

# EUREKA! ALL PLASTICS CAN BE MADE DEGRADABLE

Jerry Powell

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**PLASTICS**  
**RECYCLING**  
**CONFERENCE**

# Today's presentation

- Basic description of oxo-degradable plastics
- A review of claims and contentions about oxo-degradable plastics
- An assessment of the recycling issues involved in using these plastics



# Oxo-degradable plastics

- Degradable additives have been on the market since at least the 1980s.
- However, due to rising interest in plastics waste management, interest in oxo-degradable plastics is increasing.



# Oxo-degradable plastics

- These plastics contain a pro-oxidant additive to standards resins.
- The additive contains transition metal ions of cobalt, iron, manganese and/or nickel.



# How it works

- Two steps: the plastics undergo oxidation, with smaller molecules being produced under exposure to oxygen and heat. According to producers, the molecules further break down into CO<sub>2</sub>, water and biomass by having microbes do their job.



# How it works

- Additive producers say the heart of the technology is that the carbon-to-carbon bonds in additive-containing plastics break down when undergoing sunlight, heat and/or mechanical stress. They say this lowers the molecular weight to a point where complete degradation can occur.



# Loading

- Most producers recommend an additive loading of 1%-4%. The degradation time is determined by the percentage. For example, Planet Green says a 1.5 percent loading provides its PET with a two-year shelf life before degradation starts.



# Usage

- Oxo-degradable plastic products are made with standard equipment. Little process change is required.



# Patents

- No U.S. patents have been issued for resins or products using these terms:
  - oxo-degradable
  - oxodegradable
  - oxo-biodegradable
  - oxobiodegradable



# Selection of additive producers

- Add-X Biotech (Sweden)
- ECM Biofilms (U.S.)
- EPI Environmental Technologies (U.S.)
- Goody (Hong Kong)
- Symphony Environment Technology (UK)
- Wells Plastics (UK)
- Willow Ridge Plastics (U.S.)



# Degradable products

- Agricultural sheeting
- Bags
- Blister packaging
- Bottles
- Caps
- Clamshells
- Labels
- Landfill covers
- Lids
- Milk pouches
- Pallet wrap
- Shrink wrap
- Trays

# Sample usage

- ENSO bottles
- *New York Times* newspaper bags
- Planet Green bottles
- UK grocery store bags
- Water Promo bottles



# Degradability claims

- Goody: “Turns a 26-gram PET bottle into 13 grams of compost in 90 days.”
- Symphony Environmental Technologies: “The plastic degrades, leaving no fragments, methane or harmful residues.”



# Degradability claims

- IPF Inc.: “The plastic acts as a microbial magnet, attracting microbes. Microorganisms metabolize the material into an inert, humus-like form that is harmless to the environment.”



# Degradability claims

- Oxo-Biodegradable Plastics Association:  
These products do not leave fragments of petro-polymers in the soil. The material passes all standard toxicity tests and does not contain heavy metals.



# Recycling claims

- Producers uniformly claim that additive-containing plastics are recyclable.
- They say these plastics do not affect the recycling system.
- For example, Planet Green Bottle says “the bottle is compatible with all current recycling streams of PET.”



# Two areas of debate

- Do these plastics actually do what producers say they do by fully degrading?
- What is the effect of additive use on recycling, if any?



# The degradability debate

- Two camps now exist, each with their own set of consultants, academics and studies.
- And we have dueling trade associations (biopolymers versus oxo-degradables).
- It is the case that no additive has met the major compostability standards (EN13432 and ASTM6400).



# The degradability debate

- Standards focusing on plastics degradation through oxidation are under the purview of ASTM D20.96 committee.
- ASTM Standard 6954-04 provides guidance on testing oxo-degradable plastics degradation.



# The degradability debate

- The International Biodegradable Polymers Association contends that oxo-degradables merely produce plastic “dust.”
- The use of several metals of concern, principally cobalt and nickel, has raised attention by some analysts.



# The recycling debate

- Some plastics executive question why degradable additives might ever be used:
  - do we want strapping that isn't strong?
  - do we want bottles that cannot hold carbonation?
  - do we want carpet that falls apart?



# The recycling debate

- Some critics ask why we should lose carbon atoms to produce CO<sub>2</sub> and water.
- They note that the environmental burden of oil or gas extraction and refining and then monomer and polymer production would rise if oxo-degradable plastics use increased.



# The recycling debate

- APR and NAPCOR issued a joint policy statement:
  - they want additive suppliers to provide life-cycle assessments, test data and certifications of compliance with composting standards.



# The recycling debate

- APR and NAPCOR issued a joint policy statement:
  - the associations want additive vendors to share data on recycling that supports their claims about recyclability. They have asked five suppliers to provide details.



# The recycling debate

- APR and NAPCOR have also approached WalMart and several advocacy groups to explain their joint position and express their concern over unqualified statements.



# Conclusion

- The degradability debate will continue, with each side making the same arguments endlessly.
- In terms of recyclability, the ball is now in the court of additive producers. They have been called out by plastics reclaimers.



# Contact

Jerry Powell

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[jpowell@resource-recycling.com](mailto:jpowell@resource-recycling.com)

