



## **SUBMISSION FROM THE BIODEGRADABLE PLASTICS ASSOCIATION**

To: European Commission – Directorate-General for Environment  
Response to Call for Evidence – Evaluation of Directive (EU) 2019/904 (SUP Directive)  
Reference: Ares (2025)11556597 – 23/12/2025

### **EXECUTIVE SUMMARY**

1. The Biodegradable Plastics Association (BPA) welcomes the opportunity to contribute to the EU Commission’s evaluation of Directive (EU) 2019/904 (“SUP Directive”). As an Association with members all over the world, specialising in scientifically validated biodegradable plastic technology, it is deeply committed to reducing the environmental impact of plastic litter in the EU and globally.
2. We agree with the UK Government’s HSAC Report (2019) that “Many of the advantages, conveniences and indeed environmental benefits of modern life brought to us over the past 70 years has been thanks to the employment of plastics. .... Plastic films and packaging have provided health and safety benefits, reduced food waste and lowered the costs of transportation.”
3. However, the BPA is concerned that the ban on “oxo-degradable plastic” in Article 5, of the SUP Directive and its associated Guidance Note, fail to distinguish between oxo-degradable and oxo-biodegradable plastics, creating confusion and effectively preventing the use of oxo-biodegradable plastics in the EU. As a result, conventional plastics are still being used, which persist in the environment for decades, contributing to pollution, while oxo-biodegradable plastics—which are designed to biodegrade if they escape into nature—leaving no microplastics or toxic residues, are unnecessarily and unjustly restricted.
4. **The key point to remember is that oxo-biodegradable technology does not cause the plastic to break up into small pieces of plastic – it converts the plastic into non-toxic biodegradable materials, which are bio-assimilated by naturally-occurring microbes in the environment. It requires no special conditions – only oxygen. The process is initiated by sunlight and will then continue even in the dark and whether the conditions are warm or cold. If collected during its useful life it can be recycled with ordinary plastic without the need for separation**
5. The BPA notes the complete absence of reference to oxo-degradable and oxo-biodegradable plastics in the current consultation documents, reinforcing its view that **the Art. 5 ban is not and never has been central to the purpose of the Directive.**

6. Traditional waste management strategies (“Reduce, re-use and recycle”) are useful, but they are clearly insufficient, as significant amounts of plastic still escape into the environment, where they lie or float around for decades and fragment into microplastics. By contrast oxo-biodegradable plastics, degrade and then biodegrade much faster than conventional plastics, leaving no persistent fragments or toxicity.
7. **The BPA is critical of the EU legislative process in 2018/19** for failing to properly evaluate the proposed ban, lacking scientific assessment, environmental impact statement, and socio-economic analysis, and notes the premature termination of essential scientific studies being done by ECHA. The BPA highlights evidence and studies—including the Oxomar study and independent testing by Intertek and others—that demonstrate that oxo-biodegradable plastics do biodegrade effectively and do not contribute to microplastic pollution. Intertek is one of the world’s leading independent testing laboratories, accredited to ISO 17025, which ensures the robustness, scientific credibility, and international acceptance of their test reports. Oxomar was sponsored by the French government and involved some of their most distinguished scientists.
8. With only 16% of global plastic waste being recycled, recycling alone—and blanket bans—are insufficient solutions. Plastic pollution is inherently a transboundary issue, and addressing it requires coordinated transboundary waste management policies. In this context, mandating (instead of banning) the use of oxo biodegradable technology which complies with internationally recognised standards for biodegradation in the open environment, offers a rational and effective complement to recycling and reduction strategies. It acts as **an environmental insurance policy—one that can significantly reduce the accumulation of persistent plastic fragments and microplastics that pose risks to ecosystems and human health.**
9. The BPA recommends amending the SUP Directive by removing references to oxo-degradable plastics from Article 5 and Recitals 15 and 36, and amending Article 3(3). The BPA argues that plastics which biodegrade quickly, leaving no microplastics or toxic residues, and which can be recycled during their service life, should not be banned but should be encouraged.
10. This submission also addresses testing standards, the timescale for degradation, and misleading information in the literature, emphasising the need for scientifically sound evaluation, as well as Quality Control of manufacturing, and application of the correct biodegradability standards.
11. **Policymakers should rely upon specific tests by ISO 17025 accredited test houses such as the series of tests in 2025 by Intertek which showed biodegradation and absence of microplastics, instead of relying on general academic publications and literature-reviews - many of which we show at 85 below are irrelevant and/or contain fundamental errors.**

## INTRODUCTION

12. Plastic is immensely useful for a wide variety of products, and is especially useful for protecting food and drink from damage, loss and contamination. It has a better LCA than other materials used for packaging <https://www.biodeg.org/subjects-of-interest/life-cycle-assessments/> and it is much better than paper – See <https://www.biodeg.org/subjects-of-interest/paper-bags/>
13. There is no simple solution to plastics in the open environment. Recycling is important, and if all the plastic could be collected for recycling there would not be

a problem, but this is unlikely for the foreseeable future, even in the developed world.

