International Standard

ISO 16756

IDF 259

First edition
2024-09

Milk and milk products — Guidance for the application of Carr-Purcell-Meiboom-Gill (CPMG) pulsed time-domain nuclear magnetic resonance (TD-NMR) spectroscopy for fat determination

Laits et produits laitiers — Lignes directrices pour l'application de la spectroscopie par résonance magnétique nucléaire dans le domaine temporel (TD-RMN) à impulsions Carr-Purcell-Meiboom-Gill (CPMG) pour le dosage de la matière grasse

Reference numbers
ISO 16756:2024(en)
IDF 259:2024(en)

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Published in Switzerland

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Forewords

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This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*, and the International Dairy Federation (IDF). It is being published jointly by ISO and IDF.

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This document was prepared by the IDF *Standing Committee on Analytical Methods for Composition* and ISO Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*. It is being published jointly by ISO and IDF.

The work was carried out by the IDF/ISO Action Team C56 of the *Standing Committee on Analytical Methods for Composition* under the aegis of its project leaders Mr P.A. Golay (CH) and Mr D. Darrell (US).

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Milk and milk products — Guidance for the application of Carr-Purcell-Meiboom-Gill (CPMG) pulsed time-domain nuclear magnetic resonance (TD-NMR) spectroscopy for fat determination

1 Scope

This document gives guidance on the determination of total fat content in milk and milk-based products, such as milk, cream, yogurt, ice cream, processed dairy, cheese and dairy powders by low-resolution nuclear magnetic resonance (NMR) using Carr-Purcell-Meiboom-Gill (CPMG) pulse sequence to optimize the specific response of fat molecules.

This document is applicable to the analysis of any milk and milk-based products, regardless of source (species or region). It is applicable to dry samples (i.e. moisture content ≤ 10 %) and liquid or wet samples which have been pre-dried such that all appreciable water has been removed. The NMR with CPMG pulse sequence analyses glycerolipids, which produces fat results comparable to the total fat result of standard fat extraction techniques, without the need for matrix specific calibrations while meeting the precision criteria listed in Clause 12.

The application is not limited by sample viscosity, colour or particle size.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
time-domain nuclear magnetic resonance spectroscopy
TD-NMR spectroscopy
technique where the intensity and speed of magnetic resonance signal decay of atomic nuclei are used to determine physical and chemical properties of atoms and molecules

Note 1 to entry: Intensity of magnetic resonance should correlate to quantity of the atomic nuclei present in the sample, whereas speed of magnetic resonance signal decay inversely correlates to the movement of the molecule where the signal originated, which can be aligned with the type of molecule.

Note 2 to entry: When used under the conditions defined in this document, NMR spectroscopy is able to provide the *total fat* (3.2) value.

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