J-Trend Systems, Inc.

For better Green Solution

Distributor of Symphony Environmental Inc.

(Territory: China, Taiwan))

Oxo-biodegradable Technologies

www.symphonyenvironmental.cn

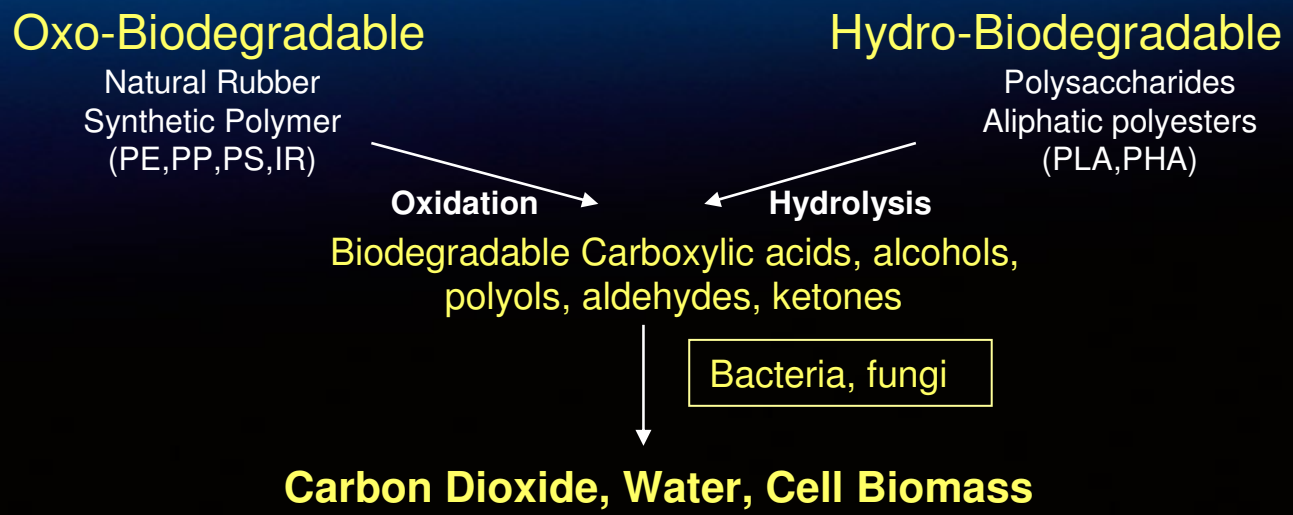
Trade Mark: d2w™

What's about Oxo-Biodegradable Technology?

It is important to distinguish between the different types of biodegradable plastic, as their costs and uses are very different. The two main types are oxo-biodegradable and hydro-biodegradable. In both cases degradation begins with a chemical process (oxidation or hydrolysis),followed by a biological process.

Both types emit CO2 as they degrade, but hydrobiodegradable can also emit methane. Both types are compostable, but only oxobiodegradable can be economically recycled.

Hydro-biodegradable is much more expensive than oxo-biodegradable.



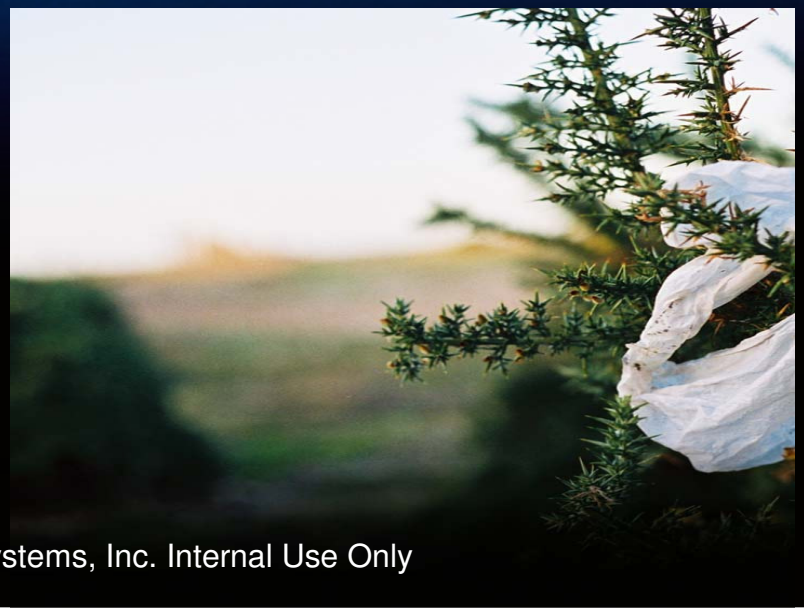
G.Scott(1999) *Polymer and the Environment, Royal Society of Chemistry, p.96*

