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Milk and milk products — Guidelines for the application of near infrared spectrometry

*Lait et produits laitiers — Lignes directrices pour l'application de la
spectrométrie dans le proche infrarouge*



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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

International Dairy Federation
Silver Building • Bd Auguste Reyers 70/B
B-1030 Brussels
Phone: +32 2 325 67 40
Fax: +32 2 325 67 41
Email: info@fil-idf.org
Website: www.fil-idf.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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.

This second edition cancels and replaces the first edition (ISO 21543 | IDF 201:2006), which has been technically revised. The main changes compared with the previous edition are as follows:

- the measurement principles “Transmittance” and “Transflectance” have been added and defined;
- all sample types have been covered: liquids, solids and semi-solids;
- the calibration and validation sections have been reviewed and updated;
- the outlier section has been revised and the plots renewed;
- the procedures for sample handling and measurement have been expanded to include liquid samples and other examples;
- [Annex A](#) has been expanded to include raw milk analysis references.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

IDF (the International Dairy Federation) is a non-profit private sector organization representing the interests of various stakeholders in dairying at the global level. IDF members are organized in National Committees, which are national associations composed of representatives of dairy-related national interest groups including dairy farmers, dairy processing industry, dairy suppliers, academics and governments/food control authorities.

ISO and IDF collaborate closely on all matters of standardization relating to methods of analysis and sampling for milk and milk products. Since 2001, ISO and IDF jointly publish their International Standards using the logos and reference numbers of both organizations.

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The work was carried out by the IDF/ISO Action Team (S16) of the *Standing Committee on Statistics and Automation* under the aegis of its project leader, Mr A. Niemoeller (DE).

Milk and milk products — Guidelines for the application of near infrared spectrometry

1 Scope

This document gives guidelines for the use of near infrared (NIR) spectrometry in the analysis of milk and milk products in liquid, semi-solid or solid form. Depending on the sample form and application, different instrument setups for transmittance, diffuse reflectance or transreflectance can be applied.

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 terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

near infrared spectroscopy

NIR spectroscopy

spectroscopic method for measuring spectra using the NIR region of the electromagnetic spectrum (from 780 nm to 2 500 nm, 12 800 cm⁻¹ to 4 000 cm⁻¹)

3.2

near infrared spectrometry

NIR spectrometry

application of *near infrared spectroscopy* (3.1) yielding quantifiable results or other application-related evaluations of NIR spectra

3.3

parameter

constituent

proximate (e.g. total solids, moisture, non-fat solids, fat, protein, lactose and salt contents) or other property (e.g. pH value) of samples applicable for NIR analysis methods

Note 1 to entry: Most parameters are measured in mass fractions expressed in per cent, but some parameters will be determined in percentage by volume or with specific units, e.g. pH and freezing point depression.

4 Principle

4.1 General

A NIR method contains the following steps:

- a sample is presented to a NIR instrument;