Analysis of Moisture and Fat in Sesame crackers

Introduction

A fast and accurate determination of relevant constituents ensures high and consistent product quality. Analysis of fat content using the reference method is very time consuming and costly. It is also the pre-dominant parameter for a sufficient process control, and faster analysis results can be used to optimize the process more efficiently.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of crackers and other snackfoods, but in the past instrument limitations have not permitted users to reap the full benefits of NIR. Difficult analysis procedures or special cups, and a small analysis area made analyses time consuming and error-prone.

Diode Array 7200

The DA 7200 is a new full-spectrum, NIR instrument designed for use in the food industry. Using innovative diode array technology it performs a multi–component analysis in only 6 seconds. Samples can be measured either ground or un-ground, depending on sample types and accuracy requirements.

During this time approximately 300 full spectra are collected and averaged. Since the sample is analyzed in an open dish, the problems associated with sample cups are avoided and operator influence on results is minimal.

Experimental

Spectral data on approximately 60 samples of sesame crackers from Intersnack was collected on a DA 7200. The samples were ground and analyzed in the small sample dish.

Perten Instruments developed calibrations using Partial Least Squares (PLS) regression. Standard Normal Variant Transform and Savitsky-Golay 1st Derivative were used as data pre-treatments to improve the calibration models.

Results and discussion

The DA 7200 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^2	SECV*
Moisture	0.1–3.7	63	0.98	0.10
Fat	17.5 – 35.1	35	0.95	0.80

The differences between the DA 7200 and the reference method are of the same magnitude as typical differences between two different reference labs. The DA 7200 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it is concluded that the Diode Array 7200 can analyze crackers for the aforementioned constituents. The large spot size and analysis area remove the effects of sample heterogeneity thereby producing more reliable and representative results. The speed allows users to easily and accurately analyze many samples a day in nearly real time.

Moisture

The accuracy of this calibration makes it possible to control product drying with a high precision. As a result, costs for re-work and out-of-spec production is greatly reduced.

Moisture - Sesame cracker

$R^2 = 0.98$

NIR [%] vs Reference [%]
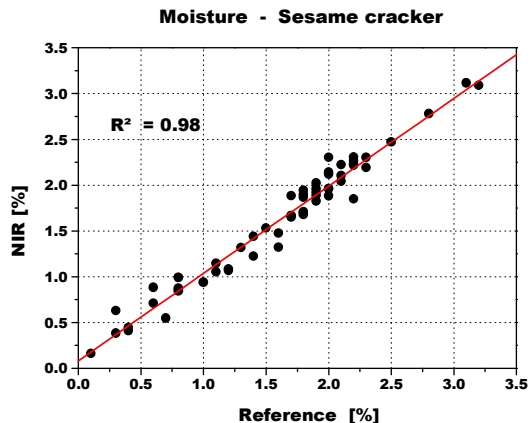
Fat

Wet chemistry analysis of fat content is time consuming and tedious. As the graph shows the DA 7200 can predict fat in sesame crackers with a very high accuracy. The rapid analysis of the DA 7200 saves laboratory costs and allows for tighter production control.

Fat - Sesame cracker

$R^2 = 0.95$

NIR [%] vs Reference [%]

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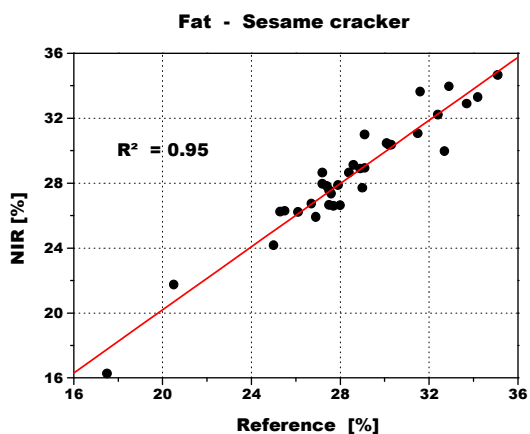
* SECV is the standard deviation between NIR and Lab data calculated in a way that describes the future performance of the calibration.