



BIODEGRADABLE PLASTIC IN SOUTH AFRICA

The OPA comments as follows on the draft Position-paper on biodegradable and compostable packaging, prepared by the "South African Initiative to End Plastic Waste."

The scientists who invented plastic soon realised that the durability which they had worked so hard to achieve would cause a serious problem if the plastic escaped into the open environment. They therefore found a way to make the molecular structure of the plastic dismantle automatically by oxidation in the open environment so that it becomes biodegradable much more quickly than ordinary plastic, and they called it "oxo-biodegradable."

Sunlight and heat are not essential, but they will accelerate the process. **It will therefore proceed more quickly in South Africa than in the UK.**

Oxo-biodegradable plastic can be made at **little or no extra cost by South Africa's existing plastic factories, with no loss of jobs.**

This technology is currently the **only way to protect the environment from plastic which escapes as litter** and would otherwise lie or float around for decades. There would therefore need to be very robust reasons for declining to use it, but there are **no such reasons in this paper.**

The oxo-biodegradable plastics industry was not invited to join the "Biodegradable and Compostable Plastics Working Group." Regrettably the draft Position-paper **does not "provide a balanced perspective and consolidated position for South Africa with regard to biodegradable and compostable packaging, based on sound research and stakeholder inputs."**

The authors declare that "the intention of their paper is not to compare the merits of traditional plastic relative to biodegradable alternatives." The paper is therefore of little value, because **the very question to which people need an answer is whether the various types of biodegradable plastics are better than conventional plastic.**

Do we want ordinary plastic which can lie or float around for decades, or oxo-biodegradable plastic which will be recycled back into nature much more quickly? Of course, we don't want plastic in the sea at all, but that is not the present reality.

Plastic products are **immensely useful to the people of South Africa, and especially to the poorest, for many thousands of whom the plastics industry also provides employment. Plastic products are the best way to protect food and water from contamination and to reduce food-waste and food-borne disease.**

However, South Africa has high levels of visible litter in the open environment, much of which is lightweight packaging that is not economically viable to collect.

South Africa should not ban plastic products, but should instead make them oxo-biodegradable.

They should be used and disposed of in the same way as ordinary plastic, but if they get into the open environment they will biodegrade much more quickly and be recycled back into nature by the bacteria, leaving no microplastics or toxic residues.

For the following reasons oxo-biodegradable plastic is much better than traditional plastic.

TERMINOLOGY AND STANDARDS

“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 in the open environment and create microplastics.

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.

Oxo-biodegradable plastic is **tested and certified according to ASTM D6954**. At present, South Africa has no legislation and standards to regulate biodegradable plastic products or verify the scientific claims, but there is no need for a South African standard. ASTM D6954 is not specific to conditions in any particular country, and it can and should be adopted in its entirety in South Africa.

ASTM D6954 provides six pass-fail tests to ensure that the plastic will degrade and biodegrade and that it will not be toxic. There are specific toxicity tests for daphnia, fish, plants, and earthworms. There is also a test to ensure that there is no significant cross-linking which might inhibit degradation.

We agree that all plastics should be properly labelled to avoid confusion, and the OPA is willing to work with the South African government to establish a certification and labelling scheme for oxo-biodegradable plastic products.

THE SCIENCE

The leading scientist in this field was **Professor Gerald Scott**, who was scientific adviser to the OPA for ten years. He was the author of the textbooks “Polymers in the Environment” - (Royal Society of Chemistry), Degradable Polymers, Principles and Applications (Kluwer Academic Publishers) and many peer-reviewed academic papers on this subject. In these publications Professor Scott has made it very clear that oxo-biodegradable plastic **will degrade and then biodegrade in the open environment very much more quickly than ordinary plastic, leaving no persistent fragments and no toxicity.**

The biodegradability of oxo-biodegradable polymers has been extensively studied and reviewed in scientific articles over more than 40 years. In 2018 the scientific evidence was reviewed by a former deputy judge of the High Court in England. <https://www.biodeg.org/uk-judge-find-the-case-for-oxo-biodegradable-plastic-proven/>

He concluded, in a 14-page written Report:

- that oxo-biodegradable technology 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 oxo-biodegradable technology is compatible with composting and recycling;
- that “the benefit is obvious of reducing future contributions to the scourge of plastic pollution of land and sea”; and that
- “the criticism alleging that oxo-biodegradable plastic technology would materially encourage littering [can only be regarded] as fanciful and unrealistic.”