14. Waste management in Switzerland is among the most efficient in the world, but the Swiss Federal Office for the Environment says: <https://www.bafu.admin.ch/bafu/en/home/topics/waste/waste-policy-and-measures/plastics-in-the-environment.html>  
“Plastics have no place in the environment. Nevertheless, around 14,000 tonnes of plastics end up in Switzerland’s soil and waters every year – primarily due to the abrasion and decomposition of plastic products and improper disposal of plastic waste. Plastics then accumulate in the environment because they only degrade very slowly.” **Clearly the traditional policies of “Reduce, re-use and recycle” are not sufficient.**
15. This is the reason why oxo-biodegradable plastic was invented. It is used in a wide variety of packaging and other products made from polyethylene or polypropylene, (but not polystyrene, PET or PVC) which are among those most likely to be littered. It is also very useful in agriculture. See <https://www.biodeg.org/agricultural-plastic-products-2/> It tackles the problem at the molecular level by ensuring that the plastic does not just break up into smaller pieces. It dismantles the molecular chains *within* the polymer so that it ceases to be a plastic and becomes a biodegradable material which is consumed by bacteria and fungi and cleaned out of the eco-system by them.
16. **Oxo-biodegradable plastic is not designed to end up in nature**, but it is the only way to prevent plastic in the open environment from accumulating there for decades. It is designed to be used and recycled and disposed of in the same way as ordinary plastic, and there is no need to label the product as biodegradable. It is designed to biodegrade only if at the end of its useful life it escapes into the open environment deliberately or by accident. It will also biodegrade if disposed of in landfill, though that is not its primary purpose.
17. We are concerned that the prohibition of “oxo-degradable plastic” in Article 5 has caused confusion by failing to distinguish between oxo-degradable and oxo-biodegradable plastic. This confusion has effectively prevented the use of oxo-biodegradable plastic in Europe with the result that **almost all the plastic which has escaped into Europe’s environment since 2019 has been conventional plastic which will lie or float around for decades instead of biodegrading**. This was not the intention of the legislature, and must be remedied without delay. There are no reliable figures, but Eurostat has estimated that in 2023 alone the EU created 79.7 million metric tons of plastic packaging waste.
18. We notice that neither oxo-degradable or oxo-biodegradable plastics are even mentioned in the consultation document (Ares(2025)11556597 – 23/12/2025) nor in the online survey, nor in the Rethink Plastics “Evaluation of the Single-Use Plastics Directive” referenced in the consultation document <https://rethinkplasticalliance.eu/wp-content/uploads/2024/12/Evaluation-report-SUP-final-text.pdf>
19. The Consultation document says “Drawing on Article 15 of the SUPD, the evaluation will also target the following issues:
  - 1) assessing whether the scope of the Directive should be revised, including the list of single-use plastic products and respective measures;
  - 2) assessing the change in materials used in SUP products;
  - 3) assessing scientific and technical progress concerning criteria and a standard for biodegradability in the marine environment;

In this paper we will address these issues.

## THE PROBLEM WITH PLASTIC

20. Oxo-Biodegradable Technology fills a Critical Gap. The SUP Directive rightly aims to reduce plastic pollution, yet millions of tonnes of plastic continue to escape waste management systems annually. Oxo-biodegradable plastic addresses this critical reality by ensuring that plastic which escapes into the environment biodegrades safely, rather than persisting for decades and creating microplastics.
21. **Oxo-biodegradable plastics are proved to achieve full biodegradation without harmful residues**; they offer environmental benefits where recycling, reuse, or controlled disposal pathways fail; and they do NOT disrupt mechanical recycling streams. <https://www.biodeg.org/subjects-of-interest/recycling-2/> Without such technology, the EU remains vulnerable to long-term accumulation of conventional plastics in soil and marine environments.
22. Some of the microplastics are coming from man-made fibres, and recycling can be a source of microplastics. Composting can also be a source of microplastics, but most of the microplastics found in the environment are caused by the fragmentation of ordinary plastic which becomes embrittled when exposed to sunlight and stress. It is also said that microplastics are coming from vehicle tyres, but these are fragments of rubber, not plastic.
23. **Waste-management and education must of course be improved, but for the foreseeable future some way must be found to deal with plastic which has escaped into the environment and cannot realistically be collected and included in a circular economy.**
24. Oxo-biodegradable plastic is used in a wide variety of bottles, packaging, and other short-life products made from polyethylene (PE) or polypropylene (PP), which are among the products most likely to be littered. It is also very useful in agriculture for mulching films <https://www.biodeg.org/agricultural-plastic-products-2/>
25. Oxo-biodegradable plastic is NOT designed to be discarded into nature, but it is the only way to prevent plastic which *does* get into the open environment from accumulating there for decades. It is not designed for plastic products intended for long-term use, and is designed to be used and disposed of in the same way as ordinary plastic. It is designed to biodegrade only if at the end of its useful life it escapes into the open environment deliberately or by accident. It can however be recycled if collected during its useful life. <https://www.biodeg.org/subjects-of-interest/recycling-2/>
26. Ordinary plastic and d2w plastic lose their tensile strength and fall apart at about the same time when exposed to sunlight, depending on their age and degree of stabilisation, but the fragments of ordinary plastic have a molecular weight which is much too high for biodegradation. The purpose of oxo-biodegradable technology is to cause a rapid reduction of molecular-weight.
27. Professor Ignacy Jakubowicz, one of the world's leading experts on this technology, has described the process as follows: <http://www.biodeg.org/Reply%20to%20Ellen%20MacArthur%20Foundation%20from%20Prof%20Ignacy%20Jakubowicz%20-%202021-8-17.pdf> "The degradation process is not only a fragmentation, but is **an entire change of the material from**

