

Boyles Law U-Tube Lab

Background:

The early gas laws were developed at the end of the 18th century, when scientists began to realize that relationships between the pressure, volume and temperature of a sample of gas could be obtained which would hold for all gases. Gases behave in a similar way over a wide variety of conditions because to a good approximation they all have molecules which are widely spaced, and nowadays the equation of state for an ideal gas is derived from kinetic theory. The earlier gas laws are now considered as special cases of the ideal gas equation, with one or more of the variables held constant.

The Irish chemist Robert Boyle (1627-1691) was the first person to quantitatively study the compressibility of gases. After many experiments he determined that the volume of a sample of gas at a given temperature varies with the applied pressure. The mathematical relationship between the volume of a gas and the applied pressure at a fixed temperature is known as Boyle's Law.

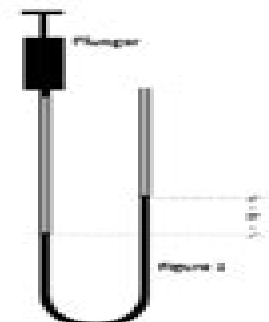
An open ended manometer is a way to indirectly measure the pressure of a gas sample. The pressure a gas sample exerts pushes the water on one side of the manometer and the atmospheric pressure pushes the water on the other end. The difference in the water levels is then used to calculate the pressure of the gas sample. In this lab, you will use a manometer to identify the mathematical relationship between the pressure of a gas and its volume.

Materials:

- 1 U-Tube apparatus
- 1 White board marker
- 1 Ruler
- 1 Ringstand and clamp
- 60 mL syringe

Procedure: Part 1 Pressure and Volume

1. Record the atmospheric pressure and temperature of the room as provided by your instructor.
2. Observe the water levels in the U tube (manometer). Answer the following questions in the analysis section of your lab report:
 - a.) Why are the water levels equal?
 - b.) How much pressure is pushing down on each side of the manometer?
3. Set the plunger at the 32.00 mL mark and carefully connect to the rubber tubing.
4. Adjust syringe until water levels in the manometer are again equal.
5. Push the plunger in until the volume of the gas in the plunger reads 20.0 mL. Answer the following questions in the analysis section of your lab report:
 - c.) What happened to the water levels?
 - d.) What happened to the gas pressure on the side with the syringe?
 - e.) Based on your observations, describe the relationship that exists between the volume and the pressure of a gas?
 - f.) What two variables remained constant throughout this trial?
6. Using a white board marker and a ruler, record the height difference (h) of the water levels as shown in figure 1 in millimeters. If the level of the liquid is higher on the plunger side than the level on the side with the atmospheric pressure only, the difference will be a negative value. If it is lower on the plunger side, then the difference will be positive (as seen in figure 1). Erase all marks when done.
7. Pull the plunger out 4.00 mL and repeat step 6.
8. Repeat step 6 until the volume is 42.00 mL using the volumes of 28.0 mL, 32.0 mL, 36.0 mL, 40.0 mL and 44.0 mL. Remember: Mark the fluid levels, measure the differences, and erase before moving on.



Graph:

Using the provided graph paper, generate a graph of volume vs. total pressure. Be sure to include all the components of a good graph:

- Title
- Labeled axis with units
- Properly scaled axis
 - Remember: the axis does not need to start at 0 when graphing data.
 - X Axis = Independent Variable
 - Y Axis = Dependent Variable
- Properly plotted points.
- Best fit line or curve.

Lab Answers For Boyles Law Lab Manual

**Ralph Petrucci, William
Harwood, Geoffrey Herring**



Lab Answers For Boyles Law Lab Manual:

Lab Answers For Boyles Law Lab Manual: Bestsellers in 2023 The year 2023 has witnessed a noteworthy surge in literary brilliance, with numerous compelling novels enthralling the hearts of readers worldwide. Lets delve into the realm of top-selling books, exploring the captivating narratives that have charmed audiences this year. The Must-Read : Colleen Hoover's "It Ends with Us" This touching tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover skillfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can prevail. Lab Answers For Boyles Law Lab Manual : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids captivating storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Lab Answers For Boyles Law Lab Manual : Delia Owens "Where the Crawdads Sing" This evocative coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These bestselling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of compelling stories waiting to be discovered. The novel begins with Richard Pappen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a brilliant and gripping novel that will keep you guessing until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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