

A STUDY OF THE PHOSPHATATION AND SULPHITATION METHODS OF
CLARIFICATION OF SUGAR-CANE JUICE WITH A VIEW TO
ESTABLISHING AN INTER-RELATIONSHIP.

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I. INTRODUCTION.

Clarification may be defined as "A process for removing non-sucrose from the juice by the formation of a flocculent precipitate within the juice". This precipitate not only absorbs colloid, but enmeshes suspended matter and carries it down in settling.

The use of lime for neutralising acidity and precipitating impurities from juices is universal in sugar factories. Since cane juice invariably contains phosphatic ions (recorded amounts vary from 0.006 to 0.087 gms. P_2O_5 per 100 cc.) a copious precipitate of calcium phosphate is formed when lime is added to the juice until neutrality or slight alkalinity is reached. When the amount of naturally occurring phosphate is small this is often added.

Frequently, where a further precipitation to supplement phosphatation is needed, sulphurous acid is used in addition to lime. The raw mill juice is sulphured to a concentration of from 0.03 to 0.25 gms. SO_2 per 100 cc. and lime is then added to approximate neutrality. The juice is then heated to $100^{\circ}C$ or over, and run into tanks in order to allow the precipitated calcium phosphate and calcium sulphite to settle out with the colloidal matter.

Farnell (1),(2) has worked out the optimum conditions for the precipitation of both calcium sulphite and calcium phosphate. The amount of precipitate formed when phosphoric acid and sulphuric acid are neutralised separately with calcium hydroxide depends, other conditions being constant, on the initial concentration of the acid.

In this investigation an attempt has been made to

determine at what initial concentration of P_2O_5 and SO_2 maximum precipitation takes place. The effect of these precipitations on each other has also been studied by precipitating them simultaneously from the same solution.

Finally, an attempt was made to determine the "critical" P_2O_5 and SO_2 concentrations for efficient clarification of cane juices. The Dye Value (3) as an arbitrary measure of colloidal content, was used as a criterion of clarification efficiency.

These experiments were planned to approximate as closely as possible to factory conditions and actual research, on a factory scale, was conducted at the Experimental Sugar Factory of the Imperial College of Tropical Agriculture and at the commercial factory of the Reform Estates (1928) Ltd.