a high molecular weight polymer, to monomeric and oligomeric fragments, and from hydrocarbon molecules to oxygen-containing molecules which can be bioassimilated.” They do not therefore leave microplastics behind, and this has been proved by a series of tests by Intertek in 2025 [copies attached].

## THE LEGISLATION

28. In making the SUP Directive 2019/904 the EU Parliament caused confusion by failing to distinguish clearly between oxo-degradable and oxo-biodegradable plastic. Confusion is due to the fact that the prohibition of ‘oxo-degradable plastic’ and its definition in the legislation **were not a considered view of the Commission included in its draft of the Directive, but were inserted at a late stage in the Environment Committee of the Parliament as a result of lobbying.**
29. In the EU, the REACH Regulation 1907/2006 sets out procedures for the evaluation of substances before they can be banned. These are set out in Articles 68-73 and are designed to ensure that there is a proper scientific assessment, as a safeguard against arbitrary legislation. In this case **those Regulations were circumvented,** and the EU Court has taken a very surprising view that this is acceptable.
30. **There was no Environmental Impact Statement or Socio-economic Analysis. There had been three reports to the Committee by their own Rapporteurs on the subject of Single-use Plastics, but none of them made a case for banning oxo-degradable or oxo-biodegradable plastic. Further, the Committee failed to await the results of a scientific study being done at the time by the European Chemicals Agency; and the Commission prematurely terminated that study. On 30th October 2018 the Agency informed the BPA that they had not been convinced that microplastics were formed.**
31. The d2w technology has been scientifically demonstrated to undergo full biodegradation without leaving behind persistent microplastics or toxic residues. This conclusion is supported by independent studies.” including in particular the **Intertek tests and the French “Oxomar” study,** which proved that oxo-biodegradable plastics are not the same as “oxo-degradable” plastics and that **“they biodegrade in seawater and do so with a significantly higher efficiency than conventional plastics.”** See [www.biodeg.org/wp-content/uploads/2021/07/Final-report-OXOMAR-10032021.pdf](http://www.biodeg.org/wp-content/uploads/2021/07/Final-report-OXOMAR-10032021.pdf)
32. In Ireland (an EU member-state) on 3<sup>rd</sup> June 2025, after evaluating the evidence for three months, the Environmental Protection Agency of the Republic confirmed in writing to Symphony Environmental (a member of the BPA) that “Following analysis of your response, and the accompanying scientific documentation—including the final memo from Jordi Labs and the Intertek reports—we believe all necessary information has now been provided to address the concerns raised. At this stage, no further information is required. **The materials submitted offer a comprehensive and scientifically substantiated overview of the d2w technology and its environmental impact, particularly in relation to microplastics.”**
33. On 20<sup>th</sup> June the EPA confirmed “We are satisfied that the materials in question do not fall under the scope of concern for oxo-degradable plastics. We therefore confirm that there is no objection to the distribution of d2w products in Ireland, and we consider this investigation closed.
34. The EPA has not changed its position on the science, but after receiving representations from the “compostable” lobby, it has concluded that products made with d2w technology are nevertheless to be regarded as “oxo-degradable” plastic for the purposes of Reg. 5 of the Single-use Plastics Directive 2019/904 and

