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Materials påverkan på dricksvatten – GC-MS identifiering av urlakningsbara organiska ämnen

Influence of materials on water intended for human consumption – GC-MS identification of water leachable organic substances

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EUROPEAN STANDARD

EN 15768

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2015

ICS 13.060.20; 67.250; 71.040.50

English Version

Influence of materials on water intended for human consumption - GC-MS identification of water leachable organic substances

Influence sur l'eau des matériaux en contact avec l'eau destinée à la consommation humaine - Identification par GC-SM de substances organiques lixiviables à l'eau

Identifizierung mittels GC-MS von durch Wasser auslaugbaren organischen Substanzen aus Materialien für den Kontakt mit Trinkwasser

This European Standard was approved by CEN on 29 November 2014.

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.

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COMITÉ EUROPÉEN DE NORMALISATION
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SS-EN 15768:2015 (E)

Foreword

This document (EN 15768:2015) has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by July 2015 and conflicting national standards shall be withdrawn at the latest by July 2015.

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.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document has been prepared on the basis of co-normative research project EVK1-CT 2000-00052 and work funded by DG Enterprise and Industry (Grant Agreement S12.403892).

This document describes methods of identification only, and should not be used or quoted as a specification.

References to this document should indicate that the methods of identification used are in accordance with EN 15678:2015.

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Introduction

Organic substances that migrate from products containing such substances have, when used in contact with water intended for human consumption, the potential to cause health concerns for consumers. The potential health effects of these chemicals are assessed in three stages as follows:

- a) preparation of migration waters by exposing a portion of the material to water under controlled conditions;
- b) analysis of the migration waters;
- c) assessment of the identities and concentrations of the substance detected.

The analysis of organic substances present in migration waters can involve two different types of analytical methods as follows:

- d) a screening method, which allows a variety of substances to be detected and a semi-quantitative assessment to be made of their concentrations;
- e) accurate quantitative methods for the determination of specific target substances known to be present in the chemical formulations of the materials.

This standard describes the analytical procedures based upon gas chromatography and mass spectrometry (GC-MS) used to screen migration waters for organic substances derived from finished products such as pipes, protective coatings, membranes, etc. This method is suitable for migration waters from all products that can potentially release organic chemicals into water when they are used in contact with water intended for human consumption, and which are the subject of an application for approval by the national regulatory body. It may be one of several methods that form part of the overall approval process. The method may also be used as part of an approval audit process. The method does not provide accurate quantitative results and other analytical methods are recommended for accurate quantitative determination of specific target substances.

SS-EN 15768:2015 (E)

1 Scope

This European Standard describes a method for detecting and identifying organic chemicals that are amenable to GC-MS analysis using the procedures described and which can migrate from a product into water intended for human consumption. This European Standard does not provide all the necessary tools to completely identify all the substances that are detected. A method of semi-quantitatively estimating the concentrations of the organic substances detected is also provided, however, concentrations should only be seen as indicative.

NOTE The method to be used for the preparation of migration waters is specified by separate ENs, as noted below.

2 Normative references

EN 12873-1, *Influence of materials on water intended for human consumption - Influence due to migration - Part 1: Test method for factory-made products made from or incorporating organic or glassy (porcelain/vitreous enamel) materials*

EN 12873-2, *Influence of materials on water intended for human consumption - Influence due to migration - Part 2: Test method for non-metallic and non-cementitious site-applied materials*

EN 12873-3, *Influence of materials on water intended for human consumption - Influence due to migration - Part 3: Test method for ion exchange and adsorbent resins*

EN 12873-4, *Influence of materials on water intended for human consumption - Influence due to migration - Part 4: Test method for water treatment membranes*

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

3 Terms and definitions

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

3.1

u

atomic mass unit, defined as 1/12 of the mass of a single atom of carbon-12 in the gas phase (i.e. unbound), at rest and in its ground state

3.2

asymmetry factor

A_s

measure of the absorption of a compound during gas chromatographic analysis

Note 1 to entry: The asymmetry factor (A_s) can be derived from Formula (1).

$$A_s = \frac{(a + b)}{2b} \quad (1)$$

where

a is the distance from the leading edge of the peak at the point on the baseline where the perpendicular dropped from the peak maximum crosses it;

b is the corresponding distance from the trailing edge of the peak.

Locate the apex of the peaks that require their asymmetry values calculated. For each peak, drop a perpendicular line down at a right-angle to the baseline.

Note 2 to entry: Some manufacturer's GC-MS software packages allow the calculation of peak asymmetries to be produced automatically. Check the criteria used for the measurement, as some packages perform the calculation at 5 % of the peak height.

3.3

electron impact ionization

ionization by a beam of electrons

3.4

GC-MS

analytical instrument comprising a gas chromatograph (GC) linked to a mass spectrometer (MS)

3.5

GC-MS general survey analysis

acquisition of a series of mass spectra (up to several thousand) during the course of a gas chromatographic run, by operating the mass spectrometer in a continuous cyclic scanning mode over a wide m/z range

3.6

injection standard

organic substance added to the final solvent extract prior to analysis

Note 1 to entry: An injection standard is added to allow the recoveries of the internal standards to be calculated, by providing a means of normalizing the GC-MS responses for solvent extracts and GC-MS standards.

3.7

internal standard

organic substance added to the migration water at a known concentration prior to the commencement of the analysis

Note 1 to entry: Internal standards are added for the following reasons (a) to demonstrate that the analysis has been undertaken successfully, and (b) to provide a reference to allow other substances detected to be quantified. Ideally, the internal standards should not be present in the migration waters being analysed; for this reason, isotopically labelled standards are used.

3.8

test water

water used to prepare the migration water, as specified in EN 12873-1, EN 12873-2, EN 12873-3 or EN 12873-4 depending on the material being tested

3.9

laboratory blank

water, as specified in EN ISO 3696, known to contain negligible levels of contamination, to which internal standards (3.7) have been added and which is then analysed in the same way as the migration water

Note 1 to entry: Laboratory blanks are used to check for potential contamination of either migration waters or solvent extracts which may occur within the laboratory during the course of the analysis.

3.10

migration water

aqueous solution that results from leaving test water in contact with the test material under the specified test conditions

3.11

procedural blank

aqueous solution that results from leaving test water in contact with tanks or containers identical to those used to prepare the migration water in the absence of the test material