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Comments on the request to the European Chemical Agency to prepare a restriction to oxo-biodegradable plastics

We have taken note of the request from the European Commission on the restriction proposal on oxo-biodegradable plastics (OBP). As motivation, three main reasons are given by the commission:

1. OBP may not degrade under all relevant environmental conditions
2. OBP could negatively impact on the quality of plastic recyclates
3. OBP constitutes a potential risk to the environment because of their potential to generate microplastics

In our opinion, as it stands, this request provides no scientific based reasons for the proposed restriction on used of oxo-biodegradable plastics.

Plastics derive their mechanical properties from their long chains. Thus, biodegradation of all types of polymers (both synthetic and natural) requires an abiotic chemical process to cleave the chains to molecules small enough to penetrate the cell membrane to be metabolized. Consequently, the rate of degradation of polymers depends on the type of polymer and environment (temperature, oxygen, moisture, etc.). OBP are identical to conventional plastics but containing small amounts of prodegradant additives.

Comment to reason 1 – The term “biodegradable” is only meaningful if the environment and the period is specified. For this reason there are various standard test methods to verify biodegradability under specific conditions e.g. ISO 14855 - ultimate biodegradability under controlled composting conditions, ISO 17556 - ultimate biodegradability in soil, EN 14987 - disposability in waste water treatment plants, ISO 14853 - ultimate anaerobic biodegradation in an aqueous system, etc. Consequently, the first argument applies to all biodegradable materials not only to OBP.

Comment to reason 2 – OBP have the same properties as the corresponding conventional plastics. They are also designed to have a certain service life using stabilizers before they start to degrade. It has been proven in several studies that OBP can be recycled together with corresponding conventional materials without negative impact on quality of recyclates. Furthermore, consumption of the OBP materials is negligible compared to the total demand for plastics. In this context, the presence of small amounts of OBP will not have any significance for the quality and long term properties of the recyclates. This has been proven in an experimental work, reported in the scientific paper (*Polymer Degradation and Stability* 97 (2012) p. 316-321).

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Comment to reason 3 – As mentioned above, polymer based materials derive their mechanical properties from their long chains. However, hydrocarbon polymers contain structural elements that are susceptible to oxidative degradation reactions. Therefore, they always contain stabilizers that are used to protect the polymer during melt processing and to protect the finished article upon exposure to light and air. During use, the stabilizers are continuously consumed and when they are gone the degradation process begins. It can be emphasized that the mechanism of oxidation is essentially the same with or without prodegradants but the prodegradants significantly accelerate the oxidation. Microplastics are always formed as intermediate in the degradation process regardless of whether it is regular plastic or OBP but the period between the beginning of degradation and bioassimilation is much shorter for OBP. Consequently, OBP should constitute less risk if any to the environment regarding microplastics formation.

Finally

OBD materials are not a general solution to the environmental problems but they provide benefits for the environment in some specific applications in the same way as other biodegradable materials do.

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