



Molar Volume of a Gas

Lab #19

One method of obtaining a sample of a gas is to collect it over water. Water provides a seal so the gas cannot escape to the atmosphere. This method is especially effective for collecting toxic or combustible gases. By employing this concept along with your knowledge of gas laws, the molar volume of a gas can be calculated.

Materials:

Gas Collection Tube	Milligram Balance	400 mL beaker
~ 5 cm strip of Magnesium (about 0.040 g)	6 M HCl	2000 mL graduated cylinder
Holed stopper and copper wire	Test Tube Clamp	Thermometer

Procedure:

Pour approximately 300 mL of tap water into the 400 mL beaker. Fill the 2000 mL graduated cylinder with water.

Obtain a piece of magnesium ribbon from your teacher and mass it. Record the mass. Wrap the magnesium around the copper wire attached to the rubber stopper.

Pour 10 mL of 6 M HCl into the gas collection tube. Fill the remainder of the tube with water and place the stopper into the tube. Make certain that there are no air bubbles at the top of the tube. Place your finger firmly over the hole in the stopper and invert the tube. Quickly place the tube into the 400 mL beaker of water and clamp the tube into place.

When the reaction is complete, reach into the beaker and place your finger over the hole in the stopper. Remove the tube from the beaker and place it into the 2000 mL graduated cylinder for about 5 minutes.

While the tube is in the graduated cylinder, obtain and record the temperature of the water in the cylinder.

After the tube has been in the graduated cylinder for 5 minutes, adjust the height of the tube so that the level of liquid in the gas collection tube is equal to the level of the water in the graduated cylinder. Record the volume of gas in the gas collection tube.

Remove the tube from the cylinder and pour the liquid remaining in the gas collection tube down the sink. Rinse the tube and stopper and return them to your teacher. Clean up.

Calculations:

Calculate the moles of magnesium reacted.

Calculate the moles of hydrogen gas produced.

Calculate the volume of hydrogen produced at STP.

Calculate the molar volume of hydrogen gas -