- cannot therefore be placed on the market in Ireland. Reliance is placed on the Guidelines issued by the EU Commission (2021/C 216/01).
35. The EPA admits that the Guidelines are not legally-binding. The BPA has examined the Guidelines and has concluded for the following reasons that they are also mistaken.
  36. The Guidelines say “Article 5 of the Directive ..... makes no distinction between oxo-degradable plastic that is biodegradable and oxo-degradable plastic that is not biodegradable.” This is true – because **Article 5 does not mention biodegradable plastic at all. That does not however mean that oxo-biodegradable plastic does not exist.**
  37. Its existence is recognised by the European standards body CEN in TR15351 as follows:
    - (a) “Oxo-degradation” is “degradation identified as resulting from oxidative cleavage of macromolecules.” This describes ordinary plastic, (which does not contain an intentionally-added prodegradant catalyst). It will abiotically degrade by oxidation in the open environment and create microplastics, but does not become biodegradable except over a long period of time.
    - (b) By contrast **“oxo-biodegradation is defined** as “degradation resulting from oxidative and cell-mediated phenomena, either simultaneously or successively”. This means that the plastic (which does contain a prodegradant catalyst) degrades rapidly by oxidation until its molecular weight is low enough to be accessible to bacteria and fungi, who then recycle it back into nature.
  38. Recital 15 of the SUP Directive provides that “The restrictions on placing on the market introduced in this Directive should also cover products made from “oxo-degradable” plastic, as that type of plastic does not properly biodegrade and thus contributes to microplastic pollution in the environment.” It follows from this that a type of plastic, (such as d2w oxo-biodegradable plastic), which is scientifically proved to properly biodegrade and not create microplastics, is not “oxo-degradable” plastic for the purposes of the Directive. The Guidelines are therefore mistaken, and in conflict with Recital 15. The quality of biodegradability is not irrelevant – it is an essential characteristic.
  39. In addition, ‘oxo-degradable plastic’ is defined by Art. 3(3) of the Directive, which would be in conflict with Recital 15 of the same Directive and the CEN definition quoted above, if it applied to plastic which is proved to properly biodegrade and not create microplastics.
  40. ‘Oxo-degradable plastic’ is defined in Art. 3(3) as “plastic materials that include additives which, through oxidation, lead to the fragmentation of the plastic material into micro-fragments or to chemical decomposition.” The EPA of Ireland and the EU Commission have been provided with scientific evidence that oxo-biodegradable plastic materials made with d2w do not contain additives which, through oxidation, lead (a) to the fragmentation of the plastic material into micro-fragments or (b) to chemical decomposition.” The additives do not “lead to” anything – they simply accelerate the process of oxidation which is happening anyway. Moreover, oxidation does not lead to (a) or (b).
  41. One of the purposes of the SUP Directive is to reduce the amount of single-use plastic products, and especially those commonly found on beaches. That is why the Directive contains a list of such products, which are banned whether they are “oxo-degradable” or not. There was no reason to add any restriction which could

apply only to oxo-biodegradable plastic products, and it should be deleted, for if they are single-use products on the list they are banned anyway. On the contrary, for the reasons mentioned above, the legislation should require all single-use plastics to be oxo-biodegradable.

42. **There is no evidence that oxo-biodegradable plastic products not mentioned on the list have ever been found on beaches**, and it is clear that it is better for Europe's environment for plastic to be made so that it quickly biodegrades leaving no microplastics or toxic residues, instead of lying or floating around for decades and creating microplastics.
43. The Directive had been challenged by Symphony Environmental in the European Court in Luxembourg, because the confusion caused by the Directive had adversely affected its business, and Symphony claimed compensation. The court did not say that the EU had made a correct assessment of the technology, but it refused to award compensation simply because it held that the legislators had not exceeded the very wide limits of their discretion.
44. This was a surprising conclusion because, as mentioned above the legislators had not followed the procedure prescribed by the REACH Regulation Arts 68-73; had failed to make an environmental impact assessment or socio-economic analysis; and had failed to await the results of a scientific study being done at the time by the European Chemicals Agency, and which was prematurely terminated.
45. Even more surprising was that the court refused to attach weight to scientific evidence obtained by Symphony from international test houses because they had paid for it. This important point was not put to Symphony's counsel during the hearing, who would have made the obvious response that it is not possible to obtain an expert report from such test houses without paying for it. Worse still the court then proceeded to place reliance on evidence from Eunomia for which the Commission had paid, and which did not in any event recommend a ban. **In our view this extraordinary behaviour undermines the authority of the EU court itself.**

## AMENDMENT

46. The Consultation document says "Drawing on Article 15 of the SUPD, the evaluation will assess whether the scope of the Directive should be revised, including the list of single-use plastic products and respective measures." The BPA recommendations for amendment will be found at the end of this submission

## THE SCIENCE

47. Oxo-biodegradable technology was invented fifty years ago, not by marketers or salesmen, but by the scientists who had themselves created plastics, and who realised that the durability which they had achieved could be a problem. Foremost among these scientists was Professor Gerald Scott, Professor of Chemistry at Aston University, UK; Professor Jacques LeMair of Clermont-Ferrand France, Professor Emo Chiellini of the University of Pisa, Italy, and Professor Ignacy Jakubowicz of Gothenburg, Sweden.
48. Professor Scott was the holder of several patents for the technology and was later the Chief Scientific Adviser to the BPA. He published the results of his work in many scientific publications including "Polymers & the Environment" (ISBN 9780854045785); "Degradable Polymers; Principles & Applications" (ISBN 1-4020-0790-6). See also "Programmed-Life Plastics from Polyolefins: A New Look

