

Reference Materials for Microplastic Analysis

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Microplastic laboratory set up

- Initial set up of laboratory in Trondheim
- Microplastic trace level vs. Microplastic production
- New premises in Trondheim
 - Aiming for ISO Certification of environment
 - Clean Room ISO7 and ISO8



Reference Materials



Reference materials (RMs)

- Sufficiently **homogeneous** and **stable**
- **Fit for its intended use** in a measurement process

Certified Reference materials (CRMs), is an RM with

- A reference material **certificate**
- With (a) **specified property** or properties
- Specified property or properties have been given a value through a **valid procedure**
- With metrological **traceability**

ISO 17034:2016



Microplastic tablets

Innovative reference materials for method validation in microplastic analysis including interlaboratory comparison exercises

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Microplastic reference materials are vital tools in the validation of methods used to detect environmental pollutants. Microplastics, a natural pollutant, require a variety of complex approaches to address their presence in environmental

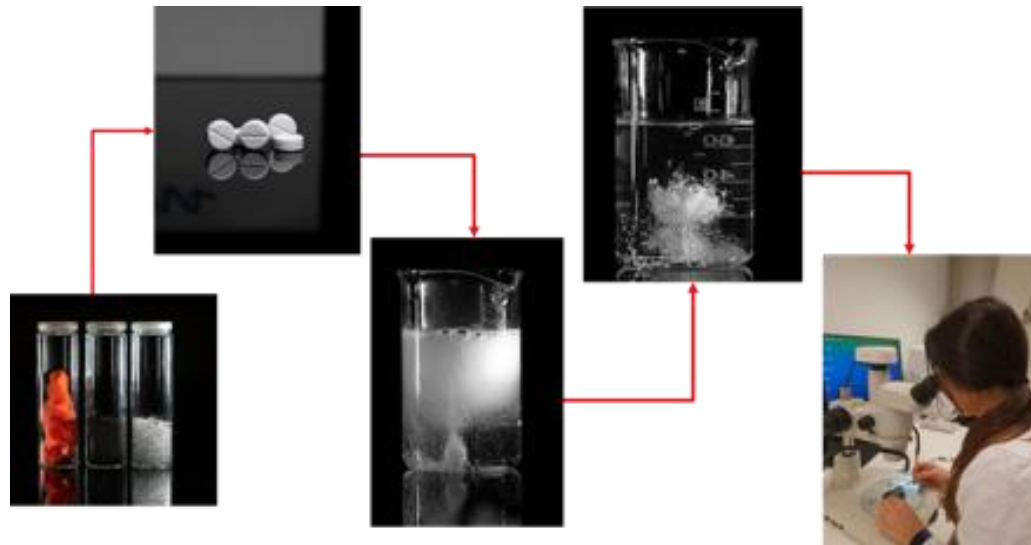


Figure: Norwegian Institute for Water Research (NIVA)

Stepwise Certification

1

Certifying neat microplastic material

Produced microplastic (polymer type and size range)

- Polyethylene (PE), 50-300 micron
- Polypropylene (PP), 50-300 micron
- Polyethylene terephthalate (PET), 50-300 micron
- Polystyrene (PS), 50-300 micron
- Polyvinylchloride (PVC), 50-300 micron
- Polycarbonate (PC), 50-300 micron

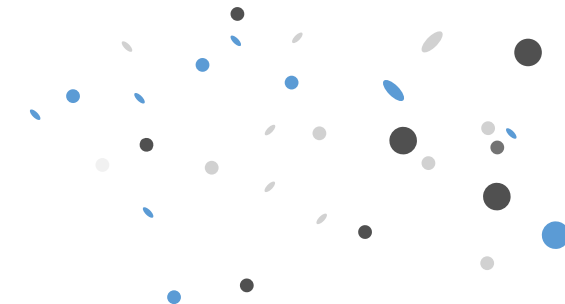
Important properties to specify

Physical properties

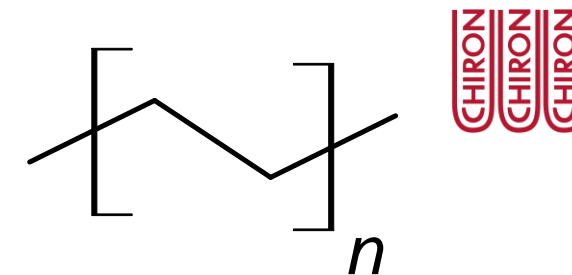
- Size distribution
- (Morphology)

