

Rethinking biodegradation & persistence testing

ARE WE MEASURING RIGHT?

Sam Deconinck

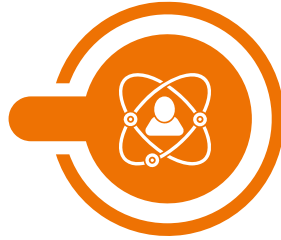
New Business Development Director

Normec OWS

25.06.2026



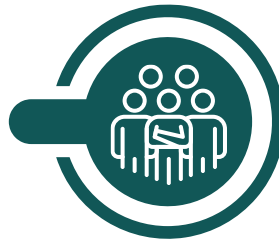
More than **35 years** of experience



Formerly linked to **Dranco Spin-off UGent**



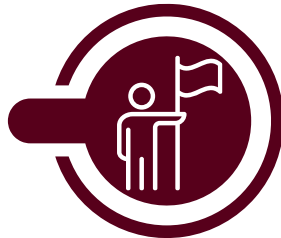
Over **60 dedicated** experts



15.000+ samples tested for **1.500+** customers



Strictly independent
No conflict of interest



Normec
OWS

World's biggest capacity of **3.500** test reactors
= short lead time



Member of several **standardization agencies**



Recognized by **all certifications bureaus** worldwide



Actively participating in industry initiatives, European subsidy projects & conferences



Operating from **Two Labs**: Europe & the US to support Customers **Worldwide**



Standardisation efforts at Normec OWS

Active committee memberships

- ISO TC38 WG30 Tests for Biodegradability
- ISO TC61 SC14 WG2 Biodegradability
- ISO TC122 SC4 Packaging and environment
- ISO TC126 WG25 Biodegradability

- CEN TC249 WG9 Bio-based and biodegradable plastics
- CEN TC261 SC4 WG2 Degradability and organic recovery of packaging and packaging materials

- ASTM D20.96 Biodegradable Plastics
- ASTM D10 Packaging
- ASTM D34 Waste Management

Standardisation efforts at Normec OWS

Project leader roles

- ISO 14853 Anaerobic biodegradation
 - ISO 16929 Pilot-scale industrial composting disintegration
 - ISO 18606 Industrial compostability
 - ISO 20200 Lab-scale industrial composting disintegration
 - Draft ISO 24282 soil biodegradation
 - Draft ISO 24299 marine biodegradation
 - Draft ISO 25302 Solubility & dispersibility
 - Draft ISO 25303 Wet anaerobic digestion
 - Draft ISO 25304 High-solids anaerobic digestion
-
- EN 13432 Industrial compostability

Biodegradable polymers in various environments

According to Established Standards & Certification Schemes

NOTES

- proven biodegradability
- ◌ proven biodegradability for certain grades
- ◌ biodegradability not proven¹

The biodegradability of plastics derived from these biodegradable polymers can only be guaranteed if all additives and (organic) fillers are biodegradable, too. Dyeing and finishing of cellulosic fibres, for example, may prevent their biodegradation in the environment.

Biodegradation depends on the complex biogeochemical conditions at each testing site (e.g. temperature, available nutrients and oxygen, microbial activity, etc.). Therefore, these generalised claims about biodegradability can only serve as approximations and need to be confirmed by standardised testing under lab conditions. In-situ behaviour can vary, depending on the mentioned conditions, size of the plastic parts, grade of the polymer and other factors. For instance, biodegradation testing is often performed after milling, showing the inherent nature of the material to biodegrade. In reality, the same level of biodegradation will be obtained, but possibly within a different timeframe.

SLOWER BIODEGRADING POLYMERS

The polymers shown biodegrade rapidly in the specified environments within the timeframe set by relevant standards or certifications. Other materials, such as PEG or PLA in soil and lignin/wood in most environments, also biodegrade but much more slowly, often taking years to decades. In some applications, such as geotextiles or tree shelters, slower biodegradation is desirable to ensure functionality over several years before decay; however, no standards currently address such cases though work is underway to develop standards for long-term biodegradation. Recent studies show that PLA also degrades slowly but completely in the ocean. The exact timeframe still needs to be validated.

- "Biodegradability not proven" can mean either there is a lack of data on biodegradability, or there is data that demonstrates non-biodegradability.
- Incl. P3HB, P4HB, P3HB4HB, P3HB3HV, P3HB3HV/C, P3HB3HO, P3HB3HQ, P3HB3HO
- PLA is likely to be biodegradable in thermophilic anaerobic digestion at temperatures of 52°C within the time frame mentioned in standards. This does not apply to mesophilic digestion.

