

A FURTHER EXAMINATION OF THE SUCROSE:CHLORIDE AND REDUCING

SUGARS:CHLORIDE RATIOS IN CANE JUICE CLARIFICATION

I. INTRODUCTION

The aim of scientific factory control is the reduction of undetermined losses to a minimum and the greatest possible extraction of sucrose from the final molasses. To achieve this aim, it is necessary to select a method of control which will give an accurate picture of what is happening to the sugars from the time they enter the factory.

Existing methods depend upon a determination of the °Brix, % pol and % reducing sugars and on the Brix:pol and reducing sugar:pol ratios. It has been proved, however, that all of these "constants" may be changed at the same time. What is more important is that reducing sugars, which in part make up the total solids in the juice (i.e. °Brix) may be destroyed, resulting in a loss of solids. If there is a simultaneous loss of sucrose by inversion, it is obvious that the Brix:pol ratio may exhibit no variation and the loss may go entirely undetected.

At this College, investigations into the behaviour of sucrose and reducing sugars were first carried out by Foster (1). He proved that °Brix was not a reliable reference standard. In its place, he suggested that either % Potash or % Chloride should be used. For determining the laevulose % reducing sugars, Foster recommended the method of Jackson and Matthews (2). The accuracy of this method was subsequently confirmed by Dunlop (3). Percent chloride was adopted as a reference standard, because it was more easily determined than % Potash.

Having chosen his methods, Foster attempted to make a general survey of the fate of reducing sugars in the factory. His results indicated that decomposition of reducing sugars and inversion of sucrose occurred in every stage. Some difficulty was encountered during the examination of the behaviour of sugars during clarification. Although there were indications that inversion and decomposition were

taking place, in some cases the sucrose:chloride ratio was found to increase from raw to clarified juice. Foster pointed out that this can only indicate either an increase in the % sucrose, which is impossible, or a decrease in % chloride. Both Foster and Dunlop, however, found % Chloride reliable in work upon the evaporation and crystallisation stages.

This investigation was, therefore, started with the following objects:-

- (1) A re-examination of the behaviour of % Chloride during clarification.
- (2) A fuller investigation into the factors governing the inversion of sucrose and decomposition of reducing sugars during the clarification stage, and the conditions under which the least inversion and destruction takes place.
- (3) A careful estimation of % sucrose in raw and clarified juices, in order to study the effect of the chemical reactions in clarification on the optical activity of sucrose.