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Title A Simple Method of Calibrating the Standard McLeod
Gauge to Read Higher Pressures

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A Simple Method of Calibrating the Standard

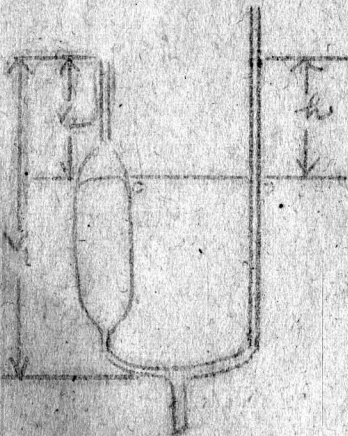
McLeod Gauge to Read Higher Pressures

Purpose:

This report describes a simple method, suggested by H. C. Steiner, of recalibrating the standard McLeod gauge so that it can be read clearly well into the centimeter pressure range.

Theory:

While taking data on the dielectric strength of various gases it was necessary to cover a large pressure range with accuracy. Since the standard McLeod gauges are calibrated to cover the range up to 2.5 mm. some difficulty was encountered in reading pressures above this value. The following theory was called to my attention as suggesting a simple method of extending the range of the standard gauge.



Applying Boyle's law (i.e. keeping the temperature constant) it can be shown that:

$$P_1 = k h$$

since:

$$P_1 V_1 = P_2 V_2$$

$$\frac{P_1 V_1}{V_2} = P_2 = \frac{h w d^2}{4}$$

$$P_1 = C P_2 = \frac{C w d^2}{4} \quad h = k \cdot h$$

Conclusions:

By applying the preceding theory it is easily possible to recalibrate the standard gauge to extend its range in the following manner:

(1) at some pressure which can be read on the standard scale read the pressure.

(2) set the zero level along the V_1 tubulation at any convenient place.

(3) Read "h" in the first-hand tubulation as the known pressure.

(4) Using this fixed unit calibrate the entire right hand column.

Thus, by bringing the mercury level to the fixed zero in the left column, the height of the mercury column in the right tubulation may be read with ease in the higher pressure ranges. By varying the zero level it is possible to vary the pressure range covered. The linear nature of the relationship involved makes this method of calibration particularly rapid and simple.

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