Solid Fat Content (SFC) Analysis

The International Standard Method for the Determination of Fat Melting Profiles
Application #1

Solid Fat Content (SFC) determination is of prime importance for food processing and development. Raw materials like fat compositions or blends need to be characterized and controlled according to their melting profiles. The SFC determination by time domain (TD) NMR analysis is the internationally recognized standard method. In a close partnership with the oil & fat industry spanning more than 4 decades Bruker has developed its dedicated Bruker SFC Analyzer. All types of SFC methods are supported by the Bruker minispec, including direct/indirect and parallel/serial methods. The TD-NMR analysis provides a quick, non-destructive and solvent-free measurement. Bruker also offers a fully automated solution including tempering procedures, NMR measurement, and determination of the SFC value plus presentation of the melting curve.

Over the past 3 decades TD-NMR has substituted dilatometry in Quality Control due to its speed, simplicity, superior repeatable and reproducible values.

Bruker's TD-NMR analysis complies with the following international standard methods:

- **AOCS Cd 16b-93**
- **AOCS Cd 16-81**
- **ISO 8292**
- **IUPAC 2.150**

Features and Benefits

- Pre-calibrated instrument
- Bruker-certified calibration standards
- Automation Option for complete SFC procedure including all tempering steps
- Dedicated SFC software
- No chemical preparation needed
- Operator-independent

Direct / Indirect method

There are currently two official methods (in existence) for the measurement of SFC:
The direct method measures the signal of both the solid and liquid components of fats and is usually favored due to its speed and simplicity. The indirect method only obtains the signal from the liquid component and compares it to the signal of a fully melted sample. Both methods are supported by the Bruker SFC Analyzer.

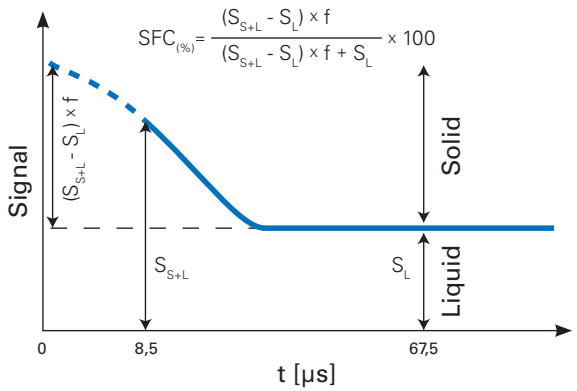
Parallel / Serial tempering methods

In using the faster parallel method, many sample tube measurement temperatures containing the same fat are processed alongside each other. With the serial method, only one sample tube is necessary, which is tempered and measured at each thermal reading. In the industry, mostly the direct/parallel method is mostly used. The indirect method also plays an important role, especially in fat research & development.

The direct Method

The TD-NMR analysis is based on the fact that the signal from the solid component decays very quickly, whereas the signal from the liquid component is preserved significantly longer. The SFC value is defined as the ratio of the signal from the solid component divided by the total NMR signal. To account for the receiver dead time, the signal is extrapolated to t = 0 by multiplying with a correction factor called f-factor.

Measurement Procedure

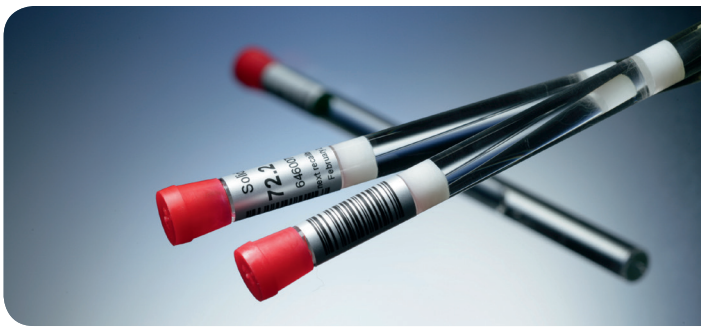


Instrument Validation

- Certified calibration samples are provided with the system. Typical values are 0, approximately 30 and approximately 70 %.
- Daily Check Procedure: standards are measured once daily and the system is validated automatically

The Bruker reference standards have originally been developed in cooperation with Unilever Research, The Netherlands. These days they are recognized as an industry standard and are the basis for inter-laboratory comparisons of SFC values.

This general calibration allows measurements of a wide range of fat compositions regardless of their chemical composition or fatty acid profile.



Recommended Equipment / Automation

- mq-one SFC Analyzer for routine QC
- mq20 series minispec for multiple applications, e.g. droplet size analysis or fat and moisture content in food
- SFC dedicated automation available for mq-one and mq20 series instruments
- Dedicated SFC software in combination with automation or for manual operation

Bruker BioSpin

cmr@bruker-biospin.com
www.bruker.com