BPI assessment of oxo-biodegradable films

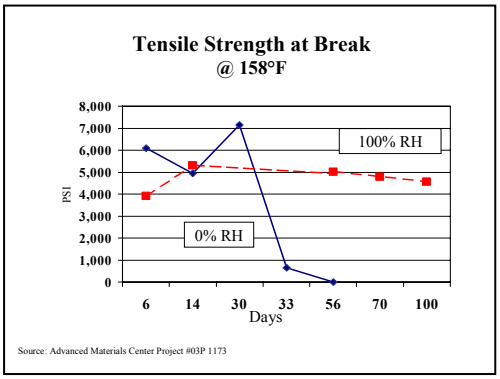
Using the Tier 1 tests in the proposed Guide for Oxo-biodegradable materials, the Advanced Materials Center, Ottawa IL (AMC) studied the performance of oxo-biodegradable films at different temperatures and under high and low humidity conditions. For these tests, EcoSafe Bags were used. These were manufactured by Envision of Wichita, KS and purchased from a distributor in the Northeast.

Tier 1 tests are designed to promote or accelerate oxidation of oxo-biodegradable materials prior to placing the materials in bio-meters to measure the rate of biodegradation. The loss of tensile strength is the signal that oxidation and chain scission are occurring. This step must take place prior to becoming able to be biodegraded.

Results:
The Tier 1 tests revealed the 2 following results:

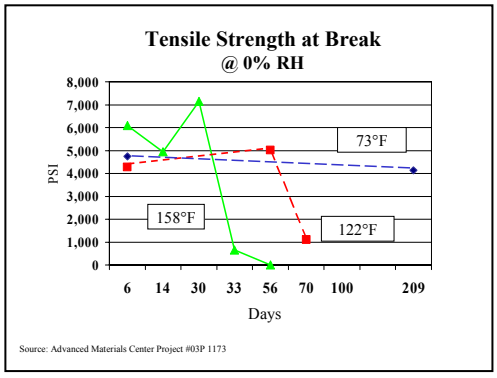
1-Moisture or humidity stops or significantly retards the rate of oxidation.

The moisture in the compost pile significantly slows down the rate of oxidation as shown by property loss changes. Note the the relatively flat line labeled "100% RH" in the chart on the left. This means that the moisture in the compost pile will delay the onset of fragmentation and biodegradation.



2-The rate of oxidation is temperature dependent.

In cooler temperatures, oxo-biodegradable materials remain intact for very long periods of time, even in arid conditions. This can be seen by the blue line, which shows little loss of strength after 209 days at 73° F.



Heavy Metal Findings

The films were analyzed for heavy metals, which are frequently used to promote oxidation. The laboratory found very high levels of lead and cobalt in the films, specially 627 ppm of lead and 1,070 ppm of cobalt (see chart below: EcoSafe Spring 2003). The lead level are 4 times higher than those allowed by ASTM D6400-99 in the US and 12 times higher than the concentrations permitted in Europe (EN 13432) and Japan (GreenPLA).

Cobalt is not a regulated metal in the US, Europe or Japan; however, it is in Canada, under the "Standard for Metals in Fertilizers and Supplements", under the section governing compost and other by-products when used as a fertilizer. The cobalt levels found in the EcoSafe Bag were 7 times higher than those allowed under these regulations.

	D6400 Limits	**EcoSafe Spring 2003**	**EcoSafe USCC 2004**	**EcoSafe Foodwaste USCC 2004**
Analyzed By		AMC	Interpoll	AMC
Additives				
Calcium carbonate	NA	28,400 ppm	50,200-88,400 ppm	8,370 ppm
Cobalt	NA	1,070 ppm	2,280-2,390 ppm	1,450 ppm
Lead	150 ppm	627 ppm	926-941 ppm	ND
Iron	NA	66.3 ppm	69-71 ppm	130 ppm
Nickel	210 ppm	ND	ND	ND
Zinc	1,400 ppm	97.0 ppm	177-181 ppm	160 ppm

These levels were confirmed in a 2nd sample of a similar sized bag that was obtained at the US Composting Council Show and tested by Interpoll, another independent lab (labeled EcoSafe, USCC 2004). In the second bag, the lead level was 926 ppm, again exceeding any current regulations and the cobalt level was 2,280 ppm. In another smaller bag, also obtained at the USCC Show, no lead was found, yet 1,450 ppm of cobalt were present.

Conclusions:

1. The moisture in the compost pile delays the onset of oxidation, fragmentation and biodegradation.
2. There are extremely high levels of regulated heavy metals in some formulations-far in excess of the limits found in ASTM D6400-99
3. The formulation of additives in these products varies significantly. When documenting oxidation and biodegradation, manufacturers should provide the concentration of additives, detailing the content of heavy metals and the temperature and moisture conditions under which the tests were conducted.

Lab reports are available upon request.