



ciclo®

BIODEGRADABLE SYNTHETICS



PROBLEM & SOLUTION

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# SYNTHETIC MICROFIBERS ARE THE MOST PREVALENT FORM OF MICROPLASTIC IN AQUATIC, ATMOSPHERIC, AND TERRESTRIAL ENVIRONMENTS ACROSS THE GLOBE.<sup>1</sup>

In the context of plastic pollution, microfibers are defined as short pieces of textile fibers that have broken from the main textile construction.

Synthetic textile microfibers account for **35%** of the primary microplastics in oceans<sup>2</sup> and are found **everywhere** on earth.

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# A NATURE-BASED SOLUTION TO MITIGATE SYNTHETIC MICROFIBER POLLUTION

CiCLO® technology is a patented sustainable textile ingredient that is added to recycled or virgin polyester and nylon during the melt extrusion process. This creates biodegradable spots in the matrix of the polymer that act as pathways, enabling naturally occurring microorganisms to completely mineralize CiCLO® fibers into basic natural elements.

This mechanism is only activated under conditions that allow for biodegradation. CiCLO® fabrics will not biodegrade or prematurely deteriorate on a warehouse shelf, while being used, or during customary care—just like inherently biodegradable fabrics made from natural fibers like cotton or wool will not.

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## **'MADE TO LAST' SHOULDN'T MEAN 'HERE FOREVER'**

The CiCLO® solution bridges industry-wide ideals of complete prevention of plastic pollution and fully closed loop systems with reality. Suitable replacements aren't currently available at scale for the over 60 million tonnes of high-performance synthetic fibers produced globally.

Almost all textiles unavoidably shed, and once these tiny plastic microfibers end up in the environment, they can't be recaptured. They are prolific and omnipresent in all environments, as well as in humans and wildlife.

## KEY BENEFITS

- Durability & recyclability maintained
- OEKO-TEX® ECO PASSPORT
- Non-toxic to marine life
- Traceable
- Responsible marketing claims
- Controlled distribution only to CiCLO® Certified Fiber Manufacturers globally
- REACH Compliant
- No change in manufacturing requirements

<sup>1</sup> Roland Geyer, Jenna Gavigan, Alexis M. Jackson, Vienna R. Saccomanno, Sangwon Suh, Mary G. Gleason, Quantity and fate of synthetic microfiber emissions from apparel washing in California and strategies for their reduction, Environmental Pollution, Volume 298, 2022, 118835, ISSN 0269-7491, <https://doi.org/10.1016/j.envpol.2022.118835>.

<sup>2</sup> Boucher, J. and Friot D. (2017). Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN. 43pp

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TESTING

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## CiCLO® FIBERS BIODEGRADE AT RATES SIMILAR TO NATURAL FIBERS LIKE WOOL

Long-term studies prove that CiCLO® polyester and nylon biodegrade at greatly accelerated rates as compared to untreated polyester and nylon.

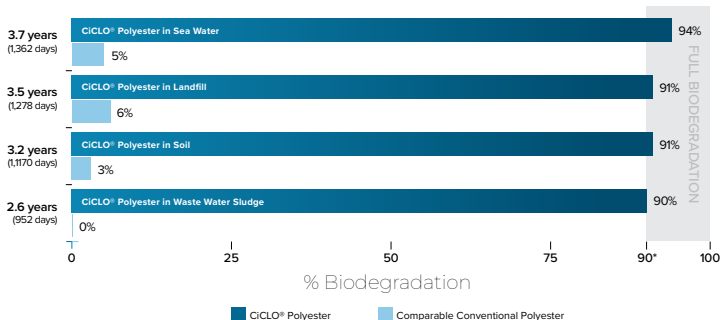
Many factors influence how quickly biodegradation may occur, the speed of which can be described as the pace of nature. Rates will vary from environment to environment for any inherently biodegradable materials that end up as pollutants in uncontrolled natural conditions.