49. Professor Scott and the other polymer scientists made it clear in their published work that PE and PP made with the masterbatch which they had formulated will degrade and then biodegrade in the open environment very much more quickly than ordinary PE or PP, leaving no persistent fragments and no toxicity.
50. **They said that if their invention had been more widely adopted there would be no ocean garbage patches today**, but instead the plastics industry chose to continue to make conventional plastic products, which created microplastics and started to accumulate in the oceans. This has now become a serious problem. Nevertheless, it is not too late – If oxo-biodegradable plastic is widely adopted today the accumulation of plastic in the oceans will start to reduce very soon.
51. It is obvious that a plastic which quickly biodegrades leaving no microplastics or toxic residues and which can be recycled during its service-life provides significant benefits and should not be banned. It is preferable to ordinary plastic which can lie or float around in the environment for decades and which fragments into microplastics on exposure to weathering.
52. However, for the past 20 years there has been a debate about whether oxo-biodegradable plastic meets these criteria. We have participated fully in efforts to answer that question, and our members have spent a substantial amount of money to have testing done by independent international test houses which verifies the published science. These test-reports have not been published for commercial reasons, but there is in particular a series of reports of tests done by Intertek, which are attached in confidence.
53. **Independent Accredited Testing.** Reviewers (and even the EU court) give limited weight to independent testing on the basis that such work is industry-funded. This position is inconsistent with regulatory practice across chemicals, materials, and pharmaceuticals, as it is impossible to obtain expert evidence without payment. Payment for testing does not invalidate results.
54. Accredited laboratories accredited to ISO 17025, are required to demonstrate technical competence, impartiality, and auditability.

### **Microplastics**

55. Plastic pollution, and in particular microplastics, are seen today as the main problem with plastics. They are being found on land, in the sea, and even in the air we breathe and the water we drink. They are caused by the fragmentation of ordinary plastic when exposed to weathering.
56. Ordinary plastic persists in the environment, getting smaller and smaller until it is small enough to get into our bodies. **This is because the molecular weight is too high to permit biodegradation, and the purpose of d2w technology is to reduce it.**
57. If the plastic is upgraded with d2w it will not just break up into smaller pieces. The molecular chains within the polymer will be dismantled, and it will no longer be a plastic. The resulting material will safely biodegrade, and will not persist in the ecosystem.
58. The tests performed in 2025 by Intertek according to ASTM D6954, on samples of plastic containing Symphony’s d2w oxo-biodegradable masterbatch, had proved biodegradation (by carbon-evolution, within 180 days) of 94.55% in the case of polyethylene (PE) and 92.76% in the case of polypropylene (PP). **These studies had therefore shown that there was very little if any plastic left which could become microplastics.**

59. 100% carbon-evolution would never be achieved because the rest of the organic carbon above the 94.55% in PE and 92.76% in PP is used by microorganisms for their energy requirements and to build their cell-structure. The hydrogen from the original PE and PP converts into water.
60. Symphony nevertheless asked Intertek to examine the soil/compost in which the biodegradation had taken place, and they provided a report dated 7th March 2025 that no microplastics had been found.
61. However, in view of the importance of these findings, Intertek carried out a further detailed assessment of the data and reported on 17th March that they had found one particle in the case of PE and two particles in the case of PP. They found a molecular weight of 4,900 Daltons in the case of PP, and 2,200 in the case of PE so if they were remnants of the test materials they were not microplastics but low-molecular-weight oligomers or short-chain polymer fragments which were biodegradable.
62. **If the PE and PP samples had not contained d2w and had simply fragmented under the influence of sunlight and stress, it is to be expected that many thousands of particles would have been found.** Accordingly, even if the particles actually found by Intertek were particles of the PE and PP samples, the fact that so few were found is an excellent result, and reinforces the view that d2w is a very useful technology for reducing the prevalence of microplastics in the environment.
63. A polymer material with a molecular weight of less than 5,000 Daltons has lost its tensile strength and barrier properties and no longer behaves as a plastic. It is hydrophilic and biodegradable and therefore not persistent.
64. **Independent studies have also included tests according to OECD 201, 202, 203, 207 and 208, showing no adverse effects on plants or earthworms,** and tests showing the absence of any metals above permitted levels. In the earthworm test the worms actually gained weight.
65. This scientific testing shows that plastics upgraded with oxo-biodegradable technology are very useful for reducing microplastics and reducing the prevalence and accumulation of plastics in the environment.

### **Oxomar**

66. The leading piece of published academic work on this subject is the **Oxomar study - a four-year study sponsored by the French government at their marine laboratory.** [www.biodeg.org/wp-content/uploads/2021/07/Final-report-OXOMAR-10032021.pdf](http://www.biodeg.org/wp-content/uploads/2021/07/Final-report-OXOMAR-10032021.pdf) The scientists cited six published studies at C7, and reported (at C6) **“We have obtained congruent results from our multidisciplinary approach that clearly shows that Oxo-biodegradable plastics biodegrade in seawater and do so with a significantly higher efficiency than conventional plastics. The oxidation level obtained due to the d2w prodegradant catalyst was found to be of crucial importance in the degradation process.”** These tests were not conducted according to an industry standard as the study was not done by laboratory technicians but by scientists at such a high level as not to need guidance from the standards bodies.
67. The technology has been extensively studied over many years, including by the European Chemicals Agency as mentioned above, and the Environmental Protection Agencies of Ireland and the United States [www.biodeg.org/wp-content/uploads/2024/10/EPA-ACCELERATING-POLYMER-DEGRADATION-](http://www.biodeg.org/wp-content/uploads/2024/10/EPA-ACCELERATING-POLYMER-DEGRADATION-)

