

BMX™

Nature's Solution for Plastic Waste

Oxo biodegradable technology!

Degradation identified as resulting from oxidative and cell mediated phenomena, either simultaneously or successively.

ISO DIS 17088

This application is recyclable like most plastics, but please do not throw it into the environment. If it is exposed to sunlight or is buried it has a limited lifetime because it degrades due to light, oxygen and temperature and ultimately oxo-biodegrades due to the same micro organisms that cause the biodegradation of natural materials such as wood, straw, leaves, etc.

Please re-use the application whenever possible! We do not support littering!



System Performance



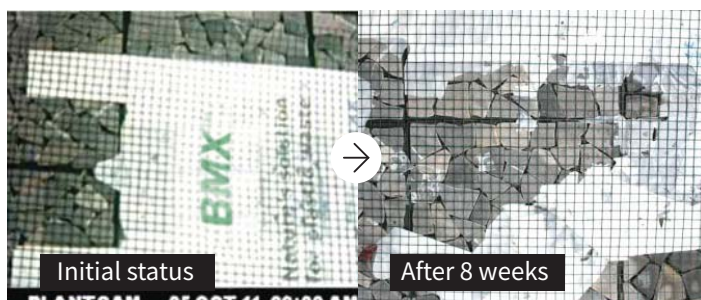
Degradation of the polymer down to a Mw of 1253 within 6 weeks

On 4 layers of film | US

Test conditions

The average temperature between Aug. 05 and Sept. 21 was 33°C (the video testing period)

Temp min 15 °C | Temp max 45 °C | Average humidity 25 %
GPS Coordinates of Buckeye, Arizona: N33° W112°



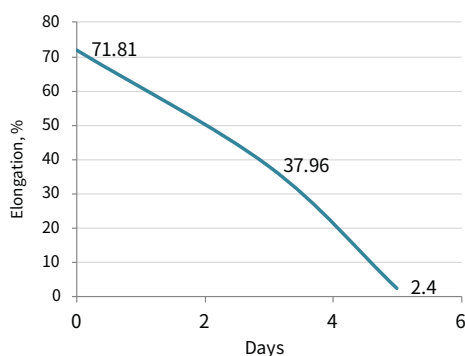
Degradation of the polymer within 8 weeks Factor 1,5

On 4 layers of film | US

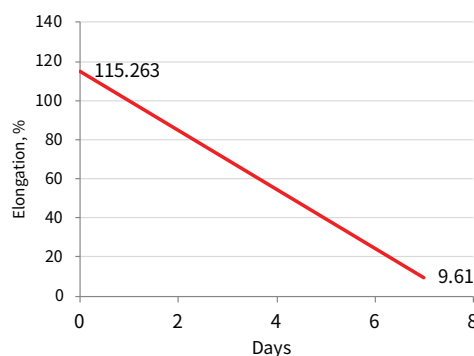
Test conditions in a parallel test in Germany

Temp min 2 °C | Temp max 30 °C | Average humidity 25 %
GPS Coordinates of Freiburg, Germany: N 48° E 8°

QUV ASTM D5208 ISO 178 - ISO 527



Oven test ASTM D3826 ISO 178 - ISO 527



BMX™ has been tested in accordance with ASTM D 6954 and ASTM Standard D 6400-99 (Standard specification for compostable plastics) and mineralized to carbon dioxide and assimilated into biomass within 180 days.

BMX™ was 65.1%

The eco-intelligent way

Infrastructure Situation

- Limited Waste Collection Available
- No Industrial composting facilities



Process and Social Situation

- Incorrect Disposal
- Littering prevalent everywhere



The eco-intelligent way

- Sustainable, cost effective and compliant solutions that work using oxo-biodegradable technology.
- BMX™ oxo-biodegradable additive, compound and formulations.

