



POLICY BRIEF No 2019/38, MAY 2019

Title: OXO-(BIO?)DEGRADABLE PLASTICS - solution to plastics pollution or not?

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DEFINITION: Oxo-degradable or oxo-biodegradable plastics are conventional plastics, such as High Density Polyethylene (HDPE), commonly used in carrier bags, which also include additives which are designed to promote the oxidation of the material to the point where it embrittles and fragments. This may then be followed by biodegradation by bacteria and fungi at varying rates depending upon the environment. ⁱ(Eunomia for European commission,2016)

Key points

Oxo-(bio)degradable plastics have recently been marketed as a possible solution to plastic pollution, since their manufacturers claim that (when disposed) they start to fragment under UV light and heat and eventually biodegrade much faster than conventional plastics. An innovation like that could possibly resolve the plastic pollution problem. Nevertheless, questions rose immediately about the accuracy of the information given and their possible harmful results. According to evidence the so-called oxo-degradable plastics do not in many cases reach the “stage” of biodegradation or they might even not biodegrade at all depending to the conditions they end up in. In addition, they are not suitable neither for composting nor recycling and can also mislead consumers due to the way they are being promoted into the market. Consequently, oxo-degradable plastics are against the targets of European strategy for plastics, since they are neither reusable nor suitable for composting or recycling. This policy brief suggests that oxo-degradable plastics:

- Should be precautionary banned till new evidence is available,
- New scientific research is done on the subject in order to discover more innovative plastic products which are compatible to the new European strategy for plastics and
- Awareness-rise campaigns for European consumers so that they are informed about the different types of plastic available on the market and their environmental impacts.

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Introduction

Oxo-(bio?)degradable plastics have been promoted as a potential solution to the emerging problem of environmental dangers caused by plastic waste.ⁱⁱ According to the definition given above and manufacturers claims, even if an oxo-degradable plastic bag ends up in landfill or the ocean, it will start to degrade into harmless fragments and this fragmentation will from then accelerate the procedure of biodegradation. 'Biodegradation' is a process by which material disintegrates and is decomposed by microorganisms into elements that are found in nature, such as CO₂, water and biomass. Biodegradation can occur in an oxygen rich environment (aerobic biodegradation) or in an oxygen poor environment (anaerobic biodegradation).ⁱⁱⁱ (European commission,2018) European Parliament and the Council in an adopted directive of 29 April 2015 aiming to reduce the consumption of lightweight plastic carrier bags and their impact on the environment reports in paragraph 18 that “The Commission should examine the impact of the use of oxo-degradable plastic carrier bags on the environment and present a report to the European Parliament and the Council, including, if appropriate, a set of measures to limit their consumption or to reduce any harmful impacts.”^{iv} (European parliament and the Council,2015). Till now, the reports presented by the Commission have not produced a new legislative proposal even though the evidence reveals many potential dangers and risks not only for the environment but also for European citizens’ health. Even the latest discussions and decisions in EU addressing the single-use plastics do not include any opinions or decisions about oxo-plastics.^v

Evidence and analysis

The presented reports of the European commission and current evidence show that oxo-degradable plastics may have in some cases an even more negative environmental impact than usual plastics. First of all, oxo-degradable plastics are incompatible to the current standards for packaging recoverable through composting in the EU (EN 13432), because they are unsuitable for any form of composting^{vi}. In addition, they are designed to degrade under certain conditions (heat, oxygen, UV light), which are not always present in real life, but are dependent on local conditions and weather changes. As the final report of European commission on the impact of oxo-degradable plastics on the environment shows (TABLE 1), in open environments absence of heat or UV light may slow down the process of biodegradation of oxo-plastics or even make it not start at all.^{vii} As a result, the biodegradation time frame of an oxo-plastic is not known and it can vary vastly(same behavior as other conventional plastics). In the scenario of oxo-degradable plastics end up in marine environment there is no evidence to date making



sure that biodegradation is going to proceed the same way as claimed by their manufacturers. On the contrary, it is evaluated to be much slower and there is a potential risk “that plastic fragments may remain either indefinitely, or for long enough to cause significant environmental damage.”^{viii}(Eunomia for European commission,2016).

