



Application Note AN-NIR-118

利用近外光法品中棉含量的定量分析

Fast, non-destructive cotton content analysis with NIRS

Cotton and polyester are two of the most popular fabrics for creating garments. Polyester is a synthetic material produced from petrochemical products, and cotton is a natural and sustainable fiber harvested from cottonseeds. Of these textile materials, polyester is the best choice of for water-resistant, durable apparel, while cotton is better suited for breathable, cool summer clothing.

Textile products must be labeled according to

their fiber composition. The procedures for the determination of fiber composition include mechanical, chemical, and microscopic methods—all of which are time consuming. In contrast, near-infrared spectroscopy (NIRS) is a fast and chemical-free alternative. This Application Note shows how NIR spectroscopy can be used to determine the cotton content in textile products within 30 seconds.

EXPERIMENTAL EQUIPMENT

In this study, 10 textile samples of varying cotton and polyester composition were analyzed with NIR spectroscopy to create a prediction model for quantification of cotton content. Samples were analyzed on a NIR spectrometer (OMNIS NIR Analyzer Solid, **Figure 1**) in reflection mode (1000–2250 nm) using a large lid and no holder to ensure that the textile samples were evenly pressed against the measurement window. Multi-point measurement was selected as the measuring mode. Data acquisition and prediction model development were performed with OMNIS software.



Figure 1. The OMNIS NIR Analyzer Solid from Metrohm.

Table 1. Hardware and software equipment overview.

Equipment	Article number
OMNIS NIR Analyzer Solid	2.1071.0010
Large lid OMNIS NIR, black, 100 mm	6.07402.110
OMNIS Stand-Alone license	6.06003.010
Quant Development software license	6.06008.002

RESULT

The 10 measured NIR spectra (**Figure 2**) were used to create a quantification prediction model for the percentage of cotton in different blends of natural and synthetic textiles. The quality of the prediction model was evaluated using a correlation diagram which displays a very high

correlation between the NIR prediction and the reference values. The respective figures of merit (FOM) display the expected precision and confirm the feasibility during routine analysis (**Figure 3**).

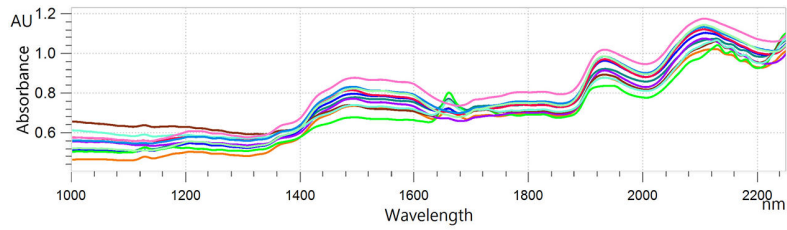


Figure 2. Overlaid NIR spectra of 10 textile samples analyzed on an OMNIS NIR Analyzer Solid.

RESULT COTTON CONTENT IN TEXTILE

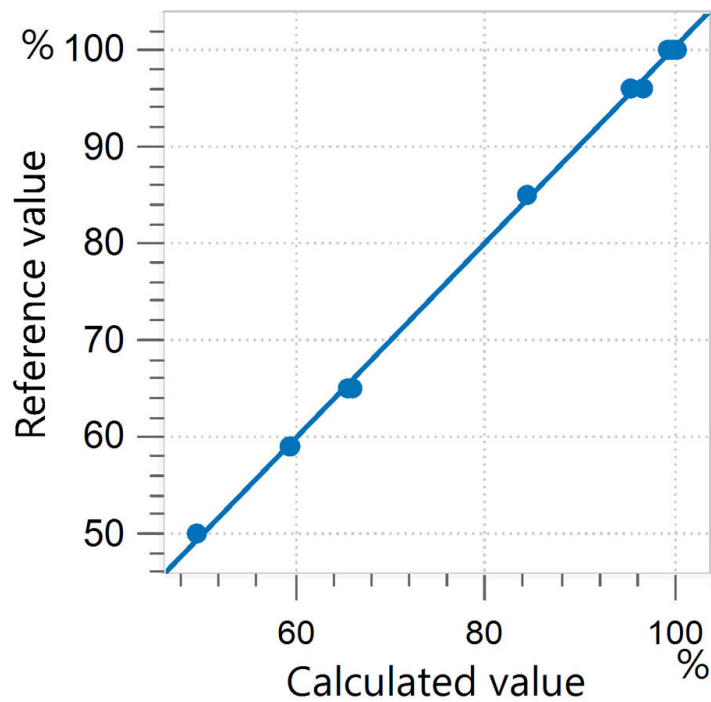


Figure 3. Correlation diagram and the respective figures of merit for the prediction of cotton content in textile using an OMNIS NIR Analyzer Solid.

R^2	SEC (%)	SECV (%)
0.999	0.50	0.59

CONCLUSION

This Application Note demonstrates the feasibility to determine the cotton percentage in textile blends quickly and easily. NIR spectroscopy offers users a fast, cost-effective, and highly accurate alternative to other

standard testing methods when identifying textiles. Additionally, NIRS analysis is non-destructive, completely reagent-free, and gives results in only 30 seconds.

CONTACT

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CONFIGURATION



OMNIS NIR Analyzer Solid 合固体和粘性品的近外光。

OMNIS NIR Analyzer 是一按照瑞士量准和生的近外光 (NIRS) 解决方案,用于整个生的常分析。使用新技和嵌入先 OMNIS Software 反在 NIR 光的速度、可操作性和活使用上。

OMNIS NIR Analyzer Solid 的点概:

- 在 10 秒以内量固体和粘性品
- 自化多位置量,即使在品不均匀,也能得可重的果
- 方便地嵌入自系,或者与其它分析技(滴定)
- 支持大量品容器

OMNIS NIR100 mm

用于在不同品位置通反射采集粉末和粒反射光的大品容器。

兼容:

- 大支架 OMNIS NIR,100 mm (6.07402.100)



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