ENVIRONMENTS

IMPORTANT TEST CONDITIONS, CERTIFICATION SCHEMES AND STANDARDS

For more details, refer to the original documents.

MARINE ENVIRONMENT

Temperature 20°C, 90 % biodegradation within a maximum of 6 months in seawater. Certification: TÜV AUSTRIA OK biodegradable MARINE, based on ASTM D6691. Or temperature 15-25, max. 20°C, 90 % biodegradation within a maximum of 2 years, water and sediment tests allowed. Certification: DIN CERTCO DIN-Geprüft and DBIplus biodegradable in marine environment, based on ISO 22460 and methods therein.

FRESH WATER

Temperature 21°C, 90 % biodegradation within a maximum of 56 days. Certification: TÜV AUSTRIA OK biodegradable WATER. Research on standards (especially on requirements) is on-going.

SOIL

Temperatures 20°C, 90 % biodegradation within a maximum of 2 years. Certification: TÜV AUSTRIA OK biodegradable SOIL and DIN CERTCO DIN-Geprüft Biodegradable in Soil. DIN-Geprüft Biodegradable in Soil is based on the European standard 17033 for mulch films and/or ISO 23517 for mulch films and other products.

HOME COMPOSTING

Temperature 20°C, 90 % biodegradation within a maximum of 12 months. Certification: TÜV AUSTRIA OK compost HOME and DIN CERTCO DIN-Geprüft Home Compostable.

LANDFILL

No European standard specifications or certification scheme available since this is not a preferred end-of-life option for biodegradable waste.

ANAEROBIC DIGESTION

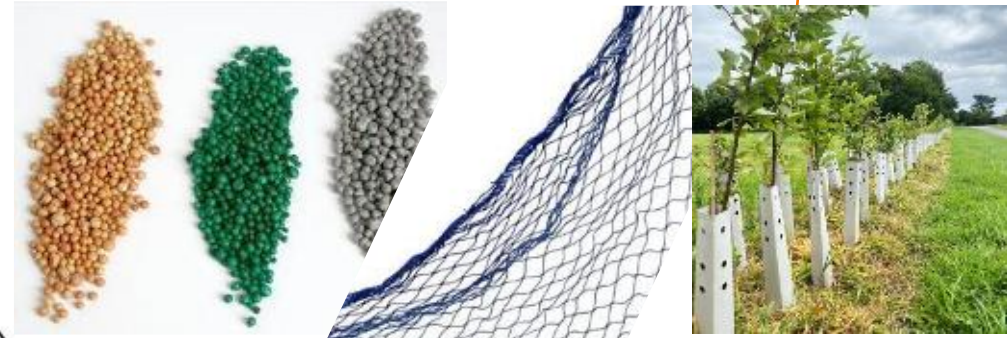
Thermophilic 52°C / Mesophilic 37°C
A specific European standard or certification scheme for anaerobic digestion is not yet available. Anaerobic digestion in a biogas plant is mentioned in EN 13432 and EN 14995. 50 % biodegradation within two months, usually followed by aerobic digestion.

INDUSTRIAL COMPOSTING

Temperature 58°C, 90 % biodegradation within a maximum of 6 months. Certification: TÜV AUSTRIA OK compost INDUSTRIAL, DIN CERTCO DIN-Geprüft Industriell Compostable and "Seedling". EN 13432 and EN 14995 are the European reference standards and the basis of these certification schemes. ISO 17088 is the international equivalent covering compostable plastics broadly.

Design for non-persistency

Avoid persistent microplastics by building in biodegradability




 Biodegradability = benefit/necessity

 Mostly **managed** end-of-life

 Existing testing, standards & certification

 Biodegradability = cannot be fast → **non-persistency**

 Mostly **non-managed** end-of-life

 Testing, standards & certification → Need for development

Design for non-persistence

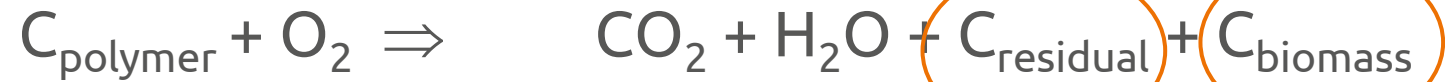
Gap analysis

- Definition of **non-persistence** & link with microplastics
- How to capture **functional life** (product specific)
- How to **accelerate** testing without false positive/negative results

