Für Mensch & Umwelt

Umwelt Bundesamt

Mikroplastik: Die Umweltperspektive

Ulrike Braun, Umweltbundesamt

Microplastics in the environment: Everywhere.

Environmental regulation related to microplastics

- Regulation on tyre labelling (EU 2020/740): **Need to address the unintentional release of microplastics from tyres** (information measures
- REACH **restriction regulation** (EU 2023/2055): Microplastics intentionally added to products
- Urban Waste Water Treatment Directive (EU 2024/3019): **Monitoring microplastics** in UWW and sludge
- Regulation on **preventing pellet losses** (2025): Preventing plastic pellet losses to the environment
- Proposal for a framework in the field of water policy (2025): Inclusion of **microplastics monitoring on watch list** (incl. reliable methods of sampling and analysis not entailing excessive costs)

Directive concerning urban wastewater treatment (UWWTD)

Official Journal
of the European Union

EN
L series

2024/3019

12.12.2024

DIRECTIVE (EU) 2024/3019 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 27 November 2024

concerning urban wastewater treatment

(recast)

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

UWWTD Article 21: Monitoring

…
3) For all agglomerations of 10 000 p. e. and above, Member States shall ensure that competent authorities or appropriate bodies monitor, at the inlets and outlets of urban wastewater treatment plants, the concentration and loads in the urban wastewater of the following elements:
…
(d) the presence of microplastics.
…
The monitoring referred to in this paragraph shall be carried out at the following frequencies:
(a) at least two samples per year, with a maximum of 6 months between the samples, for agglomerations of 150 000 p.e. and above
(b) at least one sample every two years for agglomerations of between 10 000 p.e. and 150 000 p.e.
…
The Commission is empowered to adopt implementing acts in order to establish methodologies for measuring, estimating and modelling direct and indirect GHG emissions from urban wastewater treatment plants, and microplastics in urban wastewater and sludge. Those implementing acts shall be adopted by 2 July 2027 in accordance with the examination procedure referred to in Article 28(2).
…

=> (a) 652 samples / year for Germany
=> (b) 2.078 samples / year for Germany

Regulation on preventing plastic pellet losses

Brussels, 10 September 2025
(OR. en)

9047/25

Interinstitutional File:
2023/0373(COD)

ENV 357
MI 305
IND 145
CONSOM 86
COMPET 386
MARE 22
PECHE 135
RECH 227
SAN 233
ENT 70
ECOFIN 563
TRANS 181
CODEC 613

LEGISLATIVE ACTS AND OTHER INSTRUMENTS

Subject:	Position of the Council at first reading with a view to the adoption of a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on preventing plastic pellet losses to reduce microplastic pollution

Pellet Loss Regulation Article 18: Standardisation

1. For the purposes of compliance with the obligation referred to in Article 5(6), point (b), a methodology to estimate quantities of losses shall be developed in harmonised standards in accordance with the procedures established by Regulation (EU) No 1025/2012.

2. The Commission shall submit the request for the development of harmonised standards to one or more European standardisation organisations by… [12 months from the date of entry into force of this Regulation].

3. Where no European standardisation organisation accepts the request to draft a harmonised standard or where the Commission considers that the proposed standard does not satisfy the requirements which it aims to cover, the Commission shall establish the methodology referred to in paragraph 1 of this Article by means of an implementing act. That implementing act shall be adopted in accordance with the examination procedure referred to in Article 24(3).

Environmental regulation related to microplastics: What do we know / Where are we standing ?