Chemical properties

- Identity
- Purity

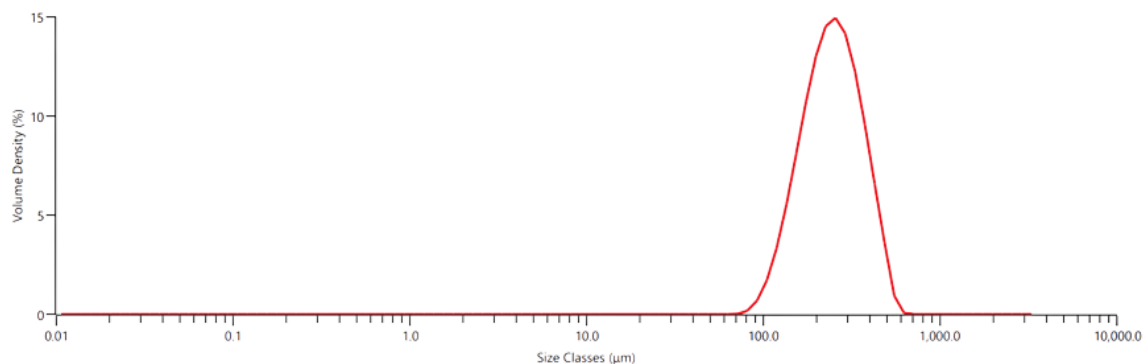


Analyses, Polyethylene (PE, LD)

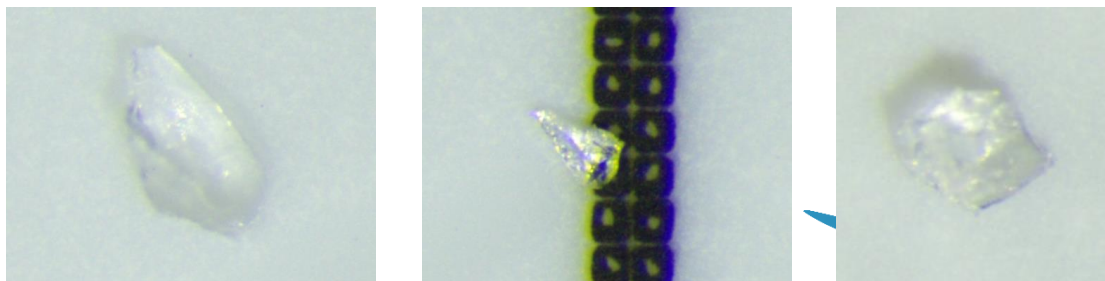


Physical Analysis

Analysis/Calculation	Results
Morphology by optical microscopy	Irregularly shaped particles
Particle size by Sieve Analysis (mass):	50-300 μm
Particle size distribution by Laser Diffraction (volume density (%)):	See graphical data below



Examples of morphology (optical microscope)



Chemical Analysis

Analysis/Calculation	Results
Chromatographic purity by Pyrolysis-GC-MS:	98.4 %
Identity by Pyrolysis-GC-MS:	Complies
Loss on drying by TGA:	<0.1 wt%
Residue on ignition by TGA:	0.37 wt%

