

Q&A

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*ENZYME-MEDIATED DEGRADABLE
PLASTICS*



- **Enzyme-mediated plastics are not bioplastics. They are conventional, fossil-based plastics with additives.**
- **Enzyme-mediated plastics are neither biodegradable nor compostable.**
- **EuBP recommends using only materials certified according to EN and ISO standards.**

What are enzyme-mediated plastics?

Enzyme-mediated plastics are not bioplastics. They are not biobased, because the material is neither fully nor partly derived from biomass and they are not reported to be biodegradable or compostable in accordance with any standard¹.

Enzyme-mediated plastics are conventional, non-biodegradable plastics (e.g. PE) enriched with small amounts of an organic additive. The degradation process is supposed to be initiated by microorganisms, which consume the additives. It is claimed that this process also expands to the PE, thus making the whole material degradable. The plastic is said to visually disappear and to be completely converted into carbon dioxide and water after some time.

What claims are used to promote enzyme-mediated plastics?

On the unproven basis that they are biodegradable and eco-friendly, producers promote enzyme-mediated plastics as a solution to littering. On top of this unjustified claim, the materials are advertised as suitable for mechanical recycling. In fact, there are neither reliable data nor reproduced test results available that support any of these claims.

How can I recognize enzyme-mediated plastics?

Enzyme-mediated plastics usually neither look nor feel different from conventional plastics. However, when a product carries claims such as “this plastic degrades faster”, or “makes conventional plastics like PE or PP biodegradable” together with “organic additives” and “eco-friendly”, it is likely that the material is an enzyme-mediated plastic.

Do enzyme-mediated plastics turn a plastic all natural?

No, they do not. The organic additives are added to conventional, fossil-based plastics, for example PE or PP. Although the marketing of enzyme-mediated plastics focuses on terms like “microorganisms” or “enzymes” that suggest a natural or environmental context, the basic non-biodegradable material is still the same – conventional, fossil-based plastic, neither biobased nor biodegradable.

Are enzyme-mediated plastics truly biodegradable / compostable?

Biodegradation is defined as the biochemical process by which materials decompose completely into substances such as water, carbon dioxide and biomass under the influence of microorganisms. However, the term “biodegradable” is not valuable if the timeframe and the conditions are not specified and related scientific data is not provided.

Currently, there are no known, scientifically reliable test results for enzyme-mediated plastics, which provide evidence for biodegradability or compostability. Likewise, there has not been any documentation of enzyme-mediated plastic fulfilling the criteria of the EN 13432 standard.

What proof exists regarding the biodegradability of enzyme-mediated plastics?

So far, no scientific evidence of complete biodegradability of enzyme-mediated plastics has been found. Not even the basic principle of enzyme-mediated degradation is scientifically explained in any publicly available documents.

What if enzyme-mediated plastics carry labels for biodegradability / compostability?

As such materials do not fulfil the extensive requirements of established standards such as the harmonised European standard EN 13432 for industrial compostability, some producers of enzyme-mediated plastics invent their own biodegradability labels. Some of the self-invented labels refer to the standard ISO 14855. Whilst this generates a positive and trustworthy initial impression, ISO 14855 merely refers to the testing methods and does not include any pass/fail criteria linked to the performance of the material tested. As of today, no enzyme-mediated plastics have been certified according to EN 13432.

If a product claims to be compostable or biodegradable, EuBP recommends checking for proper labelling with recognised logos such as the Seedling logo. Testing and certification should be carried out by independent third parties in line with appropriate international quality control systems.

Should enzyme-mediated plastics be used for any kind of application?

EuBP recommends using only materials, which satisfy existing rules in terms of organic or mechanical recycling schemes. In case of organic recycling, only products complying with EN 13432 are recommended.

For a bioplastics material solution that is biodegradable / compostable, what material should I choose?

EuBP recommends EN 13432 certified materials for applications where biodegradation and compostability are important and relevant. Many commercially available materials comply with the EN 13432 standard. EN 13432 compliant materials are entitled to carry the Seedling, the OK Compost, or the DIN CERTCO compostability logos.

Is further information on enzyme-mediated plastics available?

An independent testing laboratory at Organic Waste Systems (OWS) in Belgium reviewed all publically available information concerning enzyme-mediated degradable plastics from a number of producers that claim biodegradability and compostability.

The study shows that none of these materials provide any evidence for complete degradation. The findings of this analysis can be downloaded from the European Bioplastics homepage.

http://en.european-bioplastics.org/wp-content/uploads/2014/10/OWS_study_enzyme-mediated_plastics.pdf

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¹ “Biodegradability” refers to a process during which microorganisms from the environment convert materials into natural substances such as water, carbon dioxide and biomass without the use of artificial additives.