Application Note
Sugar Industry

SCHMIDT HAENSCH

Purity Analysis of Sugar Samples

In sugar factories, the purity analysis of liquid sugar is a fundamental element of process monitoring and quality control. Continuous supervision of impurities such as non-sugar components and residual by-products enables the early detection of deviations during clarification, crystallization, and refining. Consistent purity measurement not only supports compliance with industry quality standards but also contributes to optimized processing efficiency and uniform product quality for further applications.

Monitoring Purity of Sugar Samples with the Purity Analyser

Sugar purity is generally defined as the ratio of sucrose content to the total dissolved solids in a sugar solution, expressed as a percentage. In industrial practice and laboratory analysis, this value is obtained by combining polarimetric and refractometric measurements in accordance with ICUMSA® recommendations. There are two different methods:

Method	Description
ICUMSA GS5-1	Sucrose, Dry Substance and Fibre in Cane and Bagasse by VIS-Polarimetry after Clarification of the Aqueous Extract with Lead Acetate and by Refractometry - Official
ICUMSA GS5-2	Sucrose, Dry Substance and Fibre in Cane by NIR-Polarimetry and Refractometry using a Hydraulic Press for Juice Recovery
ICUMSA GS7-31	The Determination of Pol by NIR Polarimetry and Brix for Sugarcane and Factory Product -Tentative

There are two different methods:

1) Schmitz Table
one commonly applied approach is based on standardized reference data known as the Schmitz table method. In this method, the optical rotation of the sugar solution is measured to determine the sucrose-related value, while the refractive index is used to quantify the dry substance content in Brix. The values in that table from ICUMSA data are approximated by the formular

$$\%Pol = (Factor1 - Factor2 \cdot Brix) \cdot Pol$$

and the purity is defined as

$$Purity = \%Pol / Brix \cdot 100.0$$

2. Direct method
An alternative approach is the direct method, which is particularly suitable for prepared sugar solutions. In this procedure, the original solution is analyzed to determine its dry substance content in Brix. A second, diluted standard solution is prepared, typically by diluting a defined amount of sugar solution with distilled water, and measured to obtain the optical rotation value. The purity is subsequently calculated using the formula

$$Purity = °Z / °Brix \times 100.$$

This method provides a straightforward and reliable means of purity determination while also allowing continuous calculation based on live measurement values. Both methods are recognized in the sugar industry and form the analytical basis for accurate purity control in production and laboratory environments.

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Solution from SCHMIDT + HAENSCH

The Purity Analyzer from SCHMIDT + HAENSCH offers an integrated and automated solution for sucrose purity measurement. The system combines polarimetric and refractometric measurement principles within a modular platform that enables simultaneous determination of sucrose content, dry substance concentration, and calculated purity. The polarimetric component of the system can be either a Saccharomat® quartz-wedge polarimeter or a Polartronic circular polarimeter, while the refractometric measurement is performed using the ATR P refractometer. All measured values are processed through a unified electronic control unit and displayed via a single user interface, ensuring ease of operation and clear data visualization. The system performs automatic purity calculations according to both the Schmitz table and direct methods in full compliance with ICUMSA® standards.

The system continuously verifies that the polarimetric values and refractometric values remain within the defined validity ranges to ensure reliable purity calculations:

$1.0 < °Z < 110.0$
$1.0 < Brix < 28.5$
$0.06 < °Z / Brix < 4.5$

By eliminating manual calculations and minimizing the risk of operator errors, the Purity Analyzer delivers high analytical precision, reproducibility, and speed.

Product packages	Product	ID-N°
ATR P + Polartronic V	ATR P	12133
	ATR P flow through cell	05804
	Polartronic V 202 SC	16255
	flow through polarimeter tube	03830
	quartz control plate	18760
	connection cable to quartz	16251
ATR P + Saccharomat V	ATR P	12133
	ATR P flow through cell	05804
	Saccharomat V 202 SC	16240
	flow through polarimeter tube	03830
	quartz control plate	18760
	connection cable to quartz	16251
Tubing set	for liquid connection between polarimeter and refractometer	16093

Benefits:

- Cost and time savings
- Accurate, fast and precise measurement
- Product quality securing

Typical laboratories:

- Reception Laboratories
- Raw Material and Intermediate Product Laboratory
- Quality Control Laboratories