

# [Gas law](https://assignbuster.com/gas-law/)

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Gas laws Objective Investigate the relationship between pressure, temperature, volume, and the amount of gas occupying an enclosed room. This experiment consists of three parts. In part one, the relationship between pressure and volume will be measured. In part two, the relationship between pressure and the amount of gas present in the chamber will be determined. Part three will illustrate the relationship between pressure and temperature. The results of these measurements will be used to derive the Ideal Gas Law.   
Data   
Temperature, K   
Volume, L   
Vapor Pressure, atm PH2O   
PH2O/Ptotal   
Vair, L   
339. 05   
0. 01   
26. 167   
0. 963190636   
107. 731009   
332. 45   
0. 009   
19. 028   
0. 950069902   
145. 266044   
327. 45   
0. 0085   
15. 012   
0. 93754684   
181. 358265   
324. 95   
0. 0082   
13. 623   
0. 93161458   
198. 323738   
322. 65   
0. 0081   
12. 045   
0. 923342277   
222. 718237   
320. 95   
0. 008   
11. 171   
0. 917837483   
238. 878049   
318. 55   
0. 0078   
9. 842   
0. 907766095   
269. 107104   
318. 35   
0. 0076   
8. 2054   
0. 89136811   
322. 578941   
313. 15   
0. 0075   
7. 3814   
0. 880688191   
352. 73178   
Figure 1 Volume temperature relationship   
Part IV Relationship Between Pressure and Temperature   
Temperature, K   
Pressure, atm   
289. 85   
0. 891402126   
371. 95   
1. 272459523   
273. 05   
0. 979861879   
196. 15   
0. 728091813   
Figure 2 pressure temperature relationship   
  
  
  
Figure 3 pressure volume relation ship   
Figure 4 Pressure volume inverse law   
Discussion   
From figure 1, we deduct that volume of a gas increases proportionally to the temperature when the pressure is kept constant. The independent variable in this chart is temperature whereas the dependent variable is volume. This corresponds to Charles law V/T = k   
X intercept is when y= 0   
From equation y = 0. 0001x-0. 0262   
X= = - 262K   
From figure 2, it is seen that at constant volume pressure of a gas increases proportionally with temperature. The independent variable is temperature whereas the dependent variable is pressure   
From equation y= 0. 003x+0. 1111   
X intercept = = -37. 033K   
From figure 3, it is seen that the volume of a gas decreases exponentially with the increase in pressure. Plotting the values of pressure against the inverse of the volume gives us Boyles law (PV = Constant) that states that at constant temperature the pressure of the gas is inversely proportional to the size. From the figure for it is observed that when the pressure is doubled the volume is reduced by half. The linear graph passes through the point of origin (0, 0).   
Air is a mixture of different gases that respond differently in different conditions. The ideal gas law provides provisions for incorporation of various gasses in a system. Therefore, air was a suitable choice for an ideal gas   
According to the ideal gas law PV= nRT, therefore at constant number of moles and temperature the pressure is inversely proportional to the volume and therefore obeys Boyles law. At constant n and P, V is directly proportional to T with increasing T, V will also increase. From the data calculated and represented in figures 1-3 the ideal gas law is experimentally defined. From figure 1, it has been seen that the volume is directly proportional to temperature at constant pressure. From figure 2 it is observed that the volume is directly proportional to temperature and from figure 3 and 4 it is observed that the volume is inversely proportional to pressure. All these are the ideas behind the ideal gas law.   
References   
Goldberg D. E. (2007). Gases. In Fundamentals of Chemistry (315-334). New York: The McGraw−Hill