

# Foodstuffs — Determination of trace elements — Determination of lead, cadmium, zinc, copper, iron and chromium by atomic absorption spectrometry (AAS) after ash drying

The European Standard EN 14082:2003 has the status of a  
British Standard

ICS 67.050

# National foreword

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The UK participation in its preparation was entrusted to Technical Committee AW/-/3, Horizontal analysis, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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English version

**Foodstuffs - Determination of trace elements - Determination of lead, cadmium, zinc, copper, iron and chromium by atomic absorption spectrometry (AAS) after dry ashing**

Produits alimentaires - Dosage des éléments traces -  
Détermination du plomb, cadmium, zinc, cuivre, fer et  
chrome par spectrométrie d'absorption atomique (AAS)  
après calcination à sec

Lebensmittel - Bestimmung von Elementspuren -  
Bestimmung von Blei, Cadmium, Zink, Kupfer, Eisen und  
Chrom mit Atomabsorptionsspektrometrie (AAS) nach  
Trockenveraschung

This European Standard was approved by CEN on 18 December 2002.

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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 Management Centre has the same status as the official versions.

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## Foreword

This document (EN 14082:2003) 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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

Annex A is informative.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This European Standard specifies a method for the determination of lead, cadmium, zinc, copper, iron and chromium in foodstuffs by atomic absorption spectrometry (AAS) after dry ashing at 450 °C.

The method is applicable to determination in various types of foodstuffs. The method has been successfully tested in an interlaboratory trial in which 16 laboratories participated [1]. Foodstuffs covered by the validation of the method include composite diets, cereals, fish, fruit, liver and milk.

Specific foodstuffs for which European Standards exist are excluded from the scope of this horizontal European Standard. It is the task of the analyst to review if vertical standards exist.

## 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 (including amendments).

EN 13804, *Foodstuffs — Determination of trace elements — Performance criteria, general considerations and sample preparation*.

## 3 Principle

The samples are dry ashed at 450 °C under a gradual increase in temperature. The ash is dissolved in hydrochloric acid, and the solution obtained evaporated to dryness. The final residue is redissolved in *c* (0,1 mol/l) nitric acid, and the metal contents are determined by flame or graphite furnace atomic absorption spectrometry-procedures.

**WARNING — The use of this standard can involve hazardous materials, operations and equipment. This standard does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.**

## 4 Reagents

### 4.1 General

The concentration of the trace elements in the reagents and water used shall be low enough not to affect the results of the determination.

**4.2 Hydrochloric acid**, not less than 37 % mass fraction, having a density of approximately (HCl) = 1 190 mg/ml.

**4.2.1 Hydrochloric acid**,  $c$  (6 mol/l). Dilute 500 ml concentrated hydrochloric acid (4.2) with water to 1 000 ml.

**4.3 Nitric acid**, not less than 65 % mass fraction, having a density of approximately (HNO<sub>3</sub>) = 1 400 mg/ml.

**4.3.1 Nitric acid**,  $c$  (0,1 mol/l). Dilute 7 ml concentrated nitric acid (4.3) with water to 1 000 ml.

### 4.4 Standard solutions

NOTE The standard solutions for Pb, Cd, Zn, Cu and Fe can be prepared from metals or metal salts. Standard solutions can also be commercially available. It is advisable to use certified standard solutions. The following preparation of standard solutions are given as an example.

**4.4.1 Lead standard solution.** 1 000 mg/l. Dissolve 1000 mg Pb in 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

**4.4.2 Cadmium standard solution.** 1 000 mg/l. Dissolve 1 000 mg Cd in 14 ml water + 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

**4.4.3 Chromium standard solution.** 1 000 mg/l. Dissolve 3 735 mg K<sub>2</sub>CrO<sub>4</sub> in 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

**4.4.4 Zinc standard solution.** 1 000 mg/l. Dissolve 1 000 mg Zn in 14 ml water + 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

**4.4.5 Copper standard solution.** 1 000 mg/l. Dissolve 1 000 mg Cu in 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

**4.4.6 Iron standard solution.** 1 000 mg/l. Dissolve 1 000 mg Fe in 14 ml water + 7 ml nitric acid (4.3) in 1-l-volumetric flask. Dilute to volume with water.

### 4.5 Calibration solutions

#### 4.5.1 For graphite furnace analysis

Dilute standard solutions 4.4.1 to 4.4.3 with  $c$  (0,1 mol/l) nitric acid (4.3.1) to a range of standards that covers the linear range of the element to be determined.

#### 4.5.2 Working standard solutions for flame analysis

Dilute standard solutions 4.4.4 to 4.4.6 with  $c$  (0,1 mol/l) nitric acid (4.3.1) to a range of standards that covers the concentration of the element to be determined.