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PLASTICS RECYCLING UPDATE

PROTECTING AGAINST THE UNKNOWN

Could biodegradability additives be coming to a plastics stream near you? The Sustainable Packaging Coalition explains why the recycling industry should take a stand against the approach. **BY ROSEMARY HAN**

The Sustainable Packaging Coalition believes that there are many reasons why the application of biodegradability additives in petroleum-based plastics is a step in the wrong direction. One reason is the potentially negative impact on recycling. The additives, after all, are designed to compromise one of plastic's most important features – its strength and durability.

Research continues to investigate potential unintended impacts of utilizing recycled plastics containing biodegradability additives in a variety of real-world conditions. Several organizations – including ACC, APR, BPI, NAPCOR, NERC, SPI and European Bioplastics – have taken positions on the topic. The majority have articulated formal arguments against one particular type of technology, oxo-biodegradable additives. These additives are designed to make petroleum-based plastics bioavailable through physical fragmentation resulting from exposure to light and oxygen.

But more recently, another wave of additives has begun appearing on the market. The so-called "landfill biodegradable additives" function differently than oxo-biodegradable additives. These additives are organic substrates designed to encourage and attract colonies of microbes that perform biodegradation in anaerobic landfill conditions with limited or no oxygen available, but recyclers have equally strong concerns about the use of these additives. By reflecting on prior responses to oxo-biodegradable additives, we can shed light on the plastic industry's current concerns and discussions about landfill biodegradable additives.

Danger in lingering chemical properties

Landfill biodegradable additives are designed to successfully enable biodegradation of petroleum-based plastic in anaerobic landfill conditions without leaving behind toxic chemicals. But the long-term effectiveness of the additives – and therefore the shelf life of plastics containing these additives – is unknown. Some additive manufacturers note that the additives will not harm recycled plastics if they end up in a MRF rather than a landfill, but it is unclear if plastic reprocessors would feel the same way.

Initially, studies conducted by the industry group European Plastics Converters and by California State University's Chico Research Foundation raised concerns after finding that oxo-biodegradable additives in plastics resulted in various changes to mechanical and physical properties of recycled plastic. When additive manufacturers claim that their additives are not detrimental to the recycling process, they tend to point to evidence that modern additives do not affect the intrinsic viscosity of the plastic and therefore won't result in changes to the

mechanical properties of the recycled plastic. Regardless of whether the additive-laden plastic can successfully undergo reprocessing into a finished recycled plastic, the additive manufacturers have not yet fully addressed a more troubling concern raised by plastic recyclers: whether or not the plastic retains its purported ability to biodegrade after the recycling process.

Plastics reprocessors have expressed uncertainty over whether the additives will linger and persist in the newly recycled plastic content, and because the landfill biodegradable additives are designed to trigger in anaerobic conditions, plastics reprocessors want assurance that utilizing recycled plastic containing the additives in scenarios such as underground piping, landfill liners and underwater composite beams will not result in unintended biodegradation. In short, plastics recycling companies want to make sure the products harnessing recycled resins will continue to perform well.

We previously witnessed a flood of statements and studies issued in regards to oxo-biodegradable additives. The plastics industry, including SPI's Bioplastics Council and APR, raised key issues, primarily noting the additive manufacturers did not provide overwhelming proof that the additives were harmless to the life span of recycled plastics. Recycled plastics are transformed into a variety of new products, including packaging, carpets, benches and lumber. Some of these may have short life spans, but many products containing recycled plastics are intended to be used for years or decades. For instance, a manufacturer of outdoor playground equipment may be wary of using recycled plastics that contain oxo-biodegradable additives, since exposure to sunlight and oxygen would potentially compromise the structural integrity of the playground.

In response, the Oxo Biodegradable Plastic Alliance and the Oxo-Biodegradable Plastics Association provided anecdotal support for their claims that pro-degradant properties of the oxo-biodegradable additives are non-problematic for short life span products and easily rectifiable for long life span products. Yet, without concrete and unbiased testing of products made with recycled plastics containing oxo-biodegradable additives in real-world conditions, the plastics industry stands firm in its stance against the application of oxo-biodegradable additives to conventional plastics. Similarly, without transparent and unbiased support that they are rendered ineffective after recycling and reprocessing, the application of landfill biodegradable additives to conventional plastics will continue to be seen with the same level of scrutiny and skepticism as the oxo-biodegradable additives.

Harnessing APR testing models

While opinions vary as to whether plastics with biodegradability additives are ultimately detrimental to the technical performance of recycled resins, we can conclude that recyclers and plastics reprocessors are still unsure about the potential long-term impacts of biodegradability additives in recycled products and packaging. Until the technologies are proven to be benign under a wide range of conditions and scenarios, recyclers will continue to advocate against their use in plastic packaging and materials. To dispel any uncertainty, additive manufacturers can provide the plastics industry with detailed, credible and transparent proof of the benign effects on recyclability and the long-term technical performance of durable products made from recycled plastics containing biodegradability additives.

APR offers technical testing guidance for degradability additives in PET, PE and PP in a variety of realistic scenarios, and they recommend that additive manufacturers submit their products to testing and evaluation.

Research in this area needs to continue as we move toward a circular economy and continue efforts to utilize conventional plastics in a responsible manner. Materials should be designed and applied in ways that maximize their potential for reuse. Conventional plastics have a more useful purpose if they head into the recycling stream once discarded, and any additive inhibiting conventional plastics from being successfully recycled into new durable plastics will only hamper the recycling industry and the development of closed loop material streams. PRU

Additional online resources

Pacific Northwest Pollution Prevention Resource Center: "What are the benefits and drawbacks to oxo-degradable bags?" – tinyurl.com/OxoBenefit

Best In Packaging: "Recycling bio-based and biodegradable plastics" – tinyurl.com/RecycleBio

European Bioplastics: "Anaerobic digestion fact sheet" – tinyurl.com/BioplasticsAD

US Composting Council: "Compostable Plastics 101" – tinyurl.com/USCCbio

Oxo-Biodegradable Plastics Association: "Recycling" – tinyurl.com/OxoBioInfo

The Plastic Redesign Project: "NatureWorks PLA in the Recycling Stream" – tinyurl.com/NatureWorksPLA

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