[USING-PRO-OXIDANT-ADDITIVESFINAL-3.pdf](#) and the [American National Standards Institute](#) (ANSI),

68. Also, by [Lambton Manufacturing Innovation Centre](#) in Canada, [Jordi Labs](#) in the United States [CIQA in Mexico](#), and the [Federal Institute of Education, Science and Technology](#) in Brazil.
69. See also the letters sent to ECHA by scientists in response to their Call for Evidence [www.biodeg.org/wp-content/uploads/2024/09/Scientist-Letters-combined-06.06.18.pdf](#) and the evidence of Intertek [www.biodeg.org/wp-content/uploads/2021/01/Intertek-Report-to-ECHA-24.5.18.pdf](#)

## Standards

70. In order to test the performance of oxo-biodegradable plastics, Standards have been written and published for the guidance of laboratory technicians. **Polymer scientists were the authors of ASTM D6954 and BS 8472 the standards for plastics which biodegrade in the open environment by a combination of oxidation and microbial activity.**
71. Several countries around the world have developed national standards based on the U.S. ASTM D6954 (eg. UK BS 8472; SAUDI SASO 2879; UAE 5009/2009; MEXICO NMX E288; DOMINICAN REPUBLIC NORDOM 83) to encourage the use of technologies that improve the environmental performance of conventional plastics. These standards recognise an important reality: **not all single use plastics can be eliminated, but they must be improved so that, if they escape into the open environment, they rapidly degrade into non plastic biodegradable materials rather than persist for decades.**
72. **This is why countries such as Saudi Arabia, the UAE, Bahrain, Jordan, Yemen, and most recently the Dominican Republic, have enacted legislation mandating the use of this technology as part of their environmental strategy.**
73. As a growing number of countries adopt legislation and standards encouraging the use of biodegradable plastics designed to biodegrade in the open environment, it becomes essential for the EU to include equivalent provisions into its legislative framework. Failure to do so will create transboundary regulatory discrepancies, hinder the free movement of goods, and introduce unnecessary legal and commercial uncertainty for manufacturers, importers, and end-users.
74. ASTM D6400 and EN13432 are designed to test for biodegradation in the special conditions found in a composting facility and are not therefore relevant to biodegradation in the open environment. Those Standards do not require testing of compostable plastic in a compost heap and ASTM D6954 does not require testing for biodegradation in a field or in the ocean - which would be impossible because the degraded material would be lost and the carbon-evolution could not be measured.
75. In both cases therefore, the plastics are tested in a laboratory according to standards designed by scientists to replicate the conditions in which they are designed to biodegrade.
76. **See the evidence of one of the authors of ASTM D6954 to the UK Government at <http://www.biodeg.org/wp-content/uploads/2021/02/Swift-evidence-to-BEIS.pdf>** He explains why it contains a caveat recognising that laboratory environments are isolated, unlike the dynamic natural environment - in which degradation and therefore biodegradation is likely to proceed more quickly. These standards also require eco-toxicity testing to ensure that they will be safe in the environment.

## Timescale

77. It is not possible to say exactly how long the plastic will take to degrade and then biodegrade in the open environment, which is why approximate timescales are quoted. These plastics will float because their specific gravity is less than 1, and they will have access to oxygen and sunlight for a sufficient length of time even if discarded into water. It is possible to make approximate predictions of timescale for the abiotic phase, and to formulate the masterbatch for fast or slow degradation, but it is not possible to say exactly how long the plastic will take to degrade and then biodegrade in the open environment, because timescale depends on the formulation used, the age of the plastic, and on other components of the plastic such as antioxidants.
78. Sunlight and heat will accelerate the process so it will proceed more quickly in a warm sunny environment than a cold environment with less exposure to sunlight. It is however clear that it will be **many times faster than exactly the same type of plastic without a prodegradant masterbatch when exposed under the same conditions in the open environment.** Queen Mary University say (at para. 2.3) up to **90 times faster.** [www.biodeg.org/wp-content/uploads/2022/10/QM-published-report-11.2.20-1.pdf](http://www.biodeg.org/wp-content/uploads/2022/10/QM-published-report-11.2.20-1.pdf)
79. When the material has become biodegradable and no longer behaves as a plastic, the speed of biodegradation is not important. The more gradual the better, so that the Co2 exhaled from microbial activity is absorbed by plant life. This contrasts with the compostable version approved in the EU, which is designed to emit 90% to atmosphere within 180 days.
80. There is no need for oxo-biodegradable plastic to biodegrade at the same rate everywhere in the world and particularly not within the 180 days required by the industrial composters for plastic intended to biodegrade in composting.
81. Exposure to weathering in the environment causes the degradation of ordinary PE and PP products leading to embrittlement and fragmentation in as little as 4-8 weeks particularly when exposed to sunlight.
82. Although ordinary plastic and d2w biodegradable plastic lose their strength and fall apart when exposed in the open environment, the fragments of ordinary plastic have a molecular weight which is much too high for biodegradation.
83. The prodegradant catalyst in the d2w masterbatch not only accelerates oxidative degradation, but also – critically – removes the dependence of this process on sunlight so that, once initiated, unlike conventional plastics or photo-degradable plastics, degradation will continue, in darkness - until biodegradability is achieved. Moisture is not necessary for oxidation and does not prevent it.
84. In summary it is clear that if PE and PP products are made with an oxo-biodegradable masterbatch and get into the open environment intentionally or by accident, the molecular-weight of the plastic will reduce much more quickly and it will become a waxy substance which is no longer a plastic. It will then have become a source of nutrition for naturally occurring micro-organisms.

