

# [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