JOINT NGOs' COMMENTS TO THE ANNEX XV RESTRICTION REPORT, PROPOSAL FOR A RESTRICTION OF INTENTIONALLY ADDED MICROPLASTICS

August 19th, 2019

GENERAL COMMENTS

The European Environmental Bureau (EEB), Clientearth and the European Environmental Citizen's organisation for Standardisation (ECOS) support the dossier submitter's conclusion, according to which the releases of intentionally used microplastics pose a risk to the environment that is not adequately controlled. We therefore reiterate our support to the need for a full restriction.

While we are encouraged to see that ECHA is considering both solubility and (bio)degradability as key elements of the criterion for potential for persistence in the environment, we strongly caution against the use of plastics that are already branded as so-called biodegradable. There is currently no conclusive evidence demonstrating that so-called 'biodegradable' plastics can fully biodegrade in real-world environmental conditions or that the material and its by-products are harmless to marine life. There are also no globally accepted standards in existence against which marine (bio)degradability of plastics can be measured and/or proven. Any such 'biodegradable' plastics would therefore still function as microplastic pollutants in the aquatic environment and could have the same negative impacts on marine and freshwater species as conventional plastics[1]. We are therefore particularly concerned about the ambiguous requirement included in ECHA's note regarding the ability to demonstrate that plastics can biodegrade "sufficiently rapidly in the environment," especially as there is currently no indication of how fast this (bio)degradation would need to be[1].

[1] UNEP (2015) Biodegradable Plastics and Marine Litter. Misconceptions, concerns and impacts on marine environments. United Nations Environment Programme (UNEP), Nairobi.

Therefore, our organisations would like to provide detailed comments regarding the proposed exemption for so-called “biodegradable plastics” as a result of introducing (bio)degradability criteria for microplastics in the restriction proposal. Biodegradable plastics are known to behave like conventional plastics in the marine environment, and this is why we support a comprehensive scope that is coherent with the objectives of the restriction proposal, that is to address the risks to the environment posed by intentionally added microplastics.

Due to their high mobility, microplastics are redistributed between environmental compartments and are transported from soils to the marine environment via freshwater.

Due to the complex range of physical and chemical conditions encountered within different natural compartments, as well as the high variability and complexity of microplastics formulations (including different types of polymers, additives and other chemicals), it is not possible to develop environmentally sound criteria for the (bio)degradation of plastic that can ensure no environmental risk during the (bio)degradation process in all possible environmental compartments they will encounter.

As the restriction proposal states: "There are no international standardised higher tier test targeted for determining the half-life of plastics in different environmental compartments (freshwater, marine environment, soil or sediment). Methods available for plastics can be considered to provide screening level information for the assessment of ready (bio)degradability (ultimate degradation) and inherent (bio)degradation."

Recognising these limitations, the dossier submitter has however proposed interim criteria for (bio)degradation, which can create a major potential loophole in the restriction. This exemption would allow the continued release of microplastics that pose a risk to the environment.

Therefore, our organisations consider that the restriction should not include an exemption for microplastics based on the proposed (bio)degradability criteria.

(BIO)DEGRADABILITY OF MICROPLASTICS

The (bio)degradation criteria refer to chemicals not to microplastics

The (bio)degradation criteria mentioned in the proposal refer to chemicals, however, microplastics are a complex mixture of polymers, additives and other chemicals, with different (bio)degradability behaviours. For example: 65% “Polymer A”, 15% “Polymer B”, 18% “Polymer C”, 1% “Additive A” and 1% “Additive B”.

The criteria to evaluate (1) ready (bio)degradation (i.e. 60% mineralization after 28 days), (2) enhanced/modified ready (bio)degradation (i.e. 60% mineralization after 60 days) and (3) inherent (bio)degradation (70% mineralization) are identical to criteria used for pure chemicals. A microplastic containing 85% “biodegradable polymer” and 15% “conventional not-biodegradable polymer” might easily reach the 60% or 70% pass level of the proposed criteria. Consequently, with the current

proposed pass levels, it cannot be guaranteed that non-biodegradable polymers will not be released in the environment.

Toxicity of microplastics degradation products should be considered

Microplastics degradation products may include toxic monomers, additives and other toxic chemicals used during the microplastic manufacturing process, during their use, or that may be formed when released to the environment[2].