#### **MISLEADING INFORMATION**

85. The BPA has published a dossier at [www.biodeg.org/wp-content/uploads/2026/02/BPA-Dossier-with-links-10-2-26-optimised-V12-24-2-26.pdf](http://www.biodeg.org/wp-content/uploads/2026/02/BPA-Dossier-with-links-10-2-26-optimised-V12-24-2-26.pdf) This dossier is not put forward as evidence in itself, but for the facts, arguments, and citations which it contains. It includes a critical review of the 2019 and 2025 advice by HSAC the UK Government (DEFRA)
86. The dossier shows that many papers and literature-reviews on which policymakers rely have **passed peer review and been published even though they contain serious faults mentioned in the dossier and below.** Findings

between different studies vary considerably due to differences in the polymers utilised, differences in the pro-oxidant masterbatches, differences in the test conditions applied and use of different test protocols for the studies.

87. Peer reviewers do not usually repeat the experiments; they do not always have access to raw data; and they often miss methodological or statistical errors. More than 10,000 research papers were retracted in 2023 alone, the highest number ever recorded, according to “Nature.” The retractions were largely due to sham papers, systematic manipulation, and compromised peer review, discovered only after publication through investigations and external scrutiny.
88. “Retraction Watch” data cited by Nature confirms that publishers themselves acknowledge that these represent only a fraction of the problematic literature - describing the situation as “the tip of the iceberg. So a peer reviewed paper can be methodologically weak, based on unrepresentative samples, or analytically flawed — yet still be published. There is also editorial pressure, novelty bias, and financial or other incentives, and the fact that errors are often discovered only post-publication through retractions or corrections.
89. A significant number of academic papers cited to justify restrictions or bans on oxo-biodegradable plastics suffer from recurring methodological and conceptual errors, which are then perpetuated and widely disseminated when the papers are included in literature reviews. However, detailed analysis of these publications shows that many are unsuitable as a basis for regulation. This is important because reviewers implicitly assumes that published papers are correctly testing the intended technology, and that negative results therefore reflect failure of that technology.
90. The BPA dossier points out that **researchers often believe that oxo-biodegradable plastic is designed to start biodegrading immediately. They fail to understand that it has a predetermined service-life during which it can be re-used and recycled, and that only after a period of abiotic degradation after exposure in the open environment will it become biodegradable.** If a researcher assumes that immediate biodegradation is the design intent, the entire experimental question is wrong before the test begins.
91. The dossier also draws attention to papers where the researchers have made the following common errors:
92. **Testing Without Characterising the Sample** - Numerous studies test products taken from the market without confirming whether a pro-oxidant masterbatch is present; whether it is a suitable masterbatch for the particular application; whether it is present at the correct concentration; or whether the stabilisation package is appropriate, or whether it contains anything else likely to affect the rate of degradation. Without chemical characterisation, **it is impossible to know whether the sample tested is correctly formulated, or oxo-biodegradable at all.** From a regulatory standpoint a study that cannot verify the precise identity of its test material is invalid by definition.
93. **Testing a product which is heavily stabilised** eg with carbon-black as a colourant. Slow degradation is then the expected and correct outcome. That is not a failure of oxo-biodegradable technology; it is a failure to design the experiment correctly.
94. **Failing to follow any standard test method.** Without a standard method, results cannot be trusted, compared, or used for regulatory or scientific decision-making, and it is impossible to know whether differences in results arise from the material itself, or differences in test design, duration, inoculum, temperature, oxygen availability, or operator behaviour.

