

OPERATING INSTRUCTIONS

Boyle's Law Apparatus No. 72700-22

1. Introduction

Boyle's Law states that the volume occupied by a gas varies inversely with the applied pressure: $PV = k$. This apparatus can be used to verify this relationship between the pressure and volume of a gas.

2. Description

The Boyle's Law Apparatus consists of a 10ml plastic syringe fitted with a bracket at the top. This bracket supports a looped weight hanger. Also supplied with the apparatus is a three-way stopcock.

Not included, but required for operation, are two buret clamps; a ring stand; and a set of hooked weights, including 100g, 200g, 300g, and 1000g masses.

3. Operation

To assemble the Boyle's Law Apparatus, first remove the protective plastic tip from the bottom of the syringe. Move the plunger in and out a few times to make sure that it is moving smoothly. Firmly press either of the large, round nipples of the stopcock onto the base of the syringe cylinder, and note the "off" position. If the apparatus did not arrive with the mass hanger attached to the bracket, attach it now.

Note: The Boyle's Law Apparatus has a maximum boiling temperature of 80°C. For the best experimental results, only operate it at or below this temperature.

A. Compression of a Gas: Attach a buret clamp to a ring stand, near the top of the stand. Support the apparatus in the clamp, adjusting the clamp if necessary so that the flared top of the syringe cylinder rests on the edges of the clamp jaws. Do not over-tighten the clamp; it is important not to exert any pressure on the walls of the cylinder. The apparatus and mass hanger should now be hanging vertically.

Draw the desired volume of air into the cylinder by opening the stopcock and pulling up the piston to the desired position on the scale. Close the stopcock.

To compress the air in the cylinder, attach hooked masses to the hanger one at a time. Before taking readings on the scale, twist the piston back and forth inside the cylinder to eliminate the effect of friction on the piston's motion. Tabulate the data, being sure to add the weight of the piston assembly to the applied mass. Graph pressure vs. volume.

B. Reducing the Pressure on a Gas: Invert the apparatus, with one buret clamp holding the midsection of the cylinder loosely. Mount the second buret clamp under the first. Let the flared top of the syringe rest on the jaws of the second clamp.

Attach masses to the mass hanger, beginning at 100g, and going up to 1000g. Again twist the piston back and forth before taking readings, to eliminate the effect of friction. Determine the volume for each mass, adding the mass of the piston assembly to the applied mass. Again, graph pressure vs. volume.

What are the results? Boyle's Law dictates that pressure and volume should be directly proportional; their graph should yield a straight line.

4. Maintenance

The Boyle's Law Apparatus needs no special maintenance. If any difficulty develops, contact Central Scientific Company, giving all details of the problem. Do not return any equipment until we have sent you authorization.

5. Accessories

<u>Description</u>	<u>Catalog No.</u>
Single-Position Support Base with Rod	19070-01
Round-Jaw Symmetrical Clamp with Holder	12102
Hooked Mass Set	09810

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