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BSI Standards Publication

Foodstuffs — Determination of hydride-reactive arsenic compounds in rice by atomic absorption spectrometry (Hydride-AAS) following acid extraction

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Foodstuffs - Determination of hydride-reactive arsenic compounds in rice by atomic absorption spectrometry (Hydride-AAS) following acid extraction

Détermination de composés arséniés réactifs aux hydrures dans le riz par spectrométrie d'absorption atomique (SAA-Génération d'Hydrures) après extraction acide

Lebensmittel - Bestimmung von Hydrid-bildenden Arsen-Verbindungen in Reis nach Säureextraktion mit Atomabsorptionsspektrometrie (Hydrid-AAS)

This Technical Specification (CEN/TS) was approved by CEN on 9 September 2014 for provisional application.

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Foreword

This document (CEN/TS 16731:2014) has been prepared by Technical Committee CEN/TC 275 “Food analysis - Horizontal methods”, the secretariat of which is held by DIN.

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1 Scope

This Technical Specification describes a screening procedure for the determination of nitric-acid extractable inorganic arsenic in rice with hydride generation-AAS.

The method has been developed and validated for the application of analysis in rice. It has been validated in an interlaboratory study according to ISO 5725 [2] on parboiled rice and brown rice having an inorganic arsenic content of 0,092 mg/kg and 0,191 mg/kg.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13804, *Foodstuffs — Determination of elements and their chemical species — General considerations and specific requirements*

3 Principle

Organic and inorganic arsenic compounds are extracted from the rice using diluted nitric acid. When determining the arsenic by hydride generation technique, only reducible forms of arsenic react. Of the organic arsenic compounds only a low proportion of dimethylarsinic acid reacts to form a hydride and methylarsonic acid is typically not present in rice. The gaseous hydride is transferred into a heated measuring cell (quartz cuvettes or coated graphite tube), by a stream of carrier gas, and decomposed. The absorption line of arsenic at 193,7 nm serves as a measure of the arsenic concentration [3], [4].

The procedure is exclusively applicable to rice [5].

The determination of the inorganic fraction of arsenic requires a determination of arsenic with hydride generation AAS; direct measurement of the extract by graphite furnace AAS, using ICP-MS or ICP-OES provides incorrect results.

4 Reagents

Unless stated otherwise, chemicals of analytical grade shall be used and “solution” means aqueous solution.

The water shall be of the corresponding purity.

The arsenic concentration of reagents and water shall be so low that it does not influence the result of the determination.

4.1 Hydrochloric acid, w = 30 % [1], ρ = 1,15 g/ml [2].

4.2 Nitric acid, concentrated, w = 65 %.

4.3 Diluted nitric acid, c = 0,28 mol/l[3].

Dilute 3,7 ml of nitric acid (4.2) to 200 ml with water.

4.4 Sodium borohydride, w ≥ 96 %.

1) w = mass fraction.

2) ρ = mass concentration.

3) c = substance concentration.