# BIODEGRADATION RATE COMPARISON

CiCLO<sup>®</sup> technology is tested at 3rd party labs using internally recognized ASTM and ISO Test Methods that measure efficacy in environments where synthetic microfibers are prolific pollutants: sea water, anaerobic landfill conditions, natural soil, and waste water sludge.

CiCLO<sup>®</sup> Polyester v. Comparable Conventional Polyester



\* Achieving  $\geq 90\%$  in respirometry tests is considered full biodegradation. The remaining percentage can be attributed to biomass. Further analysis has been conducted to confirm no microplastics left behind.

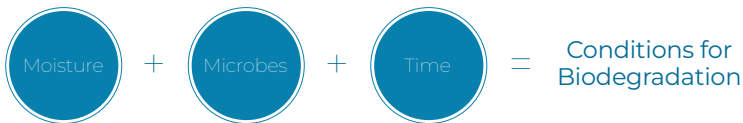
Data is summarized from studies conducted by 3rd party labs using ASTM. Visit [ciclotextiles.com](https://www.ciclotextiles.com) for more information and detailed test data.



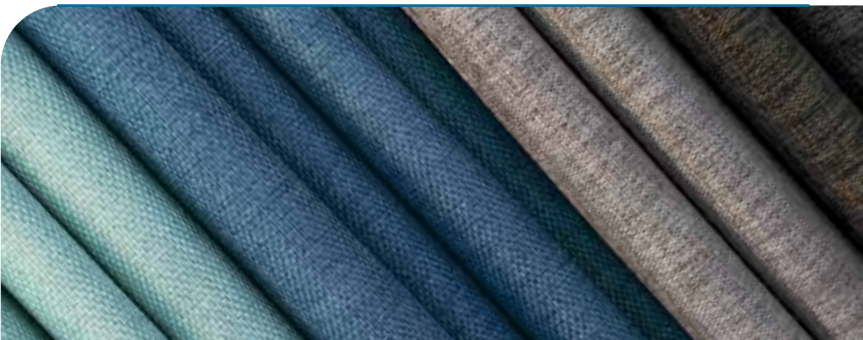
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## DURABILITY MAINTAINED

Like all inherently biodegradable materials, CiCLO® fibers will only biodegrade when exposed to moisture and microbes over time. Finished fabrics and products maintain durability and performance characteristics.



**No activation during garment use or care**



## *Additional information on lab testing and legally compliant marketing claims about biodegradable plastics:*

Biodegradation studies are conducted by independent 3rd party laboratories using internationally recognized ASTM and ISO Test Methods, including ASTM D5210, D5988, D6691 and D5511 and ISO 19679. Referenced Test Methods use respirometry, a process that measures biogas and uses stoichiometry to calculate rate and extent of biodegradation. Respirometry studies give true indication that microorganisms are breaking down and digesting materials. Biodegradation percentages never reach 100% on respirometry study data because when microorganisms digest carbon, most is used for energy and respired but some is utilized to build their cell walls. The FTC requires us to state that the rate and extent of biodegradation presented does not mean that the product will continue to biodegrade. In other words, do not extrapolate data. Laboratory studies represent controlled conditions. As with all biodegradable materials, the actual rate and extent of biodegradation is dependent upon individual conditions in actual environments.

**IMPORTANT CALIFORNIA NOTICE:** California law prohibits the sale of plastic packaging and plastic products that are labeled with the terms 'biodegradable,' 'degradable,' or 'decomposable,' or any form of those terms, or that imply in any way that the item will break down, biodegrade or decompose in a landfill or other environment. These restrictions apply to all sales in or into the State of California, including such sales over the Internet. Intrinsic Advanced Materials, LLC, has developed extensive guidelines for how to use the CiCLO® trademark and brand assets in ways that are compliant with FTC and California requirements, and how to explain the benefits of CiCLO® technology to consumers in an easy to understand and truthful way.

This brochure is intended for business to business communications. Any entity using the CiCLO® brand is required to execute a Trademark Licensing Agreement, and must responsibly promote CiCLO® technology to consumers using legally compliant messaging and claims following CiCLO® brand guidelines.