TECHNICAL INFORMATION SHEET 9B

The Biodegradation of Polymers containing Reverte oxo-biodegradable masterbatches.

A previous Reverte Technical Information Sheet (TIS 9) has described the general oxo-biodegradable mechanism introduced into poyolefins via the addition of Reverte oxo-biodegradable masterbatches.

TIS 9 describes the primary breakdown phase (oxidation of the polymer chain) and the subsequent secondary breakdown phase (soil based microbial attack resulting in the polymer breakdown to Carbon dioxide, water and biomass). This secondary phase would normally be described as “biodegradation” or “mineralisation”.

This document has been prepared to present data to demonstrate the secondary biodegradation phase and to indicate timescales for this process.

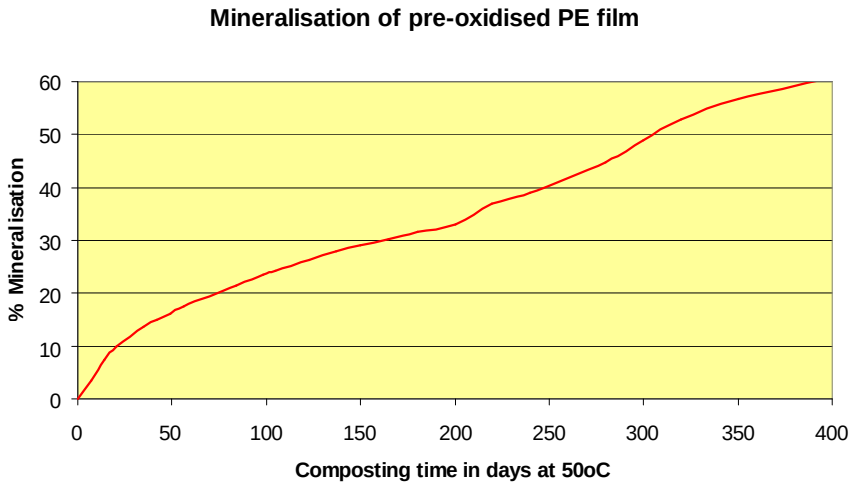
1. Laboratory composting of Polyethylene film.

In this demonstration the PE film containing oxo-biodegradable additive was introduced into an oxygenated compost column maintained at 50^{o}C following the completion of its primary breakdown phase.

Soil based micro-organisms present in compost utilise the Carbon (C) contained within the original polymer and this process converts this Carbon to Carbon dioxide gas (CO_2).

By comparison with various control composting columns the rate of biodegradation (mineralisation of C to CO_2) can be determined.

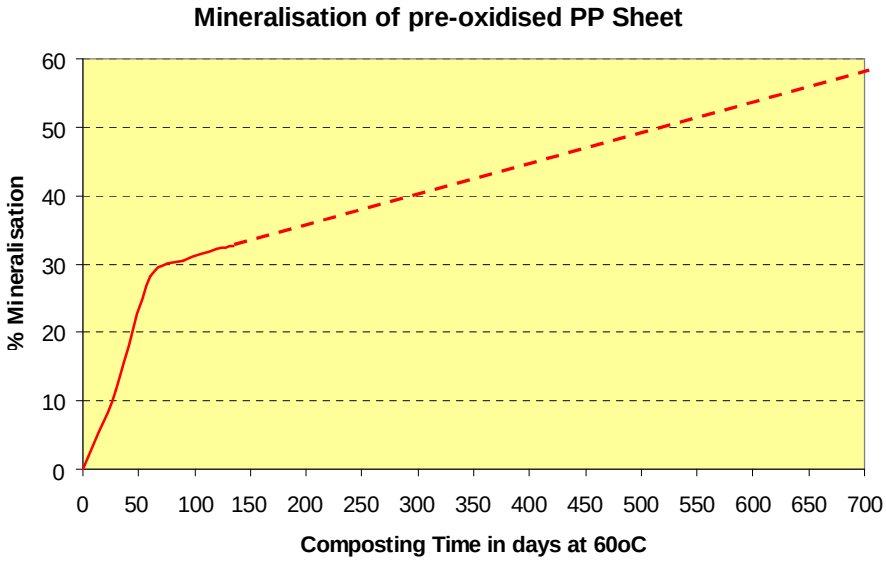
The results are displayed below :



It can be seen that after approximately 400 days of laboratory composting at 50oC, 60% of the available Carbon had been mineralised.

2. Laboratory composting of Polypropylene sheet.

In this demonstration thermoformed PP sheet containing oxo-biodegradable additive was similarly introduced into a composting column maintained at 60°C following a primary breakdown phase.



This experiment was terminated after 135 days when a value of approximately 33% was achieved. However, extrapolation of the data strongly indicates that 60% mineralisation will occur after approximately 700 days of composting.

3. Discussion of results.

Two independent tests have demonstrated without doubt that a pre-oxidised polyolefin will undergo biodegradation, with soil based micro-organisms having been enabled, through the use of this technology, to utilise the polymer as a Carbon source and so mineralise it to Carbon dioxide.

The timescales of biodegradation within the two test methods are similar and differ only due to the relative thicknesses of the two products tested. A higher thickness results in a decreased surface area for microbial attack which in turn results in a longer mineralisation time.

Notwithstanding this, both polyethylene film and polypropylene sheet have been shown to undergo the secondary biodegradation phase in the oxo-biodegradation cycle.

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