Biodegradation of polymers

Principle

- Biochemical pathway of biodegradation:



Intermediate degradation products
(=transitional microplastics)

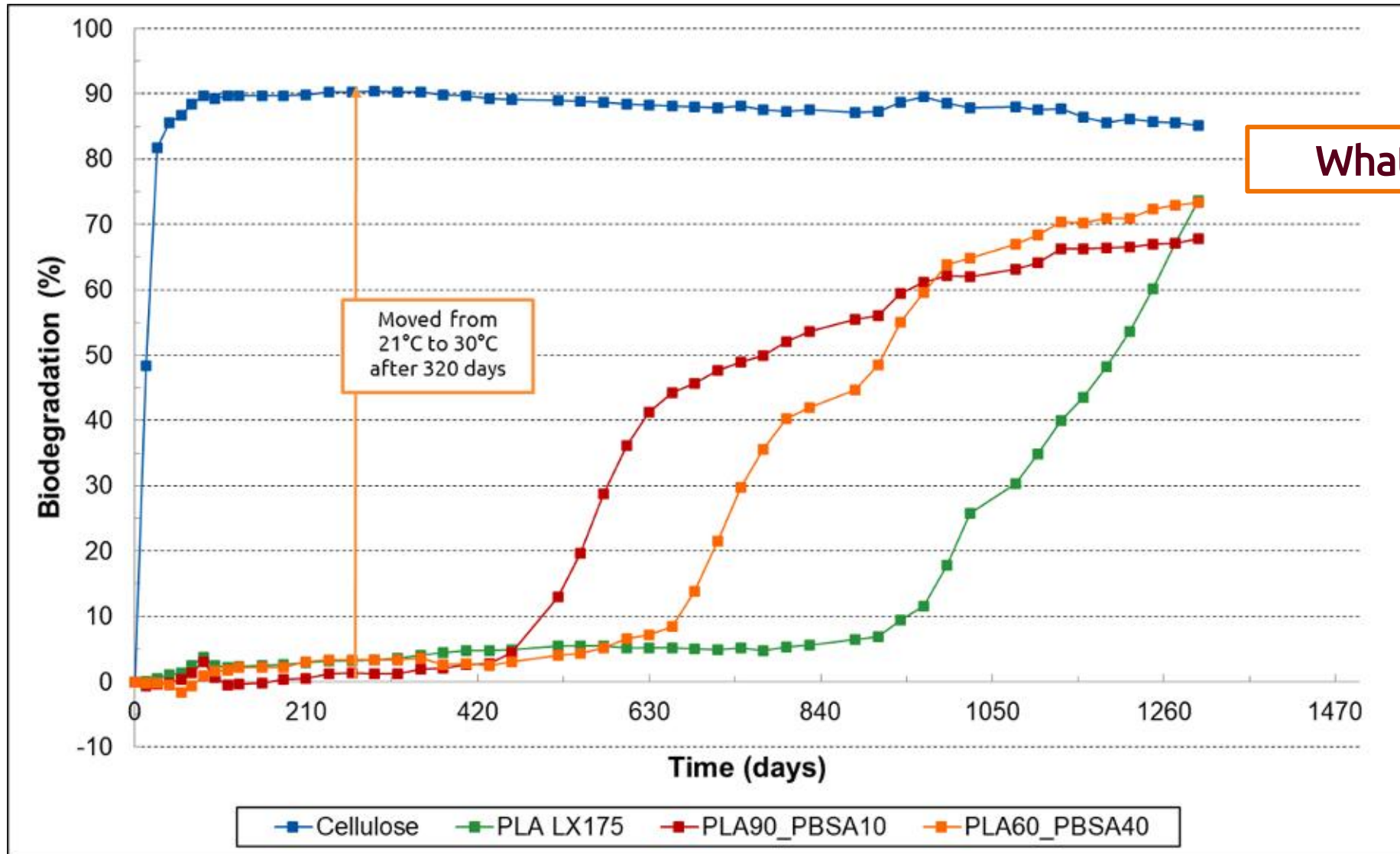
Biomass growth

- **Not all C_{polymer} "instantly" converted to CO_2 !**
- Standards on biodegradation:
 - Complete biodegradation = 90%
 - Separate evaluation of 1-15% ingredients

