



Application Note AN-NIR-118

Quantification of cotton content in textiles by near-infrared spectroscopy

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 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**).

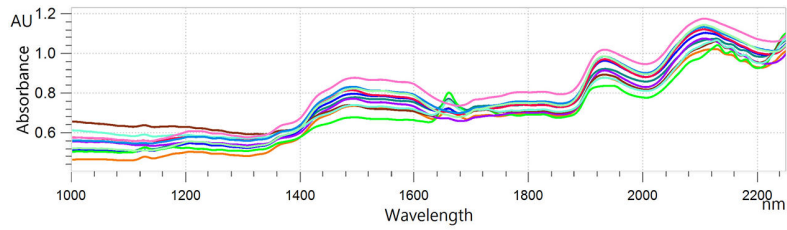


Figure 2. Overlaid NIR spectra of 10 textile samples analyzed on an OMNIS NIR Analyzer Solid.

RESULT COTTON CONTENT IN TEXTILE

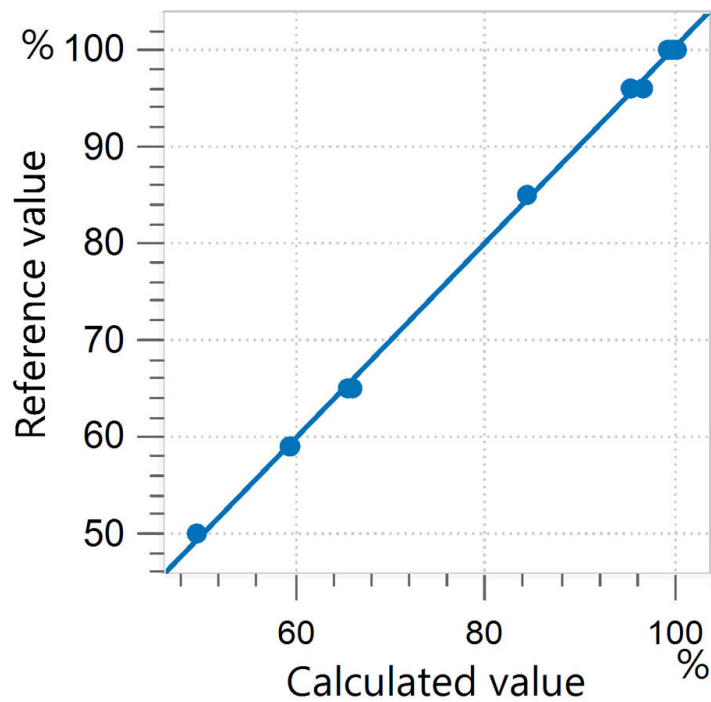


Figure 3. Correlation diagram and the respective figures of merit for the prediction of cotton content in textile using an OMNIS NIR Analyzer Solid.

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

メトロームジャパン株式会社
143-0006 東京都大田区平
和島6-1-1
null 東京流通センター アネ
ックス9階

metrohm.jp@metrohm.jp

CONFIGURATION



OMNIS NIR Analyzer Solid

固体および粘性のサンプルのための近赤外スペクトロメーター。

OMNIS NIR Analyzer は、スイスの品質基準に従って開発・製造された、生産チェーン全体に沿ったルーチン分析のための近赤外分光法 (NIRS) ソリューションです。最新技術の適用と最新の OMNIS Software への統合は、この NIR スペクトロメーターの速度、ユーザビリティ、柔軟な使用に反映されています。

OMNIS NIR Analyzer Solid の利点の概要:

- 10秒未満で固体サンプルと粘性サンプルを測定
- 不均質なサンプルでも再現性のある結果を得るための自動マルチホジション測定
- オートメーションシステムへの統合、またはその他の分析技術 (滴定) との連結が容易
- 多数のサンプル容器に対応



OMNIS NIR100 mm

様々なサンプル位置における反射中の粉末および顆粒のスペクトル記録のための大型サンプル容器。

次の製品と互換性があります:

- 大型ホルター OMNIS NIR、100 mm (6.07402.100)

OMNIS
A WHOLE NEW LEVEL OF PERFORMANCE

OMNIS

Windows™コンピューター上のOMNISソフトウェアをスタートアロン操作することか可能になります。

特徴:

- ライセンスには、既に1つのOMNISテハイスライセンスが含まれています。
- メトローム・ライセンシングポータルにて、アクティブ化する必要かあります。
- 他のコンピューターに移行することはできません。

OMNIS
A WHOLE NEW LEVEL OF PERFORMANCE

Quant Development

スタートアロン型 OMNIS Software のインストールにおける定量化モデルの作成と編集のためのソフトウェアライセンス。