Sugar is found in many staple food products and is present in numerous processed foods. The many derivatives of sugar come mainly from two major raw sources: beet sugar and sugar cane. Spectral analysis plays an important role in raw sugar production and can help to increase productivity when used as a method of quality analysis in the cane sugar industry. Analysis of theoretical recoverable sugar (TRS)accounts for many of the measurements used to set prices and measure quality in the sugar cane industry. Spectral analysis using ultraviolet (UV) and near-infrared (NIR) technology offers a reliable and efficient method of sample analysis to assist in product development, set quality parameters, and evaluate other elements in cane sugar production.

NIR spectroscopy for accurate and continual process monitoring

The core/press method for the quality analysis of raw cane sugar is a common practice throughout cane sugar industry. Samples can be quickly and accurately analyzed for TRS, sucralose content, and other components using the simple and non-destructive process of spectral analysis in combination with the core/press method for higher levels of efficiency and productivity. Spectral analysis instrumentation offers in-line sample analysis that can provide valuable feedback to inform process changes and reduce errors from random sampling methods. Continual sample averaging eliminates variations and increases production flow, which allows for constant product monitoring throughout the sugar extraction process.

Spectral analysis has been utilized for sample monitoring in the grain and cereal industry for decades, so movement into the cane sugar industry was a natural progression of this technology. This method of analysis first became popularized by the Sugar Milling Research Institute in South Africa, where spectral reflectance was used to measure moisture content in finely chopped and ground cane samples. The results from spectral analysis data were acceptable and soon this method of technology was adapted to core samples as a satisfactory method of analysis. This reflectance analysis model has also been adapted to measure sucralose concentrations to provide valuable quantification data.

Spectral technology and phosphorus analysis

Spectral analysis in the ultra-violet range is another valuable tool in the analysis in sugar. Phosphorus is an important element, essential to both plant and animal growth, making it a valuable resource within many products that we use daily. Phosphorus levels can be determined in sugarcane juice using UV spectroscopy.

The color absorption measurements of sugarcane juice, in congruence with the phosphomolybdate complex reduction method, correlate directly with the concentration of phosphates found in the sample medium. Measuring the phosphate in sugarcane juice is essential to the clarification process in refined sugar products. Studies show that cane juice clarifies best when phosphate levels are kept at ideal concentrations. Continual monitoring with spectral analysis ensures that these levels are maintained, increasing both production rates and overall quality.

Options in spectral technology

Spectral technology is a simple yet effective method of evaluation for the many steps and processes in cane sugar production. This invaluable tool provides rapid and accurate quantification of the many elements of cane sugar production, ensuring quality and a high rate of productivity. Whether measuring UV, VIS, or NIR wavelengths, spectrophotometers offer a highly-adaptable tool for many applications in the food industry.

Full article with photos available here:

https://www.hunterlab.com/blog/color-food-industry/living-sweet-life-spectral-analysis-of-cane-sugar-and-other-sugar-based-products/