

Boyle's Law Apparatus

Syringe Type "PSSC"



MF0350-001 Boyle's Law - syringe type

Description:

The simple apparatus provides a low cost but, because of frictional losses, only an approximate indication of Boyle's Law can be obtained.

The kit consists of::

- 1x Lower section with syringe body clipped to support fixed to plastic panel.
- 1x Upper section with syringe plunger fixed to plastic panel.
- 1x Short piece of small flexible woven cord.

Length: 100mm	Width: 75mm	Depth: 160mm	Weight: 330g
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Instructions:

Boyle's law states the relationship between the pressure of a gas and its volume while it is held at a constant temperature. Most Boyle's law instruments operate at very low pressures and a mercury column is used to compress the gas volume and also to measure the pressure created.. This instrument proves Boyle's law at a higher pressure than normal and the use of mercury is not required..

The lower half is placed on its plastic panel so the syringe body points upwards. The two halves of the instrument are fitted together so that the air space inside the syringe can be increased and decreased by altering the weight placed on the upper plastic panel.

To set the plunger exactly on a certain scale dimension to begin the experiment, it is necessary to permit some air to escape from the syringe. This is done by placing the piece of soft mini cord into the mouth of the body so that when the plunger is squeezed in beside it, the rubber seal on the plunger is not permitted to seal perfectly to the body.

Adjust the plunger to the starting position you require and pull out the mini cord so that the plunger can seal again. Note the starting position of the plunger and place a known weight on the upper panel. The

weight will push the plunger into the base and will be seen to compress the air and reduce its volume. Note the weight and the new length of the air column. Increase the weight and note the smaller volume.

The pressure inside the syringe is directly proportional to the weight applied that squeezes the syringe in a vertical direction. The volume of the air in the syringe is directly proportional to the length of the column of air inside the syringe. The values of weight and length are used to plot a graph relating the volume of the air / reciprocal of the pressure.

Boyle's Law states that gas
Pressure x Volume = a constant (k)
PV = k or V = k/P

Therefore, volume varies in proportion to the inverse of the pressure. Thus a graph of the gas volume (Y axis) to the **inverse of the pressure** (X axis) should be a straight line with a slope of 'k'.

Remember that air pressure around us already is pressurised to 100kPa (one atmospheric pressure) and the added mass to the plunger will increase it further. Therefore 100kPa must be added to all pressures calculated by mass and area.

Note:

The soft woven cord that is placed into the cylinder beside the piston does not indent the piston over a short time, BUT if left beside the piston for long periods, a small groove can be formed in the edge of the piston that will spoil the sealing.

If the piston has formed a small groove, placing the piston into hot water for say 10 minutes will normally recover the material so that it seals again.

Designed and manufactured in Australia

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