Non-persistence

Link with microplastics

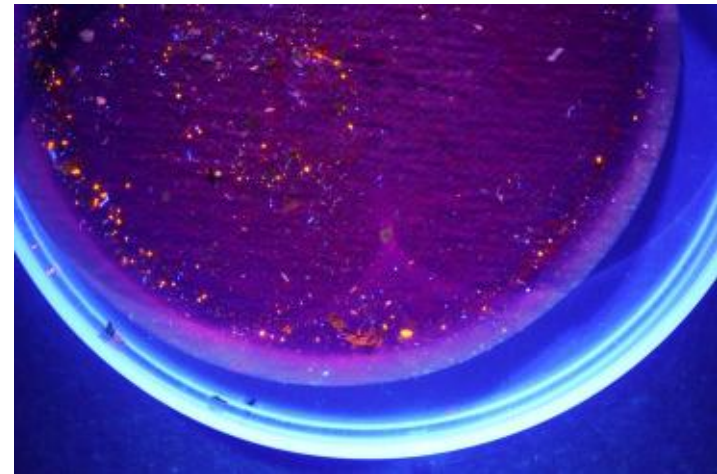
Fresh water, 20°C to 30°C



Microplastics testing

Management of expectations

- Lower limit for reliable measurements (10-25 μm) vs. “no microplastics” claims
- There is always a “background level”
- Challenge lays in recovering microplastics from matrix



Capturing functional life

EU Fertilising Products Regulation

(EU) 2024/2770: coating agents and water retention polymers

Compartment 1: soil, standard testing

ISO 17556 or ASTM D5988-18

≥ 90% ABS (CO₂) or REL (O₂ and CO₂) in 48 months plus FP

OR

Compartment 1: soil, accelerated testing

ISO 17556 or ASTM D5988-18

(a) 25°C: ≥ 45% ABS (CO₂) or REL (O₂ and CO₂)

in 20 months and degradation progressing, and

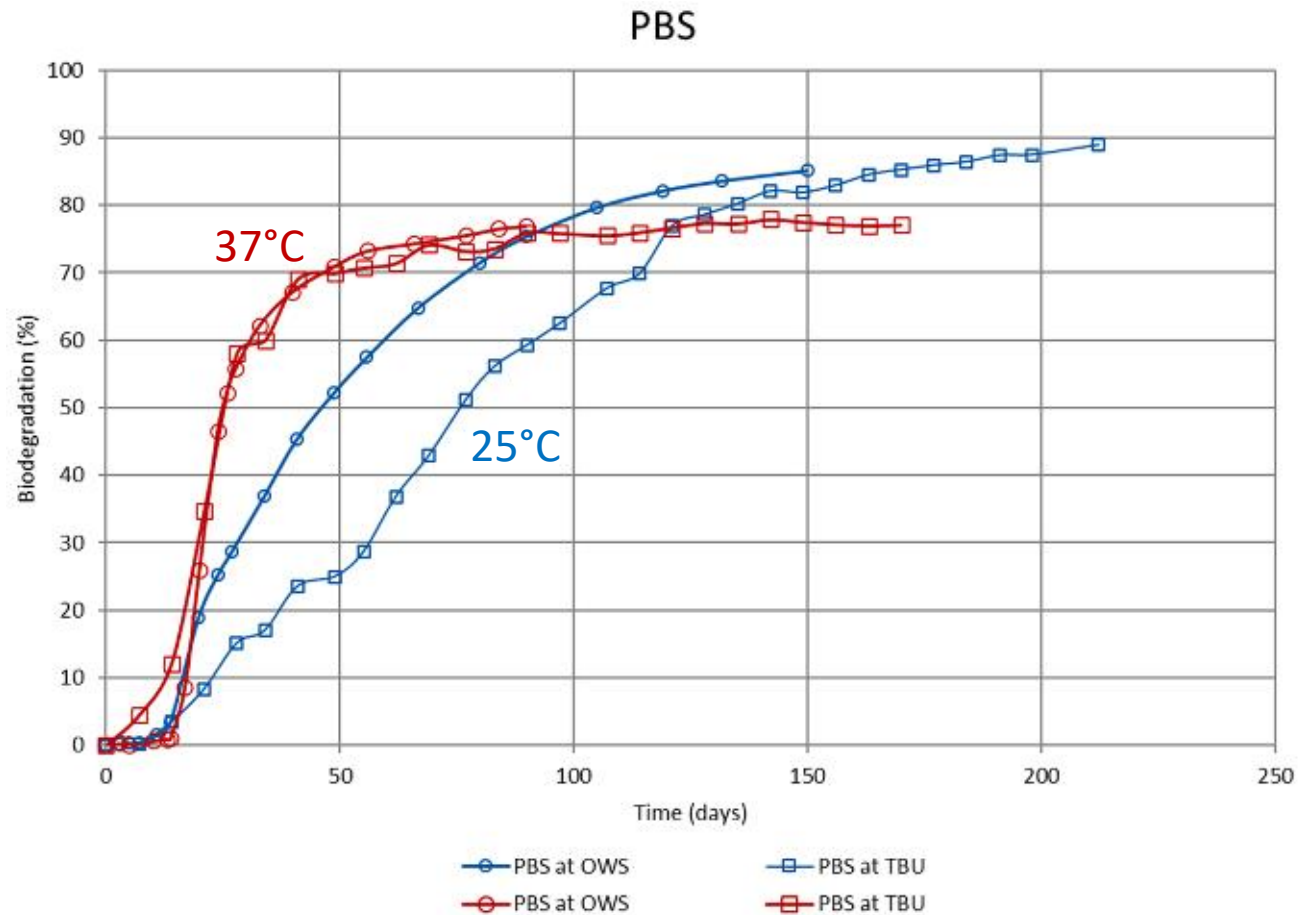
(b) 37°C: ≥ 90% ABS (CO₂) or REL (O₂ and CO₂)