Microplastics – Standardisation Activities

	Method	Title	Comment
ISO/TC 61/SC 14/ WG 4 Plastics	ISO TR 21960 (2020)	Plastics — Environmental aspects — State of knowledge and methodologies	Review
ISO/TC 61/SC 14/ WG 4 Plastics	ISO 24187 (2023)	Principles for the analysis of microplastics present in the environment	General
ISO/TC 38/ WG 34 Textiles	ISO 4484-1 (2023)	Textiles and textile products — Microplastics from textile sources Part 1: Determination of material loss from fabrics during washing	Only washing machines
ISO/TC 38/ WG 34 Textiles	ISO 4484-2 (2023)	Textiles and textile products — Microplastics from textile sources Part 2: Qualitative and quantitative analysis of microplastics	Only washing machines
ISO/TC 38/ WG 34 Textiles	ISO 4484-3 (2023)	Textiles and textile products — Microplastics from textile sources Part 3: Measurement of collected material mass released from textile end products by domestic washing method	Only washing machines
ISO/TC 147/SC 6/ WG 16 Water	ISO 5667-27 (2025)	Water quality — Sampling — Part 27: Guidance on sampling for microplastics in water	General - sampling
ISO/TC 147/SC 2/JWG Water	ISO 16094-2 (2025)	Water quality - Analysis of microplastics in water - Part 2: Vibrational spectroscopy methods for waters with low content of suspended solids including drinking water	Only detection
ISO/TC 147/SC 2/JWG Water	ISO/DIS 16094-3	Water quality - Analysis of microplastics in water - Part 3: Thermo-analytical methods for waters with low content of suspended solids including drinking water	Only detection
ISO/TC 45 WG 16 Rubber	ISO/DIS 21396	Rubber — Determination of mass concentration of tire and road wear particles (TRWP) in soil and sediments — Pyrolysis-GC/MS method	Only TRWP
ISO/TC 61/SC 14/ WG 4 Plastics	ISO/WD 24899	Plastics — A method for extraction of microplastics from compost samples	Only compost samples
ISO/TC 61/SC 14/ WG 4 Plastics	ISO/NP 25654	Plastics — Reference materials for the validation of microplastic detection methods	Reference materials
ISO/TC 61/SC 14/ WG 4 Plastics	ISO/PWI 25220	Plastics — Resin loss prevention and mitigation management practices	Management practices
ISO/TC 38/ WG 34 Textiles	ISO/CD 4484-4	Textiles and textile products – Microplastics from textile sources – Part 4: Quantitative thermal or gravimetric analysis of certain synthetic materials released from fabrics during washing"	Including GC/MS
ISO/TC 147/SC 2/JWG Water	ISO/Pre-WD 16094-4	Water quality - Analysis of microplastics in water - Part 4: Sample preparation for monitoring of microplastics in waters	General – sample preparation
CEN/TC 444 / WG 6 Soil	CEN/TS PWI	Soil, sediment and sludge — Sampling, pre-treatment and analysis of microplastics	General - all

Usage of the terminology “Microplastics”

- Synthetical processed polymers (petroleum based)
- Polymers: repeating structural units (monomers)
- Cross-linkage of polymers: classification into thermoplastics, thermosets and elastomers
- Modification of properties: inclusion of additives

Microplastic determinations:

⇒ Only detection of polymers sort (monomers)

⇒ Microplastics = degradation products by mechanical, physical-chemical aging, biological decomposition

⇒ Pellets, beads: Raw materials from application

⇒ Synthetic textile fibres, tyres particles and paint flakes: degradation particles from products

=> Urgent need of uniform understanding of the terminology

Size definitions of microplastics

Plastics Standards (21960 / 24187):
Large microplastic: any solid plastic particle insoluble in water with any dimension between **1 mm and 5 mm**
Microplastic: any solid plastic particle insoluble in water with dimension between **1 µm and 1 000 µm** (= 1 mm)

Water Standards (5667-27 / 16094):
Microplastic: any solid plastic or synthetic polymer particle insoluble in water with the largest dimension between **1 µm and 5 mm**

Textiles Standards (4484):
Microplastic: material consisting of a solid polymer containing particles, to which additives or other substances may have been added, and where a weight fraction of ≥1% particles have a) all sizes **100 nm ≤ × ≤ 5 mm**, b) for fibres, a length of **300 nm ≤ × ≤ 15 mm** and a length/diameter ratio >3

ASTM:
Microplastic: any solid, synthetic organic polymeric, material to which chemical additives or other substances may have been added, which are particles <5 mm in their largest dimension, and fibers no longer than 15 mm in length with an aspect ratio of at least 30:1 and <500 µm in its smallest dimension.

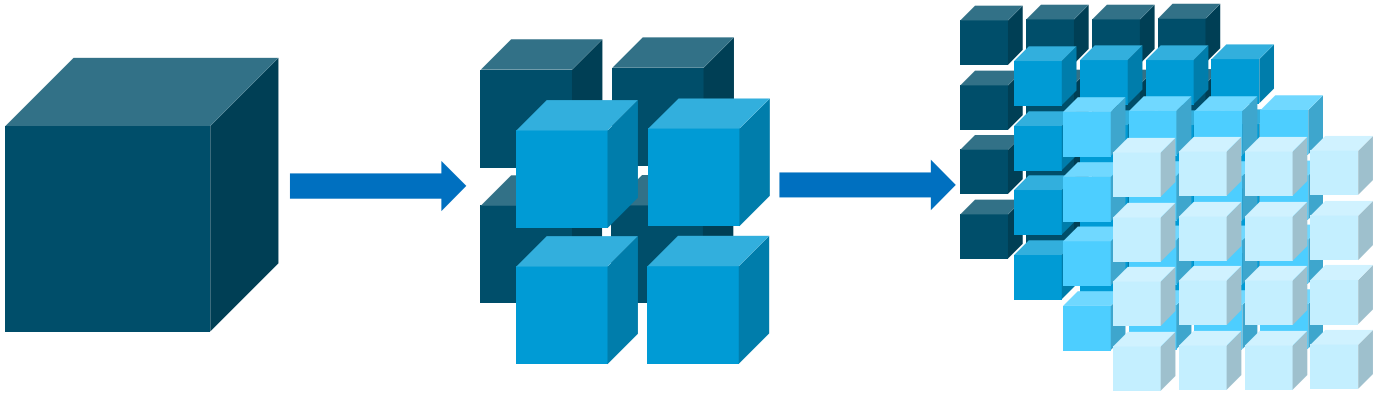
ECHA:
Microplastic: material consisting of solid polymer containing particles, to which additives or other substances may have been added, and where ≥ 1% w/w of particles have
(i) all dimensions **1 nm ≤ x ≤ 5 mm**, or
(ii), for fibres, a length of **3 nm ≤ x ≤ 15 mm** and length to diameter ratio of >3.

