

European Bioplastics

# CLAIMS ON BIODEGRADABILITY AND COMPOSTABILITY ON PRODUCTS AND PACKAGING

Claims about biodegradability and compostability are widely used to label products and packaging regarding their end-of-life. Biodegradation can take place in different systems (industrial or home composting) and environments (soil, water).

## What is biodegradability?

Biodegradability is the potential of a material to follow the process of biodegradation. Biodegradation<sup>1</sup> is a biochemical process during which microorganisms that are present in the environment convert biodegradable materials into carbon dioxide, water, and new biomass. Whether or not a material is biodegradable, depends on the chemical structure of the molecule and not on the origin of the raw material.<sup>2</sup>

The process of biodegradation is influenced significantly by the surrounding environmental conditions. Temperature, water content, nutrient availability, pH-value, supply of oxygen, concentration and activity of microorganisms etc. all affect the rate of biodegradation.<sup>3</sup> Under similar en-

vironmental conditions, the rate of biodegradation can vary for different products or materials. Thus, for example, fruit pulp will biodegrade faster than fruit peelings or wood.

## Claiming biodegradability

In general, the sole claim “biodegradable” on products and packaging, without indicating specific standards or environments in which the biodegradation takes place, is misleading and therefore should not be used.<sup>4</sup> Biodegradability claims must be transparent and verifiable and supported by standards that define the scope, i.e. the reference framework, the testing methodologies and criteria to be used, as well as the relevant environment.<sup>5</sup>

- ! **The sole term biodegradable shall not be used as a claim on any consumer packaging.**
- ! **All consumer claims shall be made with reference to relevant certification or test reports.**

<sup>1</sup> Ultimate aerobic biodegradation as defined in ISO 17088: Specification for compostable plastics. Besides aerobic biodegradation, also a technology called anaerobic biodegradation (AD) exists, in which biodegradation takes place in closed systems in the absence of oxygen, where a part of the carbon is converted into methane. For biodegradation in AD, no specific standard or certification exists.

<sup>2</sup> For an overview of biodegradable polymers in different environments, please see “Biodegradable Polymers in Various Environments”, a graphic compiled by nova Institute. 2020. Available for download at [bio-based.eu/graphics](http://bio-based.eu/graphics).

<sup>3</sup> The types of microorganisms that are present to biodegrade the material are also influenced by these factors. Biodegradation is monitored by measuring the formation of carbon dioxide during the biodegradation process of the material.

<sup>4</sup> Some countries, like Belgium, even prohibit by law to use the term “biodegradable” on a product.

<sup>5</sup> The standard ISO 14021 contains additional information on how biodegradability should be communicated.

## Industrial and home composting

When claiming compostability, a term which describes biodegradability under composting conditions, clear reference should be made as to whether the statement refers to industrial or home composting conditions. The isolated claim that a product is “compostable” is misleading and should not be used.

### Industrially compostable

Industrial composting takes place in dedicated large-scale municipal or commercial composting facilities under controlled conditions specifying e.g. temperature, humidity, residence time, composition, and air oxygen supply. These parameters are constantly monitored and steered. In Europe, the standard EN 13432<sup>6</sup> provides requirements that need to be met to test and certify packaging as industrially compostable. It is the basis for certification programs developed by EUBP, DIN CERTCO, and TÜV Austria. In other regions, similar standards and certification schemes verifying industrial compostability are in place.<sup>7</sup>

The following labels prove biodegradability under industrial composting conditions:



When claiming industrial compostability, products should ideally be certified according to EN 13432 and the according certification schemes.<sup>8</sup> In this way, it is ensured that the material has been tested for its composition, disintegration biodegradability under industrial composting conditions, to guarantee that the resulting compost is of good quality and that the products do not have a negative impact on the environment.

A claim of “industrial compostability” should be made only if the product helps to divert organic waste from landfill or incineration to composting facilities or if it prevents the formation of persistent microplastics from conventional plastic products commonly incorrectly disposed of in the organic waste stream.<sup>9</sup> Products and packaging for which collection and treatment in an industrial composting facility is highly unlikely should not be labelled as “industrially

compostable”. Local regulations on the treatment of industrially compostable products should be considered when communicating this end-of-life option. This could be done by a suggestion on the product to check with the local waste management authority.