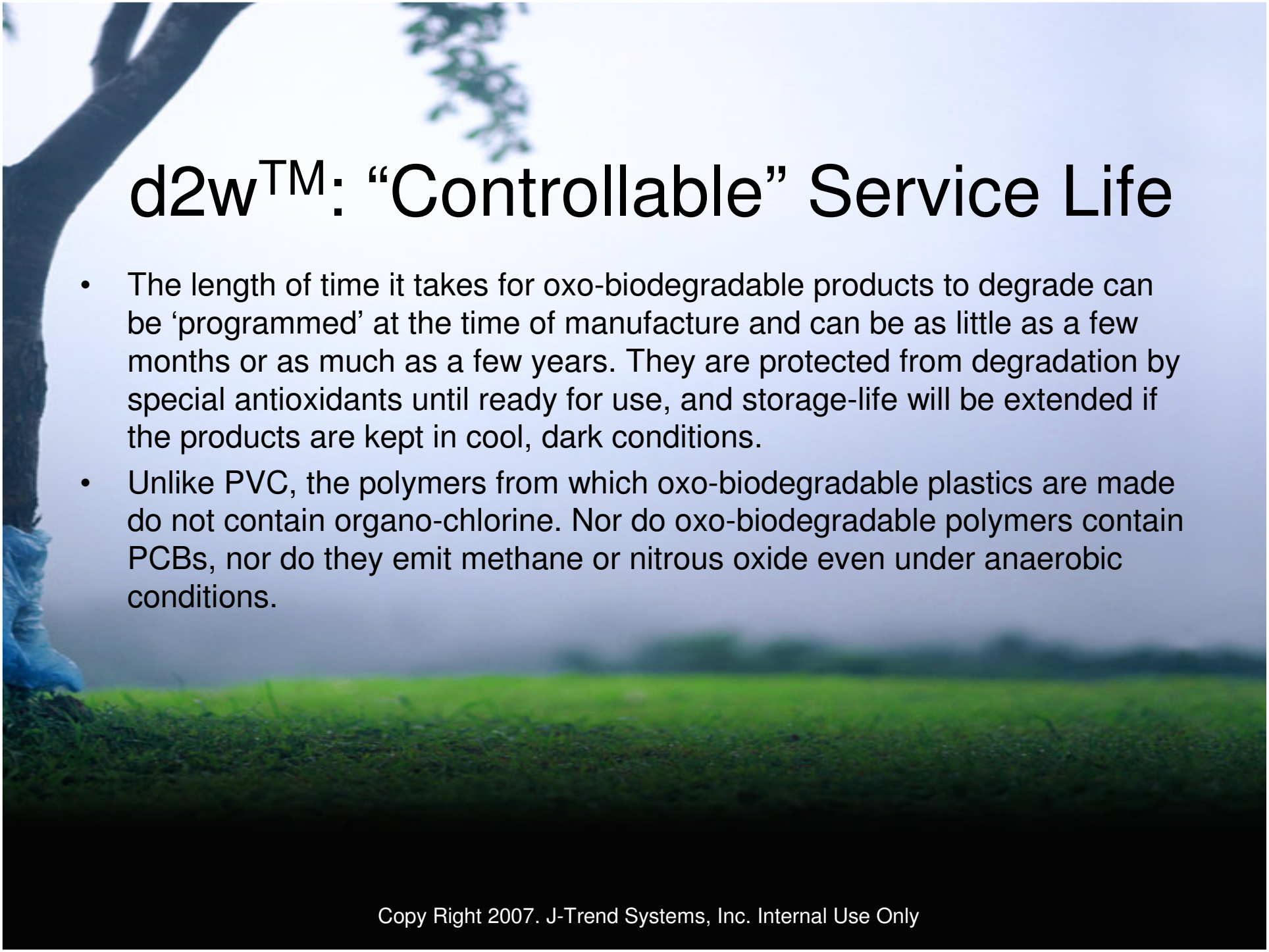
Oxo-biodegradable Plastics

This new technology produces plastic which degrades by a process of OXO-degradation.The technology is based on a very small amount of pro-degradant additive being introduced into the manufacturing process, thereby changing the behaviour of the plastic. Degradation begins when the programmed service life is over (as controlled by the additive composition) and the product is no longer required. Degradation consistent with changes expected by ASTM D 6954-04 has been certified by RAPRA.