TABLE 1:ISSUES OF BIODEGRABILITY	
In open environments, PAC plastics biodegrade following their fragmentation	INCONCLUSIVE
PAC plastics do not biodegrade in landfill.	INCONCLUSIVE
PAC plastics biodegrade in marine environments.	INCONCLUSIVE

^{ix} (Eunomia for European commission,2016)

Moreover, other concerns about the use of oxo-degradable plastics are connected to recycling procedures. According to scientific evidence (TABLE 2): “Tests have demonstrated that the presence of oxo-degradable plastic in a conventional plastic recycling system can lead to poor quality recycle”^x and “evidence suggests that oxidized PAC plastic can significantly impair the physical qualities and service life of the recycled product”.^{xi}The problem however, is even greater as technology to date can’t separate oxo-degradable plastics from conventional plastics and using manual-sorting technics is not only time-consuming, but also likely not economically viable. As a result, oxo-plastics can’t transform into a high quality and reusable recyclates and in addition, affect negatively the recycling process of conventional plastics. In conclusion, oxo-plastics seem to be against the European strategy for plastics in circular economy (European commission,16/01/2018), since they are neither suitable for reuse nor recyclable^{xii}.

TABLE 2:ISSUES RELATING TO RECYCLING PROCESSES	
PAC plastics can be identified and separated in collection systems.	REFUTED
PAC plastics can be identified and separated within recycling processes	REFUTED
The quality of conventional plastics recycle is not negatively affected by PAC plastic added to the feedstock.	REFUTED
The presence of PAC plastics in recycle does not affect recycle prices or marketability.	REFUTED

^{xiii}(Eunomia for European commission,2016)



Addressing the problem from another point of view, the information given by manufacturers about the degradability of the oxo-plastics can be misleading for the consumers and result in a rise of their littering behavior.(European commission, 2018)^{xiv}. This may have a negative impact on European Union's already started effort to reduce the consumption of single-use plastics(legally based on article 191 paragraph 1 of the Lisbon Treaty^{xv} and particularly the European strategy for plastics),which has now start to have its first results. As eurobarometer showed “After addressing plastic bags in 2015, 72% of Europeans said they have cut down on their use of plastic bags.”^{xvi xvii} But oxo-biodegradable plastics use, which is still not a part of some regulation of the EU may mislead the consumers by the way they are marketed and in this way make them believe that their use is ecofriendly and doesn't have any environmental effects, which is only partially true and still inconclusive according to the evidence presented in this policy brief .^{xviii}

Recommendations

Possible solutions to avoid environmental dangers and risks for human health from the use of oxo-degradable plastics are:

1. A precautionary banning from the market until new scientific evidence comes to light. This way EU will certainly be protected from the risks shown above and potential other -unknown till today- dangers of oxo-degradable plastics.
2. Awareness-rising measures until/if not the precautionary banning of oxo-plastics is adopted by the EU, so that consumers do know all the important information about oxo-degradable plastics. This may also include the promotion of reusable plastics products, which are not easily disposed by consumers due to their higher quality and also higher cost.
3. Supporting innovations on the scientific field of oxo-degradable plastics, which will give to the EU the leading role to fighting plastics pollution. Special programs may be designed so that manufactures of oxo-degradable plastics in Europe have access in information about improvements in technology of their field in order to distinguish all the dangerous environmental risks of the today's oxo-degradable plastics.



References

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- ⁱⁱ For more information and facts on plastics pollution in our oceans see: <http://www.europarl.europa.eu/news/en/headlines/society/20181005STO15110/plastic-in-the-ocean-the-fact-effects-and-new-eu-rules> and <https://www.euronews.com/2018/05/16/even-ocean-s-deepest-reaches-are-not-safe-plastic-trash-n874476>
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- ^{vi} i.e. same document as in endnote 1 p. ii par.2
- ^{vii} i.e. same document as in endnote 1 p. i par.2
- ^{viii} i.e. same document as in endnote 1 p. iii par. 2
- ^{ix} i.e. same document as in endnote 1 p. vi
- ^x i.e. same document as in endnote 3 p.6-7 par 5.2
- ^{xi} i.e. same document as in endnote 1 p. v
- ^{xii} European Commission (2018). A European Strategy for Plastics in a Circular Economy. [pdf] Brussels, pp.1,4-5. Available at: <http://ec.europa.eu/environment/circulareconomy/pdf/plastics-strategy-brochure.pdf> [Accessed 9 Dec. 2018].
- ^{xiii} i.e. same document as in endnote 1 p. vi
- ^{xiv} i.e. same document as in endnote 3 p.7
- ^{xv} 5 TREATY OF LISBON (2018). Official Journal of the European Union, [online] vol. 59, p.132. Available at: <https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2007:306:FULL:EN:PDF> [Accessed 9 Dec. 2018].
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