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Pioneering Oxo-biodegradable Plastic Technology

Position Statement Concerning Biodegradability Of Plastics Using ASTM 5338 / ISO 14852 / EN 13432

There is an urgent requirement for packaging materials, containers, films for agriculture and the like that are biodegradable, i.e., that are altered irreversibly by the action of naturally occurring microflora (fungi, bacteria, etc.). This was clearly reflected in the original mandate of the CEN/TC 261 working group, that had to try and define a norm for "degradability" of packaging materials, including photodegradability, chemical degradability and biodegradability. Plastics already occupy a major position in such materials owing to their ease of fabrication, their reasonable price, and other benefits -- compared to alternative materials -- from an energy conservation and environmental "friendliness" point of view.

It follows that there is a need to define and evaluate materials to ensure that they will indeed degrade in an environmentally acceptable manner in natural and/or microbially-active environments to leave no toxic residues and, if possible, to produce mulch and related substances that are soil-improvers. Biodegradability tests that have been developed largely reflect the behavior of hydro-biodegradable polymers (e.g., aliphatic polyesters plus modified starch). These materials are ideal for rapid biodegradation in sewage sludge where a maximum rate and extent of mineralization is required. The fundamental characteristic and most positive value of compost or mulches is the presence of biomass. Without biomass, there simply would be no product. Therefore rapid mineralization is not ideal for polymers in compost where the carbon in the original plastic should be converted over a longer period of time to biomass and only slowly to carbon dioxide. The oxo-biodegradable hydrocarbon polymers (e.g., the polyolefins) are ideal for this purpose since controlled peroxidation is the rate-determining step in the overall process. Furthermore, they cannot give toxic or otherwise objectionable by-products during bio-assimilation.

Standards-writing organizations in the EU (CEN) the USA (ASTM) and Internationally (ISO) have recently published or are about to publish standard test procedures which purport to evaluate the biodegradability (compostability) of plastics in laboratory scale experiments. Although there are numerous flaws in these test procedures (they are nearly identical) we wish to focus on three basic problems which cannot be overlooked.

- Numerous materials of natural origin that are recognized universally as Oxo-biodegradable do not pass the lab-scale tests. Examples of such materials are paper, leaves, natural rubber and lignin (a major component of trees, for example).

- The lab-scale tests do not even attempt to assess the formation of biomass, a major primary product of the degradation of carbon-containing materials by naturally-occurring micro-organisms.

- The requirement to have all the carbon in the candidate Oxo-biodegradable materials (including plastics) convert to carbon dioxide during the course of the tests (a matter of a few weeks to a few months) is not only unreasonable and unnecessary; it will result in compost or other soil conditioner being prevented from attaining the highest quality, for agricultural purposes. A major benefit of high quality compost in agriculture is the humic material including biomass in which the carbon has not been converted to carbon dioxide.

We are convinced that the CEN, ASTM and ISO tests for determining the aerobic biodegradation of plastic materials should not be implemented or allowed to be used.

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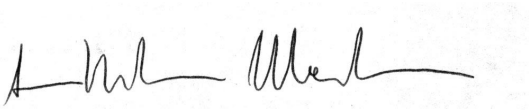

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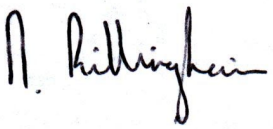

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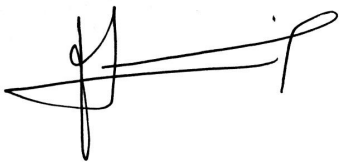

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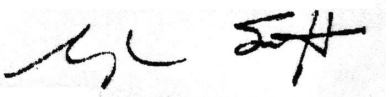

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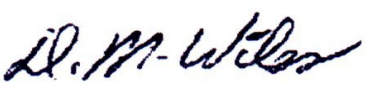

The following is a list of materials which will not pass the EN 13432 and which have been accepted as Oxo-biodegradable. The reason these materials will not pass is that they do not biodegrade within 6 – 12 months, and will not release 90%+ CO_2 in that time.

- a leaf
- paper
- poly (cis-1,4-isoprene)
- lignin
- collagen and many animal proteins
- silk
- grain proteins
- chitin
- cellulosics
- many hydrophobic polymers designed for durability in nature