

## Biodegradability and other Claims of ECM for Masterbatch Pellets and Formulated Products

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### Introduction:

ECM has publicly claimed complete biodegradability of its masterbatch formulation additive and formulated products based on polyolefins. These claims are made based on laboratory testing according to ASTM standard test methodology. Particularly, the test environments selected by ECM were anaerobic landfill (ASTM D 5511-94), microbial resistance to or support (ASTM G21 and 22) and compost (ASTM D 5338-92). Based on the results of these tests, some extravagant claims have been made, without foundation, by extrapolations far beyond what any reasonable authority in the field would make.

In addition to biodegradation, other claims relating to the superior performance and properties of plastics containing ECM Biobatch additive were made. Comparisons with EPI's oxo-biodegradable technology are filled with significant and obvious errors which illustrate their complete lack of understanding of EPI's proprietary technologies. Their claims are not addressed here as they are so egregious that no interpretation is needed.

### Comments on Biodegradation Testing:

1. ASTM D5338.92 (now ASTM D 5338-98) testing under aerobic conditions, composting, shows limited biodegradation for a 50 / 50 blend of Biobatch Additive and plastic. Gas evolution plateaus and ceases at 20% of theory long before test completion.
  - **Note:** the Biobatch Additive is claimed to be useful at 1 % wt while still producing a biodegradable plastics!
  - Highly unlikely from this result
  - Why not test at practical levels?
  - **Note:** Biobatch additive is listed in ECM's MSDS as a blend of organics and natural fibers together with a poly(vinylacetate/ethylene) copolymer
  - The additive may be biodegradable to a significant extent, the organic content, and that is the basis for the observed gas evolution.

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2. Testing under ASTM G 21 and 22 conditions is using test methodologies developed for resistance properties of plastics against fungal and microbial growth, and, although acceptable, is rarely used for degradation testing.
3. Testing Biobatch pellets and a 5% Biobatch film indicated extensive microorganism attack manifested by surface growth over a period of 11 months. The end point indicates severe friability of the pellets and film. From this the extrapolation to 2 years for complete biodegradation is a STRETCH beyond reality. Other test methods are recommended for establishing this conclusion.
  - **Note:** that the tests are not specific for biodegradation
  - No gaseous or byproducts are estimated as they should be by today's improved standards and recommendations.
  - One would expect these materials, pellets and high loaded plastics to support microbial growth knowing their compositions, see above.
  - Extrapolation to plastic life-time of 2 years in any environment from fragmented films is impossible. Yet a claim of 2 years in composting is claimed! Wrong test, wrong extrapolation, wrong conclusion!
4. Landfill testing using ASTM D 5511.94 which is for anaerobic environments is becoming outdated with the new standard close at hand which allows for the changing environment from aerobic to anaerobic which occurs in landfills. Nevertheless, if done well the test reveals acceptable results for the anaerobic environment. In this case, the test was run on Biobatch pellets, not a formulated product. As might be expected from early discussion, the portion of the pellet that is organic shows some, 24% of theoretical gas evolution before plateauing or ceasing.
  - **Note:** that claims for total landfill biodegradation based on this testing are improper and border on incompetence.
  - Pellets are not the final answer, need film tests to really see what is happening.
5. Toxicity testing is as would be expected for the ECM technology based film products, since they are based on rather benign raw materials. No unusual results obtained with film. **However**, caution must be exercised with the pellets prior to formulation as they are toxic to earthworms and daphnia.

**Conclusion:**

The claims for total biodegradation of ECM pellets or formulated plastics in any environment, which are based on the ASTM tests, are completely misleading and erroneous. Perfectly good ASTM test methods have been misused and misinterpreted and there is no evidence for the claims made on the results of these tests.

**NOTE:** The chairman of the ASTM D20-96 Standards Committee, which develops biodegradation testing methodology, is in complete agreement with my comments, above.

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