

The coffee shop I visit in the mornings offers an impressive array of sweeteners, perfect for someone like me who prefers a cup of sugar and cream with a hint of coffee flavor. For years I had been using raw sugar, bypassing the white packets of real and artificial sweeteners, congratulating myself on my commitment to healthy living as I stirred two teaspoons of golden crystals in my cardboard cup. Brown foods are better than white ones, right? I was definitely going to live forever. Then I made the mistake of Googling. It turns out that sugar color does not, in fact, indicate virtue—white, brown, and raw sugar are all virtually nutritionally identical.¹ However, color is reflective of refinement and acts as a key indicator of sugar purity, grade, and quality.

Sugar Color as an Indicator of Purity

The International Commission for Uniform Methods of Sugar Analysis (ICUMSA) was established in 1897 to create international standards for sugar quality classification. In order to produce a [common, international language](#) of sugar purity, the ICUMSA developed a colorimetric method of measurement that allows producers to quickly and easily categorize their products in accordance with global guidelines. Sugar color is recognized as being so faithfully reflective of refinement and quality that it can be relied on as the sole determinant of grade. This is due to the fact that color results from the specific manufacturing processes to which sugar is subjected; the more processing sugar cane is subjected to, the more color is removed, and the final pigmentation of the product reflects the degree of processing to which it has been subjected. These processes are also what give each type of sugar its subtle but distinctive taste. While the nutritional value may not be impacted by refinement, palatability, safety, and usability are and precise manufacturing methods are necessary to ensure that the sugar meets both consumer and industry standards.

ICUMSA Color Grading

ICUMSA scores are sometimes thought to measure sugar whiteness, but, in fact, the grading scale is a type of yellowness index [similar to the Gardner Scale](#), with lower numbers indicating lower levels of pigmentation. Sugars with an ICUMSA score of 45-800 may be classified as refined granulated sugar, extra special, crystal sugar, crystal sugar, and consumable raw sugar, also known as brown sugar, suitable for human consumption. Sugars with scores above 800 may be used for cosmetics or other non-edible purposes, but require further processing to be fit for human consumption due to high levels of contamination. Not only does the scoring system allow manufacturers to market and price their product within the correct category, but it protects consumer safety by alerting operators to unsuitable sugars that cannot yet be released into the marketplace

In order to arrive at the ICUMSA sugar score, [“a 50 Brix sugar solution is prepared as a mixture of 50% sugar solids in filtered water”](#), filtered through a 0.45 micron filter, and poured into a transmission cell where it is measured at 420 nm by a spectrophotometric instrument. The precise quantification of chromatic data made possible by spectrophotometers make them ideal tools for measuring sugar color with extraordinary precision. Using a special ColorQuest XT applet, HunterLab instruments are able to automatically calculate the sugar score based on specific measurement variables to produce the highest level of accuracy.

Towards In-Line Color Measurement

While the ICUMSA method is highly regarded and reliable, the sample preparation required for sugar color analysis can impede manufacturing efficiency when color differentiation must be made rapidly for processing and packaging purposes. In the 1990s, Transvaal Sugar Limited Malelane, a sugar manufacturer in South Africa, began using HunterLab spectrophotometers for in-line color monitoring to “to assist the packaging

department personnel to decide which type of brown sugar has to be bagged.”²The continuous measurement of sugar color made possible by non-contact, in-line instrumentation allows operators to receive the chromatic data needed to distinguish between sugar colors without interrupting production or requiring labor-intensive sample prep, ultimately increasing efficiency and productivity. A study by the Sugar Milling Research Institute confirmed the ability of HunterLab spectrophotometric instrument to classify raw and refined sugar color on an in-line basis, while also suggesting that in-line spectrophotometric instrumentation could have even further financial benefit by optimizing specific manufacturing variables, such as washing at centrifugals. Indeed, integration of spectrophotometric measurement throughout the sugar refinement process can maximize quality assurance and efficacy at every stage.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-food-industry/how-sugar-color-is-measured-and-graded-with-spectrophotometers-and-why-it-matters/>