

Status of PHA (Polyhydroxyalkanoates) as a class of *Natural Polymers* that have *not been chemically modified*

17th April 2020

GO!PHA represents over 40 stakeholders in the PHA industry and their downstream markets. We had responded on March 9, 2020 on Article 3 (1) in the SUP Directive which represents the definition of "*plastic*", "*natural polymer*" and "*chemically modified polymer*", in order to elaborate our position on PHA.

In our response we demonstrated that PHA is a *Natural Polymer*, which is *not chemically modified*. Additionally, they have excellent end of life biodegradability in all environments including marine environments and is produced from renewable substrates fitting with the European Commission's vision of a Circular Economy.

GO!PHA, once again, requests the European Commission (hereafter Commission) to clarify that PHA produced via the cultivation of microorganisms, and having identical structures and chemical compositions as naturally occurring PHA be classified as *Natural Polymers* that have *not been chemically modified* within the scope of the SUP Directive.

Hereby we respectfully submit additional comments and arguments in favour of our request for the Commission to classify PHA as *Natural Polymers that are not chemically modified*.

1. During the April 3, 2020 workshop, ECHA presented that PHA be defined as a **Nature Identical Polymer** and stated it to be different from a **Natural Polymer**:

Nature Identical Polymer is not defined in any ECHA guidelines, and as has been stated in our prior communication to the Commission, ECHA's *Natural Polymer* definition was created for a completely different purpose, and not for the purpose of the SUP Directive. EU Regulation (EC) No 1334/2008³, on the other hand defines *Natural Compounds used as flavourings* as follows:

*natural flavouring substance shall mean a flavouring substance obtained by appropriate physical, enzymatic or **microbiological processes** from material of vegetable, animal or **microbiological origin** either in the raw state or after processing for human consumption by one or more of the traditional food preparation processes listed in **Annex II**. Natural flavouring substances correspond to substances that are **naturally present** and have been **identified in nature**;*

Annex II of (EC) No 1334/2008 further lists **microbiological processes** and **fermentation** as acceptable processes to produce flavourings. In addition, the above

definition refers to natural flavourings as those that are either ***naturally present*** or have been ***identified in nature***, without regard to their origin or their manufacturing process. Therefore, flavourings that are ***naturally present*** or ***identified in nature***, but are produced via ***fermentation*** or ***microbiological processes*** are considered to be natural flavourings.

Given the a) above precedence with *Natural Compounds* within European Union legislation, b) the lack of a definition of *Natural Polymers* within the SUP Directive, and c) ECHA's guiding definition for *Natural Polymers* having being set up for a completely different purpose; we believe that the Commission should include in its definition of *Natural Polymers* those polymers that *exist in nature* and are *produced via fermentation or microbiological processes* that have *not been chemically modified* in line with (EC) No 1334/2008. Such a definition would exempt PHA from the SUP Directive.

2. PHA is a Natural Polymer when the end point is considered:

ECHA, in their presentation on April 3rd argued that using the *have not been chemically modified* section of the definition viscose can be considered to be a *Natural Polymer that has not been chemically modified*. ECHA argued that since the chemical modification in viscose occurs unintentionally and due to the extraction process, one must look at the product produced *at the end point* of the extraction process. Considering the end point, ECHA argued, that the Commission can classify viscose to be a Natural Polymer and exempt it from the SUP Directive.

GO! PHA would like to take the *End Point* argument to the *Natural Polymer* part of the definition as well. PHA is produced via industrial fermentation using the same microorganisms that produce them in nature, using the same natural and renewable substrates. PHA thus produced have chemical structures identical to those found in nature. Therefore, if the production methods for PHA are excluded from consideration, and only the *end point* is considered, as argued by ECHA in the case of viscose, PHA is a *Natural Polymer*. PHA is present in nature, it is produced using exactly the same processes as in nature, using the same microorganisms and substrates. It also has the same chemical structure as those found in nature.

