

DATA SHEET FOR ECO-DEGRADANT PD 04 (LL)

Description

Eco-degradant PD 04 is a ***Polyolefins based Controlled Degradation Masterbatch***. Polyolefins that are incorporated with Eco-degradant PD 04 would progressively degrade to lower and lower molecular weights. They become brittle, disintegrated and are ultimately digested by micro organisms back to the basic elements of Carbon dioxide(CO₂), water (H₂O) and biomass with no harmful residues. It complies with food grade polyethylene material according to FDA 21 CFR 177.1520 tested by Hong Kong Productivity Council.

Typical Properties

Appearance	Light Brown Free Flowing Pellets
Density (ISO 2781)	0.940 kg/m ³

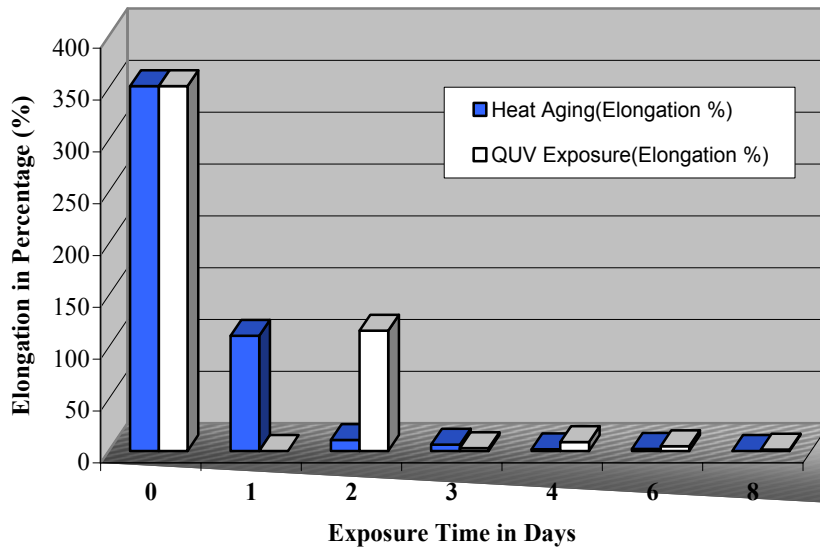
A Typical Sample Evaluation of Plastics Shopping Bags with Eco-degradant PD 04

Processing Method	Film blowing
Processing Temperature	190-210 ⁰ C
Sample Description	3% Eco-degradant PD 04, 80% HDPE, 20% LLDPE, 3% White Masterbatch
Thickness	33 micron

ASTM Standards Testing Methods for Accelerated Degradation Testing :

- (1) Oxidative-Degradation Testing : D5510 "Heat Aging of Oxidatively Degradable Plastic",
Conditions : 80⁰C Oven, Forced air-ventilation
- (2) Photo-Degradation Testing : G154 "Operating Fluorescent Light Apparatus for UV Exposure of
Non-Metallic Materials"
Condition : 340nm UV lamp, 20 Hrs UV, 4 Hrs Condensation, 50⁰C
- (3) Tensile Testing : D3826 "Degradation End Point Using a Tensile Test" Elongation and Tensile
Strength : Machine Direction (MD).
Samples : 2" length, N=5(4), Instron crosshead speed : 20"/min

Degradation is to be evaluated using above ASTM testing standards and subsequent testing for **embrittlement (< 5% elongation)**.



Embrittlement Tests after 80°C Heat Aging (Elongation, %)

	0	1 Day	2 Days	3 Days	4 Days	6 Days	8,10,12 Days
Plastics Shopping Bag	352	111	10.6	6.1	1.6	2.0	-

Embrittlement Tests after UV Exposure (Elongation, %)

Sample	0	2 Day	3 Days	4 Days	6 Days	8 Days	12 Days
Plastics Shopping Bag	352	116	2.7	8.5	4.5	1.3	-

Source : Programmable Life, Inc

The **Service Life of Eco-degradant PD 04 Plastic Products** under indoor conditions should be calculated by determining the activation energy of heat aging testing.

1 day of 80°C Heat Aging is estimated as 4 days in 64°C and about 4 months in 24°C environment.

In terms of UV Exposure testing :

1 day UV Exposure testing is approximately equal to 2 weeks at a climate similar to Miami, Florida.

However, the actual lifetime of the products will be varied in the respective local environment conditions.

Results and Evaluation :

Sample was subjected to the accelerated oxidative test environment for up to 12 days and to the UV exposure test environment for up to 12 days.

It was found that the sample was embrittled when they reached the 5% elongation point (ASTM D3826) after **3.1 days** of Oxidative-Degradation Testing (ASTM D5510) i.e. Biodegradation starts after about 1 year and 2 weeks (3.1 days X 4 months) in 24°C environment. While **5.7 days** UV Exposure Testing (ASTM G154) i.e. Biodegradation starts after about 3 months (5.7 days X 2 weeks) at a climate similar to Miami, Florida.

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Environmentally Degradable Plastics

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