PRODUCT INFORMATION SHEET REFERENCE MATERIAL

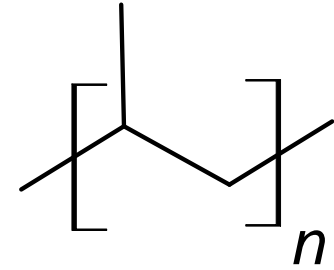
**Micro
Prefs®**

Certificate no.: 15246.X-29568-2

1. Description of the reference material

1.1 General product data

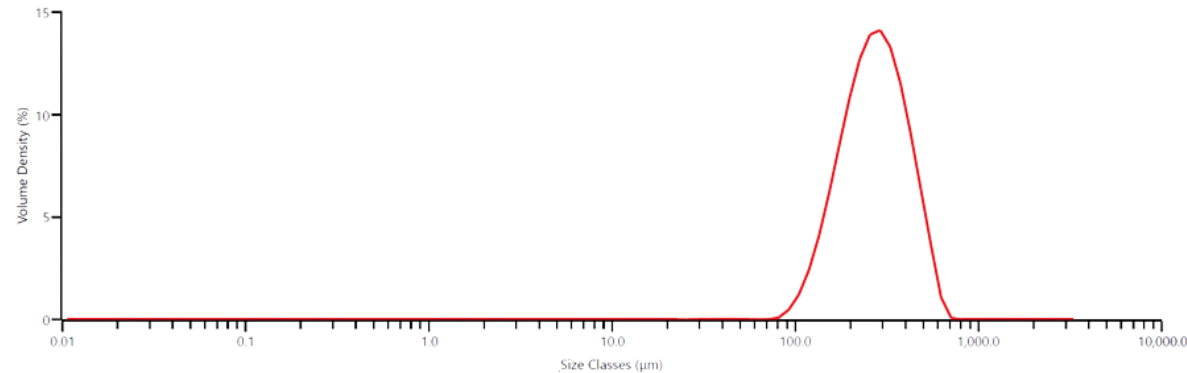
Catalogue #:	15246.X
Product name:	PE 50-300 micron
Chemical name:	Polyethylene, microplastics 50-300 micron
Synonym:	PE MicroPrefs® 50-300 micron; Polyolefin MicroPrefs® 50-300 micron
Expiry date:	2033/03
Long term storage:	+20 °C \pm 5 °C. Dry, protect from light and moisture. Avoid vigorous shaking.
Short term storage:	This product is suitable for transit at ambient temperatures.
CAS #:	9002-88-4
Molecular formula:	(C ₂ H ₄) _n



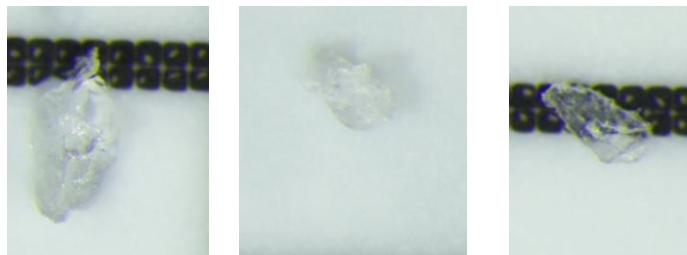
Analyses, Polypropylene (PP)

Physical Analysis

Analysis/Calculation	Results
Morphology by optical microscopy	Irregularly shaped particles
Particle size by Sieve Analysis (mass):	50-300 μm
Particle size distribution by Laser Diffraction (volume density (%)):	See graphical data below



Examples of morphology (optical microscope)



Chemical Analysis

Analysis/Calculation	Results
Chromatographic purity by Pyrolysis-GC-MS:	96.0 %
Identity by Pyrolysis-GC-MS:	Complies
Loss on drying by TGA:	< 0.1 wt%
Residue on ignition by TGA:	< 0.1 wt%

PRODUCT INFORMATION SHEET REFERENCE MATERIAL

Certificate no.: 15249.X-29571-2

1. Description of the reference material

1.1 General product data

Catalogue #:	15249.X
Product name:	PP 50-300 micron
Chemical name:	Polypropylene, microplastics 50-300 micron
Synonym:	PP MicroPRefs® 50-300 micron
Expiry date:	2033/03
Long term storage:	+20 °C \pm 5 °C. Dry, protect from light and moisture. Avoid vigorous shaking.
Short term storage:	This product is suitable for transit at ambient temperatures.
CAS #:	[9003-07-0]
Molecular formula:	(C ₃ H ₆) _x

