



Spin Finish on Fibers Oil Pick Up without Sample Weighing

● Fast and Reliable Quality Control | Application #12

Fiber manufacturing often uses a thin layer of finish to assist the fiber's performance and its ability to run in downstream spinning processes. This Spin Finish guarantees the lubrication of the fiber surface, the cohesion of filaments, and static protection for the fiber bundle as essential properties in the production of fibers, yarn and non-woven fabrics. The determination of the Spin Finish content by time-domain (TD) NMR is an established method. The most accurate measurement techniques usually require sample weighing (see application note "Spin Finish on Fibers – Oil Pick Up with Sample Weighing"), which is considered as time consuming.

Features and Benefits

- No sample weighing required
- Very few calibration samples necessary (3–5)
- Independent from sample color, surface or yarn count
- No solvent required
- More reproducible than wet chemistry

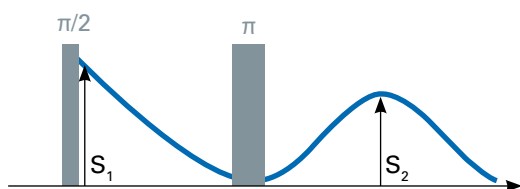
Applicable Material

- Technical textile and high performance fibers
- Multi-filament, monofilament, staple fibers, non-woven fabrics, texturized samples
- Polyester, polyamide, polypropylene, polyethylene, polyacrylonitrile fibers and yarns

Application Method

The TD-NMR signal of a fiber sample exhibits different components. Fibers, moisture and Spin Finish are each characterized by a typical decay behavior. The TD-NMR signal of Spin Finish is well separated from the other signals and can be quantitatively analyzed. For the application Spin Finish on Fibers without Sample Weighing, both FID and Hahn echo are recorded. The amplitude of the FID signal (S_1) corresponds to the total signal, while the amplitude of the echo signal (S_2) relates only to the Spin Finish component. The ratio of the amplitudes correlates with the Spin Finish concentration. Thus, weighing the sample is not required.

Measurement Procedure



S_1 : total signal (fiber, moisture, Spin Finish...)

S_2 : Spin Finish signal

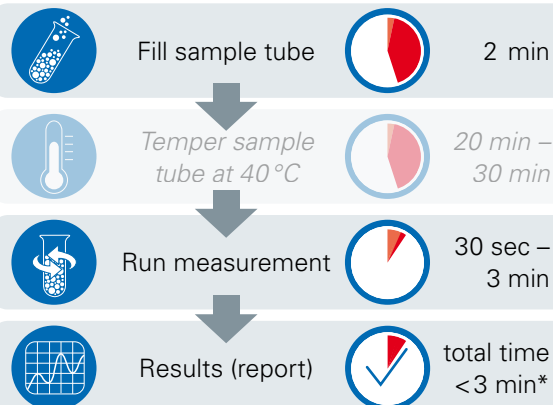
S_2/S_1 : correlates with Spin Finish concentration

Note: Make sure to use dry fibers. The average sample mass depends on the kind of fiber and the detection limit on the amount of fibers measured.

Calibration

Calibration is suitable for the determination of Spin Finish concentrations from 0.5 % to 5 %. It can be done by using well-known reference values (e.g. Spin Finish results from extraction) or by adding defined masses of Spin Finish to a fiber-free of Spin Finish. Alternative calibrations for respective Spin Finish and eventually for respective fibers are recommended, but not necessary in all cases.

Workflow



*For sample tempering additional 20 – 30 min needed.

Flexibility of Use

The Bruker minispec is capable of running the non-weighing method with very high long-term reliability. The minispec hardware can be applied for both, the weighing and non-weighing method. Thus, the user may run both methods or has the option to swap from one method to the other.

Recommended Equipment

- mq-one Spin Finish Analyzer for routine analysis or mq20 Spin Finish Analyzer with 18 mm sample diameter for versatile use
- Multilingual m+ software with fully traceable data
- Glass or TEFLON® tubes
- Metal block thermostat for sample pre-tempering (optional)



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