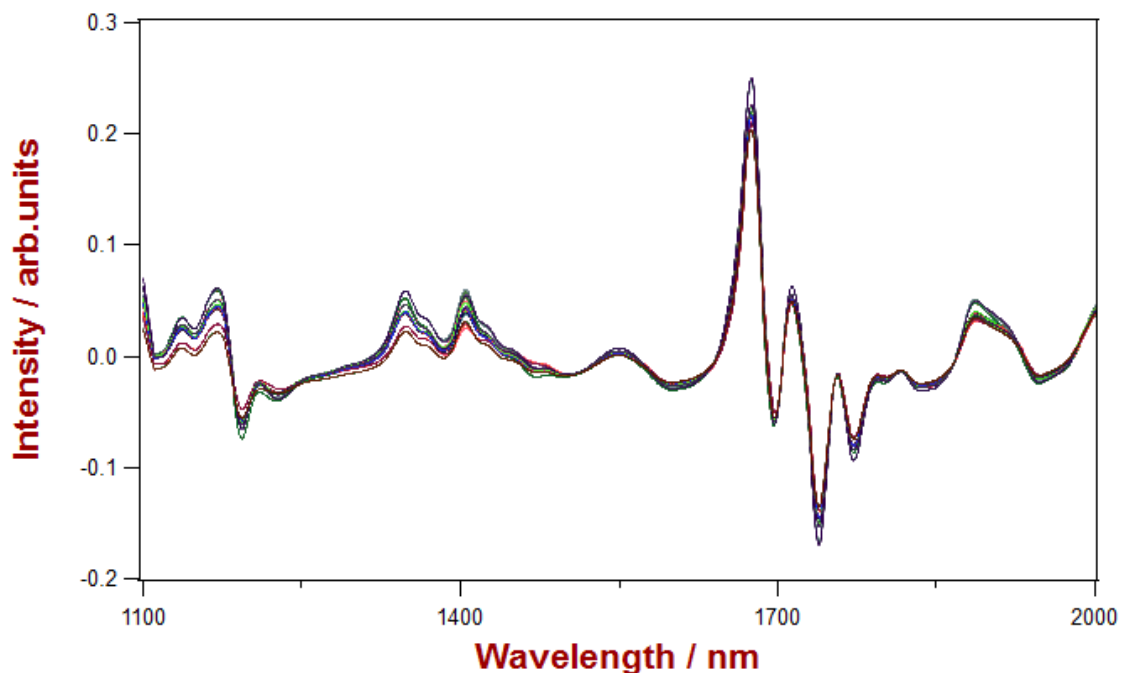# Rheological additive and wax in packaging paint by Vis-NIR spectroscopy

Multiple parameters with one measurement

Packaging has become an indispensable part in the food manufacturing process. To improve the appearance and properties of the packaging, a wide variety of coatings and inks are used. Different additives enhance rheological properties, control the wetting dispersion, or in the case of wax increase abrasion resistance. The regulations of these coatings in food packaging applications are very strict in some countries, creating the need for close monitoring of the production process.

A fast, reliable, and simple to use solution for quantifying rheological additives and wax in such coatings is Visible-Near Infrared Spectroscopy (Vis-NIRS). Both parameters are determined simultaneously by Vis-NIRS in less than a minute.

Metrohm NIRSystems

Method description

Samples & Sample preparation

40 samples with varying wax and rheological additive content were provided by a customer. The Vis-NIR spectra were measured in transmission mode using a Metrohm XDS RapidLiquid Analyzer without any sample preparation.

Configuration

NIRS XDS RapidLiquid Analyzer	2.921.1410
NIRS 2 mm quartz cuvette	6.7401.210
NIRS Spacer for 12.5 mm cuvette	6.7403.180
Vision Air 2.0 Complete	6.6072.208

Experimental

The samples were transferred into a 2 mm quartz cuvette and kept at a constant temperature of 30°C during measurements. Data acquisition and method development was carried out with the software package Vision Air 2.0 Complete.

Figure 1. NIRS XDS RapidLiquid Analyzer used for spectral data acquisition


Method development

Unwanted spectral variance was excluded during the method development process by the selection of specific wavelength ranges. Two different PLS models were developed to quantify additive content and wax content. The results were predicted using the following settings:

Rheological Additive and Wax

Regression model	PLS
Pretreatment	1. derivative
Validation	Cross validation

Results

Rheological Additive
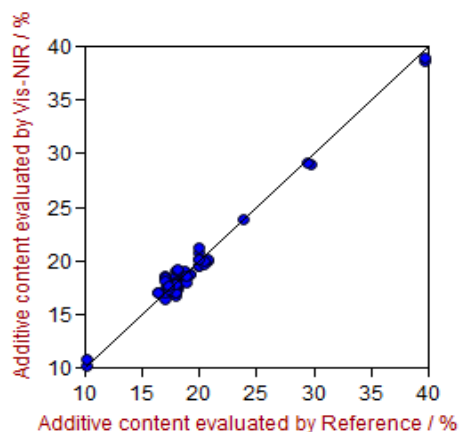
Range	10.00–40.00%
No. of factors	4
R²	0.99
SEC	0.73%
SECV	0.78%

Wax
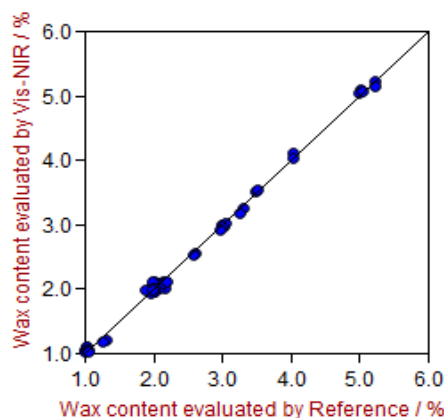
Range	1.00–5.20%
No. of factors	3
R²	0.99
SEC	0.06%
SECV	0.07%

www.metrohm.com