Unit B – Practical 3

Boyle's law

Safety

There are no safety issues concerning this experiment.

Apparatus and materials

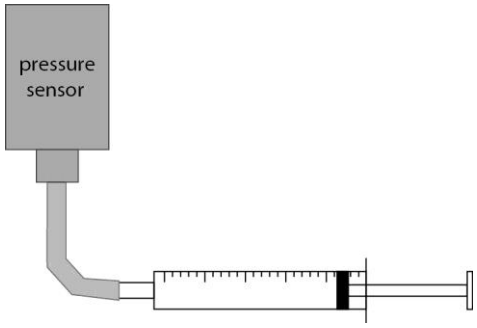
- syringe (100 cm^3)
- sealing lubricant
- pressure sensor
- rubber tube

Introduction

Boyle's law is the relationship between the pressure and the volume of a gas for a given mass of gas kept at constant temperature. It states that the volume of the gas *V* is inversely proportional to its pressure *P* and can be expressed as:

$$PV = \text{constant} \quad \text{or} \quad P_1V_1 = P_2V_2$$

It is equivalent to the ideal gas law $PV = nRT$ (n = number of moles of gas, R = gas constant, T = temperature of gas) when n and T are constant.



Procedure

1 To ensure that no air will leak, cover the piston seal of the syringe with a small amount of lubricant, as well as the connections of the rubber tube with the syringe and the pressure sensor.

2 Adjust the initial volume of the syringe to 50 cm^3 and wait for a few minutes for the air in the syringe to reach equilibrium. Then measure the pressure of the air using the pressure sensor.

3 Increase the volume by 10 cm^3 and repeat step **2**.

4 Repeat the process for five volumes in total. Record your measurements in an appropriate table.

5 Plot a graph of your data.

Questions

1 What is the shape of the line that Boyle's law would have in a graph of P vs V?

2 How could you graph your data so as to obtain a straight line?

