

A SURVEY OF THE REDUCING SUGARS

IN CANE SUGAR MANUFACTURE.

-----oOo-----

I. INTRODUCTION.

Recently the Sugar Technology Department of the Imperial College of Tropical Agriculture, has been attempting to find a substitute for Stannous Chloride in the manufacture of "Yellow Crystal" sugar. During one of these experiments carried out at the College Experimental Factory, varying amounts of phosphoric acid were added to the pan just before striking. This addition of acid might have caused some inversion of sucrose, so the percentage of Reducing Sugars in the various products was determined. As these products were of different concentrations, the reducing sugars present were expressed as a percentage of the °Brix. These results were expressed in a table¹.

On examining this table it was noted that in every case, where either stannine or phosphoric acid had been added to the pan, there was a decrease in the Reducing sugars % Brix of the treated as compared with the untreated molasses. In the massecuites there were an equal number of increases and decreases in the Reducing sugars % Brix as a result of treatment.

It was also noted that in every case the apparent and gravity purities of molasses from strikes treated with either stannine or phosphoric acid were higher than those from untreated molasses, but in the massecuites there were an equal number of decreases and increases in the gravity and apparent purities.

If the differences between the gravity and apparent purities are compared, it will be seen that with only one exception, molasses in strike 6. the differences in the treated massecuites or molasses are always smaller than in the untreated.

These facts were at first attributed to a destruction of fructose, and some attempts were made to split the total reducing sugars into fructose and glucose. The method used was that of Sieben²., in which the fructose was destroyed by heating with strong Hydrochloric acid and the drop in reducing power was taken as representing the fructose.

The results thus obtained were too inconsistent to enable definite conclusions to be formed, and although a destruction of fructose could not entirely explain the results, yet there remained the possibility of this destruction.

It was decided therefore, to find a reliable, established method, failing which an attempt was to be made to develop one.

If this destruction of reducing sugars is taking place, it will have marked effects on the Boiling House Recovery of a factory, for by the theories of molasses formation, each part of either fructose or glucose present is capable of displacing approximately one part of sucrose from the sugar-salt-water complex which is the major part of Final Molasses. The decomposition is also accompanied by the formation of dark coloured compounds, which influence the colour of the sugar.

Many attempts have been made to calculate a Balance-sheet of the reducing sugars entering and leaving a factory, and conflicting results have been obtained. This is quite understandable, as if inversion and destruction were occurring at the same time, only the excess of one over the other would be apparent.

Thus if a method were found which would show an increase or decrease in either fructose or glucose individually, it might be possible to apply it to the various stages of sugar manufacture, and in this way find out in which of them destruction of either component of reducing sugars occurred.

The objects of the present investigation are:-

- (a) Finding a method of determining fructose and glucose separately.

(b) Applying the method to the sugar manufacturing process.