Oxo-biodegradable Plastics

The plastic does not just fragment, but will be consumed by bacteria and fungi after the additive has reduced the molecular structure to a level9 which permits living micro-organisms access to the carbon and hydrogen. It is therefore “biodegradable.” This process continues until the material has biodegraded tonothing more than CO2, water, and humus, and **it does not leave fragments of petro-polymers in the soil**. Oxo-biodegradable plastic passes all the usual ecotoxicity tests, including seed germination, plant growth and organism survival (daphnia, earthworms) tests carried out in accordance with ON S 2200 and ON S 2300 national standards.





d2w™: “Controllable” Service Life

- The length of time it takes for oxo-biodegradable products to degrade can be ‘programmed’ at the time of manufacture and can be as little as a few months or as much as a few years. They are protected from degradation by special antioxidants until ready for use, and storage-life will be extended if the products are kept in cool, dark conditions.
- Unlike PVC, the polymers from which oxo-biodegradable plastics are made do not contain organo-chlorine. Nor do oxo-biodegradable polymers contain PCBs, nor do they emit methane or nitrous oxide even under anaerobic conditions.

d2wOxo-biodegradable Product Application

Oxo-biodegradable plastic products are now being used by the leading UK supermarkets, Tesco and the Co-op13. In Portugal the country's largest retail group, Sonae, has adopted oxo-biodegradable plastic carrier bags for their Continente, Mondelo and Mondelo Bonjour supermarket chains. Other major users include Marriott, Royal Caribbean Cruise Lines, BUPA, News International, Pizza Hut, KFC,and Walmart. Oxo-biodegradable plastic is ideal for frozen food packaging, as it can be kept for extended periods at low temperature, and will then quickly degrade when it becomes a waste product at normal temperatures.

d2w Oxo-biodegradable (contin)

To summarise, oxo-biodegradable plastics have the following advantages:

- They will degrade in any outdoor or indoor environment where air is present, even in the absence of water. This is a very important factor in relation to litter, because a large amount of plastic waste cannot be collected.
- Oxo-biodegradable plastic can be programmed at manufacture to degrade within a timescale to suit the user's requirements. The rate of degradation of hydrobiodegradable plastics cannot be controlled.
- Oxo-biodegradable plastics are stronger and more versatile.
- They are much cheaper
- They are thinner, and use less space to store and transport, and less material toproduce
- They can be transparent, so that the food or other contents within can be clearlyseen.

d2w Oxo-biodegradable

- They can be recycled and can be made from recyclate.
- Less energy is required to produce and transport them.
- No genetically-modified ingredients
- They do not emit methane when oxidising
- No organo-chlorine or PCBs or “heavy metals”
- Safe for direct food contact
- Ideal for frozen food
- Can be used in high-speed machinery (such as for bread packaging) but the
- performance of hydro-biodegradable plastics in these machines is often not
- acceptable.
- Can be incinerated with much higher energy-recovery than hydro-biodegradable plastic
- They can be made with the same workforce and machinery as conventional plastic products, but hydro-biodegradable products are made by a quite different process.

d2w Oxo-biodegradable Products Available

- Carrier bags or “shopper-bags” which consumers use to take away their purchases from the shop
- Refuse sacks, which consumers buy in rolls at the shop, and use for disposal of their ordinary household waste.
- Aprons, for the protection of garments, in the home, hospitals, restaurants,workshops etc.
- Bags to contain dog faeces collected in parks, gardens, etc
- Bin liners
- Gloves
- Plastic sheeting for a variety of applications in agriculture and horticulture.
- Plastic film for wrapping newspapers and magazines.
- Bread bags
- Frozen food bags
- Wrappers for cigarette packets
- Shrink-wrap and pallet-wrap
- “Bubble-wrap”
- Rigid products such as bottles and cups
- More products will become available in due course.

d2w™ Certification/Standards

- *New draft British Standard BS 8472*
  (In final stages of creation at British Standards Institute)
- *ASTM (US) 6954 testing protocol*
- *New French Standard AFNOR54-980*
- *Food Contact Safe – tested by RAPRA, UK*
- *Soil Safe – tested by OWS, Belgium*
- *Biodegradable – tested by PYXIS, UK*
- *SGS-Food Contact Safe*