in 20 months plus FP

- Biodegradation only
- Application specific (fishing nets, geotextiles, etc.) versus environment specific (marine, soil, etc.)

Accelerating biodegradation testing

Impact of temperature

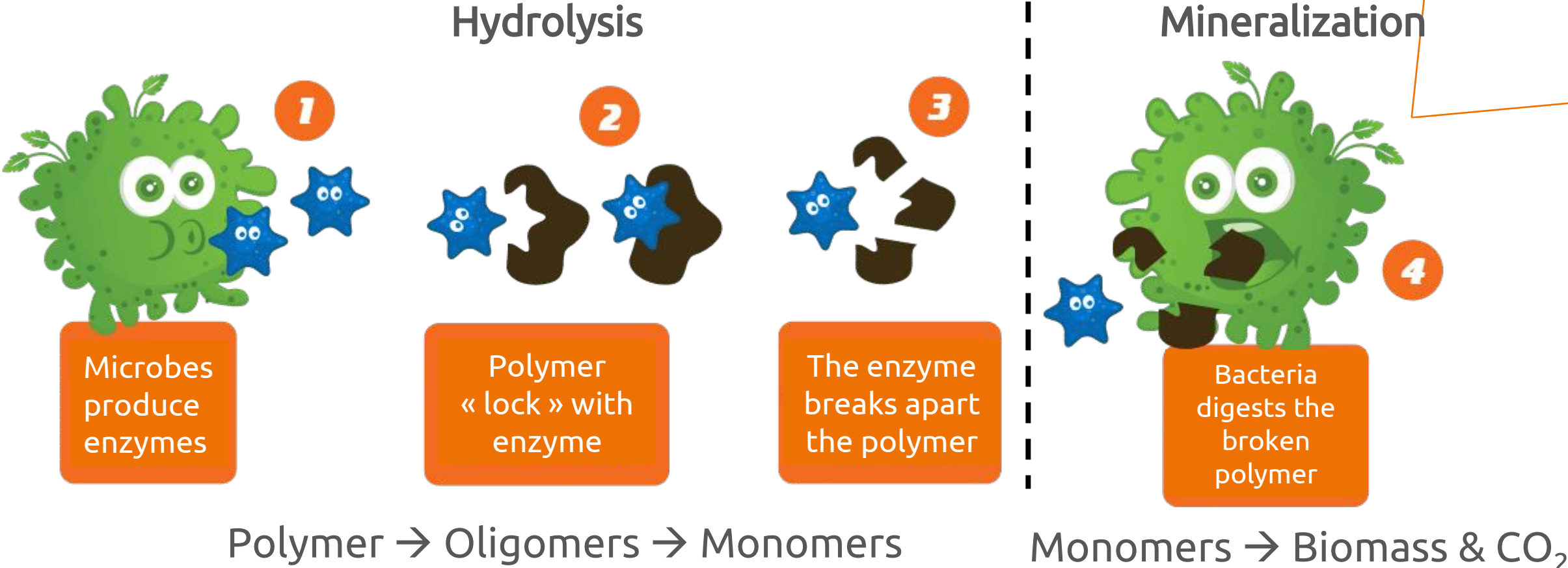