In 2015 Gewert et al found that “Abiotic degradation produces carbonyl groups that increase the hydrophilicity of the polymer and thus increase its availability for biodegradation”

Dussud et al (2018) compared three polyethylene-based polymers, with similar surface roughness, and observed increase in oxidation and hydrophilicity brought about by the inclusion of a prodegradant additive and then by oxidative degradation, which is a clear factor in the ability of organisms to colonize the material. During these experiments, the degree of colonisation (cell count) is not only an indication of the ability of microorganisms to physically populate the surface of the material, but is also influenced by each material’s ability to act as a source of nutrients for the microorganisms.

Eyheraguibel et al (2017) identified the products of degradation facilitated by a prodegradant additive in an OBP as oxidised short carbon chain molecules called oligomers. The characterisation of the oligomers, before and after exposure to the bacterial strain *R. rhodochorus*, provides insight into the oligomeric products of polyolefin degradation and their biodegradability. The paper demonstrates that after sufficient molecular weight reduction, the oligomers are soluble in water and that they undergo near-total biodegradation: 60% biodegradation after only four days, up to 95% after 240 days.

Arraez et al (2017) say “The design of materials with the ability to degrade once their service life has finished is one of the industrial approaches to face the problems of accumulation of plastic wastes in the environment. The purpose of such process is to generate chemical changes in the polymer structure as a result of oxidation in air. This is achieved by using special additives called pro-oxidant/pro-degradants (oxo additives) consisting of organic salts of metals

The degradation process induced by the incorporation of oxo additives in polymers is called oxo-biodegradation and is defined as the process of transforming complex molecules into simpler elements from oxidation reactions that promote the cleavage of the chemical bonds, the

incorporation of polar groups, and the reduction in molecular weight in polymer chains favouring their interaction with micro-organisms in the environment, transforming them into bio-assimilable materials. Micro-organisms such as bacteria fungi and algae use the oxidation products of the polymer chains as carbon sources resulting in the formation of carbon dioxide, water, and bio-mass.”

See also Ammala et al., 2011; Koutny et al., 2006a; Singh and Sharma, 2008). (Albertsson and Karlsson, 1980; Chiellini et al., 2006; Jakubowicz et al., 2006; Ojeda et al., 2011 (Albertsson et al., 1987; Bonhomme et al., 2003; Corti et al., 2010; Jakubowicz et al., 2011).

The EU Commission Jan 2018 report accepts at para. 3.1 that the plastic does not simply fragment into small pieces. It says that “This first stage of degradation prepares the oxo-degradable plastic for biodegradation by reducing the molecular weight of the plastic to the point where it may be consumed by biological organisms,”

In 2019 a Report **by Queen Mary University London**

<https://www.biodeg.org/wp-content/uploads/2019/12/qmu-press-release.pdf> showed that:

- Molecular-weight reduction is a critical factor in rate and extent of biodegradability
- The use of a prodegradant catalyst caused rapid molecular-weight reduction;
- The degraded polymer was then biodegraded by bacteria commonly found in soil and marine environments
- Oxo-Biodegradable plastic demonstrated up to 90 times more mineralisation than ordinary plastic
- There is similar biodegradation whether the polymer is degraded in the laboratory or under real-life conditions.

So, in the light of all this evidence where is the “significant body of academic literature” which would justify a refusal to accept oxo-biodegradable plastic in South Africa?

A report was issued by the Ellen MacArthur Foundation in 2017 and endorsed by some of the world’s largest producers of the very plastic packaging which is polluting the oceans. It was also supported by the producers of crop-based plastics who see oxo-biodegradable plastics as a threat to their market-share. It said that “oxo-degradable” plastics simply fragmented - but having engaged with our scientists they no longer say that.

They now admit in their May 2019 report **that “oxo-degradable” plastics are manufactured so that they can degrade faster than conventional 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.”

For that reason a broad indication only can be 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-biodegradable plastic item will become biodegradable significantly more quickly than an ordinary plastic item.

