

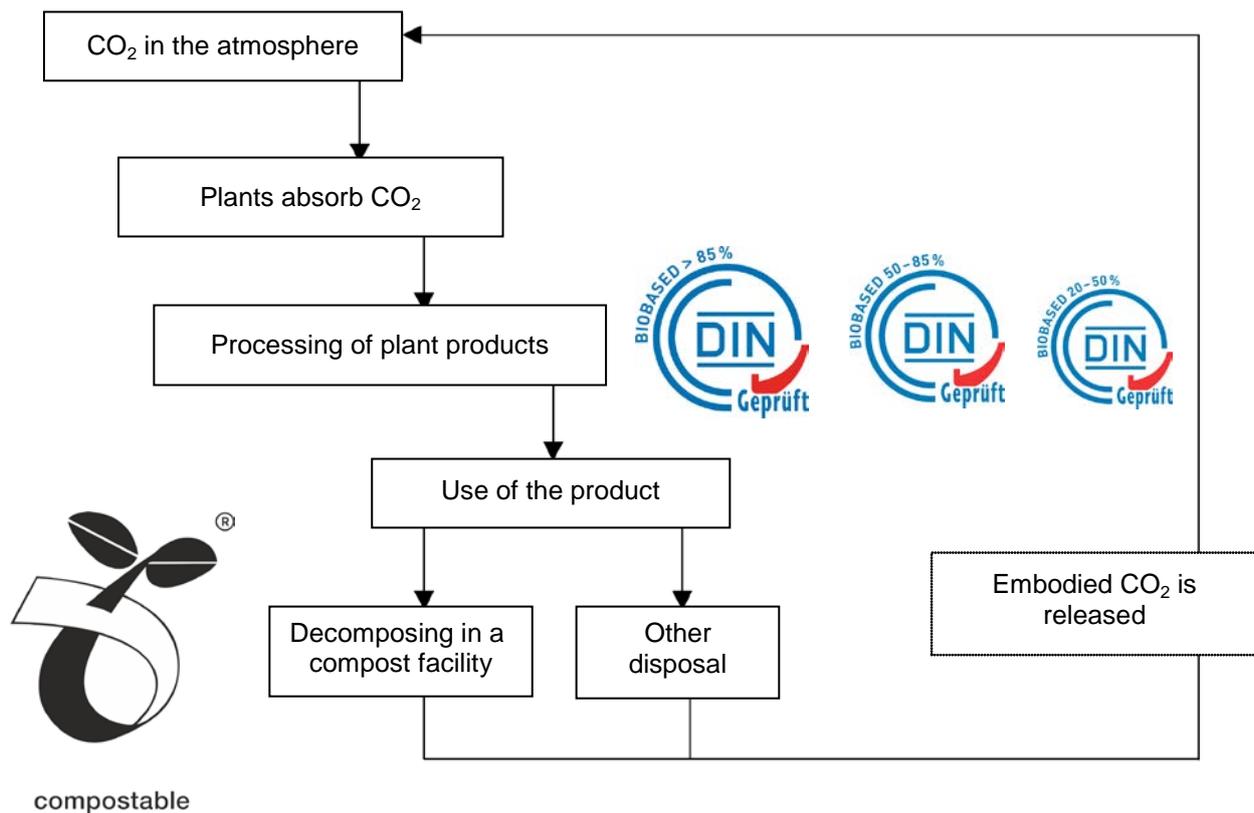
Data sheet on bio-based products and the ¹⁴C-method

Sustainability

Ecological sustainability aims to preserve the environment and resources for future generations. All organic material, whether of animal or plant origin, produces CO₂ emissions that are hazardous to the environment, for instance, when decomposing or being burned. Sustainability means minimizing CO₂ emissions and also protecting resources and making minimal use of finite raw materials.

Bio-based Products

Bio-based products are made from raw materials that have absorbed as much CO₂ during their short growth as they will release when they are disposed of and/or burned. The removal or replacement of fossil based products in a manufacturing process greatly reduces harmful effects to the environment. This is shown below as an example diagram.



