

EXPERIMENT 17: BOYLE'S LAW

Equipment: Tube, thermometer, buret clamp, ruler

In this experiment we will learn how the volume of a gas changes as the pressure on the gas is changed. We can change the pressure on the gas by changing the position of the tube. Look at Figure 1 below.

Figure 11

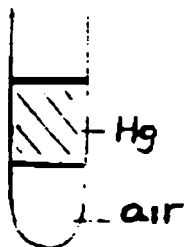


Figure 12

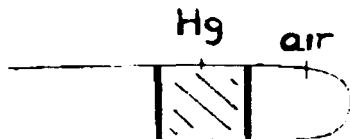


Figure 13



In this position (Figure 1) the pressure on the gas is equal to the weight of the Hg above it AND the air pressure on the Hg. Since the weight of the Hg is related to the length of the Hg column, and normal air pressure may be expressed as 760 mm. Hg, the pressure on the gas may be expressed as 760 mm. + length of Hg column.

Procedure: Support the tube as indicated in Figure 1. Measure the length of the air column and record it and the pressure on the air column in the data table. Repeat and record for positions as indicated in Figures 2 and 3.

DATA TABLE

POSITION	GAS PRESSURE (mmHg)	LENGTH OF AIR COLUMN	P x V
1			
2			
3			

SUMMARY QUESTIONS

1. Within the limits of experimental error, what statement can be made about the number obtained by multiplying the pressure and volume of the gas for any position of the tube?
2. State Boyle's Law in mathematical form.
3. Why was it necessary to prevent the temperature of the gas from changing during the experiment?
4. If we were really interested in measuring the volume of the gas, why did we measure the length of gas column?
5. At constant temperature the pressure on 10 liters gas is increased from 5 atmospheres to 20 atmospheres. What volume will the gas occupy at the higher pressure?
6. The pressure on 50 mL of gas is reduced from 760 mm.Hg to 380 mm.Hg at constant temperature. What volume does the gas occupy at the lower pressure?