Issue
Compostable products are not useful

Issue
Traditional and compostable products are inappropriate



eco-intelligent production proposal

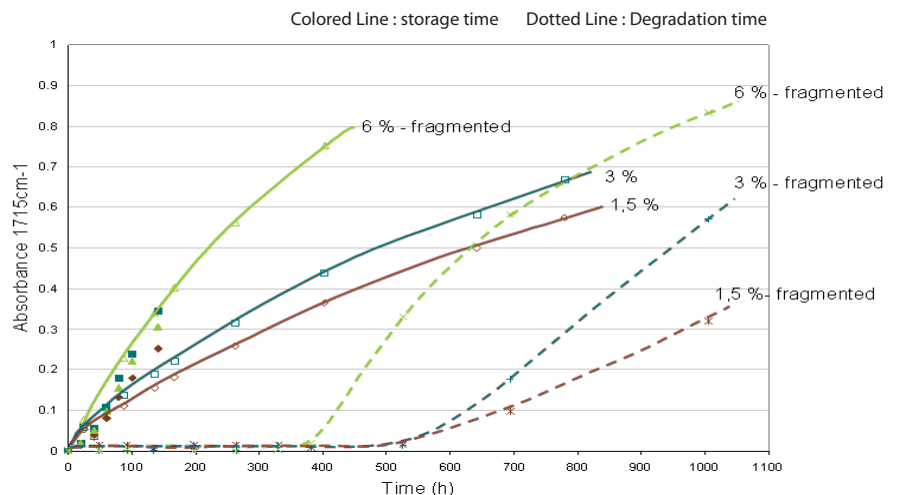
Material	Energy for Production MJ/Kg	Remarks
Polylactic acid (PLA)	69	
Polyhydroxy alkanooates(PHA)	89	
Polyethylene (PE)	28	as well applicable for BMX™
Mineral modifier	1.3	Eg: CaCO ₃
Paper	600	
HIPS	15	

BMX™ + mineral modifier = < 18 MJ / kg (at ca. 50/50)

Storage, Use and Degradation Behaviour

※ Example of a 25 µm LDPE film

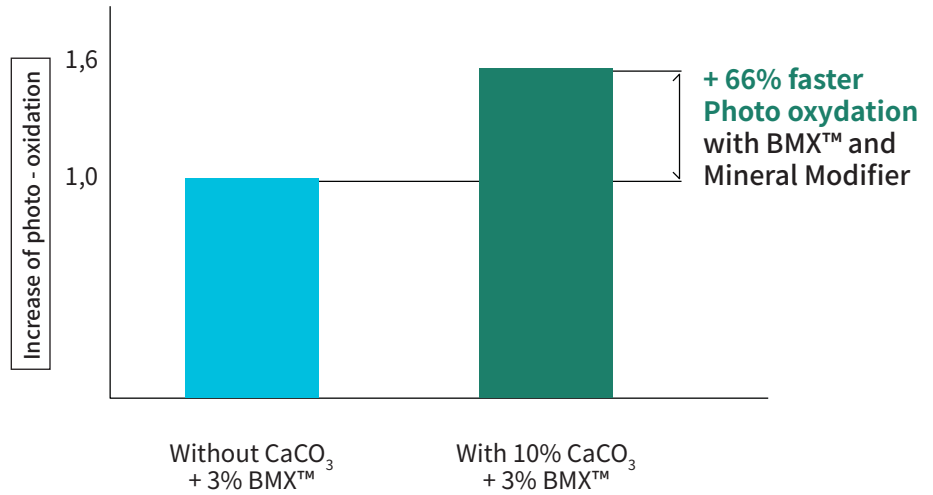
R & D Prof. J. Lemaire, CNEP, Clermont Ferrand, France