Bio-based materials or products are completely or partially composed of renewable resources. Additionally, bio-based products could be biodegradable. This depends on the chemical composition and on further additives that may have been used. The compostability of a product can be proven by certification under the relevant schemes offered by DIN CERTCO.

Examples of Product Groups

- Bio-based and biodegradable, e.g. polyesters formed by bacteria
- Bio-based and not biodegradable, e.g. polyethylene produced from bioethanol
- Of fossil origin and biodegradable, e.g. biodegradable plastics on mineral oil basis
- Of fossil origin and not biodegradable, e.g. polyethylene produced from fossil sources

Determination of Bio-based Content

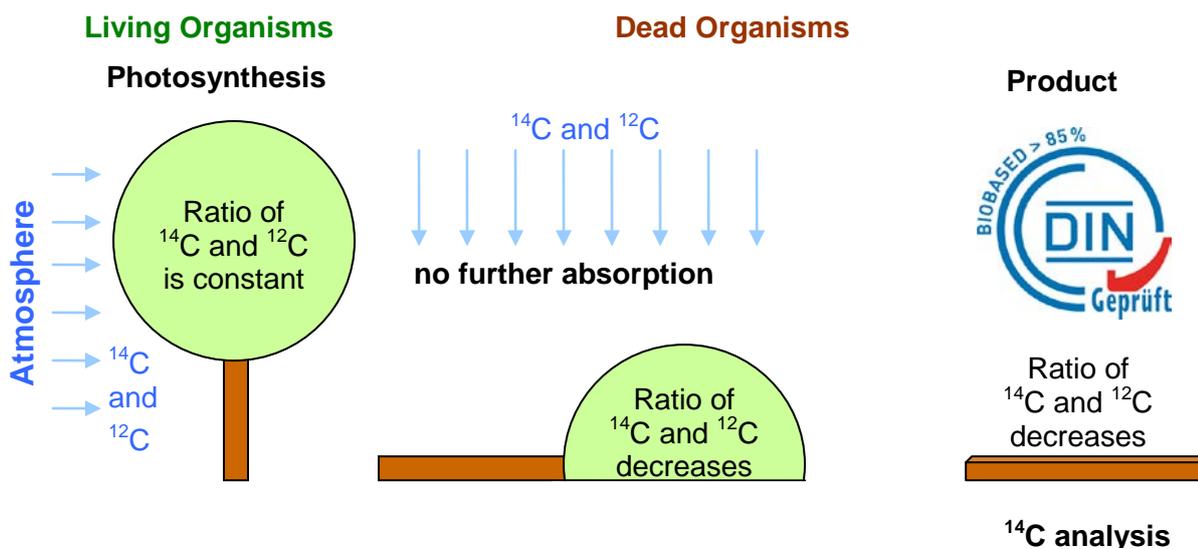
Using the ^{14}C -method, the age of an organic resource is determined, and it is thus designated as fossil or bio-based.

Organic Compounds

They consist of carbon, hydrogen and other atoms. All animal and vegetable-based materials, (also called biomass), contain organic compounds.

Isotopic Ratio

^{12}C and radiocarbon (^{14}C) are carbon isotopes: carbon atoms with various atomic masses. The ratio between ^{12}C and ^{14}C is the same in a living organism as it is in the atmosphere. Living biomass absorbs ^{12}C and ^{14}C isotopes during metabolism through food or photosynthesis. If the metabolism of an organism stops, no further radiocarbon is absorbed. The isotope ratio decreases with time, because the ^{14}C isotope decays within a half-life of 5730 years. However, ^{12}C is a stable carbon isotope and shows no decay.



^{14}C -method

Using the ^{14}C -method, the content of ^{14}C isotopes in an organic material is determined. The method is a recognized and safe process that is specified in testing standards and has proven its usefulness, for instance, in archaeology for determining the age of bones.

The ^{14}C -activity shows the bio-based carbon content of the product as a percentage.