Launching PRefs®



Micro PRefs



Microplastics

Microplastics are tiny plastic particles, which can be unintentionally formed as a result of the breakdown of larger plastics. Some plastics are deliberately designed to be small. They are known as microbeads and are used in many health and beauty products, such as exfoliating beads in facial or body scrubs.



FEATURED PRODUCT

What are the concerns?

Plastic pollution boundary threat

Our beaches and marine life are under threat. Because of their small size, plastic pollution is a wide-spread problem in Antarctica, and as closely as our own shores.

Microplastic and nanoplastic pollution pose to our potentially human health.

The PRefs® project

PRefs®, established in Norway and Chiron, is a plastic reference materials: PE, PET, PS, PP, PVC, PC 50-300 micron.

PRefs® will produce plastic reference materials for polymer testing.

The three sub-brands, Micro PRefs, Macro PRefs and Nano PRefs, specialise in microplastic reference materials.



PRefs®

Plastic Reference Materials

What does Chiron offer?

Available Standards:

Chiron No.	Name	Synonym	CAS
15246.X	Polyethylene, microplastics 50-300 micron	PE 50-300 micron	9002-88-4
15247.X	Polyethylene terephthalate, microplastics 50-300 micron	PET 50-300 micron	25038-59-9
15248.X	Polystyrene, microplastics 50-300 micron	PS 50-300 micron	9003-53-6
15249.X	Polypropylene 50-300 micron	PP 50-300 micron	9003-07-0
15250.X	Polyvinylchloride, microplastics 50-300 micron	PVC 50-300 micron	9002-86-2
15251.X	Polycarbonate, microplastics 50-300 micron	PC 50-300 micron	25037-45-0
15558.6-KIT	KIT containing PE, PET, PS, PP, PVC, PC 50-300 micron	KIT MicroPRefs® 50-300 micron	n/a

Your PREFERRED supplier of plastic reference materials

Chiron standards are made for pyrolysis GC-MS, and tablets (coming soon!) are produced for counting microplastic particles in a sample using MicroFIR, FT-RAMAN or similar techniques. For a quotation, please contact us today at sales@chiron.no

References

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Your quality is our business

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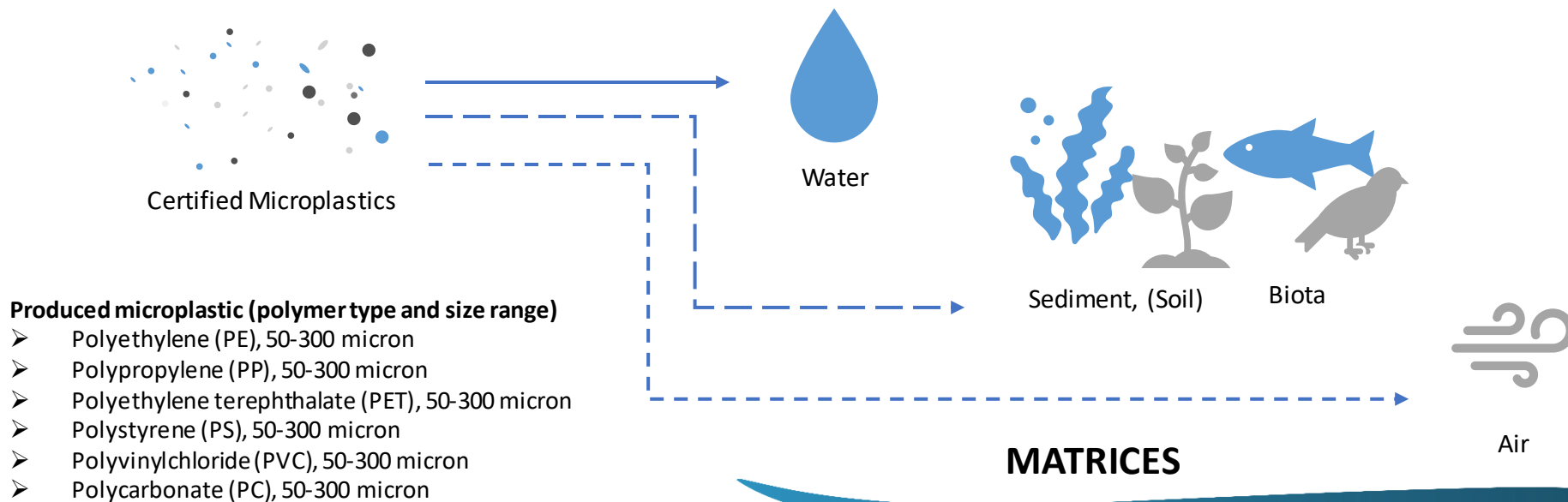
Stepwise Certification

