The remaining methods, though capable of accuracy in many cases, and particularly adapted to certain coals, do not by the reliability of the results or the ease of manipulation rival either the standard method or that of Eschka.

The preceding work was undertaken at the suggestion of Professor Edmund H. Miller, and for his advice and assistance throughout the course of these experiments the writer owes his most grateful thanks.

QUANTITATIVE LABORATORY,
May 20, 1902.

ON A METHOD FOR THE DETERMINATION OF VERY SMALL VAPOR-TENSIONS IN CERTAIN CIRCUMSTANCES.

BY LAUNCELOT W. ANDREWS.

Received June 7, 1902.

WHILE much has been done in recent years on the vapor-tensions of solvents, there has been but little work upon the tension of volatile substances in solution. It can not be doubted, however, that an investigation of phenomena of the class alluded to, promises interesting results if the experimental difficulties can be overcome. The method to which I would invite attention is based on a comparison of the tension of the solvent, assumed as known, with that of the substance dissolved.

If a substance, whose vapor-tension is S and molecular weight is M, evaporates freely into a volume V of air until the latter is saturated, we have for the weight of the substance evaporated, W, at constant volume,

$$W = MSV \text{ const.}, \tag{1}$$

in which the constant depends upon the units chosen. If a second substance with vapor-tension s, molecular weight m, evaporates simultaneously into the same volume of air to saturation, its weight, w, will be

$$w = msV \text{ const.} \tag{2}$$

Combining equations (1) and (2) and assuming all quantities as known, except s and V, we have

$$s = \frac{wMS}{mW}. \tag{3}$$

In this expression, the magnitudes indicated by the capital letters may belong to the solvent, those indicated by small letters to the substance dissolved. The vapor-tension S would, of course, be that, not of the pure solvent but as diminished by the material in solution, according to Raoult's law.

In practice the method thus outlined may be carried out as follows: Assume, as a concrete case, that a determination of the tension of iodine in a solution of this element with potassium iodide and water is to be undertaken. The solution is weighed in a suitable vessel, and placed in a thermostat. A slow current of dry air is passed through it for a time, and it is again weighed. The loss of weight equals evaporated water plus iodine, (or $= w + W$), and titration of the solution before and after shows how much of this loss is due to evaporated iodine.

All the required data for formula (3) are therefore at hand. As yet, the method has been applied only to a study of starch iodide, of which an account will be found in the following paper. It was devised and experiments with it were begun more than two years ago, but circumstances beyond control of the present writer have delayed publication so long already that it seems undesirable to withhold preliminary notice any longer.

So far as iodine solutions are concerned, I would reserve the field for a time.

CONTRIBUTIONS TO THE STUDY OF STARCH IODIDE.

By LAUNCELOT W. ANDREWS AND HENRY MAX GOETTSCH.

Received June 7, 1902.

SINCE the discovery of the blue substance known as "starch iodide" by Stromeyer,[1] our knowledge of its properties has been enriched by numerous researches[2]. In spite, however, of the remarkably extensive literature pertaining to the subject, no consensus of opinion has been arrived at with regard to either the nature of the substance, its composition, or even some of its more important properties.

Thus, while Blondlot, Béchamp, Pohl, R. Fresenius, Duclaux, Brückner, and Küster[2] consider it to be a mixture of starch with

---

[1] Thorpe's Dict., Vol. III, p. 565.

[2] See bibliography at the end of this paper.