BMX™ - 40h SEPAP + Oven at 60° C IRTF and transmission of films

Photo induced – Oxydation in Combination of BMX™ and Mineral Modifier

R & D Prof. J. Lemaire, CNEP, Clermont Ferrand, France



Application Usage

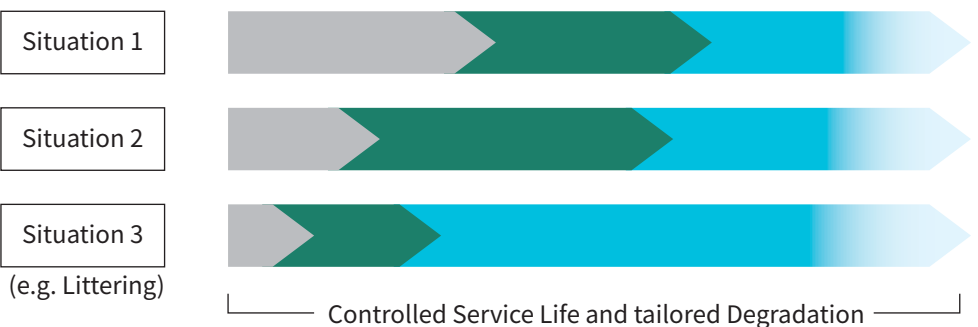
Application	Let down	Thickness	% BMX™
Fruit & Vegetable T-shirt bags	HDPE	9 µm	1 % EL / EL-S
Carrier bags	LD / HD	18 µm ~ 25 µm	1 - 2 % EL / EL-S
Food trays	PP	ca. 300 µm	5 % EL / EL-S
Injection moulded parts	PP	ca. 500 µm	6 % EL / EL-S

All applications are subject to customer / enduser specification and will be tailored to have optimised properties in storage, use, degradation and economics.

System unique examples

It allows to control the time for

■ Storage ■ Use ■ Degradation



Products

	BMX™ EL	BMX™ EL-S
Typical Letdown	1% - 5%	1% - 4%
Letdown Polymer	LLDPE, LDPE, HDPE	LLDPE, LDPE, HDPE
Typical Applications	Carrier-and waste – disposal bags, mulch film	Carrier-and waste – disposal bags, mulch film
	Non-odor food grade Combined Photo- and Oxo- biodegradation	
	BMX™ Special	BOPP, HIPS, PVC, custom

Product range

BMX™ EL

Standard / transparent, General purpose grade e.g., For shopping bags optimized for degradation under littering conditions

BMX™ EL-S

Standard / transparent slight yellowish hue, General purpose grade e.g., For shopping bags optimized for degradation under littering and landfill.

BMX™ EL-ST

High stabilized transparent, Grade for extended shelf and service life

BMX™ EL-PSST

stabilized/transparent, Grade based on GPPS e.g. cutlery

BMX™ EL-PVC

PVC white (powder) customer grade on request

BMX™ EL-PVC-T

PVC transparent (powder) customer grade on request

BMX™ EL-PA

PA6 based

BMX™ EL-C-T

LLDPE based integrated compound with 80% CaCO₃

BMX™ EL-CC

Same properties as HES-S
More economical version

BMX™ EL-CCS

Same properties as HES-S
Extra stabilized

BMX™ EL customized

customer grades on request

Application cases

■ Storage ■ Use ■ Degradation



Carrier Bag

Specification (month)

■ 6-12 ■ 3 ■ 12-48

Solution

HDPE

1 % BMX™ EL-W

Mineral masterbatch
at 25µm film thickness
Oxo – Biodegradable



Carrier Bag

Specification (month)

■ 6-12 ■ 3 ■ 12-48

Solution

HDPE

3 % BMX™ EL

30% Mineral
at 30 µm film thickness



Food Bag

Specification (month)

■ 3-6 ■ 1 ■ 12-48

Solution

LDPE

3 % BMX™ EL-W

Mineral masterbatch
at 25µm film thickness
Oxo – Biodegradable



Food Tray

Specification (month)

■ 3-12 ■ 1-3 ■ 12-48

Solution

PP

3 % BMX™ EL

50% mineral modifier
at 500 µm film thickness
Oxo – Biodegradable



Vending Cup

Specification (month)

■ -12 ■ 1-3 ■ -36 Month

Solution

PS

3 % BMX™ EL-PS

at 300 µm film thickness
Oxo – Biodegradable



Vending Cup Lid

Specification (month)

■ -12 ■ 1-3 ■ -48

Solution

PS

3 % BMX™ EL-PS

at 300 µm film thickness
Oxo – Biodegradable
Right outdoor
degradation after 3 Month



Non-wovens

Specification (month)

■ 6 ■ 3-12 ■ 3

Solution

PE/PP

3 % BMX™ EL-S

at 25µm film thickness
Oxo – Biodegradable
Outdoor weathering
after 6 weeks



Woven Bags

Specification (month)

■ 12 ■ 3 ■ 48

Solution

PE/PP

3 % BMX™ EL

at 125µm film thickness
Oxo – Biodegradable