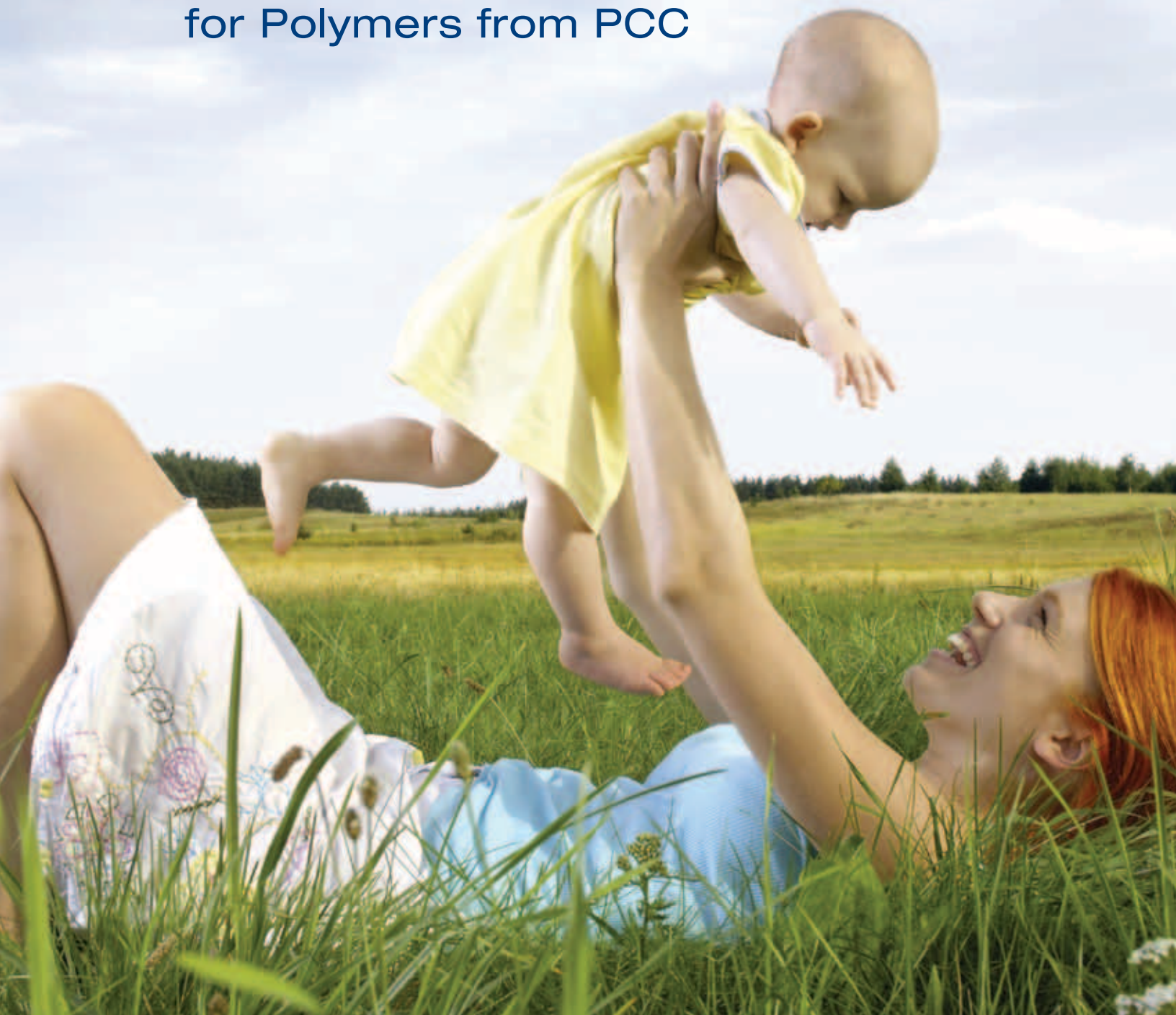


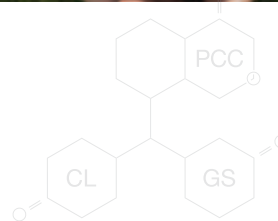
# Sustainable Solutions

for Polymers from PCC



Plastics Color  
CORPORATION

# Solutions that matter



## Why consider PCC's sustainable solutions?

- › Immediately enhance your company's sustainability programs
- › Support environmentally-friendly manufacturing processes
- › Achieve customer and government sustainability metrics

## PCC is at the forefront in creating environmentally sound solutions for colorants, resins and additives.

This commitment has led PCC to introduce product lines that include: **color concentrates** made with post-consumer regrind (PCR) and industrial plastic content; **eco-friendly** colorant and additive systems and compounds that deliver true biodegradability while maintaining the structural and aesthetic characteristics of traditional polymers; and **a line made from renewable resources**.

