

Microbiology of the food chain - Quantitative determination of emetic toxin (cereulide) using LC-MS/MS (ISO 18465:2017)

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English Version

**Microbiology of the food chain - Quantitative
determination of emetic toxin (cereulide) using LC-MS/MS
(ISO 18465:2017)**

Microbiologie de la chaîne alimentaire - Détermination
quantitative de la toxine émétique (céréulide) par CL-
SM/SM (ISO 18465:2016)

Mikrobiologie der Lebensmittelkette - Quantitative
Bestimmung von emetischem Toxin (Cereulid) mittels
LC-MS/MS (ISO 18465:2017)

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European Foreword

This document (EN ISO 18465:2017) has been prepared by Technical Committee CEN/TC 275 "Food analysis - Horizontal methods", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 34 "Food products".

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of an identical text or by endorsement, at the latest by August 2017 and conflicting national standards shall be withdrawn at the latest by August 2017.

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

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Endorsement notice

The text of ISO 18465:2017 has been approved by CEN as EN ISO 18465:2017 without any modification.

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Foreword

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This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 275, *Food Analysis — Horizontal methods*, in collaboration with ISO Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 9, *Microbiology*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

Cereulide, the emetic toxin produced in foods by certain strains of *Bacillus cereus*, is a heat and acid stable toxin that causes nausea and vomiting when ingested. In very rare cases, people can die after ingestion of the toxin. Due to its stability, the toxin may still be present even when *B. cereus* can no longer be detected. The presence of cereulide seems to be linked to starch-rich foods like rice (dishes) and pasta (dishes). However, recent data suggest that the occurrence of food borne outbreaks due to cereulide is more common to foods in general^[9]. The toxin has a cyclic structure and consists of in total 12 monomers as a repeat of (D-O-Leucine-D-Alanine-L-O-Valine-L-Valine). Several methods have been developed for the detection and/or quantification of the toxin. Some of these methods are nonspecific bio-assays^[3, 4] and other methods are specifically based on the chemical analysis using liquid chromatography with mass spectrometry (LC-MS/MS) for the detection and quantification of the toxin^[5, 6, 7, 8]. The chemical methods are more specific for cereulide and have, therefore, been chosen as the starting point for standardization of a method for the quantification of cereulide. Recently, research has been done for the chemodiversity of cereulide. At least 18 cereulide variants were detected by UHPLC-TOFMS and ion-trap MSⁿ sequencing, among which the previously unknown isocereulides A-G^[10].

Microbiology of the food chain — Quantitative determination of emetic toxin (cereulide) using LC-MS/MS

1 Scope

This document describes the quantitative analysis of the emetic toxin cereulide using high performance liquid chromatography (HPLC) or ultra performance liquid chromatography (UHPLC) connected to a tandem mass spectrometer (LC-MS/MS).

This document is applicable to the analysis of the toxin in products intended for human consumption.

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1

cereulide

toxin cyclo[D-O-Leucine-D-Alanine-L-O-Valine-L-Valine]₃ produced by certain strains of the species of *B. cereus*

4 General principle

Cereulide is extracted from the food matrix by shaking the sample with acetonitrile. ¹³C₆-Cereulide is used as an internal standard. The components in the solution are separated using HPLC or UHPLC and subsequently detected using tandem mass spectrometry (LC-MS/MS). For MS, the electro spray ionization technique (ESI) is used, using the positive mode. The level of emetic toxin (cereulide) is expressed as µg cereulide/kg product.

5 Reagents

Use only reagents of recognized analytical grade, unless otherwise specified.

5.1 Water, according to ISO 3696.

5.2 Acetonitrile, LC-MS grade.