A draft of the 2017 MacArthur report had been submitted to Prof. Ignacy Jakubowicz, one of the world's leading polymer scientists, who replied that it did not accord with his understanding, nor the science in this field. <http://www.biodeg.org/Reply%20to%20Ellen%20MacArthur%20Foundation%20from%20Prof%20Ignacy%20Jakubowicz%20-%202021-8-17.pdf>

He also explained to them 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 the naturally-occurring micro-organisms. **This point is absolutely crucial to an understanding of (OBP) but the MacArthur researchers had failed to understand it.**

The same mistake was made by the authors of the January 2018 EU Commission report on oxo-biodegradable plastic.

For the OPA response to the 2019 MacArthur report see:

<https://www.biodeg.org/wp-content/uploads/2019/11/emf-report-2-2.pdf>

For the OPA response to the EU Commission report see <http://www.biodeg.org/OPA%20responds%20to%20European%20Commission%20%20-%20%20%202019%20January%202018.pdf>

The draft Position paper cites an old report (2010) from Thomas et al, of Loughborough University, written without the benefit of the later science mentioned above. The Thomas Report is however helpful because it deals with some of the misconceptions about oxo-biodegradable technology which had become all too common. It has confirmed that oxo-biodegradable plastics:

- Are not toxic
- contain no heavy metals
- are safe for food contact
- do not emit methane, even deep in landfill
- do degrade abiotically in a normal environment
- do degrade abiotically under elevated temperatures in landfill

The report has also confirmed that:

- there is no evidence that degradable plastics encourage littering
- there is no evidence of bio-accumulation nor any harmful effect on the environment
- there is no evidence of accumulation of pollutants
- pro-degradant additives are not harmful and have no negative environmental impact in the production and use phase

They found no evidence that fragments of plastic are more likely to attract toxins than fragments of seaweed or wood or other fragments naturally present in the oceans. A fragment of oxo-biodegradable plastic which has undergone the abiotic phase of degradation is no longer a polymer and has a completely different molecular structure. It will also be removed from the oceans much more quickly than ordinary plastic

For the OPA analysis of the Loughborough report see <https://www.biodeg.org/wp-content/uploads/2020/02/opa-response-to-loughborough-report-.pdf>

The only other work cited in the Position-paper against oxo-biodegradable plastic is a 2016 paper by Portillo, F., Yashchuk, O., Hermida, É., in Argentina. "Evaluation of the rate of abiotic and biotic degradation of oxo-degradable polyethylene." Polym. Test. 53, 58–69.

It is well understood that degradation of polyolefins by whatever means, leading to a reduction in molecular-weight results in increased biodegradability (eg. Rose 2019).

Oxo-biodegradable technology is designed to facilitate increased biodegradation of littered plastic both by accelerating the molecular-weight reduction of the plastic exposed to sunlight, and also by removing dependence on constant sunlight exposure for polymer degradation (Gewert 2015), so that it may continue in dark conditions which are likely to be experienced by plastic litter as it begins to degrade..

Portillo et al (2016) consider only the effect of constant sunlight exposure, using aggressive and constant UV-accelerated ageing conditions. They fail to evaluate the continued degradation of plastic made with a prodegradant catalyst when sunlight is occluded (Vogt 2009, Fontanella 2010 & 2013). The authors also fail to consider the role of thermal stabilisers, and their deactivation (Pospisil 1999, Fontanella 2010 & 2013), to explain the results observed in their experiment.

The aggressive uv exposure conditions used by the authors (exceeding the conditions outlined in the cited standard ASTM D5208) create advanced degradation of both the oxo-biodegradable and conventional polyethylene films. While the oxo-biodegradable plastic demonstrates an increased rate and extent of degradation prior to biodegradation, the extreme conditions of the test resulted also in degradation of the conventional material that would not be observed in a reasonable time frame in the open environment even for a material made without a prodegradant catalyst - indeed, if their observed results were accurate we would not expect to have the current issue of plastic litter in the environment.

This effect is demonstrated by the authors' follow-up experiment presented in the same body of work. When the authors reduced the exposure conditions to within the parameters of the cited standard, (which have been selected by the authors of the standard to produce degradation matching that observed in nature), the oxo-biodegradable plastic demonstrated a similarly significant level of biodegradation of 23% in 120 days.

By contrast, the conventional polyethylene material aged with UV light under the same conditions for the same duration, demonstrates only 4% biodegradation - a level essentially equivalent to the biodegradation observed in the unaged material (6%). This demonstrates the increased degradation and biodegradation of oxo-biodegradable plastics in conditions representative of the real-world exposure of plastic litter.

