

THE ESTIMATION OF CANE-SUGAR IN MILK.

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(For further particulars see the ANALYST, vol. v., pp. 35-40.)

TEN grams. of the milk are evaporated to dryness upon 4 grams. of hydrated calcium sulphate with frequent stirring, so that nothing sticks to the basin. The dry residue is powdered, placed in a *dried* filter and extracted with ether in the "Soxhlet," and the fat weighed as usual. The residue is transferred to a beaker, together with the filter containing it and 20 c.c. of hot (not boiling) water are added, and the whole is well stirred; 30 c.c. of *rectified* spirit (60° O. P.) are then added, and the mixture is allowed to cool, stirring occasionally. When cool it is thrown on a filter, placed over a long graduated measure, and washed with *proof* spirit until the filtrate measures 120 c.c. (usually sufficient unless the amount of cane-sugar be very large, as in condensed milks). The filtrate is divided into two equal parts, and the one portion is evaporated on the water-bath in a weighed platinum dish, and then dried at 212° to constancy, weighed, slowly burned to a white ash at a *dull* red heat and again weighed (weight—tare of dish + ash) $\times 20$ = per cent. of total

sugars. In the other portion the milk-sugar is estimated by Fehling *gravimetrically* by the author's method of directly weighing the reduced cuprous oxide, and the milk-sugar so found $\times 20$ = per cent. This deducted from the total = cane-sugar. In all milks containing over 2 per cent. of cane-sugar the process is accurate, but when dealing with small adulterations the following allowances must be made:—

Per cent. of cane-sugar found.				Deduction to be made.			
Under	0.5	...	...	...	...	0.5	...
Over	0.5 but under	1.0	...	...	...	0.2	...
"	1.0	"	1.5	...	...	0.1	...
"	2	"	...	...	...	none.	...

Pure milk thus treated shows a slight difference (about $\frac{3}{4}$ as a maximum) between the total sugar and the estimated milk-sugar, and therefore a limit of .5 is fixed, below which the process is not to be used, and it is *only to be applied when the presence of sugar can be distinctly proved by taste* in the original sample. A proper training of the palate can detect the addition of any amount of sugar to milk over half per cent.

As to the gravimetric Fehling and direct weighing as Cu_2O , although it is apparently against all preconceived ideas, it has still stood the test of time in the author's hands. He reiterates his opinions (1) That the only reliable reduction of copper obtained from milk-sugar is when the "Fehling" is added all at once and in distinct excess. (2) That it is quite possible to dry and weigh Cu_2O with sufficient accuracy, if only the method be practised. (3) That by this process the Cu_2O found multiplied by the factor .6835, gives the actual amount of milk-sugar as it really exists in the milk with sufficient accuracy for all ordinary purposes. The author now makes some slight modifications on the original process. Thus instead of a weighed filter as originally used for collecting the Cu_2O , a pair of tared filters are employed so as to equalise any possible action of the "Fehling" on the paper. Again the final washing water is displaced by strong spirit, and then that is in turn displaced with a little petroleum spirit before putting in the bath. The use of the thick pad of dry white blotting paper below the filter paper in the bath is absolutely necessary, and a slight pressure of the filter and contents between thick blotting paper before putting in the bath is now resorted to. A good quick-running filter paper should be used, and the rapidity of manipulation of the whole process should be aimed at. The author has never himself tried how far Pavy's method would do for the estimation of the lactose, but for those who prefer volumetric work, it might possibly answer sufficiently well. For an ordinary analyst, only meeting occasionally with sugared milks, however, the gravimetric process as detailed in the original paper (with the above modifications) is far the best and most convenient.

(Conclusion of Society's Proceedings.)