APPLICATION NOTE

No. 3.01 SUGAR

ICUMSA COLOR

- ICUMSA Methods GS 1/3-7, GS 2/3-10 and GS 2/3-10
- Determination of the solution color of white sugars, brown sugars, raw sugars and colored syrups
- Decolorization of glucose syrups
- Charcoal filter alarm
- Manufacturing quality and control
- Real time in-line continuous measurement
- Zero maintenance LED light source that never needs replacing

The International Commission for Uniform Methods of Sugar Analysis (ICUMSA) describe a number of methods for the colorimetric determination of filtered sugar suspensions at known concentration (Brix value).

The ICUMSA color scale is used to measure the grade and quality of the sugar. The color of sugar directly relates to the degree of refining – raw sugars being dark brown in color while highly refined sugars are white in color. The ICUMSA color scale is a measurement of the yellowness of the sugar resulting from residual molasses not removed in the refining process and can be used to monitor and control the manufacturing process.

APPLICATION

The Kemtrak DCP007 process photometer is recommended to accurately measure ICUMSA color. The Kemtrak DCP007 utilizes a proprietary dichromatic measurement technology that compensates for particulates, allowing accurate color measurement without the need for filtration.

The Kemtrak DCP007 process photometer has a high performance long life LED light source, precision optical filters and robust fiber optics that results in an ICUMSA color analyzer with outstanding performance and reliability.

Thanks to the proprietary dichromatic four channel measurement technology, particulates in the process media can be compensated for in real time providing an accurate measure of color without the need for filtration. A primary "absorbing" wavelength accurately measures color changes in the process medium, while a *second reference wavelength, which is not absorbed* by the process medium, compensates for particulates and/or fouling of the optical windows.

Since optic fibers are used to transfer light to the measurement point and back, the measurement cell contains no electronics, moving parts or sources of heat that result in condensation on the optical surfaces. Standard measurement cells are machined in sanitary grade stainless steel with sapphire windows.

INSTALLATION

ICUMSA recommend the absorption of light at 420nm for white and light colored sugars and 560nm for darker sugars. 720nm is recommended for the reference wavelength to measure and compensate for the turbidity of the solution.

The Kemtrak DCP007 process photometer will accurately measure ICUMSA color for a known concentration sample using the Brix value (degrees Brix or °Bx). ICUMSA color is calculated as follows:

$$ICUMSA\ Color\ = \frac{1000 \times A_s}{b\ c}$$

Where:

A_s = absorbency of the solution
(DCP007 primary measurement)

b = the optical path-length (cm)

c = concentration (g/mL)
(using the Brix value)

Color score is expressed in RBU (reference base units) per ICUMSA standard method(s). Where an end user specific base reference is used, the DCP007 can be adjusted accordingly.

The process Brix value can be manually entered into the analyzer or for highest accuracy, measured continuously using a separate density or refractive index analyzer and compensated using the DCS control system or via an external data logger.

The Kemtrak DCP007 process photometer should be configured for the desired measurement range for maximum resolution and accuracy. An optical path-length of at least 10 cm or more is recommended for low color white sugars, while shorter path-lengths are necessary for darker sugars. Please contact Kemtrak for specific configuration details regarding measurement wavelength and selection of optical path-length for the desired measurement range.

ICUMSA color is a laboratory method that requires the pH of the solution to be adjusted to pH 7 prior to color measurement. The regulation of pH is generally not practical when monitoring in-line and the operator should be aware of this.