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**BOYLE'S  
LAW**

**LA30-217**

**INSTRUCTIONS FOR USE**

# BOYLE'S LAW

## LA30-217

### INTRODUCTION



This apparatus provides an accurate instrument for investigating Boyle's Law and is completely self-contained requiring no additional equipment or PSU, the unit requires 1 PP3 9V battery (supplied).

Volume is adjusted using the 2.5ml Syringe connected to a pressure sensor on the front panel. The signal from the sensor is then scaled to read in kPa on the digital display.

### SETTING UP

Although not essential it is useful to vent the sensor to atmospheric pressure and reset the syringe to a midpoint to achieve a good range of readings.

Slide the whole syringe to the right disconnecting the tube from the sensor – the display will now read current atmospheric pressure. Set the syringe to around half way (1.5ml) and reconnect the tube by sliding the syringe to the left – ensure the connecting tube has sealed around the sensor.

## IN USE

The unit is capable of reading pressures up to 199.9kPa, exceeding this pressure will lead to an error reading on the display.

The simple relationship between pressure and volume can be demonstrated by simply adjusting the syringe to show an increase in volume leads to a decrease in pressure and vice versa.

The inverse proportionality between pressure and volume may be quickly demonstrated by demonstrating that halving the volume doubles the pressure, e.g. moving the syringe from 1.8ml to 0.8ml (see note below)

**There is an additional 0.2ml of enclosed air due to the internal volume of the sensor and connecting tube which must be added to the syringe reading. A volume of 2ml is therefore enclosed when the syringe is set at 1.8ml**

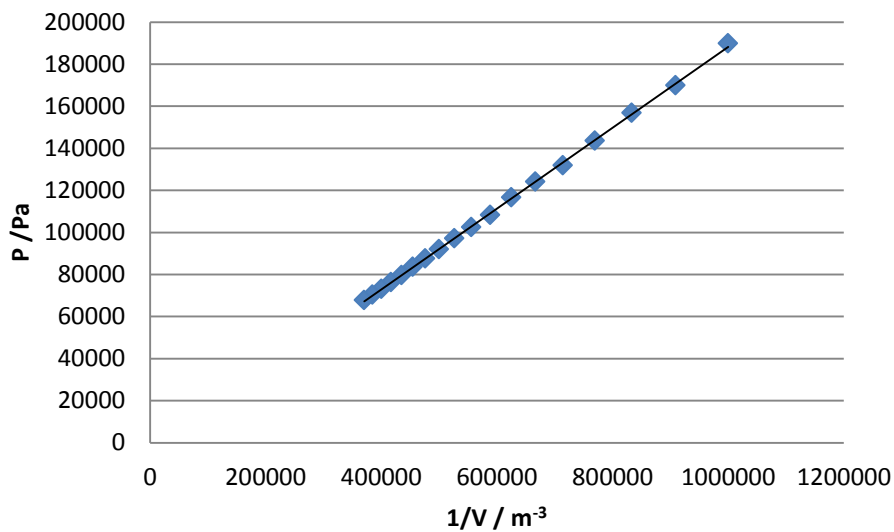
Readings may also be taken at 0.1ml intervals and the values of pressure and volume taken. Plotting  $P$  against  $1/V$  should then yield a straight line graph. (A sample data set can be found overleaf.)

## DEMONSTRATION

4mm sockets are provided allowing a large demonstration voltmeter to be connected (1V is equivalent to 100kPa). A larger syringe may also be connected to the sensor using a length of suitable tubing to allow the unit to be used for a class demonstration.

# SAMPLE DATA

P / kPa	V / ml	V +0.2 / ml
189.8	0.8	1
169.9	0.9	1.1
156.8	1	1.2
143.5	1.1	1.3
131.8	1.2	1.4
124.1	1.3	1.5
116.6	1.4	1.6
108.2	1.5	1.7
102.5	1.6	1.8
97.1	1.7	1.9
91.9	1.8	2
87.6	1.9	2.1
83.5	2	2.2
79.6	2.1	2.3
76.3	2.2	2.4
73	2.3	2.5
70.3	2.4	2.6
67.7	2.5	2.7



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