

A SIMPLE LABORATORY METHOD OF MEASURING VAPOR TENSION.

BY A. E. CASWELL.

About a year ago I designed a slight modification of the ordinary barometer tube apparatus for measuring vapor pressure of less than an atmosphere. This has been used in connection with a heat course for engineers with very satisfactory results, the accuracy attainable being about the same as by the usual methods.

The general arrangement of the apparatus is shown in the accompanying figure. A, is a piece of glass tubing about 2 cm. in diameter and 105 cm. long, graduated at suitable intervals. B, is a metal tube of slightly larger cross section than A, and ending in the reservoir C. This is provided with a tripod support. The length from the bottom of the tube to the top of the reservoir may be 15 cm. less than the length of A. The top of the tube A is surrounded by the vessel D, which may consist simply of a metal or glass tube fitted with a rubber stopper E. The vessel D, together with the tube A, to which it is rigidly attached, is raised or lowered by means of a clamp attached either to a rigid support attached to the tube B, or to a common laboratory support. When the tubes A and B are being filled with mercury about 5 cm. of the length of the tube, A is filled with the liquid whose vapor tension is to be measured. The vapor space can be varied by raising or lowering D, and by noting the corresponding change in height of the mercury column the necessary correction for any contained air may be determined. Ten centimeters is a convenient length for the vapor space. D is equipped with suitable thermometer and stirrer.

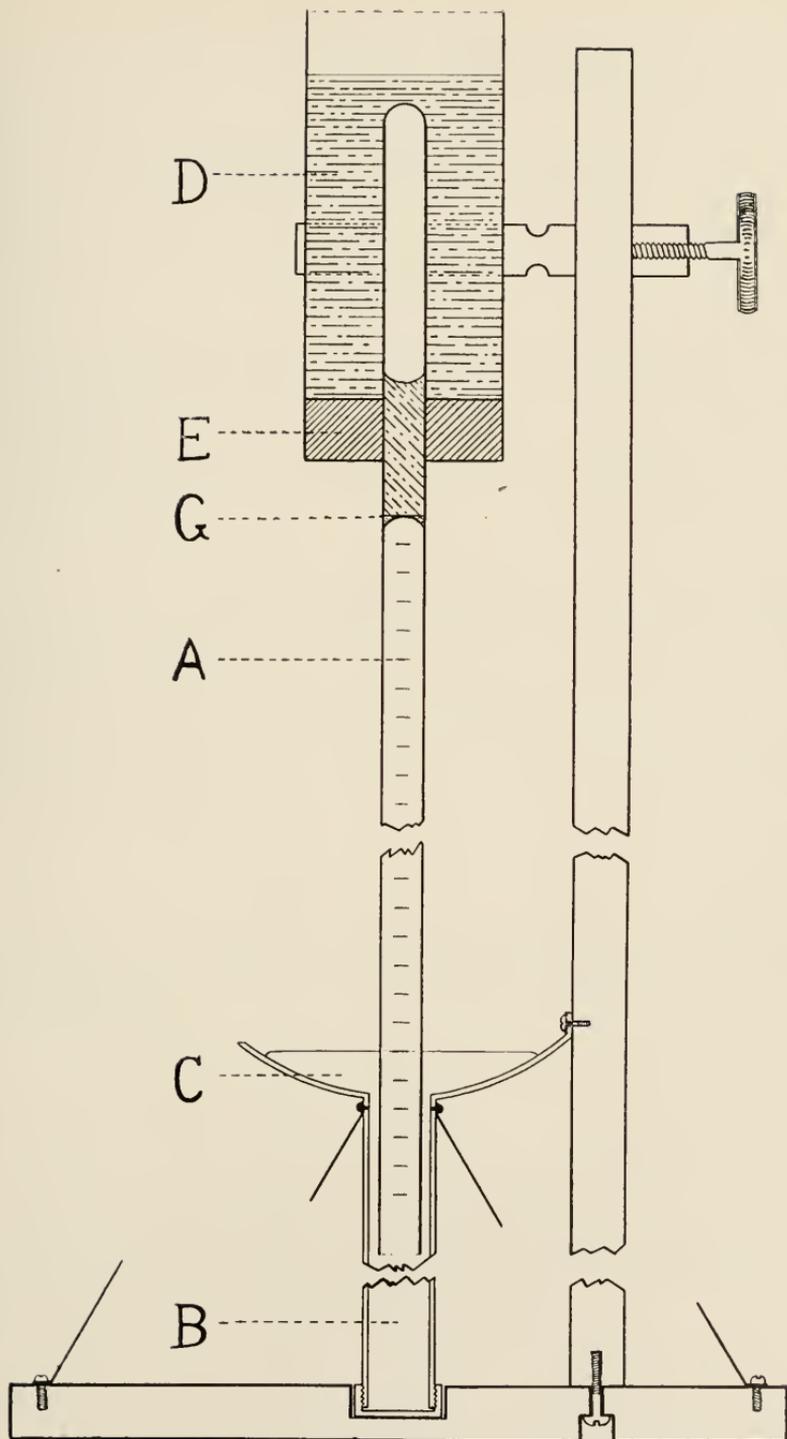
This method involves determining the temperature corresponding to a given vapor pressure. The vessel D, is filled with water, or other liquid, heated to a temperature above that at which the determination is to be made, and raised or lowered until the mercury surface in the tube is below graduation G, which is about 15 cm. from the upper end of the tube, and another graduation coincides with the level of the mercury surface in the reservoir C. The liquid D, is kept well stirred and allowed to cool

slowly; the temperature being read the instant that the meniscus coincides with G. The vapor tension in cm. of mercury is then the difference between the barometric reading and the height of the mercury column in A plus the mercury equivalent of the liquid in A and pressure of air in the vapor space.

The principal advantage of this arrangement lies in the ease with which one may secure a series of determinations at different temperatures by merely raising D 5 or 10 cm. as soon as one determination is made, and allowing the liquid in D to cool until the meniscus again coincides with G. In this way a series of ten or twelve determinations may be made in a half hour.

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