

ABSTRACT

Turbidity Studies on Cane Juice and Raw Sugar

Ludlow Oswald Osmond Brown

Turbidity in raw sugar provides valuable information about its refining quality. Similarly, turbidity in clarified juice gives information on the efficiency of the process of clarification which is a crucial parameter in raw sugar manufacture for achieving a good quality product acceptable to refiners. In the present studies nephelometric methods were used to measure the turbidity in Jamaican and Louisiana raw sugar solutions and juices. Turbidity in raw sugar was also measured using the techniques of spectrophotometry and colorimetry. Good correlation was achieved between nephelometric and spectrophotometric methods with a correlation coefficient, r^2 , of 0.94. The nephelometric method gave good reproducibility with the percent coefficient of variation being 1.98. It is a simple and reliable method. The method is recommended by the International Commission for Uniform Methods of Sugar Analysis (ICUMSA) for obtaining turbidity measurements.

Protein content of mixed juice varied from 0.2 - 0.9% and clarified juice from 0.2 - 0.9%. The percent elimination of protein as a consequence of clarification varied from 3.3 - 32.4%. There was good correlation between turbidity and protein content with r^2 being 0.98. The literature reports 12.5 - 60% removal of nitrogen by clarification.

The polysaccharide content of mixed juice varied from 0.2 - 0.8% of solids and for clarified juice from 0.1 - 0.7% of solids. The elimination of polysaccharide due to clarification varied from 6.8 - 40.9% of solids. There was good correlation between turbidity and polysaccharide content with r^2 being 0.79. Previous studies report polysaccharide levels in cane juice of 0.5% of solids and a 35 - 53% removal by clarification.

A nephelometric system was used to measure juice turbidity of several clarifiers at Jamaican and Louisiana mills and gave information for assessing clarifier performance. Clarified juice turbidity values varied widely between clarifiers and between each tray of a single clarifier over time. Clarified

juice turbidity at Jamaican mills ranged from 56 Nephelometer Turbidity Units (NTU) to values in excess of 2000 NTU. Turbidity measurements for clarified juice at Louisiana mills ranged from 77 to 198 NTU. Excellent juice clarity was achieved when turbidity values were less than 100 NTU. Turbidity measurements of clarified juice were used as a technique to assess the performance of one or more clarifiers operating simultaneously.

The results indicate that for Jamaican and Louisiana juices, the nephelometric method for measuring turbidity gives accurate and reproducible values for this parameter.