

APPLICATION NOTE - ANALYZING SUGAR PURITY AND CONTENT USING A POLARIMETER AND A REFRACTOMETER

Application Need: The sugar industry needs to analyze the purity of sugar and the sugar content in its products.

Solution: Reichert provides a purity analysis solution that is a combination of a circular polarimeter (either the Polar1 or the Polar3), and either the AR5 or AR9 refractometer to measure sugar content. The concentration is expressed as either a percentage, as a Brix scale value, or in °Z. The purity can be calculated either manually or automatically via the Universal Display, which can be used with the Polar3 and AR9 combination. The polarimeter controls both instruments, and the test values are shown on the polarimeter's display. The results can be printed out or saved electronically.



Purity analysis combination, shown here with the Polar3 polarimeter and the AR9 refractometer.

Calculating %Pol and Purity

There are two methods of calculating %Pol and purity:

- A: Schmitz Table
- B: Direct Method

A: Schmitz Table

With a Reichert purity analysis combination, you can evaluate the **%Pol** and the **Purity** easily.

The calculation of the %Pol is based on the data given by the ICUMSA in the Schmitz table (see ICUMSA Methods Book, Method GS 5/7-1 (1994)). The values in that table are approximated by the formula:

$$\%Pol = (\text{Factor1} - \text{Factor2} - \text{Brix}) - Pol$$

The purity is calculated as:

$$\text{Purity} = \%Pol / \text{Brix} - 100.0$$

The program calculates the %Pol and Purity continuously, using the actual polarimetric and refractometric values (whose units are %Pol and %, respectively).

If the values of the polarimeter (in °Z) and the refractometer (in Brix) are outside the following valid ranges, Error Code 5 is displayed:

$$1.0 < \text{°Z} < 110.0$$

$$1.0 < \text{Brix} < 28.5$$

$$0.06 < \text{°Z} < 4.5$$

B. Direct Method

If you are interested in determining the purity of an already-prepared sugar solution, then choose the Direct Method from the Polarimeter menu.

Prepare a solution with your sugar material, then dilute the sample down to a normal sugar solution (weigh out 26 g sugar solution into a measuring flask and fill up with distilled water to 100 ml). Measure the Brix value of your original sugar solution on a refractometer, fill the diluted solution into a polarimeter tube, and start the measurement. The instrument will then calculate the purity as a percentage and display the result.

Purity is defined as:

$$\text{Purity} = \text{°Z} / \text{Brix} - 100.0$$

The program calculates the Purity continuously using the actual polarimetric and refractometric values, and displays the value as a percentage (%).

Product Recommendations:

Purity Analysis Solutions:

Polar3 Polarimeter – Reichert Cat #14003000

and

AR5 Refractometer -- Reichert Cat #14007000

Measures purity to accuracy of 0.0074 °Z/Bx



Polar3 Polarimeter – Reichert Cat #14003000

and

AR9 Refractometer – Reichert Cat #14009000

Measures purity to accuracy of 0.0031 °Z/Bx



