by measuring the volume of a known amount of a gas at a specific temperature and pressure.

PROCEDURE - In order to verify the ideal gas law you will generate hydrogen gas by dissolving a measure amount of zinc metal in a 6.0 molar solution of hydrochloric acid according to the chemical equation:

$$Zn + 2\ HCl \longrightarrow ZnCl_2 + H_2\ (g)$$

PUT ON GOGGLES BEFORE PROCEEDING FURTHER!!

1. Set up apparatus as shown below.



2. Measure out 100 ml of 6.0 molar HCl solution and place in leftmost flask.
3. Measure out a piece of zinc approximately 2.0 cm^2 and measure, carefully, the mass and record (the mass should not exceed 1.100 grams or the piece is too big - cut it smaller).
4. Fill the second flask with tapwater as shown.
5. BEFORE connecting the two flasks together, blow into the lefthand rubber tube pushing some of the water out of the second flask into the beaker - close the pinch clamp while the water is flowing. Discard the water collected in the beaker.
6. Connect the two flasks together.
7. Remove the stopper from the leftmost flask, drop in the piece of zinc and quickly replace the stopper **TIGHTLY!**
8. Release the pinch clamp allowing displaced water to be pushed out of the second flask by the expanding hydrogen gas.
9. When the gas flow has stopped and ALL of the zinc has dissolved adjust the positions of the second flask and the beaker until the water levels are the same in both and wait 60 seconds. [This step assures that the pressure in the system is at atmospheric pressure!] Close the pinch clamp.
10. Measure the volume of the displaced water - this should be equal to the (measured) volume of the gas generated!
11. Based on the mass of the zinc that reacted and the balanced chemical equation above, determine number of moles of hydrogen gas produced.
12. Determine the atmospheric pressure and temperature.
13. Use the Ideal Gas Law, PV = nRT, to calulate the (predicted) volume of hydrogen gas and a percent error.