

NOTE ON THE OPTICAL ESTIMATION OF MILK-SUGAR.

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At the December meeting of the Society of Public Analysts, I made mention of a process of optically estimating milk-sugar, which is largely employed in America, and was communicated to me recently by Professor S. P. Sharples, a description of which appears in the February number of the ANALYST. To the description I appended a footnote, signed with my initials "A. H. A.," but which is attributed by the printer to "A. Hill."

Within the last few days, I have received a copy of a paper by H. W. Wiley (reprinted from the *American Chemical Journal*, Vol. vi, No. 5) in which he shows, by a number of experiments that, as ordinarily employed, the optical estimation of milk-sugar is below the truth, owing to the solubility of the lævo-rotatory albuminous bodies in an excess of the solution of basic lead-acetate. He proposes, therefore, to limit the amount of lead solution used. He prepares it by boiling a saturated solution of lead-acetate with excess of litharge, and diluting the solution to a specific gravity of 1.97. 1 c.c. of this re-agent, will precipitate the albuminoids from 50 to 60 c.c. of milk. Professor Wiley, however, strongly recommends the replacement of the lead solution by an acid solution of mercuric nitrate, prepared by dissolving mercury in twice its weight of nitric acid of 1.42 specific gravity, and diluting the solution so obtained with an equal measure of water; 1 c.c. of this re-agent is added to the standard quantity of milk, the solution made up with water to 102.4 c.c., agitated, and at once filtered. It will be observed that an allowance is made 2.4 c.c. for the volume occupied by the albuminous precipitate. Through the courtesy of Mr. Bodmer, I have had the opportunity of perusing an abstract of his paper "On the determination of cane-sugar in the presence of milk sugar." I think the point established, that cane-sugar is readily inverted by citric acid, while milk-sugar undergoes no change, a very important one.

I am indebted to Mr. H. T. Brown for calling my attention to the use of invertin, the soluble ferment of yeast, as a reagent for inverting cane-sugar, but its employment seems to have been first proposed by Kjeldahl. For effecting the inversion of cane-sugar by invertin, Kjeldahl (*Zeits. Anal. Chem.*, xxii. 588) treats 50 c.c. of the sugar solution with a little concentrated alcoholic solution of thymol, and adds a little yeast previously washed and ground up with water. The thymol completely prevents fermentation without interfering with the action of the invertin. The mixture is allowed to remain for twenty-four hours at a temperature of about 50° to 52°C. It is then diluted to 100 c.c., filtered, and the cupric oxide, reducing power and optical activity estimated. From the increase in the former, and the change in the latter, the amount of cane-sugar present in the original solution can be determined.

H. T. Brown modifies the foregoing process by grinding well washed yeast in a mortar, with a little water and ether, or chloroform, and adding a small quantity of the product to the sugar solution, previously saturated with ether or chloroform. The liquid is then kept at a temperature of 30°C. for half an hour, when it is filtered and examined as before. If chloroform has been employed it must be got rid of by heating the liquid before adding Fehling's solution.

(CONCLUSION OF THE SOCIETY'S PROCEEDINGS.)