

## Sugar, Refractometry and NanoCuvette™ One

Refractive measures are widely used in the sugar industry for rapid quantification of the sugar content in sugar solutions.



### 1. Sugar

Sugar is the generic name for sweet, soluble carbohydrates. Simple sugars are called monosaccharides and include glucose and fructose. The 'normal table sugar', most commonly used in food, is sucrose, a disaccharide composed of one unit glucose and one unit fructose. Different sugars are found in the tissue of most plants, and can be extracted at concentrations sufficient for commercial use from sugar beet and sugarcane. Such sugar is a common additive in a range of food and beverages.

### 2. Description

Refractive index measurement of sugar solutions is typically used to determine the sugar content. For pure solutions of known compound the refractive index measurement can be used to determine the exact concentration of the specific sugar. For mixed solutions with a high sugar content, the refractive index measurement can be used to give an approximate measure of the sugar content.

### 3. Principle

Conventionally a specialized refractometer has been required for the refractometric quantification of sugar. However, with the innovative NanoCuvette™ One, a nanosensor is installed in a cuvette, allowing quantification of sugar to be carried out in a standard spectrophotometer. Because sugar does not absorb light in the UV-visible spectrum, traditionally, spectrophotometers have been unable to quantify sugar.

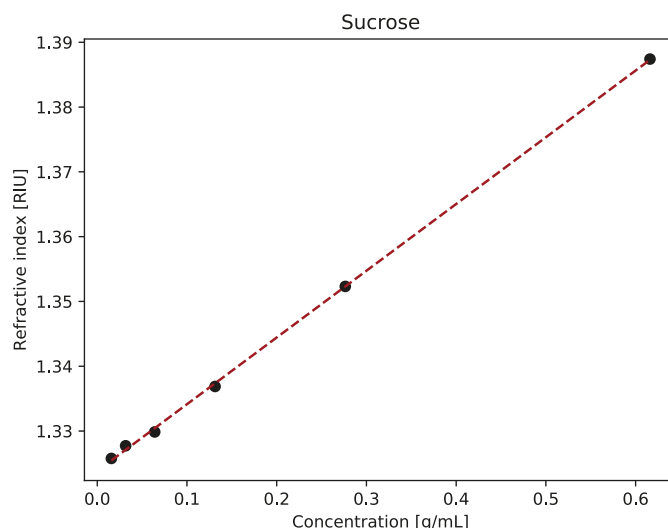
### 4. Safety precautions

This method does not entail any safety precautions. Please refer to common laboratory practices.

### 5. Measurement

#### 5A. Materials and apparatus

The only apparatus required is a standard spectrophotometer and a computer with internet access. For each measurement a NanoCuvette™ One is required.



*Figure 1 The measured refractive index is linearly proportional to sucrose concentration, as displayed by the free software.*

## 5B. Sample preparation

Pure sucrose is dissolved in de-ionized water at a concentration of 50 g pr. 100 g of sugar solution, corresponding to 50 °Brix. The solution is mixed until fully dissolved. For making a standard curve, the sucrose solution is serial diluted from 50 to 0.1 °Brix in water.

## 5C. Measurement procedure

The spectrophotometer and computer are switched on and the free NanoCuvette™ One software is opened. For each sample a new NanoCuvette™ One is used according to the software guidance. Following the last measurement the software will present the data as a variable of absorbance, refractive index or concentration, depending on the experimenter's preferred choice of representation (Figure 1).

## 6. Contact

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*Figure 2 NanoCuvette™ One measures refractive index and absorbance on the same sample, using only a standard spectrophotometer and the free NanoCuvette™ One software.*