

Sample Lab Procedure for the Determination of the Gas Constant, R

1. Add 10.0 ml of 3.00 M HCl to a 50 ml graduated cylinder
2. Fill a 600 ml beaker with approximately 400 ml of water and place a temperature probe into the water.
3. Use a gas pressure sensor to record the air pressure in the room.
4. CAREFULLY layer water on the top of the HCl. The water should float since it is less dense and if it is carefully poured, they shouldn't mix.
5. Measure the mass of your magnesium strip.
6. Place the magnesium strip in a copper wire "cage" that can attach to the lip of the cylinder by being wedged in between the stopper and the cylinder. Place the cage with the magnesium strip into the water layer.
7. Insert the rubber stopper into the cylinder. There should be NO air in between the liquid and the rubber stopper.
8. Quickly and carefully invert the cylinder with your finger over the hole in the rubber stopper and place it into the beaker upside down.
9. As the HCl diffuses down, it will react with the Mg to produce hydrogen gas. The hydrogen will rise to the top of the cylinder and displace the water by pushing it out through the hole in the rubber stopper.
10. Once the reaction is complete, move the cylinder up or down until the water line in the cylinder is level with the water line of the beaker. At this point, the pressure inside of the cylinder is equal to the pressure outside of the cylinder (the air pressure that we already measured).
11. Measure and record the volume of the air in the graduated cylinder.