k_{MAX}	25°C	37°C	AF
OWS	1.53	5.73	3.75
TBU	0.82	2.85	3.48

Soil conditions

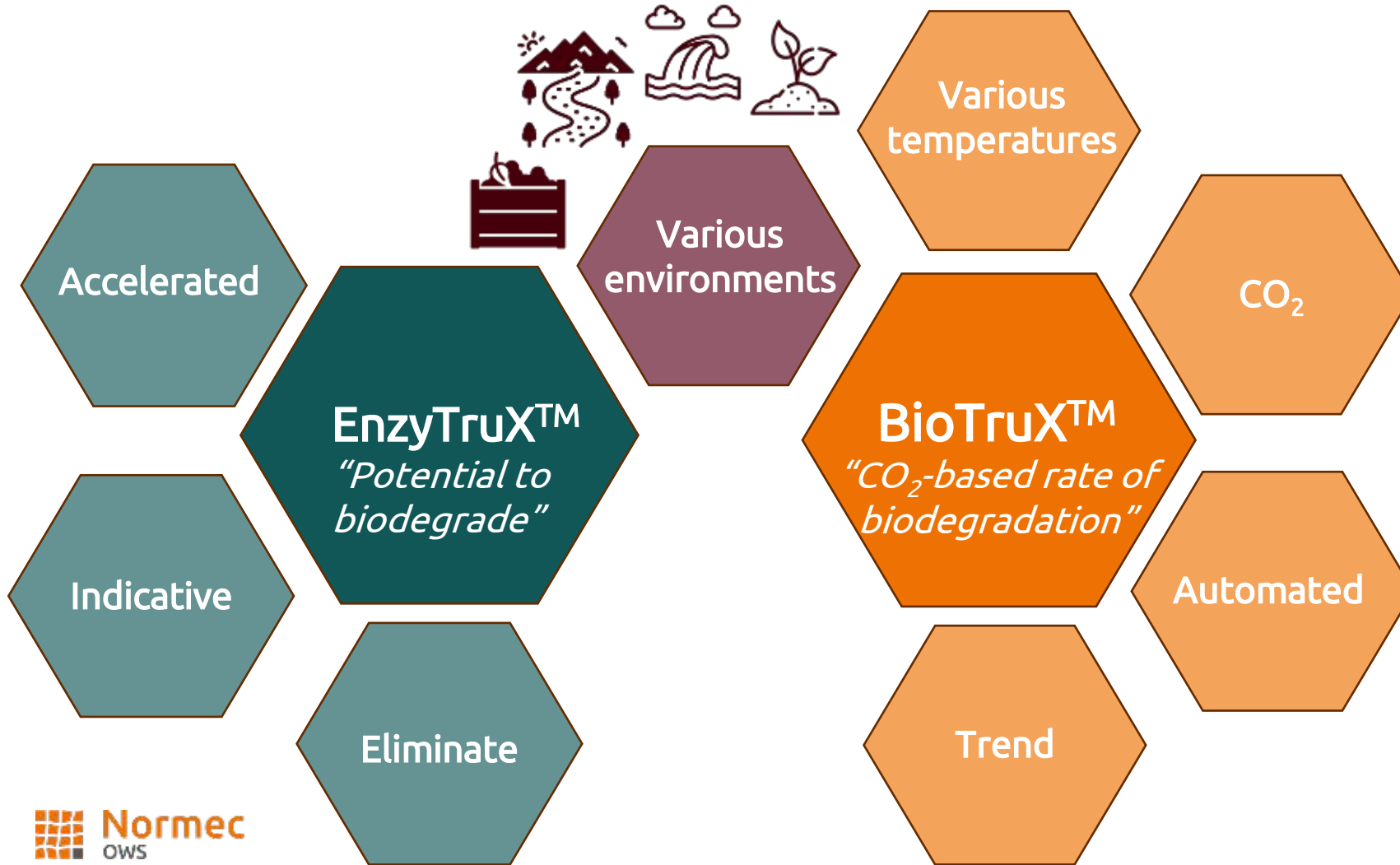
Biodegradation of polymers

Principle



High-Throughput Pre-Screening Testing