2

Certifying microplastics in specific matrix

Important properties to specify

- Particle number in a given sample



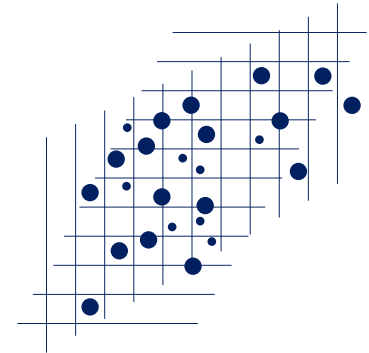
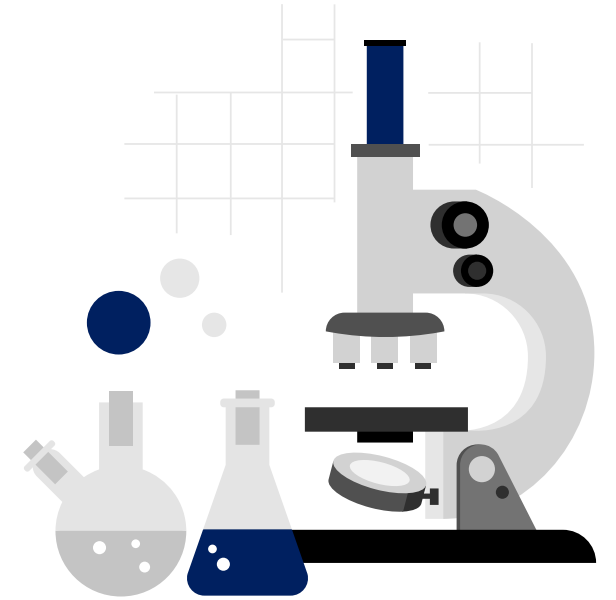
Progress summed up



1. Set up microplastic laboratory at Chiron in Trondheim, Norway
2. Produced and analyzed neat reference material for 6 different polymer types:
 - a) Polyethylene (PE), 50-300 micron
 - b) Polypropylene (PP), 50-300 micron
 - c) Polyethylene terephthalate (PET), 50-300 micron
 - d) Polystyrene (PS), 50-300 micron
 - e) Polyvinylchloride (PVC), 50-300 micron
 - f) Polycarbonate (PC), 50-300 micron
3. Co-produced tablets for interlaboratory comparison study
4. Launched neat reference material
5. Initiated tablet production
6. Prepared the ground for certification of
 - a) Microplastic Reference Material – in both neat and tablet form
 - b) Environment (Clean room)

Future steps

- Production and analysis of tablets
- Move into clean room laboratory
- Certification of
 - Neat material
 - Tablets
 - Environment (Clean room)
- Expanding the portfolio (other matrices, size ranges, artificial aging)



Thank you for your attention!

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*Please contact us,
if you have any questions or inputs*



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