EU /REACH:
Microplastic: The Commission considers that synthetic polymer microparticles below 0,1 µm in all dimensions pose an equivalent or potentially higher risk to the environment than particles between **0,1 µm and 5 mm** in all dimensions. The definition of synthetic polymer microparticles should therefore cover polymers in or coating particles below 5 mm in all dimensions and **fibre-like particles below 15 mm** in length.

=> Urgent need of size class harmonisation

Analysis of microplastics: Detection

One particle with a very high mass



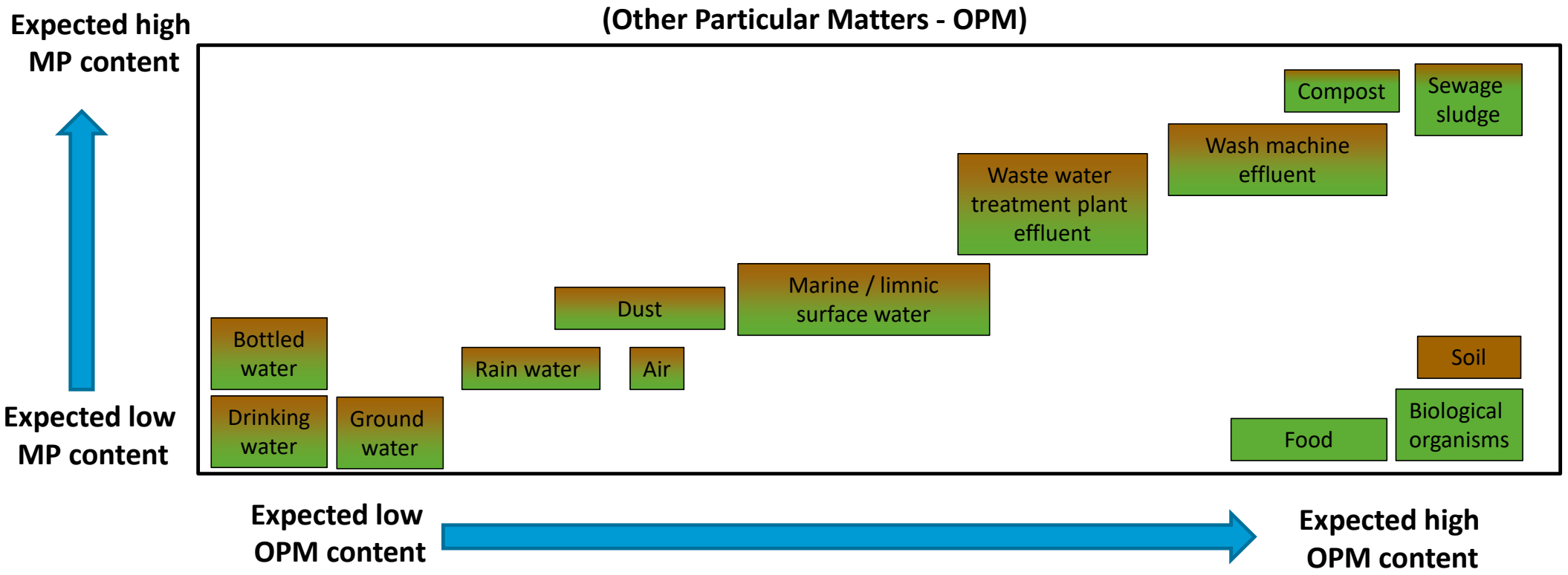
Many particles, each with a very small mass

Fragmentation of a 1 mm particle	Number	1	8	1.000	8.000	1.000.000
Diameter of particle	µm	1.000	500	100	50	10
Mass on one particle	µg	1.000	125	1	0,125	0,001
Limitation Microscopic-spectroscopic methods						
Limitation Thermo-analytic methods						

=> Urgent need of method differentiation for the application (considering limitation for PVC/ tire abrasion particles)

