

**POSITION
PAPER**

JUL 2009

"OXO-BIODEGRADABLE" PLASTICS



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INTRODUCTION

Bioplastics are either biobased or biodegradable or both. European Bioplastics, as the industry association for such materials is distancing itself from the so-called "oxo-biodegradables" industry.

Terms such as "degradable", "biodegradable", "oxo-degradable", "oxo-biodegradable" are used to promote products made with traditional plastics supplemented with specific additives.

Products made with this technology and available on the market include film applications such as shopping bags, agricultural mulch films and most

recently certain plastic bottles. There are serious concerns amongst many plastics, composting and waste management experts that these products do not meet their claimed environmental promises.

In this position paper, European Bioplastics, the European organisation representing the certified bioplastics industry outlines the issues and questions concerned in order to support consumers, retailers and the plastics industry in identifying unsubstantiated and misleading product claims.

TERMINOLOGY

Producers of pro-oxidant additives use the term "oxo-biodegradable" for their products. This term suggests that the products can undergo biodegradation. However, main effect of oxidation is fragmentation into small particles, which remain in the environment. Therefore the term "oxo-fragmentation" does better describe the typical degradation process, which can occur to these products, under some specific environmental conditions.

European Bioplastics considers the use of terms such as biodegradable, oxo-biodegradable etc. without reference to existing standards as misleading and as such not reproducible and verifiable. Under these conditions the term "oxo-biodegradable" is free of substance.

The term "biodegradable" by itself is not more informative than the adjective "tasteful" used to advertise food-products. The term "oxo-biodegradable" is an appealing marketing term which however is very misleading because it cannot be verified due to the absence of a standard specification i.e. an explicit set of requirements to be satisfied by a product.

On the other hand, the terms "biodegradable/compostable" enjoy a different status. There are internationally established and acknowledged standards that effectively substantiate claims on biodegradation/compostability such as ISO 17088. Total biodegradation in less than six months must be proved, according to the ISO 17088. The specification of time needed for the ultimate biodegradation is an essential requirement for any serious claim on biodegradability.

Therefore, the U.S. Federal Trade Commission has advised companies "that unqualified biodegradable claims are acceptable only if they have scientific evidence that their product will completely decompose within a reasonably short period of time under customary methods of disposal."¹

Accordingly, the National Advertising Division in the USA recommends that advertisers discontinue claims such as "100% oxo-biodegradable" because such statements incorrectly suggest that a plastic will quickly or completely biodegrade with the help of these additives.²

THE DEGRADATION PROCESS BEHIND THE SO-CALLED "OXO-BIODEGRADABLE" PLASTICS

The "oxo-biodegradable" additives are typically incorporated in conventional plastics such as Polyethylene (PE), Polypropylene (PP), Polystyrene (PS), Polyethyleneterephthalate (PET) and sometimes also Polyvinylchloride (PVC) at the moment of conversion into final products.

These additives are based on chemical catalysts, containing transition metals such as cobalt, manganese, iron, etc., which cause fragmentation as a result of a chemical oxidation of the plastics' polymer chains triggered by UV irradiation or heat exposure. In a second phase, the resulting fragments are claimed to eventually undergo biodegradation.

In addition to additives that trigger the fragmentation process, the "oxo-biodegradables" include stabilizers, which are added to limit the unwanted fragmentation of the polymer chains whilst the plastic is still used by consumers. However, the stabilizing effect of the additives is limited. Research studies have concluded that "even with some content of stabilizing additives, PE film [with "oxo-biodegradable" additives] loses its mechanical properties rather fast, especially when exposed to sun-light."³ For this reason, different storage conditions would be required in order to prevent premature ageing and loss of mechanical properties.

FRAGMENTATION IS NOT THE SAME AS BIODEGRADATION

Fragmentation of oxo-fragmentable plastics is not the result of a biodegradation process but rather the result of a chemical reaction. The resulting fragments will remain in the environment.⁴ The fragmentation is not a solution to the waste problem, but rather the conversion of visible contaminants (the

plastic waste) into invisible contaminants (the fragments). This is generally not considered as a feasible manner of solving the problem of plastic waste, as the behavioural problem of pollution by discarding waste in the environment could be even stimulated by these kinds of products.

AN ANSWER TO LITTERING OR THE PROMOTION OF LITTERING?

Oxo-fragmentable plastic products have been described as a solution to littering problems, whereby they supposedly fragment in the natural environment. In fact, such a concept risks increasing littering instead of reducing it. The United Nations Environment Programme (UNEP) stresses that littering is a behavioural problem and must be resolved by raising environmental

awareness and by the establishment of appropriate waste management systems.⁵ Oxo-fragmentable plastics are not specified as a solution by UNEP. Long standing efforts for the prevention of littering could actually be damaged by giving users of plastic items the impression that those items might vanish harmlessly if discarded in the environment.

ACCUMULATION OF PLASTIC FRAGMENTS BEARS RISKS FOR THE ENVIRONMENT

If oxo-fragmentable plastics are littered and end up in the landscape they are supposed to start to disintegrate due to the effect of the additives that trigger breakdown. Consequently, plastic fragments would be spread around the surrounding area. As ultimate biodegradability has not been demonstrated for these fragments,⁶ there is substantial risk of accumulation of persistent substances in the environment.

Through the impact of wind or precipitation the plastic fragments can drift into aquatic or marine habitat where they affect organisms and pose the risk

of bioaccumulation. In addition, studies, amongst others by the US National Oceanic and Atmospheric Administration, have shown that these degraded plastics can accumulate toxic chemicals such as PCB, DDE and others from the environment and act as transport medium in marine environments.⁷ Such persistent organic pollutants in the marine environment were found to have negative effects on marine resources.⁸

ORGANIC RECOVERY IS NOT FEASIBLE

Collection and recovery schemes for organic waste are liable to suffer from the use of oxo-fragmentable materials, as these materials are reported not to meet the requirements of organic recovery.⁹

Unfortunately, sometimes the oxo-fragmentable products have been publicised as "biodegradable/compostable", despite not meeting the standards of suitability for organic recovery. Besides, the terms "oxo-biodegradable", "oxo-degradable" and the like can be taken by the consumers as synonym of "biodegradable/compostable" and erroneously recovered via organic recovery. This is why the Italian Antitrust Authority in 2005 sanctioned a retailer distributing "100% degradable" shopping bags made with PE supplemented with pro-oxidant additives.¹⁰

This can lead to a general mistrust of consumers and composting plants managers towards the whole sector of biodegradables and thus to a lack of acceptance also of truly "biodegradable/compostable" materials. Therefore, well-developed and broadly accepted certification schemes according to EN 13432, EN 14995 or equivalent standards should be used invariably.

This is also why, in the interest of the best recovery of organic fractions and biowaste, the involvement of oxo-fragmentable materials in such recovery schemes should be avoided.

PLASTIC RECYCLING SCHEMES ARE DISTURBED

A further environmentally feasible option for the handling of used plastics is that of recycling. Oxo-fragmentable products can hamper recycling of post consumer plastics. In practice, these plastics are traditional plastics. The only difference is that they incorporate additives which affect their chemical stability. Thus, they are identified and classified according to their chemical structure and finish together with the other plastic waste in the recycling

streams. In this way, they bring their degradation additives to the recycle feedstock. As a consequence the recycles may be destabilised, which will hinder acceptance and lead to reduced value. The European Plastics Recyclers Association (EuPR) and the Association of Postconsumer Plastic Recyclers (APR) therefore warn against oxo-degradable additives.^{11,12}

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