

Lesson 110: Boyle's Law Lab

Chemistry with Lab

Lab: Boyle's Law—Datasheet

Data and Calculations:

- Pressure is defined as force per unit area: $P = \text{Force} / \text{Area}$
- When a book rests on top of the plunger, the pressure it exerts equals the weight of the book divided by the area of the bottom of the plunger.

1. Diameter of syringe = _____ cm = _____ m
Show your work here.

2. Weight (force) of 1 book = _____ N
Show your work here.

3. Calculate the area of the circle in m^2 using the formula πr^2 :

4. Using the fact that pressure is defined as $\text{force} \div \text{area}$, what is the pressure exerted by 1 book in N/m^2 ?

5. If $1 \text{ N}/\text{m}^2 = 1 \text{ Pascal (Pa)}$, what is the pressure exerted by 1 book in Pa?

Lesson 110: Boyle's Law Lab (cont.)

Chemistry with Lab

Using conversion facts, convert Pa to kPa. Show your work here.

Exerting Pressure	Pressure (kPa)	Volume of gas (cm ³)	P/V (kPa/cm ³)	P x V (kPa x cm ³)
atmosphere				
atmosphere + 1 book				
atmosphere + 2 books				
atmosphere + 3 books				
atmosphere + 4 books				
atmosphere + 5 books				

Use graphical analysis to make a graph of "pressure vs. volume". Use proper technique for scientific graphing and be sure to draw a best-fit line.

Conclusions:

As the pressure exerted on the air inside the syringe increased, the volume (increased, decreased).

Volume and pressure are (directly, inversely) proportional.

Look at the last two columns of your data table. Within bounds of experimental error, the relationship between pressure and volume of a gas is ($P/V = k$, $P \bullet V = k$). This relationship is known as: (Look at the title of this lab!)

_____.