

Foodstuffs - Detection of irradiated foodstuff
containing crystalline sugar by ESR spectroscopy

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Foodstuffs - Detection of irradiated foodstuff containing crystalline sugar by ESR spectroscopy

Produits alimentaires - Détection par spectroscopie
RPE d'aliments ionisés contenant des sucres
cristallisés

Lebensmittel - ESR-spektroskopischer Nachweis von
bestrahlten Lebensmitteln, die kristallinen Zucker
enthalten

This European Standard was approved by CEN on 14 February 2022.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 13708:2022) has been prepared by Technical Committee CEN/TC 275 “Food analysis - Horizontal methods”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by September 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13708:2001.

The predecessor of this document was elaborated on the basis of a protocol developed following a concerted action supported by the Commission of European Union (XII C.). Experts and laboratories from E.U. and EFTA countries, contributed jointly to the development of this protocol.

In comparison with the previous edition, the entire document was editorially revised according to current rules. Additionally, the following technical modifications have been made:

- a) clause “Normative references” was added;
- b) clause “Terms and Definitions” was added;
- c) former 3.2 was scientifically refined and converted into a footnote;
- d) section “Sample preparation” was slightly extended and modified by conversion of the NOTE and WARNING into main text;
- e) section “Spectrometer settings” was scientifically refined, its normative character (i.e. provisions set out) modified towards more exemplary/suggestive expressions of provision and aligned with EN 1787;
- f) clause “Evaluation” was amended by restructuring the subsections (subsection “G-value calculation” became 7.1 and “Identification of irradiated samples” 7.2), including refinement of the given information, designations and abbreviations including the alignment with the Annexes and EN 1787;
- g) clause “Limitations” was extended;
- h) layout of Figures A.1 to A.4 were revised and Figures A.5 to A.7 for irradiated fructose, glucose and saccharose were added including alignment of the given information with the main text and EN 1787;
- i) the Bibliography was updated and extended by entry [8], [9] and [10].

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies a method for the detection of foodstuff containing crystalline sugars which have been treated with ionizing radiation, by analysing the electron spin resonance (ESR) spectrum, also called electron paramagnetic resonance (EPR) spectrum, of the foodstuff, see [1] to [7].

Interlaboratory studies have been successfully carried out on dried figs, dried mangoes, dried papayas and raisins, see [1] to [3].

2 Normative references

There are no normative references in this document.

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:

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

4 Principle

ESR spectroscopy detects paramagnetic centres (e.g. radicals). They are either due to irradiation or to other compounds present. An intense external magnetic field produces a difference between the energy levels of the electron spins $m_s = +\frac{1}{2}$ and $m_s = -\frac{1}{2}$, leading to resonance absorption of an applied microwave beam in the spectrometer. ESR spectra are conventionally displayed as the first derivative of the absorption with respect to the applied magnetic field.

The magnetic field and microwave frequency values depend on the experimental arrangements (sample size and sample holder), while their ratio (i.e. g value) is an intrinsic characteristic of the paramagnetic centre and its local co-ordination. For further information, see [1] to [7].

Radiation treatment produces radicals, which can be mostly detected in solid and dry parts of the foodstuff. The intensity of the signal obtained increases with the concentration of the paramagnetic compounds and thus with the applied dose.