INTERNATIONAL STANDARD

ISO 15151

IDF 229

First edition
2018-11

Milk, milk products, infant formula and adult nutritionals — Determination of minerals and trace elements — Inductively coupled plasma atomic emission spectrometry (ICP-AES) method

Lait, produits laitiers, formules infantiles et produits nutritionnels pour adultes — Détermination de la teneur en minéraux et en oligo-éléments — Méthode par spectrométrie d'émission atomique avec plasma induit par haute fréquence (ICP-AES)

Reference numbers
ISO 15151:2018(E)
IDF 229:2018(E)

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Published in Switzerland

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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), in collaboration with AOAC INTERNATIONAL.

It is being published jointly by ISO and IDF and separately by AOAC INTERNATIONAL. The method described in this document is equivalent to the AOAC Official Method 2011.14: *Minerals and Trace Elements in Infant Formula*.

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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It is being published jointly by ISO and IDF and separately by AOAC INTERNATIONAL. The method described in this document is equivalent to the AOAC Official Method 2011.14: *Minerals and Trace Elements in Infant Formula*. All work was carried out by the ISO/IDF Action Team on C17 of the Standing Committee on Analytical Methods for Composition under the aegis of its project leader, Mr H. Cruijsen (NL).

Milk, milk products, infant formula and adult nutritionals — Determination of minerals and trace elements — Inductively coupled plasma atomic emission spectrometry (ICP-AES) method

1 Scope

This document specifies a method for the quantitative determination of calcium (Ca), copper (Cu), iron (Fe), magnesium (Mg), manganese (Mn), phosphorus (P), potassium (K), sodium (Na) and zinc (Zn) using inductively coupled plasma atomic emission spectrometry (ICP-AES). The method is applicable for milk, dried milk, butter, cheese, whey, dried whey, infant formula and adult nutritional formula in the ranges given in Table 1.

Table 1 — Analytical ranges

	Ca	Cu	Fe	Mg	Mn	P	K	Na	Zn
Lower analytical range[a], in mg/100 g	20	0,03	0,5	3	0,01	15	10	10	0,2
Upper analytical range[a], in mg/100 g	1 280	1,2	20	110	1,0	800	2 000	850	18

[a] concentrations apply to

— milk and "ready-to-feed" liquids as-is, using a typical sample size of 4 g per final analytical solution volume of 25 ml and

— reconstituted milk powder, infant formula powders and adult nutritional powders (25 g into 200 g of water), using a typical sample size of mass of the reconstituted slurry per final analytical solution volume of 25 ml.

Ranges for non-reconstituted dairy ingredients (butter, cheese, whey powders, whey protein concentrates) are adjusted proportionally upward from these values based upon the sample size used for the ingredient. For example, if 0,6 g of cheese is digested the ranges will be 4 g/0,6 g = 6,7 × higher.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 648, *Laboratory glassware — Single-volume pipettes*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

No terms and definitions are listed in this document.

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/