



Molecular physics and thermodynamics

2.4 Pascal's Law

THEORETICAL PREPARATION

Pascal's Law relates to pressures in fluids:

An external pressure applied to a fluid in a closed vessel is uniformly transmitted throughout the fluid.

Notes:

- 1) In a vessel with any fluid, which is in a gravitational field, e. g. of Earth, it is necessary to take into account also hydrostatic pressure (caused by gravitational force).
- 2) Pascal's law can be applied also for gases.

EQUIPMENT

dual pressure sensor, USB link, notebook with DataStudio program, plastic bottle, water, rubber plug with two holes, two tubes, sticks and rubber bands



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EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



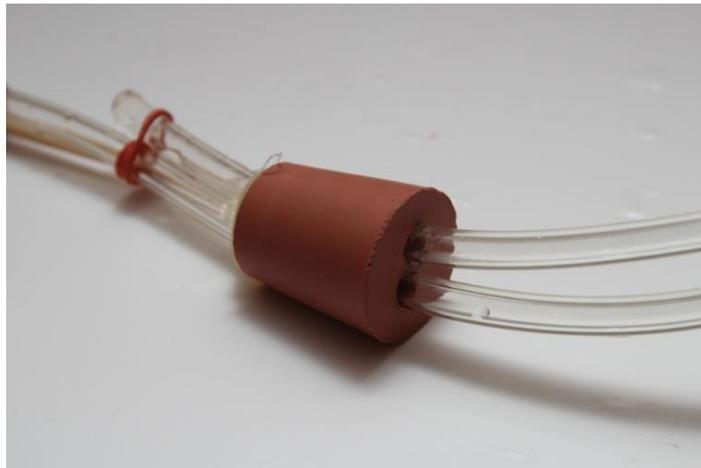
OP Vzdělávání
pro konkurenceschopnost



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

PROCEDURE

1) Fix the tubes into the holes in the rubber plug. End pieces of the tubes must be suitable for connection to the pressure sensor. The ends of the tubes must be of different length, so they can reach different point inside the plastic bottle. It is possible to fix the tubes to a stick by the rubber bands, because they can get twisted easily.



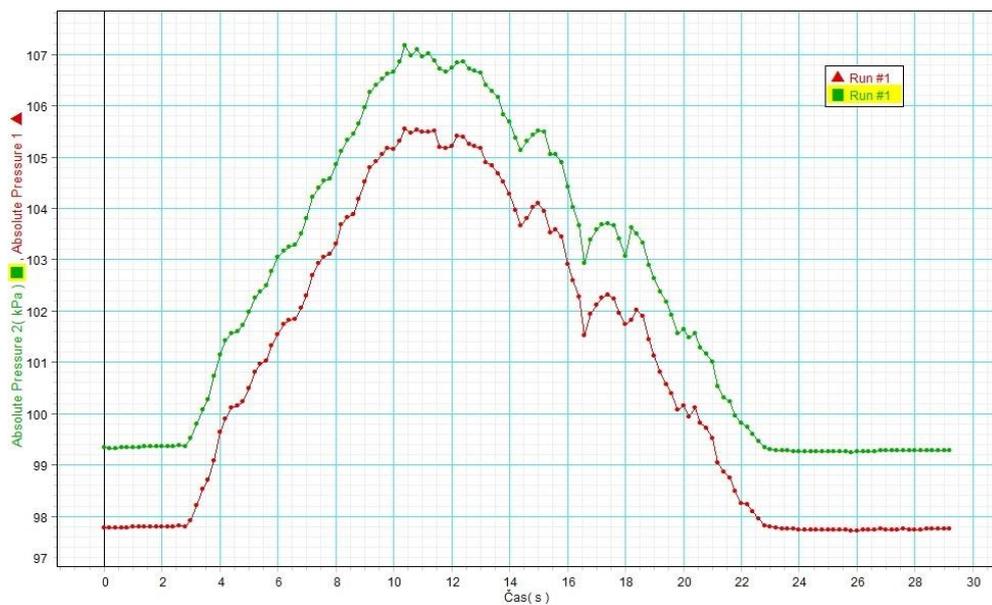
2) Pour water into the plastic bottle, so it is almost full and close the bottle with the rubber plug with tubes. Connect the tubes to the sensor, which was placed above. See the USB link to connect the sensor to the notebook. Pay attention to water, so it does not wet the sensor.

3) Start the DataStudio and set the sampling frequency of the sensor to 5 Hz.

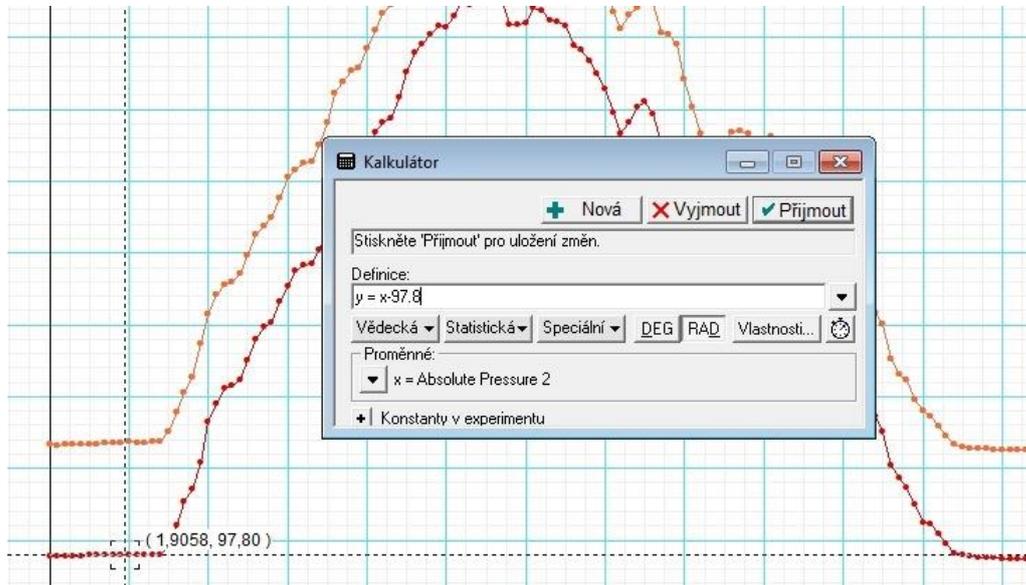
4) Use the button Start to initiate the measurement. Squeeze and let go the bottle several times. End the measurement by pushing the button End.



5) Create pressure-time graphs. The graphs are identical, the only difference is their shifting of the difference of the hydrostatic pressures.



6) Use the function Calculation (icon of Calculator) to move both graphs down in the vertical direction within the measured values of the hydrostatic pressures. These are pressures measured before the bottle squeezing.



7) Write the summary.