



# Oxo Biodegradation, Independent Reports and Precautionary Principle

Michael Stephen, an international expert on bioplastics, shares his thoughts and opinion on important issues impacting the bioplastics industry. Today, Michael writes about Oxo biodegradation, independent reports and precautionary principle.



It is unfortunate that organisations to whom people look for expert guidance on degradable plastics are getting it badly wrong, and are adding to the confusion. Another example has just come to my attention.

In September 2019 IK Industrievereinigung (IKV) published a report on “so-called oxo-degradable plastics” which contains many errors.

Their first mistake is to say that the relevant standard for biodegradability of plastics is EN13432, but that standard says that it “makes provision for obtaining information on the processing of packaging in controlled waste treatment plants, but does not take into account packaging waste which may end up in the environment through uncontrolled means, ie as litter.”

In fact, the Danish courts have held in *Ellepot v Sungrow* (2019) that “compostable” PLA products must not be described as “biodegradable,” because they are tested according to EN13432 to biodegrade in the special conditions found in an industrial composting facility, not in the open environment.

By contrast, oxo-biodegradable plastics are designed to biodegrade if they get into the open environment as litter. Of course nobody finds littering acceptable, but it happens on a large scale even in Europe, and is the cause of public concern about plastics. Therefore, until waste-management has advanced to the point where there is no plastic litter, we need oxo-biodegradable plastic, which converts automatically into biodegradable materials if it gets into the open environment.

Oxo-biodegradation is not relevant to PET. It is designed for PE and PP.

IKV then fail to distinguish between oxo-degradable and oxo-biodegradable plastics. “Oxo-degradation” is defined by CEN (the European Standards authority) in TR15351 as “degradation identified as resulting from oxidative cleavage of macromolecules.” This describes ordinary plastics, which abiotically degrade by oxidation in the open environment and create microplastics, but do not become biodegradable except over a very long period of time. Nobody puts additives into plastic and sells it as oxo-degradable, so organisations like IKV are causing confusion when they use that description.

By contrast, “oxo-biodegradation is defined by CEN as “degradation resulting from oxidative and cell-mediated phenomena, either simultaneously or successively”. This means that the plastic degrades by oxidation until its molecular weight is low enough to be accessible to bacteria and fungi, who then recycle it back into nature.

IKV then make the incorrect statement that “There are currently no standards or certifications for the group of “oxo”, “photo”- or “thermo-degradable” plastics or plastic products in Europe. In fact there are British (BS8472) and Swedish (SPCR 141) Standards and a French Accord (AFNOR T51-808) for oxo-biodegradation There is also an American Standard (ASTM D6954) and similar standards exist in other countries. There is actually no need for Standards to be specific to a country or region, as the conditions for oxo-biodegradation are universal. It requires only exposure to oxygen for the technology to work. Light and heat will accelerate the process but they are not essential.

As to certification, products are certified by a private organisation, Vincotte, as compliant with EN13432, and by the Oxo-biodegradable Plastics Association [www.biodeg.org](http://www.biodeg.org) as compliant with BS8472 and the other standards for oxo-biodegradation mentioned above. In each case a report has to be produced from an independent laboratory of testing according to the appropriate standard.

IKV then correctly state that “oxo-degradable” plastics disintegrate into small fragments, but they do not seem to understand that oxo-biodegradable plastics are quite different. The process of oxo-biodegradation is described by the Swedish Professor Ignacy Jakubowicz as follows: “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.”

IKV refer to the 2017 Ellen MacArthur report which claims that oxo-degradable plastics simply cause fragmentation, but IKV omit to mention that the 2019 report does not make that claim. It accepts that they do become biodegradable. See <https://www.biodeg.org/wp-content/uploads/2020/03/emf-report-3.pdf>

Ordinary plastic will fragment due to weathering and mechanical erosion/abrasion, but the fragments still have a high molecular-weight and will lie or float around for decades. However, oxo-biodegradable plastic will fragment because the catalyst contained within it has caused the molecular structure of the polymer itself to be dismantled. It reduces the molecular weight to the point where it is no longer a plastic and has become biodegradable.

IKV Mention the EU Single-use Plastics Directive, but the section relating to “oxo-degradable” plastic was passed without the required technical dossier from the European Chemicals Agency (ECHA). In relation to oxo-biodegradable plastic ECHA said after considering the evidence that they were not convinced that micro-plastics are formed.

