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**Foodstuffs - Detection of irradiated  
food containing cellulose by ESR  
spectroscopy**

Foodstuffs - Detection of irradiated food containing  
cellulose by ESR spectroscopy

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 1787:2000 sisaldab Euroopa standardi EN 1787:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 19.07.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 1787:2000 consists of the English text of the European standard EN 1787:2000.</p> <p>This document is endorsed on 19.07.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b> This draft European Standard specifies a method for the detection of foods 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 food.</p>	<p><b>Scope:</b> This draft European Standard specifies a method for the detection of foods 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 food.</p>
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ICS 67.050

Võtmesõnad:

**English version**

Foodstuffs

**Detection of irradiated food containing cellulose by  
ESR spectroscopy**

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

Lebensmittel – ESR-spektro-  
skopischer Nachweis von bestrahlten  
cellulosehaltigen Lebensmitteln

This European Standard was approved by CEN on 2000-02-21.

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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 275 "Food analysis - Horizontal methods", the secretariat of which is held by DIN.

This European Standard supersedes EN 1787:1996.

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 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This draft European Standard 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 E.U. and EFTA countries, contributed jointly to the development of this protocol.

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## 1 Scope

This draft European Standard specifies a method for the detection of foods 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 food, 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].

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 3696 Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)

## 3 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 field and 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 coordination. For further information, see [1] to [13].

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

## 4 Apparatus and equipment

Usual laboratory apparatus and, in particular, the following:

- 4.1 **Commercially available X-Band ESR spectrometer** including magnet, microwave bridge, console with field-controller and signal-channel, rectangular or cylindrical cavity
- 4.2 **ESR tubes**, of internal diameter about 4,0 mm (e.g. Suprasil<sup>1)</sup> quartz tubes)
- 4.3 **Balance**, accurate to the nearest 1 mg (optional)
- 4.4 **Laboratory vacuum oven, or freeze dryer**
- 4.5 **Electric blender**
- 4.6 **Filter paper**
- 4.7 **Scalpel**
- 4.8 **Water** of at least grade 3 according to EN ISO 3696

## 5 Procedure

### 5.1 Sample preparation

#### 5.1.1 Shells and stones

Remove pieces of suitable size (about 50 mg to 100 mg, 3,0 mm to 3,5 mm in diameter) from the shells or stones of the food, e.g. using a scalpel. Drying (e. g. in a freeze-dryer or at approximately 40 °C in a laboratory vacuum oven (4.4)) is usually not necessary in the case of nutshells but recommended for pips and kernels of fruits.

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<sup>1)</sup> Suprasil<sup>®</sup> is an example of a product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement of CEN of this product.