

10.8 Gas Pressure Sensor: Boyle's Law

Subjects: Properties of gases, volume and pressure, Boyle's Law

Description: The relationship between pressure and volume is explored with the Vernier Gas Pressure Sensor. Data is displayed on the laptop using the Logger Lite or Logger Pro program.

Materials:

Gas pressure sensor*
Computer and interface*
Logger Pro or Logger Lite software
20 mL syringe

*The sensors, interfaces, and assembly are located in the drawers opposite the bin storage shelves.

Procedure:

1. Position the piston of a plastic 20 mL syringe so that there will be a measured volume of air trapped in the barrel of the syringe. Attach the syringe to the valve of the Gas Pressure sensor. A gentle half turn of the syringe should secure the syringe to the sensor.
2. Connect the gas pressure sensor to either the Go!Link or the LabQuest interface. Connect the interface to the computer.
3. Option 1: Start the Logger Pro (Logger Lite doesn't have the experiment files) program on your computer. Open the file "30a Gases" from the Advanced Chemistry with Vernier folder. This file allows you to collect pressure data from the Gas Pressure Sensor using "Events with Entry mode". For each pressure reading you take with a keep button, this mode lets you enter a volume value.

Option 2: Use with Logger Pro or Logger Lite. For a more qualitative analysis, don't use the experiment file. After connecting the sensor to the computer, perform the experiment showing in real time how the pressure increases as volume in the syringe decreases.

Discussion:

This demonstration illustrates the direct relationship between volume and pressure known as Boyle's Law. Decreasing volume of a gas will increase its pressure. Likewise increasing the pressure on a gas decreases its volume (as seen in Demo 10.3, Cartesian Diver).

Safety: None

Disposal: None

References:

Adapted from:

1. 1. Randall, J. et al. Advanced Chemistry with Vernier. 2nd Ed. 2007. Vernier Software and Technology. Experiment 30.

http://www.vernier.com/files/sample_labs/CHEM-A-30-COMP-gas_laws.pdf