It should also be noted that in these experiments abiotic degradation occurs exclusively prior to biodegradation, since by design of the test, degradation is halted in order for biodegradation to be studied. Therefore, the extent of biodegradation is limited by the molecular-weight reduction achieved prior to biodegradation testing, but in nature no such limit exists and both processes occur simultaneously. Micro-organisms rapidly consume the products of oxo-biodegradation (Eyheraguibel 2018) as it is made available by the abiotic degradation process.

RECYCLING

South Africa has a mature, well-established mechanical recycling industry that employs tens of thousands of people in the collection, transport and processing of recyclable plastics. **This industry would be damaged if bio-based plastic were used in large quantities in South Africa and found their way into the recycling waste-stream. This would not be the case with oxo-biodegradable plastic.**

As the Position-paper says "products made from incompatible materials (e.g. PLA beverage bottles) that are indistinguishable from traditional polymers (e.g. PET beverage bottles) must be avoided." It would not be possible to contain all the bio-based plastic waste within the collection and recycling landscape in South Africa.

In many countries plastic is deemed officially 'recycled' if it is recovered for recycling, no matter what ultimately happens to it. However, whilst almost all pre-consumer waste (eg factory offcuts) is recycled or reused, much of the post-consumer waste plastic is not. There are reasons for this, one of which is that a great deal of water is needed to wash post-consumer waste to make it useable, so the amount of waste-water generated is enormous. Moreover, this process leaves prodigious quantities of dirty solid waste, including biological waste that is hazardous and highly undesirable.

Similarly, the recycling charity RECOUP says that "where plastic products are particularly lightweight and contaminated with other materials, the energy and resources used in a recycling process may be more than those required for producing new plastics. In such cases recycling may not be the most environmentally sound option." It is too costly in financial and environmental terms to collect it, transport it, sort it, bail it, store it, and then reprocess it. This is why it was being dumped in Malaysia.

These are the very products in which OBP technology is commonly used. They are not plastics in high-value use and they are not attractive to "waste-pickers." OBP technology is not suitable for PET.

Actually, the best way to deal with contaminated post-consumer waste plastic is to send it to modern, non-polluting, thermal recycling facilities and to use the calorific value of the plastic to generate electricity.

Recycling is sometimes used as an objection to biodegradable plastic, on the basis that it will contaminate a post-consumer waste stream, but this is **clearly irrelevant if most of the waste plastic is not going to be mechanically recycled anyway.**

Although oxo-biodegradable plastic is normally used for low-value items which are not worth recycling, experts in Austria and South Africa have found it to be compatible with recycling if anyone still wants to recycle it. <https://www.biodeg.org/recycling/> They also found that bio-based plastics are not recyclable.

Separation of the different types of polymer is a problem with all types of plastic film, and is another reason why post-consumer plastic film is not attractive to recyclers.

It is sometimes said that oxo-biodegradable plastic cannot be separated from ordinary plastic in the waste stream by the existing equipment, and that it could compromise the quality of recycled products. This is easily remedied by the inclusion of a tracer in the OBP at manufacture which the equipment can recognise, but it is not necessary because as noted above oxo-biodegradable plastic can be safely recycled without separation.

It is clear from these expert reports that it is not necessary to add stabilisers unless the recycle is being used to make long-life products, in which case the manufacturer of those products would be adding stabilisers anyway. These stabilisers are in a quantity and with a chemistry which he would normally use, and no special arrangements are necessary for recycle containing OBP.

Most conventional waste plastics will have been exposed to UV radiation, in particular agricultural film, and may have oxidised to some extent, but not enough to become biodegradable. Recyclers of mixed plastic wastes have no way of knowing which have been exposed and for how long, and it is also known that printing inks, and other chemicals will affect the recycling process.

Therefore, the industry already has the problem of identification when dealing with post-consumer plastic films and deals with it by using those materials for low-value/short-life applications such as carrier bags and garbage sacks. If an OBP carrier bag is going to be collected for recycling at all it is likely to be collected during its useful life, and during that time, it will be unlikely to have oxidised.

The position of the OBP industry is therefore based on scientific reports by specialist researchers, and we have seen no evidence of any deleterious effect on any product made from recycle containing OBP.

In the last four years alone, enough masterbatch has been sold by one OPA member to make 600,000 tonnes of OBP products from polyethylene and polypropylene. We know that OBP products have been successfully recycled for the past 10 years by OPA members and their customers around the world, and in those ten years we have heard no reports of any difficulty encountered.

