Analysis of shredded Sugar cane for Brix and Polarity

Introduction

For sugar producers it is critical to be able to monitor and control key parameters such as brix and polarity, as they determine the price of the sugar cane.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of these types of samples, but past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements such as grinding and carefully cleaning between samples made analyses laborious, time consuming and error-prone.

Diode Array 7250

The DA 7250 is a new full-spectrum, NIR instrument designed for use in food processing facilities. Using novel diode array technology it performs a multi-component analysis in only 6 seconds with no or little sample preparation required.

During these 6 seconds, a baseline is collected, noise monitored, wavelength accuracy is standardized, and a large number of full spectra are collected. As a very large sample surface is analyzed, samples do not need to be ground, but can be analyzed as received from the core sampler.

Experimental

Approximately 1700 samples of shredded sugar cane were analyzed in a DA 7250 and by wet chemistry methods. In the DA 7250 the samples were analyzed without any grinding or other sample preparation. The shredded cane was simply placed in the DA 7250 analysis dish, and was analyzed in only 6 seconds.

More than 1600 samples were used as the training set set, and the remaining 100 samples were used as an independent validation set. Calibrations were developed by Perten Instruments using The Unscrambler chemometrics software by Camo. The regression method used was Partial Least Squares (PLS). Standard Normal Variate (SNV) and Savitsky-Golay 1st derivatives were used as a data pre-treatment to enhance the calibration models.

Results and discussion

The DA 7250 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

| Parameter	Range	Samples	R
Brix	14.2 – 22.3	1600+	0.87
Polarity	9.7 – 19.4	1600+	0.89

The differences between the DA 7250 and the reference method are of the same magnitude as typical differences between two different reference labs. The DA 7250 is more precise than the reference methods meaning that replicate analyses are generally more repeatable and representative.

In summary it is concluded that the DA 7250 can analyze shredded sugar cane for the aforementioned constituents. As samples do not need to be ground prior to analysis, users can accurately analyze many samples a day in nearly real time. The ease-of-use and flexibility – it can also analyze juices, molasses, sugar etc. as well – make it ideal for use at sugar mills worldwide.

Polarity

The DA 7200 accurately determines polarity in a wide range, covering immature cane as well as mature.

Polarity
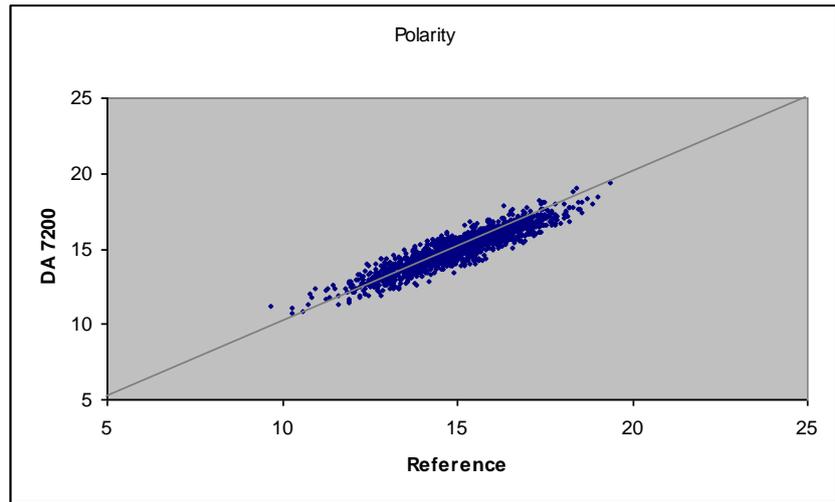
Brix

The current brix calibration covers the range of 14-22, with excellent accuracy.

Brix