



Qualification of liquid products in the sugar industry

The sugar market is constantly changing. Worldwide sugar consumption is expected to continue to grow by 2% annually during the coming decade. The rise in consumption is linked to population growth and countries developing towards industrialization.

The critical steps and parameters for any sugar production, whether derived from sugar beet or sugar cane, must be qualified.

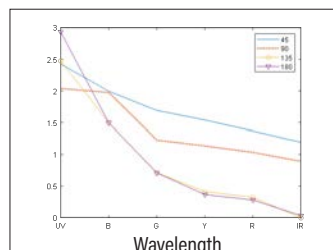
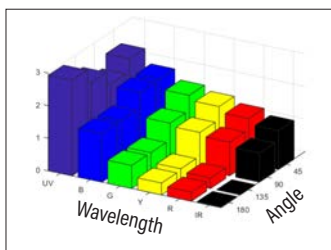
Goals: Qualifying sugar production at a given stage

The flows of goods within a globalized market like the sugar market require common quality scales, particularly for sugar intended for use in food.

Sugar quality can be assessed according to several parameters such as the level of sucrose, the color or the moisture content. The color remains the main criterion for characterization, however, as it gives a direct indication of the sugar's purity.

This is why the International Commission for Uniform Methods of Sugar Analysis has set up a common scale for qualifying the color of sugar: the ICUMSA scale.

It is this parameter which INDATECH proposes to measure in intermediate liquid products during sugar production.



Application of INDATECH's expertise

INDATECH has designed a LED spectroscopy instrument called SPOT4Line which can be used for physical characterization by means of measurement with multiple scattering angles (45°, 90°, 135° and 180°) and for chemical characterization by means of 6 LEDs ranging from near-UV to near-infrared.

By using all these features, it will be possible to monitor the critical sugar quality parameter (color) using the ICUMSA scale, independently of the variations of a set of other parameters (°Brix, pH, turbidity). Dedicated to inline measurement with a special design to facilitate cleaning, thus minimizing the risk of contamination, this tool can be used to monitor continuous production processes, giving priority to operator safety and product quality.

Example: Qualification of sugar samples by ICUMSA quantification

Sugar solutions were prepared covering a wide range of ICUMSA values (0-9800), using sugar solutions of different concentrations in order to cause the °Brix value to vary as well.

2059 measurements were performed on samples taken from 10 different groups of sugars, using all the optical parameters of SPOT4Line (6 wavelengths and 4 scattering angles).

Then a selection of the variables of interest was produced in order to develop predictive models for different ICUMSA range selections.

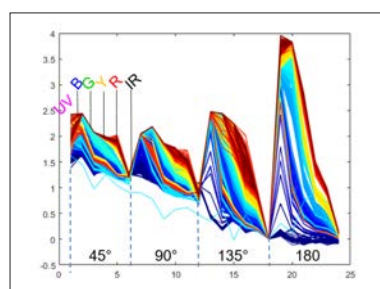


Figure 1:

Absorbance measurements at 6 wavelengths and with 4 S4L scattering angles on sugar samples colored according to their ICUMSA reference value

Selection of the variables explaining the ICUMSA variations

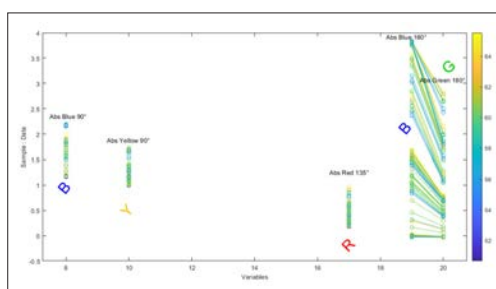


Figure 2:

Preservation of the variable of interest in the context of prediction

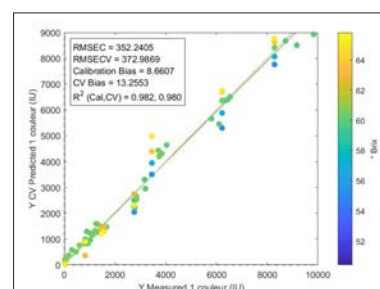


Figure 3:

ICUMSA linear predictive model, measurements colored according to the value in degrees Brix



Our teams at INDATECH will be delighted to answer your questions by telephone:
+33 4 80 78 01 40

Advantages of SPOT4Line

SPOT4Line offers a means of inline measurement and inspection which is ideal for sugar production:

- Sensitivity and accuracy of measurement at low concentrations
- A set of optical parameters enabling prediction of the ICUMSA value over a wide range
- Monitoring of the different production steps by division into several ICUMSA ranges of interest

This system offers a variety of optical parameters for measuring over a wide range of sugar colors, thus enabling primary qualification of the sugar industry's products at certain key stages in production, such as refining and/or purification.