Our experience is entirely consistent with the specialist reports, that oxo-bio plastic can be safely recycled, and recyclers have presented no technical evidence and no actual experience, to the contrary. **They are not in a position to veto the adoption of a technology which could significantly reduce the overall burden of plastic waste in the environment,** especially - as noted above - the low value plastic films for which oxo-biodegradability is appropriate, are not likely to be recycled anyway.

A much greater danger to their industry comes not from oxo-biodegradable plastic, but from bio-based plastics which will undoubtedly compromise the recycle. This is a major danger, as bio-based plastics are now being marketed for carrier-bags, tableware, food packaging, and many other applications.

A much greater danger to their industry comes not from oxo-biodegradable plastic, but from **bio-based plastics** which will undoubtedly compromise the recycle. This is a major danger, as bio-based plastics are now being marketed for carrier-bags, tableware, food packaging, and many other applications.

It is time for a much better dialogue between the recyclers and the OBP industry. If we can combine oxo-biodegradable technology with the three R's of 'Reduce, Reuse and Recycle', we can all help win the battle against plastic waste - for the lasting benefit of future generations.

COMPOSTING

A "Grocer" magazine survey of more than 1,000 individuals in 2019 found that "consumers think that plant-based compostable plastics are the most environmentally friendly packaging materials, but...

most consumers don't realise that "compostable" plastic does not convert into compost. This is because it is required by EN13432 or ASTM D6400 to convert rapidly into CO₂ gas, and the last thing the planet needs is more CO₂. Nor do they realise that it cannot be recycled.

Nor do they know that it is tested to biodegrade in an industrial composting facility – **not in the open environment**. As the Position-paper says "while most consumers understand that traditional plastics take an extremely long time to degrade in the natural environment, most are unaware that many bioplastics can be similarly slow to degrade outside controlled environments." It also says "biodegradation is dramatically slowed down in dry climates." "Compostable" plastic does need controlled conditions, including moisture, but oxo-biodegradable plastic does not.

"Compostable" plastic is therefore addressing the wrong problem. The problem is not that there is insufficient plastic going into composting facilities – the problem is that there is too much plastic getting into the open environment, and as far as we know there are no composting facilities in the oceans.

Worse still, the industrial composters themselves do not want it. In a January 2020 Report the industrial composters of Oregon <https://www.biodeg.org/oregon-composters-dont-want-compostable-packaging/> gave nine reasons why they don't want "compostable" plastics, and in the same month the City of Exeter, UK rejected "compostable" plastic and paper. <https://www.biodeg.org/exeter-rejects-compostable-plastic/>.

Most recently Suez, one of Europe's leading waste management companies, has also rejected "compostable" plastic <https://www.usinenouvelle.com/article/sacs-plastiques-compostables-le-grand-malentendu.N926789> Laure Constans, of the International Centre for Research on Water and the Environment (Cirsee), research and expertise centre of Suez, explained the setbacks he encountered with "compostable" plastic bags in his units for anaerobic digestion of bio-waste and other organic waste, such as sewage sludge.

He said “After 21 days, they are not really degraded, even less assimilated. Also, they block the screws intended to break them open. Worse, they inhibit microbial activity, thus reducing the production of biogas (methane) intended to be injected into the networks in substitution for fossil natural gas. Finally, their persistence in the compost co-produced by the mesophilic methanisation unit in the liquid channel means that the digestate obtained must be screened to meet acceptable standards for spreading.”

There is no reason to use crop-based plastic because of concerns about fossil-resources. Oil-based plastics, including oxo-biodegradable plastic, do not cause fossil resource-depletion. This is because they are made from ethylene – a by-product of oil-refining which used to be wasted. The oil is extracted to make fuels and lubricants, and a similar amount would be extracted even if oil-based plastics did not exist.

Therefore, until other fuels and lubricants are found for vehicles, ships, aircraft, buildings, and factories, it makes sense to use this by-product of oil instead of consuming large amounts of land, water, and fossil-fuels in the agricultural production, transport, and polymerisation of “crop-based” plastics. See <http://www.biodeg.org/biobased.html>

We do not agree that “compostable plastics” provide “a responsible end-of-life option that is in line with circular economy principles.” It is impossible to regard the conversion of plastic not into compost but into CO₂ gas as being in line with circular-economy principles.