The term biodegradable plastic refers to plastics that contain specific polymers or additives[3] to promote (bio)degradation of the plastic by microorganisms under specified conditions, and chemical breakdown due to exposure to water, light and air. Biodegradable plastics can be made from both renewable and fossil fuel feedstocks. Their (bio)degradability is entirely dependent on the conditions of their environment and most plastic products currently labelled as biodegradable are only able to truly biodegrade in the special conditions of industrial composting facilities (e.g. high temperature, regular turning), which essentially makes them compostable plastics (see definition below). There is no available standard for marine (bio)degradability[4] (the previous standard – ASTM D7081 – was withdrawn in 2014 and was not considered effective in reducing risks to the marine environment)[5].

Plastics claimed to be biodegradable are known to present risks to marine life. For example, high density polyethylene (HDPE), oxo-degradable plastic and biodegradable polybutylene adipate terephthalate (PBAT)/starch blend (Mater-BiTM) were all exposed to gastrointestinal fluids of sea turtles for over a month[6]. HDPE and oxo-degradable plastic degraded negligibly, and biodegradable PBAT/starch blend degraded by 4.5 – 8.5%, much slower than the 100% degradation that the manufacturers reported would occur at an industrial composting site. As such, biodegradable plastics would still be able to present a serious gastrointestinal tract blockage risk to sea turtles, and any other marine life that ingested them.

---

[2] Groh K.S. et al. Overview of known plastic packaging-associated chemicals and their hazards. Science of the Total Environment 651 (2019) 3253–3268

[3] Food Packaging Forum, Dossier – Biocides and food contact materials, Birgit Gueuke, July 2014

[4] UNEP (2015) Biodegradable Plastics and Marine Litter. Misconceptions, concerns and impacts on marine environments. United Nations Environment Programme (UNEP), Nairobi, accessible via: https://wedocs.unep.org/bitstream/handle/20.500.11822/7468/-Biodegradable_Plastics_and_Marine_Litter_Misconceptions,_concerns_and_impacts_on_marine_environments-2015 BiodegradablePlasticsAndMarineLitter.pdf.pdf?sequence=3

[5] *Ibid*. 3

[6] Müller, C., K. Townsend and J. Matschullat (2012), "Experimental degradation of polymer shopping bags (standard and degradable plastic, and biodegradable) in the gastrointestinal fluids of sea turtles." Science of The Total Environment 416(0): 464-467.

Additionally, biofouling on so-called 'biodegradable' plastics quickly causes them to sink from surface waters to cooler waters and drastically reduces exposure to the ultraviolet light that is often required for degradation (e.g. photodegradation) to occur[7].

Microplastics are very mobile

Although some laboratory studies have demonstrated a potential for (bio)degradation of some plastics in controlled settings, those studies are limited to analysing results for one environmental compartment only.

Microplastics might be released in various media and environmental compartments, "with any release in the environment assumed to result in a risk"[8]. Among them: the marine environment, wastewater treatment facilities, freshwaters, soil, sediment, compost, snow and the atmosphere[9] etc.

As the restriction report recognises (1.4.3. Environmental fate page 44):

> "The mechanisms and rate of bio(degradation) of microplastics in the environment are not well understood. Transport processes redistribute plastics between compartments and result in a net flow of materials from the terrestrial compartment (including run-off from agricultural soils amended with biosolids), via freshwater, to the marine compartment; including ocean sediments (Geyer et al., 2017b, Kooi, 2018, Rochman, 2018). Microplastics disposed to land could remain in the soil, run-off to water or be dispersed by wind (Duis and Coors, 2016)."

However, the current proposed criteria do not permit to foresee the release locations of microplastics and do not apply equally, regardless of the release location.

In practice, it is not possible to determine the pathways or final release location of microplastics.

Even (bio)degradable materials don't degrade in all affected environmental compartments

Due to the complex range of physical and chemical conditions encountered within natural ecosystems (soils, sediments, freshwater or marine environments..), as well as the high variability and complexity of microplastics formulations (including different types of polymers, additives and other chemicals), it is not possible to develop environmentally sound criteria for the (bio)degradation in all the affected environmental compartments.

Materials that may degrade in laboratory conditions (where the recommended range for the test temperature is between 15-28 °C or in industrial composting facilities with 58 °C) may not degrade in

---

[7] *Ibid*. 4.

[8] ECHA, Dossier submitter's Proposal for a restriction under Annex XV, version 1, 11 January 2019, p.73

[9] M. Bergmann, S. Mützel, S. Primpke, M. B. Tekman, J. Trachsel, G. Gerdts, White and wonderful? Microplastics prevail in snow from the Alps to the Arctic. Sci. Adv. 5 , eaax1157 (2019), accessible via: https://advances.sciencemag.org/content/5/8/eaax1157

the environment (the average environmental temperature in the EU is 9 °C in marine environment and 12 °C in fresh water environment and soil), as already recognised in the restriction report.