Calculations according particles with density of 1 g/ml, resolutions limit of 20m µm, LOD value of PE ~ 2 µg

Analysis of microplastics: Sampling and sample preparation

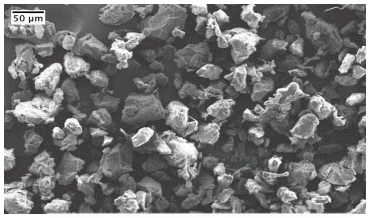


=> Urgent need of harmonisation of sampling strategy and sample preparation (considering representativeness, aspects of time cost)

Blown: Mainly inorganic OPM-Need of density separation, Green: Mainly organic OPM-Need of oxidative treatment

Analysis of microplastics: Reference materials

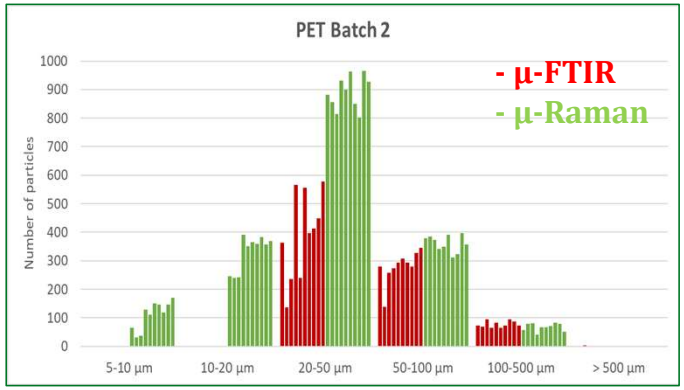
MP powder



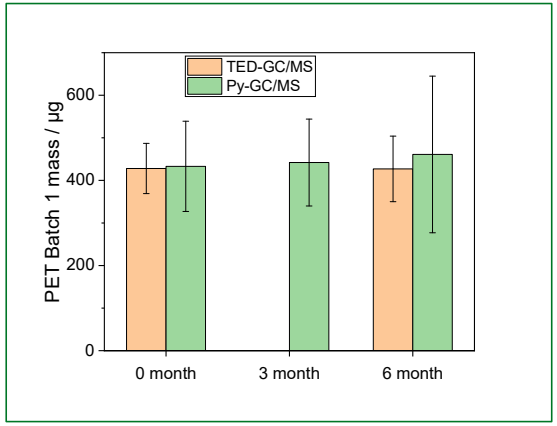
Water soluble matrix

Solid phase dilution

Tablet pressing



Characterisation, Homogeneity and Stability control

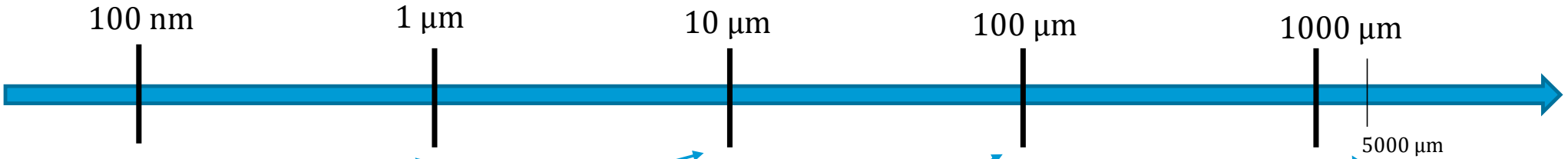


PlasticTrace
Tracing Micro and NanoPlastics in Food and Environment

BAM
Bundesanstalt für Materialforschung und -prüfung

=> Further establishment and dissemination of high-quality reference materials (incl. fibers)

Analysis of microplastic pellets



Ulrike (1 m)

Bundespresseamt,
Berlin (~10 m)

Waireinga fall, NZ
(~ 100 m)

Tenerife, ES,
(~ 5.000 m, measured from see floor)

=> Urgent need of new analytical concepts for pellet monitoring

Bedarf für die Zukunft

- Einheitliches Verständnis des Begriffs „Mikroplastik“
- Sinnvolle, praxisorientierte Harmonisierung der Größenklassen

- Methodendifferenzierung für die Anwendung: Massen- und Partikelbestimmung
- Harmonisierung der Probennahmestrategie und Probenvorbereitung
- Weitere Etablierung hochwertiger Referenzmaterialien
- Separate Lösung für Pellets

- Verbesserte interdisziplinäre Kommunikation und Zusammenarbeit (=> Wissenschaft/ Industrie)
- Methodenentwicklung für die Routineüberwachung (=> kostengünstig und zeitsparend)
- Methodenentwicklung für die Risikobewertung (=> auch für recycelte Kunststoffe)

Fragen?

Umwelt Bundesamt