

LAB: Boyle's Law

Students: Please read the following information given below, and then come to class on your lab day with the following already prepared in your notebooks:

1) Date, 2) Partner, 3) Title, 4) Purpose, 5) Materials, 6) Safety, 7) Procedures/Observations, and 8) Data & Calculations (collect data in your notebooks)

The last page needs to be printed out. This page will be turned in. You must write up your own data tables. Data for this lab should be collected in your notebooks. Two computer-generated tables along with the last page should be completed. The data, calculations, and questions will be due one week after performing the lab in class (your next lab class).

Boyle's Law states that at a constant temperature the volume of a gas is inversely proportional to the pressure. That is, as the volume of the gas decreases, the pressure increases. The mathematical relationship is given by $PV=k$ (P = pressure, times V = volume = k a constant). How can you determine this constant for different gases? How does changing the pressure exerted on a gas affect its volume? This will be found out during this lab.

$$PV = k$$

Please use the following procedures.

First, lower the volume on your computer! If I hear anyone's computer make noise, you will lose lab points!

Future Lab should be open, Select Boyles's Law Experiment, then Standard Setup 1

The Toolbar should be opened, and a piston chamber, nitrogen tank, a pressure gauge, two connecting tubes, a Magic Meter, and five 50-kg masses should be selected. One of the connecting tubes should be connected to the lower left side of the piston chamber and to the pressure gauge. The other connecting tube should be connected to the lower right side of the piston chamber and to the nitrogen tank.

10 liters of nitrogen gas should now be added to the piston chamber. VERY SLOWLY click on the gas tank's silver button 10 times to release the gas from the tank. Measure and record the pressure and volume.

One 50-kg mass should be placed on top of the piston chamber. The new volume and pressure should be recorded using the Magic Meter.

*** How has increasing the pressure of the gas affected the volume?***

The additional four 50-kg masses should be added to the piston chamber, one at a time, and the new volume and pressure should be recorded each time.

Calculate the product for PV for all of your data.

This experiment should be repeated using another gas.

DATA TABLE: remember final handed in one must be computer generated

Here is the only help that will be given for the construction of the two data tables (one for each gas). The data table should consist of 5 columns; 1)trials, 2)volume, 3)pressure, 4)mass, and 5) $PV=k$.

Name _____

Date _____

Period _____

Lab Group # _____

Lab: Boyle's Law**QUESTIONS: (answer in complete sentences, and show calculation next to problem when needed)**

1. How has increasing the pressure of gas affected the volume? Explain thoroughly. _____
2. The relationship between volume and pressure can be stated as _____
 - a. volume increases as pressure increases.
 - b. volume decreases as pressure decreases.
 - c. volume decreases as pressure increases.
 - d. there is no relationship between volume and pressure.
3. The value that was calculated for k after placing the first 50-kg mass on the piston is _____
 - a. 10.0 L atm
 - b. 7.9 L atm
 - c. 0.1 L atm
 - d. 0.5 L atm
4. The average value for k is _____
 - a. 8.5 L atm
 - b. 0.5 L atm
 - c. 7.5 L atm
 - d. 10.0 L atm
5. Volume and pressure are _____
 - a. not proportional.
 - b. inversely proportional.
 - c. directly proportional.
6. If the gas exerts a pressure of 7.5 atm and the value of k is 2.2 L atm, the volume of the gas is _____
 - a. 0.1 L
 - b. 16.5 L
 - c. 0.29 L
 - d. 3.4 L
7. As the pressure increases inside the chamber, the value of k _____
 - a. increases.
 - b. decreases.
 - c. becomes zero.
 - d. stays the same.
8. If k has a value of 5 L atm, the pressure inside the chamber at the start of this experiment would be _____
 - a. 0.3 atm
 - b. 0.5 atm
 - c. 0.8 atm
 - d. 1.0 atm

REMEMBER TO SUBMIT TWO COMPUTER GENERATED TABLES