IKV is an organisation promoting bio-based plastics, and they really ought to tell their readers that bio-based plastics will create microplastics in the open environment. They also claim that oxo-degradable plastics hinder the recycling process. This is not true, but again they should tell their readers that “compostable” plastic will certainly contaminate a recycling stream if it gets mixed with ordinary plastics. This is not the case with oxo-biodegradable plastics – see <https://www.biodeg.org/recycling-and-waste/>

As to ecotoxicity, oxo-biodegradable plastics are required by the standards mentioned above to pass OECD ecotoxicity tests, which are much the same as the tests required by EN13432, so this is not an issue.

### **“INDEPENDENT” REPORTS**

Sometimes I hear that reports paid for out of public money are independent, but reports paid for by a company are not. However, laboratories and technical experts do not work for nothing, so how else is a company to obtain independent testing and advice?

Experts hired by a public authority are often the beneficiaries of well-paid contracts, with an incentive to secure further contracts from the same authority if they can. Some of them may be tempted to give the authority what they think it wants in order to support preconceived ideas which that authority may have.

Also, when an expert report is commissioned by a public authority it is necessary to look at the relationship which the authors, or their company or university department, may have, or have had with commercial interests.

Ultimately the credibility of the report depends not so much on who paid for it, but on the knowledge and experience of the authors and the strength of the facts and arguments.

### **PRECAUTIONARY PRINCIPLE**

The Precautionary Principle says that where there is a danger of serious irreversible damage, lack of absolute scientific certainty should not be used as a reason to postpone effective measures to prevent environmental degradation.

Ordinary plastic is admitted to be a danger to the environment, and in particular to create microplastics. It is said that if nothing is done there will soon be more plastic in the ocean than fish.

The danger is caused by the propensity of ordinary plastic to persist in the environment for many decades before it becomes biodegradable, but oxo-biodegradable plastic biodegrades much faster and does not leave microplastics. It is claimed that there is no absolute scientific certainty that this is the case, but this

should not be used as a reason to postpone effective measures to prevent environmental degradation by banning ordinary plastic and adopting oxo-bio technology.

There is solid scientific evidence of degradability, biodegradability, and non-toxicity, and the environment cannot afford to wait for the day when, if ever, all the scientists are in agreement.

## Michael Stephen

Michael Stephen is a lawyer and was a member of the United Kingdom Parliament, where he served on the Environment Select Committee.

When he left Parliament Symphony Environmental Technologies Plc. attracted his attention because of his interest in the environment.

He is now Deputy Chairman of Symphony, which is listed on the AIM market of the London Stock Exchange, and is the founder and Chairman of the Oxo-biodegradable Plastics Association.

## Earlier Postings in this Column

- 1/ 1/ 20 – [Plastiphobia, Microplastics and A Throw-Away Society](#)
- 7/ 1/ 20 – [Recycling, Lab Testing, Bangladesh and the Right Bioplastic](#)
- 14/1/20 – [Plastiphobia and Bioplastics Definitions](#)
- 21/1/20 – [Composting, the European Union and Unemployment](#)
- 30/1/20 – [Plastiphobia, Malaysia and a Case Against Compostables and Paper](#)
- 7/02/20 – [Coronavirus, MPs Letter, Montreal, Australia and the Dominican Republic](#)
- 14/02/20 – [Oman, MacArthur Foundation, Stifling Innovation, South Africa and Compostable Plastics](#)
- 24/02/20 – [Serbia, India, Pakistan and European Bioplastics](#)
- 03/03/20 – [Plastic To Protect Health and Common Sense on Plastic](#)
- 10/03/20 – [Plastiphobia, Singapore, Compostable Plastics, Doorknobs and Carbios](#)
- 17/03/20 – [Greening our Way to Infection, Defra Warns Against Bioplastics and Montreal](#)
- 24/03/20 – [Ditch the Plastic Bag Ban and Inn-Probio](#)
- 01/04/20 – [The Come Back of Plastic Bags, Compostable Plastic Not Wanted and EASAC](#)
- 16/04/20 – [Coronavirus and Agricultural Plastics](#)
- 11/05/20 – [Coronavirus, Peru, Barbados and Recycling](#)
- 18/05/20 – [Say No to Plastiphobia, False Descriptions and the Recycling Myth](#)
- 02/06/20 – [Definitions and More Setbacks for Plastiphobia](#)
- 11/06/20 – [BBIA, Food Waste and Testing of OXO-Biodegradable Plastic](#)

## Interview with Michael Stephen

- [Questions and Answers on OXO-Biodegradability](#)

## **Disclaimer**

*The opinions expressed here by Michael Stephen and other columnists are their own, not those of Bioplasticsnews.com.*