95. **Following the wrong standard** – Some of the papers assess oxo-biodegradable plastics using composting standards such as EN 13432, ASTM D6400, or ISO 17088. These standards are designed for industrial composting environments and include a time-limit (180 days) which is required for industrial composting. They are not intended to evaluate plastics designed to degrade in the open environment.
96. The only internationally recognised standard specifically written for plastics intended to degrade and then biodegrade in the open environment is ASTM D6954 (which has been followed in national standards such as BS 8472, SASO 2879 etc). Failure to apply this standard reduces the value of conclusions about oxo-biodegradability.
97. Arguments that oxo-biodegradable plastics fail composting standard tests (eg because they do not fully biodegrade within 180 days, or because they require an abiotic step) are therefore irrelevant. Oxo-biodegradable plastics are not designed or marketed for composting, and compostability is not a valid requirement for environmental performance in the open environment. Failure of a product tested under the wrong standard is scientifically meaningless.
98. **Failing to continue important parts of the test for a sufficient length of time.** If terminated before the process is designed to complete, the result only shows that “Nothing happened yet.” That is not evidence of failure — it is evidence of premature termination or some other fault in the testing protocol.
99. **Inappropriate Test Conditions:** Exposing products under conditions they were never designed to encounter (e.g. burial, anaerobic conditions, continuous immersion) tests the wrong question. Oxo-biodegradable plastic is designed to biodegrade in the open environment with access to oxygen, and testing outside that envelope cannot be used to measure environmental performance.
100. **Failing to compare for biodegradability, recyclability and microplastics with bio-based plastic** – (which is not banned). Many studies fail to compare biodegradation rates in the open environment; microplastic formation; and recyclability; against bio based plastics, which have well documented limitations in these respects. Without that comparison, conclusions about “better” or “worse” or “benefit” or “no benefit” are unfounded.
101. **Failing to Compare with Ordinary Plastic** – which is also not a banned material: Some reviewers and policymakers implicitly compare oxo-biodegradable plastic with an ideal alternative which does not exist. Many published papers evaluate oxo-biodegradable plastics in isolation, without comparison to conventional plastics under identical conditions. The correct regulatory question is not whether a material degrades perfectly, but whether it persists for a longer or shorter time; and whether it creates microplastics or toxicity; as compared to the conventional plastic it is intended to replace.
102. Reviewers implicitly require proof of complete biodegradation, rather than considering whether incremental environmental benefit, relative performance, or risk-reduction might justify differentiated treatment.
103. **Conflating fragmentation with biodegradation** - Many papers equate visible fragmentation with environmental harm, but this reflects a misunderstanding of polymer science. Fragmentation is not the endpoint of oxo-biodegradation – it is a physical manifestation of molecular-weight reduction.
104. ASTM D6954 requires proof that molecular weight is reduced to 5,000 Daltons or below, at which point the material no longer behaves as a plastic and is biodegradable. Many studies do not measure molecular weight or

biodegradation, and cannot therefore substantiate claims of microplastic formation or persistence.

105. ***Incorrect Assumptions About Microplastics:*** Persistent microplastics exist if polymer chains remain at a high molecular-weight. The purpose of oxo-biodegradable technology is to accelerate molecular-weight reduction so that fragments do not persist but convert into biodegradable materials. Regulatory and scientific assessments that fail to distinguish between persistent microplastics and biodegradable oxidised fragments therefore reach erroneous conclusions.
106. ***Taken together,*** the literature often relied upon by policymakers does not demonstrate that oxo-biodegradable PE or PP performs worse than conventional plastics in the open environment. At most, it demonstrates variability in rate and highlights the need for standards-based, material-specific assessment—an approach already provided by ASTM D6954 and related standards.

#### **AMENDMENT** of Single-use Plastics Directive 2019/904

107. In light of the above, the BPA respectfully requests that the Commission:
- (1) Re-evaluate Article 5's inclusion of "oxo-degradable plastics," taking into account the lack of procedural compliance, lack of consultation coverage, and absence of underlying scientific or impact assessments.
  - (2) Formally distinguish oxo-biodegradable plastics from oxo-degradable plastics, based on CEN TR 15351.
  - (3) Acknowledge that oxo-biodegradable technologies support the Directive's environmental goals, by preventing long-term plastic persistence and microplastic formation in the environment.
108. Ensure that future revisions are grounded in comprehensive scientific risk assessment, as required by EU jurisprudence regarding the need to avoid arbitrary measures.
109. Correct the regulatory misalignment and ensure that proven alternatives to ordinary plastic remain available within the EU.
110. The **specific recommendation** of the BPA is that:
- (a) Article 5 be amended to read as follows "Member States shall prohibit the placing on the market of the single-use plastic products listed in Part B of the Annex, unless they are made from oxo-biodegradable plastic.
  - (b) Article 3(3) be amended to read as follows: "oxo-biodegradable plastic" means plastic material that contains a masterbatch which accelerates degradation by oxidative and cell-mediated phenomena, either simultaneously or successively and is certified for abiotic and biotic degradation in the open environment by testing according to ASTM D6954."
  - (c) The following words be deleted from Recital 15 "The restrictions on placing on the market introduced in this Directive should also cover products made from oxo-degradable plastic, as that type of plastic does not properly biodegrade and thus contributes to microplastic pollution in the environment, is not

compostable, negatively affects the recycling of conventional plastic and fails to deliver a proven environmental benefit.”

(d) The following words be deleted from Recital 36 “products made from oxo-degradable plastic.”

**111.** The BPA would be pleased to provide additional scientific documentation, participate in hearings, or engage with the evaluation team directly. **We request a meeting** before the end of June 2026.