### Biodegradable in home composting piles/home compostable

A material is home compostable when it biodegrades under the conditions prevailing in home composting. When referring to “home”, “backyard”, or “garden” composting, an aerobic breakdown of organic material at ambient temperature is meant, usually in small-scale composters or by “slow-stack” treatment methods. However, compared to industrial composting, a precise control of temperature, moisture level, oxygen supply, and residence time is difficult to achieve. There is no final quality control of the compost. Home composting must be operated according to good home composting practice, as there are no standardized or completely controlled conditions. It is influenced by multiple factors such as weather conditions and composting practice. It is also a much slower process than industrial composting, involving a comparatively smaller volume of waste, and it is not suitable for treating large quantities throughout the year.<sup>10</sup>

While there already exists a French norm for home compostability<sup>11</sup>, a European norm for home compostable carrier bags is currently under development. This prEN 17427 sets the maximum duration to reach 90% disintegration at 26 weeks, compared to 12 weeks for the industrial composting standard (EN 13432), and includes a guidance on best practice of home composting. As with EN 13432, certification schemes for home compostability ensure a control of biodegradability, environmentally safe chemical composition, and disintegration.

Today, the following labels prove biodegradability under home composting conditions<sup>12</sup>:



**! Communication on compostability shall use the terms industrially compostable or home compostable.**

<sup>6</sup> EN 13432: Packaging - Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging. EN 13432:2000. It is a harmonized European standard developed by an independent expert committee within CEN. EN 14995 is the equivalent standard for plastics in general.

<sup>7</sup> Such as the BPI certification in the United States or ABA certification in Australia.

<sup>8</sup> Similar standards proving compostability are ISO 18606 or ASTM D 6400. For further standards and test methods, see: Bioplastics – Industry Standards and Labels. European Bioplastics. September 2019.

<sup>9</sup> E.g.: It does not make sense to claim a raincoat is compostable whereas it does make sense to claim a tea bag or fruit sticker is compostable.

<sup>10</sup> See also: Fact Sheet on Home Composting, European Bioplastics. April 2015.

<sup>11</sup> NF T51-800: Plastics - Specifications for plastics suitable for home composting. NF T51-800 November 2015.

<sup>12</sup> Both certification schemes are based on a modified, not separately standardized version of the EN 13432 standard.

### Biodegradability in other environments

Careful precision is essential in communicating biodegradability in soil or water environments. In no way should there be any risk of the misperception that, based on such a claim, the product or material could be littered to the sea or on land.

### Biodegradable in soil for agricultural applications

The European norm EN 17033<sup>13</sup> sets the requirements for soil-biodegradable mulch films, manufactured from thermoplastic materials. Respective certification is offered by DIN CERTCO. For mulch films and other applications prone to being left behind in soil, in agriculture, or horticulture, a related certification scheme is offered by TÜV Austria. When claiming biodegradability in soil, the respective product should be certified with the appropriate logo or respective test reports should be available.

As soil conditions do vary broadly, depending on nutrients, temperature, or water content, the conditions for biodegradation differ as well. However, a soil condition suitable for plant cultivation will at the same time provide the necessary conditions, e.g. availability of microorganisms, for soil biodegradable materials.

The following certification schemes and logos can be used:



### Biodegradable in marine or fresh water

Certain polymers are able to biodegrade in water. Biodegradability in water is an intrinsic product characteristic, but it is not a dedicated end-of-life option. There can be specific exceptions for applications where bioplastics are occasionally unavoidably lost in aquatic environments, such as fishing gear.

Also, for biodegradation in water, the specific environment is significant: marine water, freshwater, or wastewater/sewage. Even within these specific environments, diversity and concentration of microbes do vary, conditions at the sea floor will differ strongly from those found in a water column. Currently, ISO 22403 is the only international standard available providing clear pass/fail criteria for intrinsic biodegradation of plastics when exposed to marine microorganisms.<sup>14</sup> This standard was not issued to make product claims but rather to assess any ecological risk in case of dispersion. Several test methods exist on ASTM or ISO level<sup>15</sup>, and research on further standards is on-going.

Current certification schemes exist for biodegradability in fresh water and in the marine environment. TÜV Austria offers certification for both, OK biodegradable water and OK biodegradable marine, clearly restricting the authorization to communicate on this certification.<sup>16</sup>

**! Claims on biodegradability in sea/soil/water shall be restricted to B2B communication using EN 16848 for bio-based products.<sup>17</sup>**

<sup>13</sup> EN 17033: Plastics - Biodegradable mulch films for use in agriculture and horticulture - Requirements and test methods. EN 17033:2018.

<sup>14</sup> ISO 22403: Plastics - Assessment of the intrinsic biodegradability of materials exposed to marine inocula under mesophilic aerobic laboratory conditions — Test methods and requirements. ISO 22403:2020.

<sup>15</sup> For example: ASTM D6691: Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials in the Marine Environment by a Defined Microbial Consortium or Natural Sea Water Inoculum. ASTM D6691 – 17. For further standards and test methods, see: Bioplastics – Industry Standards and Labels. European Bioplastics. September 2019.

<sup>16</sup> Both certification schemes are based on several European and international standards and test methods.

<sup>17</sup> EN 16848: Bio-based products - Requirements for Business to Business communication of characteristics using a Data Sheet. EN 16848:2016.