3. A Comprehensive Definition of materials that fulfil the objectives and intent of the SUP Directive must include biodegradability as a criterion:

The original intent of the SUP Directive is three part:

- 1) *to prevent and reduce the impact of certain plastic products on the environment, in particular the aquatic environment, and on human health,*
- 2) *to promote the transition to a circular economy with innovative and sustainable business models, products and materials*
- 3) *to contribute to the efficient functioning of the internal market.*

Eliminating litter completely is an extremely difficult task, however, eliminating damage from litter via the use of harmless and sustainable materials can be accomplished through this SUP Directive. Given the first two primary objectives of the SUP Directive, GO!PHA believes that any material with a natural character and

marine biodegradability must be the overriding criteria used to exempt materials from the SUP Directive. *Natural Polymers that have not been chemically modified* alone is a narrow and insufficient method for defining materials to fit the primary objectives of the SUP Directive. Not all natural materials biodegrade in all environments; case in point, Lignin and Chitin do not biodegrade in marine environments and yet they would be classified as *Natural Polymers* using the ECHA guidelines solely, while, PHA just like cellulose – Lyocell and viscose – are natural and biodegradable in all environments would be excluded from the SUP Directive.

4. The innovative nature of PHA, including in combination with other natural materials, can have far reaching positive consequences:

The innovations with PHA given their behavior as plastics and end of life characteristics are very well known. GO!PHA would also like to bring to the Commission's attention an additional innovative nature of PHA, their combination with cellulose. Both materials have similar biodegradation characteristics and together bring significant value in single use and multiple use applications while at the same time ensuring:

- a. Recyclability within a well-organized paper recycling system without generating microplastics,
- b. Allow for complete composting in home and industrial composting facilities,
- c. Incinerate after collecting for energy generation, if no other uses can be found, coupled with a closed loop carbon dioxide capture and use, and
- d. Not harm the environment, including the marine environment, if unintentionally littered.

Several of our members are working with industry leading partners in the cellulose industry to bring such innovations to the market. Therefore, to include PHA in the SUP Directive now would stifle such projects that currently employ large number of highly skilled researchers in Europe and would further stifle large number of manufacturing jobs when these projects are scaled and commercialized. In addition to that, other countries and regions are adopting single use plastics legislation that allows biodegradability to be a criterion for determining exemption from their directives, thus allowing PHA and innovative cellulose/PHA technologies to be commercialized in those regions at the expense of European Union innovations and jobs.

5. GO!PHA continues to believe that an effective SUP Directive must have the following four key elements that define materials:

1. They should not be harmful to the environment in any way when they are purposely or accidentally left in the environment. Therefore, they should:
 - Biodegrade into carbon dioxide and water when left in the environment.
 - Be non-toxic and harmless if ingested by birds, animals, fish or marine mammals.
 - The objective of biodegradability of materials to be used in has also been laid out in the European Union's new *Circular Economy Action Plan of March 2020*.

2. Should fit into current and future waste collection, recycling and incineration streams. Therefore, they must be home and industrially compostable, recyclable when large streams of such materials become commercially available or can be incinerated to generate energy/carbon dioxide capture/recycle/reuse, if necessary.
3. Encourage the use of renewable raw materials that are readily available in the atmosphere (like CO₂ or CH₄), in the biosphere (renewable substrates) or in the Technosphere (recycled carbon), thus also benefiting the environment through reduction of greenhouse gases, and fit into the overall vision of the European Union's new *Circular Economy Action Plan of March 2020*.
4. Establish a regulatory and standards driven regime for biodegradability and compostability rooted in science to allow for the introduction of new and innovative materials.

GO!PHA, on behalf of our members, therefore, requests the Commission to exempt PHA from the SUP Directive:

- a. By classifying PHA as a *Natural Polymer* under the SUP Directive's current definition in line with (EC) No 1334/2008, or
- b. Create a new definition for materials that would exempt biodegradable materials from the directive

Waiting 7 years, for the next revision of the SUP Directive, to exempt PHA would kill significant ongoing environmentally sustainable innovations (many of whom are EU sponsored) in materials that would otherwise allow EU citizens to continue to enjoy the benefits of plastics without harming the environment. Killing these innovative projects, risks sending future potential EU manufacturing jobs to other regions of the world.

We thank the Commission for giving GO!PHA's position due consideration and exempting PHA from the SUP Directive. We are ready to meet and assist the Commission with further discussion, evidence and information in order to achieve the objectives, intent and spirit of the SUP Directive.

Sincerely

Anindya Mukherjee

REFERENCES (included, as noted below):

1. EU SUP Directive P8-TA-2019_305
2. GO! PHA Position Paper to DG Environment, March 9, 2020 (included)
3. EU Regulation (EC) No 1334/2008 on Flavouring