Accelerating product-to-market process



GOAL

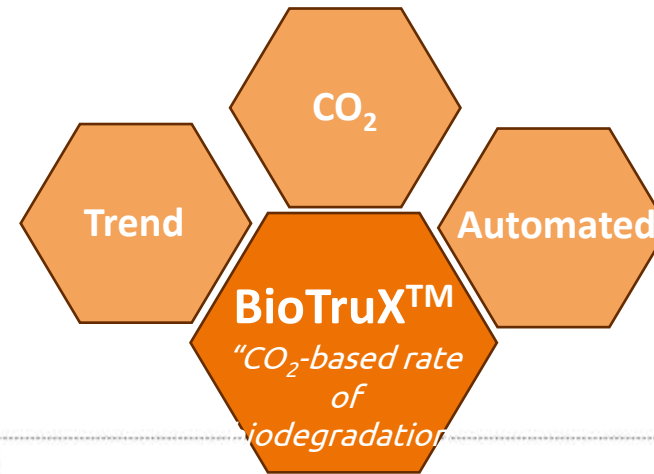
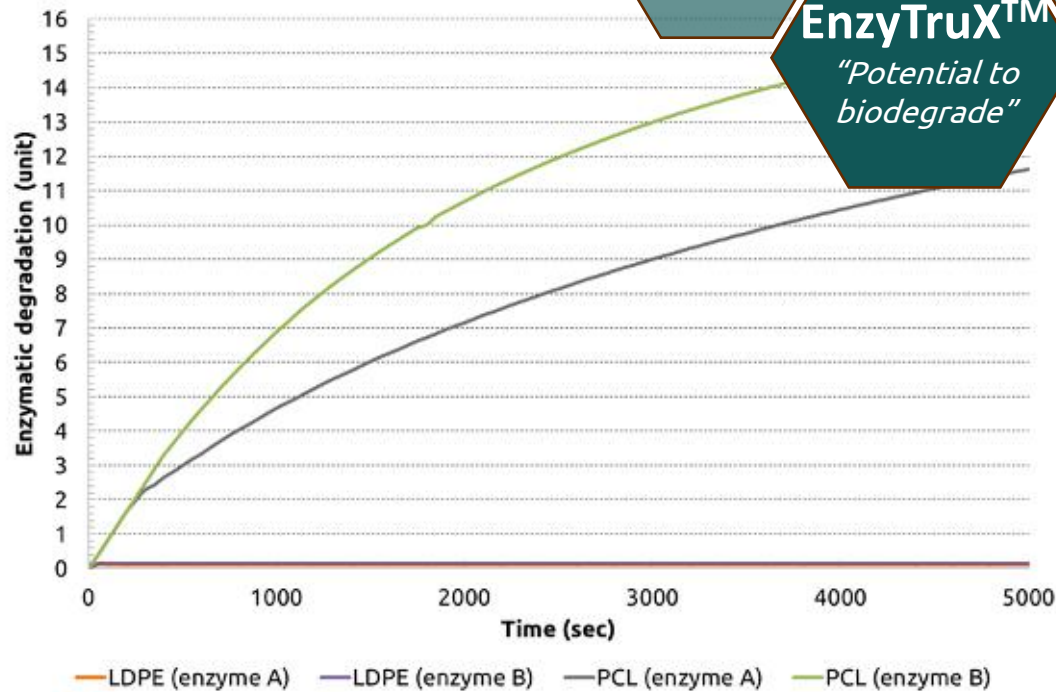
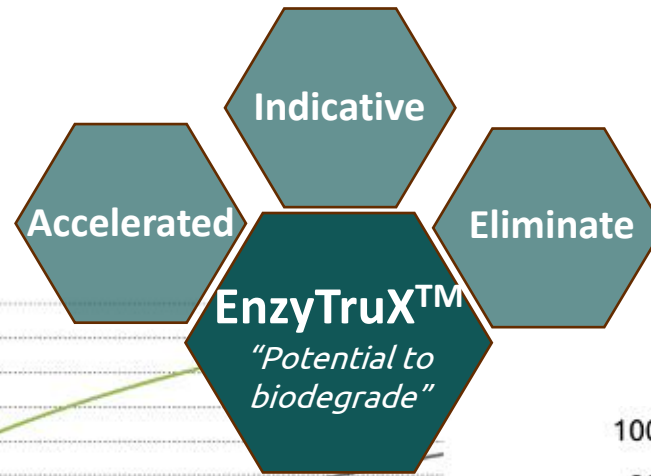
Provide fast, reliable data on environmental impact and degradation behaviour

