SLOVENSKI STANDARD
oSIST prEN ISO 16094-3:2024

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Kakovost vode - Analiza mikroplastike v vodi - 3. del: Metode termične analize za vodo z nizko vsebnostjo suspendiranih trdnih delcev, vključno s pitno vodo (ISO/DIS 16094-3:2024)

Water quality - Analysis of microplastic in water - Part 3: Thermo-analytical methods for waters with low content of suspended solids including drinking water (ISO/DIS 16094-3:2024)

Wasserbeschaffenheit - Analyse von Kunststoffen in Wasser - Teil 3: Thermo-analytisches Verfahren für Wasser mit geringen Gehalten an natürlichen Schwebstoffen (ISO/DIS 16094-3:2024)

Qualité de l'eau - Analyse des microplastiques dans l'eau - Partie 3: Méthodes thermo-analytiques pour les eaux à faible teneur en matières en suspension, y compris l'eau potable (ISO/DIS 16094-3:2024)

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Part 3: Thermo-analytical methods for waters with low content of suspended solids including drinking water

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

A list of all parts in the ISO 16094 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Pollution linked to microplastics is recognised as a global phenomenon. The standardisation of the sampling, quantification and identification protocols is required to ensure reliability and comparability of the data produced for health and environmental risk assessments.

Microplastics in water can be identified and quantified using various methodological approaches. Depending on the measurement objectives, several complementary approaches shall be used to cover the full spectrum of microplastics (size and chemical nature). Table 1 summarises the characteristics and the information obtained with the thermo-analytical technics.

Table 1 — Characteristics of the various analytical techniques and information obtained

	Thermal Extraction Desorption associated with Gas Chromatography - Mass Spectrometry	**Pyrolysis associated with Gas Chromatography - Mass Spectrometry**	
Type of Sample	Water filtrate residue		Isolated particles
Chemical nature of the polymer	Yes		
Information provided by analytical technique	Thermal decomposition products		
Results expression	Polymer type, mass		Polymer type
Minimum measurable size of particles	Undefined		Visual identify-cation
Minimum mass subject to measurement after preparation	0,1 – 2 µg (absolute)	0,01 – 1 µg (absolute)	

Water quality — Analysis of microplastic in water —

Part 3:
Thermo-analytical methods for waters with low content of suspended solids including drinking water

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff.

1 Scope

This document provides key principles for the analysis of microplastics in drinking water and water with low content of natural suspended solids using thermo-analytical methods.

This document is applicable for the determination of types of polymers and mass of microplastics in the sample.

This document is not applicable for the determination of particle size, particle shape and particle numbers.

This document is applicable for the detection of microplastics in drinking water and waters with low content of natural total suspended solids (TSS)[1].

NOTE However, the described detection procedures can also be applied to other sorts of samples. Whenever a laboratory applies this standard for detection of microplastics in water with higher contents of TSS than defined here, additional quality assessment and control (including preparation) is recommended to be applied to verify that detection methods are also applicable for higher amounts of TSS.

This standard describes the detection of different sort of polymers, which are the main ones (most used in industry and most abundant in the environment) being: polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polystyrene (PS). These types of polymers can be analysed by all thermo-analytical methods. Depending on the used thermo-analytic methods, additional further polymer can be detected, such as polyvinylchloride (PVC), polycarbonate (PC), poly-methylmethacrylate (PMMA) polyamides (PA), polyurethanes (PU) and as well as signals from PS-co-polymers[2].

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 472:2013, *Plastics — Vocabulary*

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 4880:1997, *Burning behaviour of textiles and textile products — Vocabulary*

1) ISO 6107 (1-100 mg/l) or lower if they interfere with determination; in future a reference to ISO 5667-27 is desirable, which is still under development.

2) Signals from PS-co-polymers can be derivate from tire wear and can be detect with the methods as well, but elastomers are outside the scope of this document.

ISO 8421-1:1987, *Fire protection — Vocabulary — Part 1: General terms and phenomena of fire*

ISO 11074:2015, *Soil quality — Vocabulary*

ISO 11358, *Plastics — Thermogravimetry (TG) of polymers — General principles*

ISO 14644-1, *Cleanrooms and associated controlled environments — Part 1: Classification of air cleanliness by particle concentration*

ISO 17034 GUIDE-30:33, *35, Reference materials — Guidance for characterization and assessment of homogeneity and stability*

ISO 24187, *Principles for the analysis of microplastics present in the environment*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
microplastic
any solid plastic or synthetic polymer particle insoluble in water with the largest dimension between 1 µm and 5 mm

Note 1 to entry: Microplastics can show various shapes.

Note 2 to entry: This definition encompasses the ISO/TR 21960 definitions of large microplastics and microplastics.

Note 3 to entry: The term “microplastics” covers the sum of several individual microplastic particles.

3.2
thermal analysis

group of techniques in which a physical property of a substance is measured as a function of temperature or time while the substance is subjected to a controlled temperature program

Note 1 to entry: The adjective corresponding to “thermal analysis” is “thermo-analytical” (as in, for example, thermo-analytical techniques).

Note 2 to entry: When two or more techniques are applied to the same test sample at the same time, they should be identified as “simultaneous multiple techniques”, for example simultaneous thermogravimetry and differential thermal analysis. The term “combined multiple techniques” would indicate the use of separate test samples for each technique.

[SOURCE: ISO 472:2013, 2.1160]

3.3
pyrolysis
irreversible chemical decomposition of a material due to an increase in temperature without oxidation

[SOURCE: ISO 8421-1:1987, 1.44; ISO 4880:1997, 53; ISO 11074:2015, 6.4.33]