PLASTIPHOBIA

There are dangers in “plastiphobia” which can have unfortunate consequences, as explained in a recent Report by the Green Alliance https://www.green-alliance.org.uk/plastic_promises This report points out how useful plastic is for protecting goods – especially food – from contamination and for reducing food-waste and food-borne diseases.

That Report says “Worryingly, brand-owners report that decisions to switch away from plastic are often made without considering the environmental impact of the substitute materials chosen.” One respondent added: there is “not a lot of joined up thinking going on.” Another noted: “I think **there’s a lot of pressure to move to alternatives, which aren’t necessarily better from an environmental and climate impact point of view.**”

The Report adds that some decisions have been taken knowing it could actually increase environmental burdens. One supermarket representative was frank: “We are aware that [by switching from plastic to other materials] we may, in some cases, be increasing our carbon footprint.”

EUROPEAN UNION

Conditions in South Africa are very different to those in Europe. EU law does not apply in South Africa, and there is no reason why it should be copied.

Nevertheless, South Africans will be aware of what has been happening in the EU. The S.U.P. Directive 2019/904 seeks to ban "oxo-degradable" plastics because, according to Recital 15 of the Directive, that type of plastic:

- does not properly biodegrade. Oxo-degradable plastic does not become biodegradable except over a very long timescale, but the scientific evidence summarised above shows that oxo-biodegradable plastic does properly biodegrade.
- and thus contributes to microplastic pollution in the environment. "Oxo-degradable" plastic does create microplastics and they are often found in the oceans by researchers. However, oxo-biodegradable technology was designed to deal with this by making the fragments biodegradable and no longer plastics.
- is not compostable. Whether or not a plastic is compostable is not a justification for a ban. (See above as to composting). Oxo-degradable plastic is not compostable, but oxo-biodegradable plastic is proved to be compostable by testing according to ISO 14855 ("Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions").
- negatively affects the recycling of conventional plastic. For the reasons given above this is irrelevant. Oxo-biodegradable plastic has in any event been proved not to negatively affect the recycling of conventional plastic.
- fails to deliver a proven environmental benefit. Oxo-degradable plastic does not deliver a proven environmental benefit, because it creates microplastics which persist for decades in the open environment. Oxo-biodegradable plastic does not.

Accordingly, the reference to oxo-degradable plastic in Recital 15 of the S.U.P. Directive does not apply to plastic which does not have the undesirable characteristics specified in that Recital.

In any event the purported ban on oxo-degradable plastics is for the following reasons unconstitutional and legally invalid.

There is a well-established procedure in the EU for deciding whether substances should be restricted, which is set out in the REACH Regulation 2006/1907. In December 2017 the EU Commission acted under Article 69 to ask the European Chemicals Agency (ECHA) to study what they called "oxo-degradable" plastics, because the Commission thought that they created microplastics, but on 30th October 2018 (ten months into the study) ECHA advised the OPA that they were not convinced that microplastics were formed by oxo-biodegradable plastics. The Commission promptly terminated ECHA's enquiry.

If, and only if, ECHA had recommended a restriction, supported by a scientific dossier under Annex XV, it would have had to be considered by two committees under Articles 70 and 71 of REACH, and there would have had to be a stakeholder consultation under Art 71(1), before any restriction could be proposed under Art. 73. **None of this has been done, and there is no scientific justification from the EU's own scientific experts for any restriction.** The OPA is therefore advised that any restriction is legally invalid and unenforceable.

Never before has the EU attempted to circumvent an ECHA investigation by legislation.

It is important to note that the January 2018 report to the Parliament by the Commission did not call for a ban - it called for an investigation by ECHA. Moreover, the proposal for the Directive sent to the Parliament by the Commission did not include a proposal for a ban.

The Commission did not therefore think that they had sufficient scientific evidence for a ban, but that is not the point. Their opinion has to be tested by the procedures laid down in Arts. 68-73 of REACH, and the public are entitled to the benefit of the safeguards set out in those Articles.

CONCLUSION

South Africa should not ban plastic products, but should make everyday products oxo-biodegradable, so that they can be used and disposed of in the same way as ordinary plastic, but if they get into the open environment they will biodegrade much more quickly and be recycled back into nature by the bacteria, leaving no microplastics or toxic residues.