BOYLE - MARIOTTE'S LAW

MED 16.08

Material:

Item-no.	Qty.	Description
DE722-2D	1	Manometer, differential, "inno"
P3120-5B	1	S-shaped assembly platform
C6100-2A	1	Syringe, 120ml, plastics
C7445-7S	1	Hose, silicone, D=7/9 mm, L=100cm

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Purpose
Investigate the indirectly proportional relation between pressure and volume.
At constant temperature, the volume is indirectly proportional to the pressure.

The product **p . V** is constant.

Preparation
- draw the syringe up to a volume of 60 ml
- connect the syringe to the Manometer with the silicone hose
  (pay attention to the pressure direction "↑ overpressure"!)
- place the Manometer on the L-shaped assembly platform
- turn the Manometer on and tare (set it to 0)

Note
The normal ambient air pressure can be assumed to be around 1000 hPa.
By setting the manometer "to zero" we have a "relative" pressure display.

Experiment

Push the piston into the syringe to compress the air.
We note the value in 10 ml – steps and note them in the char below.

Volume (ml)	30	40	50	60	70	80	90	100	110	120
Pressure (hPa)										
Product of Volume and Pressure										

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We pull the thin hose off the manometer.

The syringe is again up to a volume of 60 ml

The syringe is connected to the hose with the manometer (pay attention to the pressure direction "↓ underpressure"!).

We slowly pull the piston out of the syringe and thus expand the air.

Again we note the value in 10 ml – steps and note them in the char below.

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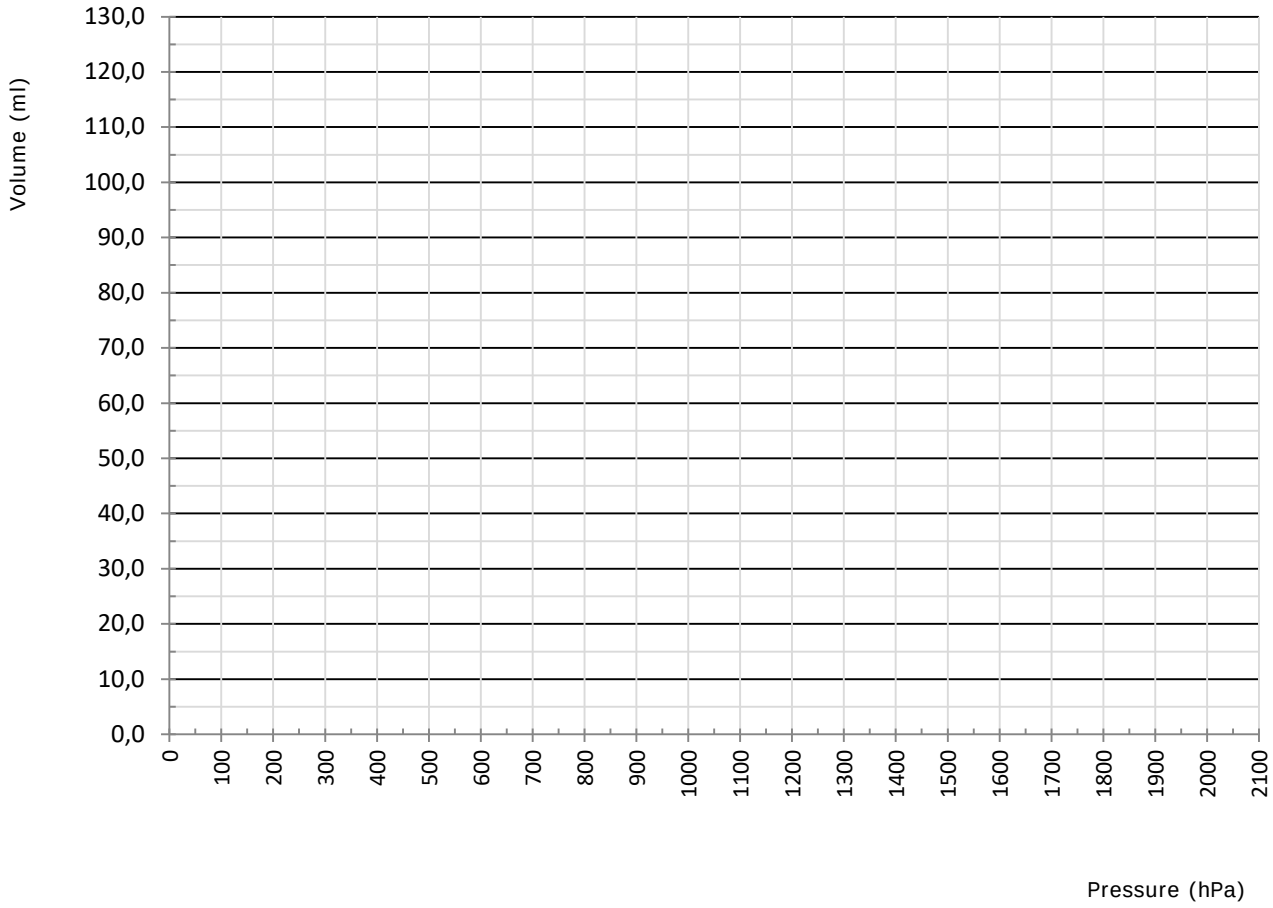
To get an absolute value of the pressure, we add the air pressure of the environment to the determined pressure values. This is between 970 and 1030 hPa.

Since the diagram below has only a rough division, we simply add "1000 hPa".

Note this value and the corresponding volume in the following diagram:



Conclusion

The larger the volume the smaller the pressure - the pressure is therefore indirectly proportional to the volume. The following applies (at constant temperature): p. V = constant

Note

Since the temperature rises when pressed together quickly, the process must be carried out so slowly that temperature compensation can take place.
The volume change at constant temperature is called isothermal.
The process without temperature compensation is called adiabatic.