

INTER-RELATIONSHIP OF CALCIUM SULPHITE AND PHOSPHATE
IN THE CLARIFICATION OF SUGAR-CANE JUICES.

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I. INTRODUCTION.

The object of clarification is to secure a clear juice with maximum removal of impurities both colloidal and suspended, but in practice this is accomplished with varying amounts of success according to the process of clarification employed.

The process of clarification is both physical and chemical. In all processes of clarification, calcium phosphate is always formed by the inter-action of phosphoric acid occurring naturally in the sugar-cane juice and the lime added. In the ordinary lime clarification for the production of raw sugar (96° test) the amount of calcium phosphate formed, largely determines the quality of the clarification. This depends on the phosphate content of the juice and hence a low content results in poor defecation and vice versa.

This clarification is far from efficient in eliminating the soluble and insoluble impurities, and hence, fairly large amount of impurities find their way in the raw sugar which are subsequently removed by the refiner in a secondary clarification for making granulated white sugar.

In the manufacture of direct consumption sugars, the clarification should be as thorough as possible to produce a bright limpid juice free from colloidal and colouring matters. The method chiefly used for such a clarification is "sulphitation." The underlying principle in this process is the formation of calcium sulphite and phosphate precipitates within the juice which offer greater surface for colloidal adsorption, and carry down the cane colloids and suspended matter in flocs, which gives quick settling and

easy filtration. These inorganic precipitates are physical defecants, which are indispensable for efficient clarification.

Due to the important part played by these insoluble calcium salts in the clarification of sugar-cane juices, they have in recent years been given considerable attention by chemists.

As far as the writer is aware, no work has yet been done on the inter-relationship of calcium sulphite and phosphate, either in pure aqueous solutions or in sugar-cane juices. This forms the subject of study of this paper and an attempt is made to throw some light on cane-juice clarification from this point of view.

In judging the clarification efficiency by different treatments of the juice as regards SO_2 and P_2O_5 concentrations, the percent colloid elimination and rise in purity from the main basis of comparison in all the clarification experiments both in the Laboratory and in the Factory.

All laboratory experiments were conducted under conditions approximating as closely as possible to those of the sugar house, and in an attempt to keep the quality of cane juice as uniform as possible BH 10(12) was the variety used exclusively.

The method of adding sulphurous acid to the juice differs from country to country. In the present work the Standard Louisiana Method has been followed (sulphuring cold juice and liming). It is assumed that the action of sulphurous acid added before or after liming cold or hot, simultaneously or continuously with the lime does not give appreciably different results. - Muller (1).