



# Boyle's Law

## Lab #16

Boyle's law describes the mathematical relationship between the volume of a gas (the size of the container it occupies) and the pressure of the gas (the force it exerts on the walls of the container). In this lab you will alter the size of a syringe containing a confined sample of air and will measure the resultant pressure.

### Materials:

TI-83 calculator with CHEMBIO

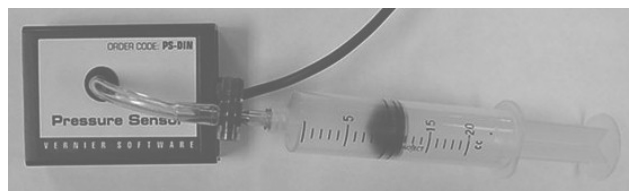
Pressure sensor

CBL

syringe

### Procedure:

Connect the calculator, CBL, and pressure sensor. Open the syringe to 10 mL and connect it to the pressure sensor as in the diagram.



Run CHEMBIO Set up probes, and when prompted, choose STORED calibration, then choose mm Hg as the unit of measurement. When you return to the main menu, choose COLLECT DATA, then TRIGGER/PROMPT.

Make sure that the syringe is not open to the atmosphere (You should feel resistance if you try to change the volume of the syringe) and then pull it back until it reads 20 mL. When the reading on the CBL stabilizes, press **TRIGGER** and then enter 20 into the calculator.

Choose MORE DATA, decrease the volume to 18 mL, press **TRIGGER** and enter 18. Continue to decrease the volume by 2 mL, taking readings at each point until you reach 2 mL or can no longer compress the syringe.

Choose STOP AND GRAPH, and use the graph to check the validity of your data. You should have what appears to be a smooth curve. If your data is lousy, check your setup for leaks and repeat the experiment. If your data looks good quit the program and either upload the data to a computer and save it, or write the data points down for later use.

### Calculations:

Graph pressure v. volume and pressure v 1/volume. For the second graph, determine the equation of the line.

Use this equation to determine the volume of space between the end of the syringe and the pressure sensor.