Irish Standard
I.S. EN 1787:2022

Foodstuff - Detection of irradiated foodstuff containing cellulose by ESR spectroscopy

I.S. EN 1787:2022

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN 1787:2022 is the adopted Irish version of the European Document EN 1787:2022, Foodstuff - Detection of irradiated foodstuff containing cellulose by ESR spectroscopy

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1787

April 2022

ICS 67.050

Supersedes EN 1787:2000

English Version

Foodstuff - Detection of irradiated foodstuff containing cellulose by ESR spectroscopy

Produits alimentaires - Détection par spectroscopie RPE d'aliments ionisés contenant de la cellulose

Lebensmittel - ESR-spektroskopischer Nachweis von bestrahlten cellulosehaltigen Lebensmitteln

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

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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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European foreword

This document (EN 1787:2022) 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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.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 1787:2000.

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.5). Experts and laboratories from EU 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) the scope was supplemented by the information, that chemical bleaching of nuts in shells can lead to comparable signals;

b) clause “Terms and definitions” was added;

c) scientific language usage of clause “Principle” had been clarified;

d) former 4.1, 4.2 and 4.7 were updated and a footnote added for the g-value calculation;

e) clause “Procedure” was scientifically refined, its normative character (i.e. provisions set out) modified towards more exemplary/suggestive expressions of provision and aligned with EN 13708;

f) subclause “General” was added to subclause “Sample preparation”;

g) clause “Evaluation” was amended by supplementing two subclauses, 7.1 “G-value calculation” and 7.2 “Identification of irradiated samples”, in alignment with EN 13708, including implementing its former content into 7.2, whereas “6,0 mT” was refined to “6,05 mT ± 0,05 mT”;

h) clause “Limitations” was extended;

i) Figures A.5 and A.7 of irradiated but bleached nutshells from hazelnuts and walnuts and Figures A.6 and A.8 of irradiated (not bleached) nutshells from hazelnuts and walnuts were added;

j) Annex B was extended by the matrix hazelnuts;

k) the Bibliography was updated and extended by entry [23], [24] and [25].

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 cellulose 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 [13].

Interlaboratory studies have been successfully carried out with pistachio nut shells, [14] to [18], paprika powder [19] and [20] and fresh strawberries [21]. However, it has been shown that chemical bleaching of nuts in shells can lead to comparable signals. For further information, see Clause 8 on limitations.

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.

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

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 $m_s = +½$ and $m_s = -½$, 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 [13].

Radiation treatment produces specific radicals that 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.