

INSIGHTS BIO-CAPSULE

Renewable raw materials

Why is it important that a capsule is from renewable raw materials?

Because the alternative would be the consumption of scarce or environmentally harmful resources such as the consumption of crude oil for the production of plastics.

Proportion of renewable raw materials

Why is it important to question the proportion of renewable raw materials in the material used?

Theoretically, the material of a capsule could consist of only a very small proportion of renewable raw materials and the main component of plastic - at least this could be the reason given by critics.

At this point at the latest, there is a need to build up basic and background knowledge in order to constructively evaluate.

1. Plastic is nothing more than a synonym for the term "plastic".
2. Plastic is - somewhat abbreviated - a result of material compositions that do not exist in nature in this way; in other words, they were not created naturally, but artificially.
3. If you want a capsule coffee, unfortunately (as of today) no purely natural unmodified substance on this planet works alone to meet the demanding requirements in terms of temperature, pressure, shape, stability, oxygen tightness, etc..
4. Therefore, a mix of individual substances is required to produce a new substance... a plastic.
5. components originate from renewable raw materials, this is referred to as bioplastics.
6. The following points must be observed: Chemical processes can change the properties of individual substances; for example new molecular structures are created that have properties such as better temperature resistance or for example a longer half-life as with petrochemically produced plastics!
7. In order to make the most of the whole topic, the following fact must be taken into account: There are petrochemically produced plastics that are biodegradable, i.e. leave no or no significant toxic residues and these are bioplastics that decompose without toxic resi-



dueshinterlassen because, for example, microorganisms utilize the bioplastics in their organism (= bio-chemically convert) in such a way that "toxic" remains for the environment.

Result:

- Not every renewable raw material is harmless to the environment
- Not every non-renewable raw material is harmful to the environment.
- Chemically modified renewable raw materials can acquire useful but also environmentally harmful and food-polluting properties.



Biodegradable

Important to know: Plastics are also referred to as bioplastics if they are "biodegradable" (...The term or definition is viewed critically elsewhere in), without going into whether renewable raw materials have been used for production.

In summary, the question of the proportion of renewable raw materials must therefore be asked as follows:

1. How high is the proportion of renewable raw materials that have been "used" in such a way that they do not leave toxic residues or substances hazardous to health?
2. And in this case - with coffee as a food - even more important: Are the composition of the substances chosen in such a way that the new substance - the bioplastic - does not cause any food-damaging migrations affect health and taste of the coffee?
3. Since not all of the components required for the terracaps capsule currently originate from renewable raw materials in order to build a capsule that offers a sufficient oxygen barrier, it is still necessary at present to resort to substances that originate from non-renewable raw materials....important question, as just learned...are the substances from non-renewable raw materials toxic to the environment during degradation or not?
Answer: The following applies to the terracaps capsule: All substances, whether from renewable raw materials or non-renewable raw materials, are biodegradable without leaving behind toxic residues.

What is the proportion of renewable raw materials?

The material of the biocapsule is a bioplastic in the sense of the EU Regulation 10/2011. A basic material is used in the bioplastic, it consists of 96% biodegradable carbon molecules. The proportion of carbon molecules in a Stoff is the proportion that serves organisms as food and decomposed independently by natural influences; fachlich correctly expressed: "...The basic material used is based on renewable raw materials (>96%) whose monomers originate from the synthesis of microbial fermentation..."

What are the specific substances that contain carbon?

The basic material of the biocapsule consists of biopolymers, lignin, natural resins, waxes, oils, natural fatty acids, cellulose, biological additives and natural reinforcing fibres, depending on the formulation".



The important question that arises:

How high is the proportion of basic material in the total bioplastics?

Answer: 63%.

Follow-up question: What are the remaining 37% of the bioplastics made of?

37% of the capsule material consists of

- Material which does not or hardly consists of carbon atoms
- Material which, among other things, has substances/molecular structures which hold the carbon biomaterial together in such a way that it can withstand the stresses in the coffee machine and also offers an oxygen barrier (= aroma protection).
- biodegradable material,
- food-technically harmless material according to EN.

Hint:

Terracaps® and partner companies are still looking for alternative substances derived from renewable raw materials. However, these are not yet available, although they could theoretically also be produced from renewable raw materials.

If a certain main component is available as a raw material from renewable raw materials, 94% of the entire capsule cup and not just the basic material would come from renewable raw materials.



Garden compostability

A capsule may only be declared as a garden compostable capsule if the conditions of a European standard are fulfilled.

The standard states, things, that that within 26 weeks at least 95% the material must be degraded.

Since the properties of a compost heap can vary greatly, an ISO standard has been established for the composition of the compost heap itself.

Nun hat terracaps already composted ihre capsule in a self-test and regularly checked the decomposition process and recorded it on photos. A photo series shows corresponding Zwischenergebnisse.

according to self-test. See www.terracaps.bio.

Due to the fact that self-tests could be manipulated, Terracaps® decided to have the garden composting process carried out by independent third parties.

The interim results of the composting process show that the capsule decomposes, but not within the period specified in the standard.

Rating:

In principle, it is not decisive whether needs 23, 26 or 30 weeks bis die Natur "geholt" hata . It is important that it dissolves as quickly as possible and without harmful substances.

Therefore, not obtaining an official "garden composting certification" is only problematic insofar as the results show that the capsule would not decompose or would decompose over a much longer period of time.

Why the more relaxed Strengte this point?

Every compost heap in the garden has its own bacterial structure and you cannot expect the same Atimesmeveryncompost heap.

It is not the worms that make the compost, but the internal temperature of the compost pile in interaction with its bacteria. And even standardized compost heaps can ensure non-standardized decomposition processes.



SUMMARY

The capsule offers als bislang einzige Kapsel an oxygen-tight capsule body along with oxygen-tightr paper sealing. This wird an MHD of 13 to 16 months möglichto . These propertieserfüllt far keine alternative sauerstoffdichte Bio-Kapsel.

Therefore, despite the currently missed official home compost certification, this capsule is in our opinion the most optimal from the point of view of the necessary properties with regard to aroma protection and environmental compatibility.

The oxygen tightness bedeutetthat NO additional plastic packaging required.