

Plastic is useful – but it is damaging the environment. Redesigning plastic itself could help solve the problem

Symphony Environmental can make plastic convert into biodegradable materials if it gets into the open environment as litter

LA Tribune reported in June 2019 that 600,000 tonnes of plastic are being dumped by 22 countries in the Mediterranean Sea alone every year, and this plastic will rapidly fragment into microplastics. For the foreseeable future, a substantial amount of plastic will continue to get into the open environment, from which it cannot realistically be collected, and it is this fraction of plastic waste for which most countries¹ have no answer.

Plastic is immensely useful and is the best way to prevent food wastage and sickness, by protecting our food from contamination and damage. It is much better than paper, especially when wet. However, there is one fundamental problem – that if it gets into the open environment as litter, it will lie and float around for decades, perhaps 100 years. That is the reason why there is so much opposition to plastic, but it is now possible to solve this problem by redesigning the plastic itself.

Innovation

Scientists have been working for more than 30 years to upgrade plastic products so that they remain fit for purpose but will become



biodegradable if discarded at the end of their useful life. They will then be recycled back into nature by bacteria and fungi much more quickly than ordinary plastic. The efforts of these scientists have resulted in a technology which has become known as oxo-biodegradable (or oxo-bio). This is essentially environmental insurance, which automatically removes unwanted plastic if it becomes litter.

Nobody would want to sell or buy a technology which simply causes plastic to fragment into tiny pieces, so the crucial point to understand is that this is not what oxo-bio does. Professor Ignacy Jakubowicz (Sweden), explains that: "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 are then recycled back into nature by naturally-occurring micro-organisms.

Oxo-bio plastic products are made from polyethylene (PE) or polypropylene (PP) in the same way as normal plastic, but the manufacturer adds a catalyst which accelerates a change in the molecular structure soon after its useful life has expired, so that it ceases to be a plastic. Oxo-bio plastic can therefore be made by existing factories at little or no extra cost. PE and PP do not place a burden on fossil-resources as they are made from ethylene (a by-product of refining oil for fuels), which used to be wasted. A Life-cycle Assessment by Intertek in May 2012² confirmed that oxo-bio plastic had the best LCA of all materials used for making carrier bags and bread bags.

There is a need for clarity, and commentators should stop referring to oxo-biodegradable plastics as "oxo-degradable," "photo/thermo-



degradable," "oxo-fragmentable," or "pro-oxidant additive-containing plastics".

No Special Conditions

The only environmental conditions needed for oxo-biodegradation are oxygen and bacteria, both of which are present in the open environment, so no special conditions are necessary. Degradation in landfill is not necessary and could generate methane.

When oxo-biodegradable plastics end up on land or aquatic environments, they degrade into harmless biodegradable residues within a period ranging from a few months to several years. The difference in timescale results from the formulation of the plastic product (some are designed to degrade faster than others) and the conditions in the environment where they are lying or floating (sunlight and heat will accelerate the process but are not essential). Polyethylene and polypropylene have a specific gravity less than one, so they will float on the surface.

Some commentators used to say that oxo-bio plastics simply fragmented, but they no longer say that. They admit that these plastics are manufactured so that they can degrade faster



than ordinary plastics and that they do become biodegradable, but they say that “it is not yet possible accurately to predict the duration of the biodegradation for such plastics.” It never will be possible, for the reasons mentioned above, and for this reason a broad indication only is given as to timescale. It is however possible to say with certainty that at any given time and place in the open environment an oxo-bio plastic item will become biodegradable much more quickly than an ordinary plastic item.

The Science

Some commentators say that during this time fragments from oxo-bio plastics contribute to microplastic pollution and this poses an environmental risk, particularly in the ocean. In fact, the European Chemicals Agency said³ that they were not convinced that microplastics are formed by such plastics, and Professor Jakubowicz explains above what actually happens. However, even if microplastics were formed, this is not a good reason to be opposed to oxo-bio plastics, because it is known that the ordinary plastics which they are designed to replace, will without doubt fragment and contribute to microplastic pollution which is *much more* persistent and poses a *much greater* environmental risk – particularly in the oceans.

The most recent independent review of the scientific evidence⁴ is by Peter Susman QC, a former Deputy Judge of the High Court in England. He found that oxo-biodegradable plastic:

- does facilitate the ultimate biodegradation of plastics in air or seawater by bacteria, fungi or algae, within a reasonable time, so as to cause the plastic to cease to exist as such, far sooner than ordinary plastics, without causing any toxicity

- that “the benefit is obvious of reducing future contributions to the scourge of plastic pollution of land and sea” and

- that oxo-biodegradable technology is compatible with composting and recycling.

Degradable plastic products have been available for more than 20 years but there is no evidence that people dispose more carelessly of them. In fact, if oxo-bio had been brought into use even a few years ago the enormous ocean garbage patches would not have accumulated, and most of the plastic would have biodegraded and returned to nature.

It is sometimes said that oxo-bio is incompatible with a circular economy, but the opposite is true. Ordinary plastic can be recycled if it can be collected (and if it makes economic or environmental sense to do so), but what of the plastic on land or sea which cannot be collected? If that plastic were oxo-bio it would complete the circle by being recycled back into nature by bacteria and fungi. Oxo-bio plastic is not an alternative to waste-management and is not intended to be wasted. It can be reused and recycled during its useful life and is designed to biodegrade only if it has not been collected for re-use and recycling, but has instead escaped into the open environment as litter.

In the last four years alone, enough masterbatch has been sold by one OPA member to make 600,000 tons of oxo-bio products. We know that oxo-bio products have been successfully recycled for the past 20 years by customers around the world, and in those 20 years we have heard no reports of any difficulty encountered. Our experience is entirely consistent with the specialist reports⁵ that oxo-bio plastic can be safely recycled, and the recyclers have presented

no technical evidence and no actual experience, to the contrary.

The Last Word

Policymakers should not be asking themselves “is oxo-bio plastic good for the environment” but “is oxo-bio plastic better for the environment than ordinary plastic?” It is urgently necessary to stop using ordinary plastic for everyday items before we end up with more plastic in the sea than fish. Until we can be sure that no plastic will get into the oceans it should all be upgraded with oxo-bio technology as a matter of urgency.

1 Except for the UAE, Saudi Arabia, Pakistan and other countries, who have legislated to make it mandatory to use oxo-biodegradable technology for everyday plastic items. By contrast, the EU have terminated the European Chemicals Agency’s study and therefore have no dossier from their own scientific experts to support any policy on oxo-bio technology.

2 <http://www.biodeg.org/wp-content/uploads/2018/11/intertek-final-report-15.5.121.pdf>

3 30th October 2018 – ten months into their study.

4 <http://www.biodeg.org/wp-content/uploads/2018/11/15-page-written-opinion.pdf> Also available in French and Spanish

5 <http://www.biodeg.org/recycling-and-waste/>



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