Indeed, available standards cannot guarantee that a polymer intended to biodegrade in a specific environment will also biodegrade in another environmental compartment. Biodegradable polymers require a controlled fate in order to kickstart the expected (bio)degradation process and as a result, it is nearly impossible to manage the uncertainties related to their improper use and disposal. For example, a soil biodegradable polymer coating for a slow release fertiliser will only biodegrade in soil, it will not biodegrade in the expected manner in case it is blown away and ending up in another environmental matrix such as water.

Marine (bio)degradation is unlikely

There are currently no commonly agreed international methods to assess (bio)degradability of plastic in the marine environment. Reasons for this include the high variability in marine conditions globally, but also in Europe, with regards to temperature, salinity, exposure to light, etc.

Furthermore, (bio)degradability criteria are established based on laboratory tests and these cannot mimic the full spectrum of marine conditions that can be encountered. Even if a laboratory method were to be developed and agreed internationally, it would still be impossible to predict how a product will behave in the multitude of different marine environments in which it may end up.

First attempts at establishing (bio)degradation criteria in the marine environment have foreseen a minimum duration for (bio)degradation of 28 days and maximum duration of 6 months. However, in that timeframe the item can still cause harm to marine life by ingestion, entanglement, etc.

Considerations on the proposed (bio)degradation criteria

1. The specific weathering stage of microplastics

All intentionally added microplastics must be restricted under REACH without going through (bio)degradability tests because all microplastics are complex solid substances, which means that once they enter the environment their (bio)degradability would involve two separate stages:

1. A complex weathering stage that involves gradual damage to the surfaces of the given microplastic ingredient and potential physical fragmentation into even smaller plastic pieces. This stage must not be overlooked when discussing possible (bio)degradability criteria for microplastic ingredients because:
    - During this stage, the weathered microplastic ingredients are still small pieces of plastic that would pose the same environmental risks as non-weathered microplastics and continue to be mistaken for food by animals, which can have serious biodiversity impacts.
    - It would not be possible to effectively address this environmental risk of ingestion during the weathering stage, if (bio)degradability criteria applied to microplastics cannot specify an appropriate timescale for plastic weathering in all possible environments that microplastic ingredients are known to reach at their end of life.
    - Defining an appropriate weathering timescale for plastic is extremely problematic. Even if we take the seemingly extreme timescale of one day for example, allowing the use of such

biodegradable microplastic ingredients, which only weather for one day before they completely break down into their basic chemical components, would still create a big environmental risk because:

- All microplastics are known to pass through wastewater treatment when used as microplastic ingredients in down-the-drain products[10] and wastewater treatment plants across the world do not necessarily have effective microplastics capture systems in place;
- Before the introduction of the UK microbeads ban, it was estimated that microplastics from UK wastewater treatment plants alone enter waterways and oceans at rates of up to 500 million per day (despite UK wastewater treatment plants having a maximum microplastic retention rate of 80%).
- This means that even with a weathering timescale of a day, biodegradable microplastics would still pose a risk to millions of aquatic organisms if they are exempted from the restriction and allowed to replace conventional microplastic ingredients across the European Union.

2. A follow-up chemical breakdown process involving the degradation of the weathered microplastic item into chemical by-products which themselves must also be assessed in terms of toxicity. -

2. The current (bio)degradability test methods do not prevent adverse impacts on the environment

We strongly urge ECHA to ensure that any exemption considered should, at the very least, be based on improved criteria as existing methods are currently not adequate to address the complexity of microplastics and not stringent enough to ensure no adverse impacts on the environment are created from the use of biodegradable (micro)plastics. At the very minimum, current test methods should be improved to:

1. Require the separate testing on biodegradation of added constituents to the microplastic and finished products;
2. Put strict limits on the presence of substances of concern in plastics intended to biodegrade;
3. Include the field-testing of the biodegradable polymer and the finished product to ensure all criteria are met in real-life conditions as well.

[10] The Environmental Protection Bureau of the New York State Attorney's General Office (2015), Discharging microbeads to our waters: an examination of wastewater treatment plants on New York, available via: http://www.ag.ny.gov/pdfs/2015_Microbeads_Report_FINAL.pdf. Magnusson, K. Wahlberg, C. (2014). Screening of microplastic particles in and downstream of a wastewater treatment plant, *Technical Report published for IVL Swedish Environmental Research Institute*, Swedish Environmental Research Institute, Stockholm, Sweden

For more information please contact:

Tatiana Santos

Policy Manager: Chemicals & Nanotechnology

European Environmental Bureau

Rue des Deux Eglises 14-16, B-1000 Brussels

Tel: +32 2 289 10 94

Email: tatiana.santos@eeb.org