



## APPLICATION NOTE – MEASURING SUGAR CONTENT IN JUICES AND PROCESSED BEVERAGES

**Application Need:** Juice producers need a reliable and economic way to measure the sugar content of fruit and vegetable juices.

**Solution:** Reichert's AR9 and AR5 laboratory refractometers.

### Introduction

Fruit and vegetable juices are part of a balanced diet. The dissolved solids in these juices provide nutrition. In addition, some juices have added sweeteners. In order to maintain product consistency and quality, and to control costs, the dissolved solids must be measured.

There are several methods available to measure concentrations of liquids containing dissolved solids. Choosing the right method can help you save money and control the quality of the final product better. Reichert's refractometers offer you the quickest, most accurate, and least-expensive method to assess the sugar content of liquids.

### The Brix Scale

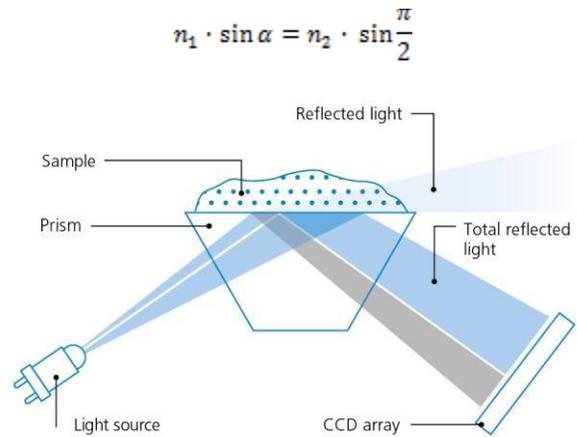
Reichert's refractometers use the Brix scale to measure the gravimetric (mass%) concentration of sugar in a water solution. For example, a solution of 10 grams of sugar in 100 grams of de-mineralized water will have a reading of 10 on the Brix scale. The Brix scale is used by the ICUMSA (International Commission for Uniform Methods of Sugar Analysis) method SPS-2.

The Brix scale can be measured using either a density meter or a refractometer. A refractometer has several advantages over a density meter:

- **Sample volume:** Density meters need a sample size of at least 2 ml. Our refractometers only require a few drops of the sample on the prism to perform a reliable measurement.
- **Cleaning:** Density meters contain a U tube, which may require many cleaning cycles to ensure the juice is completely removed from the tube. Our refractometers' prisms, on the other hand, can be cleaned by simply wiping with tissue paper and rinsing with distilled water.
- **Temperature measurement:** An electronic density meter's U tube is located inside a helium cell, which makes a reliable temperature measurement time-consuming and difficult. Reichert's refractometer prisms are directly coupled to the temperature control module and contain a high-precision temperature sensor that measures the sample when it contacts the prism, providing a faster and more accurate measurement of temperature.
- **Accuracy:** Reichert refractometers reach an accuracy up to  $\pm 0.05$  Brix.
- **Price:** Both the Reichert AR9 and AR5 refractometers offer different price points to meet different budgets. These instruments are less costly than density meters.

Reichert has produced refractometers for over 150 years, with an emphasis on refractometers designed to measure juices. Our measurements are performed using "the principle of critical angle," which prevents the light from going through the sample. The following picture illustrates the principle. By applying a 90° angle to Snell's law, the relation between the propagation constants (prism and sample) can be calculated.

The refraction index (and therefore the Brix scale), as the quantity of light that has been refracted in the sample, can be measured by finding the light transition through a CCD array:



We provide an accurate temperature measurement by including high-precision temperature sensors right in the prism, next to the sample, ensuring an accurate measurement. With this, the compensation of temperature when calculating the Brix scale is stable and 100 percent accurate.

As a result of these technical improvements, Reichert's refractometers are the best value on the market, providing you with efficiency, reliability, and convenience when measuring dissolved solids in fruit and vegetable juices.

### Product Recommendations:

**AR9 Refractometer** – Reichert Cat #14009000



**AR5 Refractometer** — Reichert Cat #14007000

