XXII.—Table for the Correction of Saccharimetric Tests by Inversion.

By P. Casamajor.

In a paper "On the Influence of the Variations of Temperature, on the Deviation of Polarized Light by Solutions of Inverted Sugar," published in 1879,* I endeavored to show the principle on which is founded the method, so important in sugar analysis, of correcting the direct test of the optical saccharometer, by taking into account the test after inversion. In this communication I will assume that the reader is familiar with the subject, and I propose to enter only very briefly into it.

Clerget, to whom this method of correction is due, published a table in the *Annales de Chimie et de Physique* (**26**, 3d series, 175), by means of which the desired rectification may be obtained, without the need of any calculation beyond taking the algebraical difference of the indications of the saccharometer, before and after inversion. There is also a table by Dr. Tuchschmid, which is essentially the same as Clerget's. Although these tables are published in several works on sugar, many persons who need to use them find great difficulty in obtaining them. There is the resource of copying them by hand, but they are so extensive that this would involve an amount of labor which few persons like to undertake.

The following table will be found useful by persons who have not those spoken of. It is very short and it would be little trouble to copy it. It requires but one operation more than Clerget's table, which is to multiply the algebraical difference of the two readings by a certain factor, corresponding to the temperature of the inverted sugar at the time of observation.

To understand how the numbers in this table were obtained, we must bear in mind that the deviation due to inverted sugar varies with the temperature. For a solution of inverted sugar giving a deviation of 100 to the right, the indication, after inversion, is 44 to the left, or —44, if the observation is made at 0° C. For every centrigrade degree above 0, the deviation becomes half a degree less of the

* See Journal of the American Chemical Society, **1**, 26; also *Chemical News*, **39**, 212, 234; *The Sugar Cane*, **11**, 296; *Moniteur Scientifique*, Juin, 1879, 647; *Zeitschrift des Vereins*, July, 1879, 683.

negative scale. If we call the temperature t, the law of deviations after inversion is expressed by

$$-\left(44 - \frac{t}{2}\right)$$

For a temperature of 10° C., the deviation is —39; for 20° C., the deviation is —34, etc.

If D is the indication of the saccharometer before inversion, and —D′ the indication after inversion, D + D′ will be the algebraical difference, and, for a solution of pure sugar, with D = 100,

$$D + D' = 144 - \frac{t}{2}$$

If the direct test is not 100, and if we call the correct test Z, we will have

$$\frac{Z}{D + D'} = \frac{100}{144 - \frac{t}{2}}$$

$$\text{Whence } Z = D + D' \times \frac{100}{144 - \frac{t}{2}}$$

If for every degree centigrade, we calculate this quantity :

$$\frac{100}{144 - \frac{t}{2}}$$

we may form a table by writing it opposite to every degree of temperature. We will then have in a second column the factors by which to multiply the difference of the indications, before and after inversion, to obtain correct results.

NUMERICAL EXAMPLE.—If the direct reading of the saccharometer is 90, and, after inversion, —27, the temperature being 25° C., then D + D′ = 117. Referring to the table, we find, opposite 25° C., the factor 760. This number multiplied by 117 gives 88.9, which is the correct result.

This table is given on next page :

TABLE OF FACTORS CORRESPONDING TO $\frac{100}{144 - \frac{t}{2}}$

Degrees Centigrade.	*Factors.*	*Degrees Centigrade.*	*Factors.*
10°	0.719	26°	0.763
11	0.722	27	0.766
12	0.724	28	0.768
13	0.727	29	0.771
14	0.730	30	0.774
15	0.732	31	0.777
16	0.735	32	0.780
17	0.738	33	0.784
18	0.740	34	0.787
19	0.743	35	0.790
20	0.746	36	0.793
21	0.749	37	0.796
22	0.752	38	0.800
23	0.754	39	0.803
24	0.757	40	0.806
25	0.760		

XXIII.—AN APPARATUS FOR THE RAPID ANALYSIS OF MIXTURES OF GASES.

BY ARTHUR H. ELLIOTT, PH.B, F.C.S.

The apparatus is of the type of those in which the various gases are absorbed by the use of liquid reagents added in a certain order. This was carried out by Raoult* in a graduated tube with a stop-cock above and another below, and the upper stop-cock surrounded by a cylindrical funnel. But the washing out of each reagent before adding a new one, and a somewhat risky manipulation of the tube and stop-cocks to insure measuring the gas without pressure, makes this method troublesome. Wilkinson further modified this method of Raoult, by introducing another vessel in which the burette stood in water, doing away with the lower stop-cock. By this means, the level of the water in the burette, and the exterior tube, could be adjusted by means of a stop-cock on the latter, and the gas measured

*F. M. Raoult, *Compt. Rend.*, 1876, 844.