BENEFITS

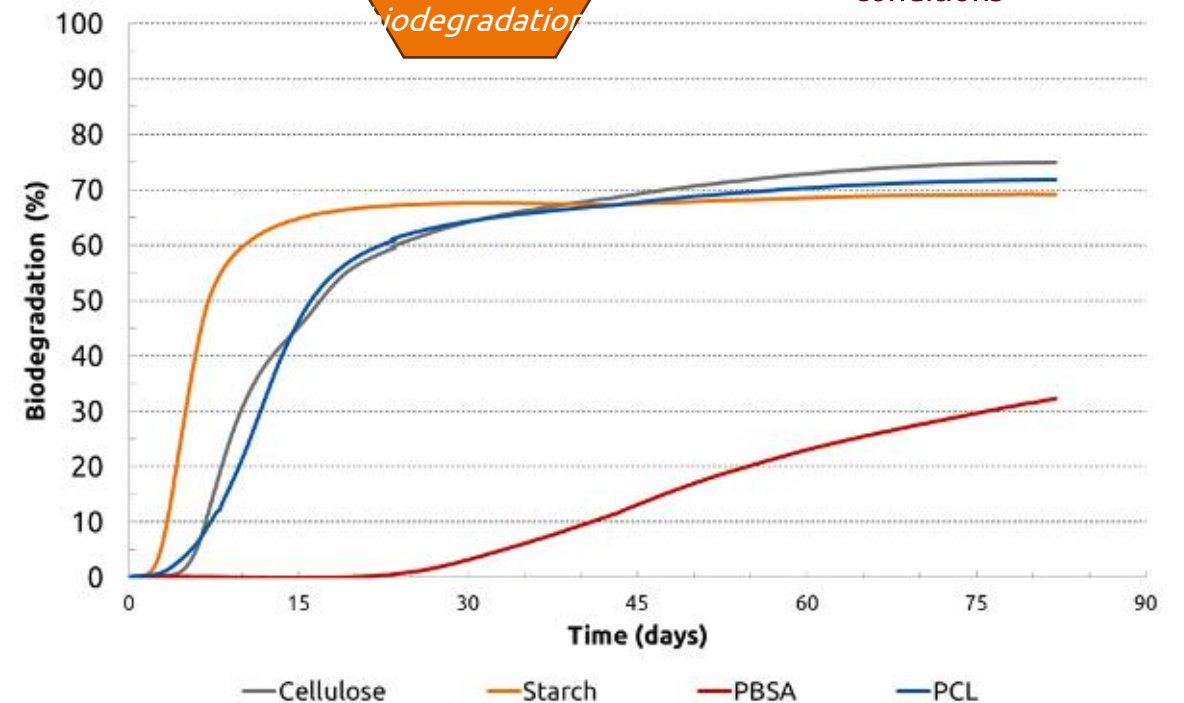
- Early R&D testing
- De-risking processes
- Streamline budgets
- Shorten development cycles
- Big data generation

Validation of EnzyTruX™ & BioTruX™

First test results



Soil conditions



Normec OWS

offers support in
pushing sustainable
solutions to the market
together

HOW?

By assisting in various
environmental services



Normec OWS Intelligence Platform

Independent insight for legislation, standards and compliance

Powered by 35+ years of biodegradation and compostability expertise

Regulatory clarity

Key takeaways on emerging legislation and upcoming regulatory changes.

Expert insight

Exclusive articles, whitepapers and expert commentary.

Data-driven interpretation

Testing translated into decision-ready insights.

Design assurance

Guidance to de-risk material development.

Industry perspective

Benchmarks and sector insights.



Discover the platform



Get a sneak peek of the platform



[Normec OWS - Intelligence - Home](#)





Let's do this...
TOGETHER!



Questions?

Contact us!

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