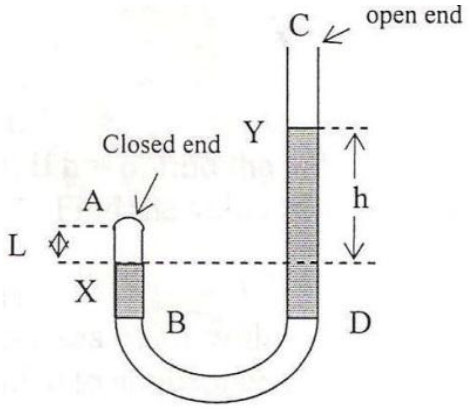
Boyle's Law

Purpose: To measure the pressure of the atmosphere.

To verifies Boyle's law.

Apparatus: glass tube-containing mercury as shown in fig.



Method:

1. Keep the mercury levels X and Yin the same position.
   Record the scale reading of these levels and also the scale.
   Reading of "A" the inside of the closed end of the tube "AB". This is balance point "X = Y"
2. Rising the tube CD above "balance point" and record the scale reading of X and Y levels.
3. Take about four sets of reading over the balance point.
4. Now, lowering the tube CD, below the "balance point" and record the scale readings of X and Y.
5. Take about four sets of readings below the balance point.

Readings:

1. Make the following table.

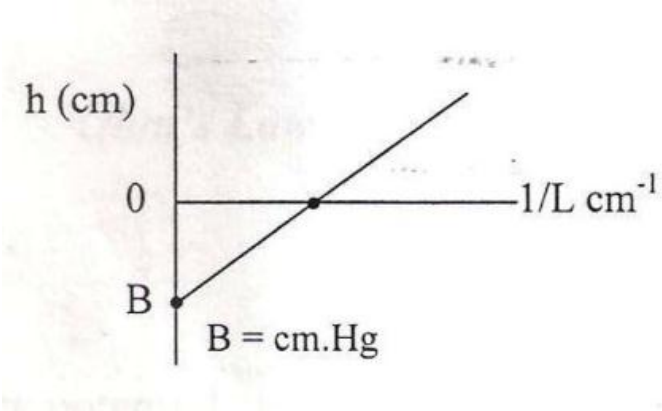
Scale readings / cm		A-X=L	Y-X=h	I / L
Y	AX			

2. Plot a graph for the values of h "cm" as ordinates against the corresponding values of I / L.

Theory and calculation:

1. If a plot of "h" assents I / L yields a straight line, Boyles law is verified and the negative intercept on the h-axis is numerically equal to B.

   • B = atmospheric pressure.



2. Use:

   h = C/K. I **/** L-B

   C&K = constant.

   From the graph; if h = o. find the value of 1 / L =?

   Find the value of C / K.

Medical Applications

Since we live in a sea of air with a pressure of 1 a tm. It is easier to measure pressure relative to atmospheric pressure than to measure true.

There are a number of places in the body where the pressure is lower than atmospheric, or negative. For example, when breath in (inspire) the pressure in the lungs must be somewhat lower than atmospheric pressure or the air would not flow in. the lung pressure during inspiration is typically a few centimeter of water negative.

When a person drinks through straw the pressure in his mouth must be negative by amount equal to a height of his mouth above the level of the liquid is drinking.

Other examples are discussed in chapter 7. For more reading see ch. 6 (Medical Physics) Cameron.