## PCC's eco-enhancing products

### SoluPur™ with EcoPure®

SoluPur with EcoPure is a carrier system and additive package incorporating EcoPure biodegradable technologies – unique, patented products exclusively from PCC  
*available as liquid or solid*

### EcoPure®

The chemical matrix added to traditional polymers to promote anaerobic biodegradability  
*available as liquid or solid*

### SoluPur™ Color Palette

Products made from pigments that are inert in post degradation environments

### SoluPLAs™

A full line of solutions designed to enhance the physical properties and improve aesthetics of PLA  
*available as liquid or solid*

### PCC Colorants with PCR

A line of color concentrates made from various levels of post-consumer regrind and industrial plastics

# Measureable results from PCC's biodegradable products

SoluPur™ with EcoPure® accelerates the biodegradation of traditional, petroleum-based plastic products in a biologically active landfill. When SoluPur with EcoPure is added (at approximately 1% in the finished part) during the manufacturing process, the product will biodegrade when disposed of in microbe-rich environments. An example of a microbe-rich environment is a biologically active landfill. EcoPure breaks down plastic into inert biomass, methane and carbon dioxide.

The addition of SoluPur with EcoPure does not negatively affect the manufacturing process or the physical properties of plastics. ASTM D5511 tests prove that SoluPur with EcoPure-treated plastics biodegrade in a fraction of the time required by untreated polymers.

## Are these solutions right for any operation?

SoluPur with EcoPure additives are compatible with various types of plastics, including the following:

**PE, PET, PP, PS, Nylon, PVC, EVOH, ABS, EVA, TPU, TPR and Polycarbonate.**

**Test results:** SoluPur with EcoPure is scientifically proven in ASTM standard testing to actually promote the measured bio-degradation of the host resin.

These products were tested against both positive and negative controls in the ASTM D5511-02 Anaerobic Digestion Test. Independent laboratories have concluded that EcoPure increased methane off-gassing as a result of anaerobic biodegradation in a variety of traditional polymers.

## Test protocol

**Purpose:** To determine the degree of anaerobic biodegradation of plastic materials in a high-solids anaerobic environment. (High solids conditions are usually considered to be greater than 20% solids.)

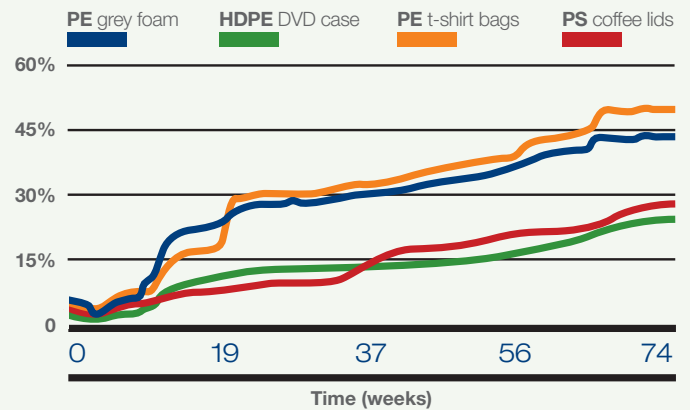
- The sample is exposed to a methanogenic inoculum cultivated from a wastewater treatment facility's anaerobic digesters operating on household waste. The digester test conditions remain static.
- The volume of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) is measured as the test evolves. The data are relative to a positive control (typically cellulose), a negative control (typically the same resin lacking the proprietary additive), and the inoculum alone.
- At the conclusion of the test, the remaining solid test sample mass and control sample masses are determined by weight.
- This method is considered an accelerated representation with respect to a typical active landfill environment.

## Test results for SoluPur with EcoPure

See corresponding data on back page

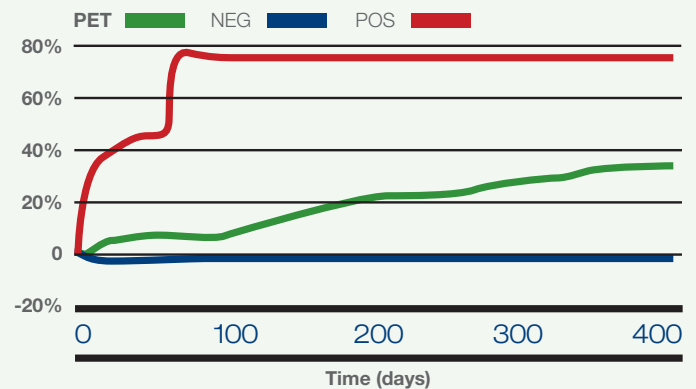
### Biodegradation various resins

518 days



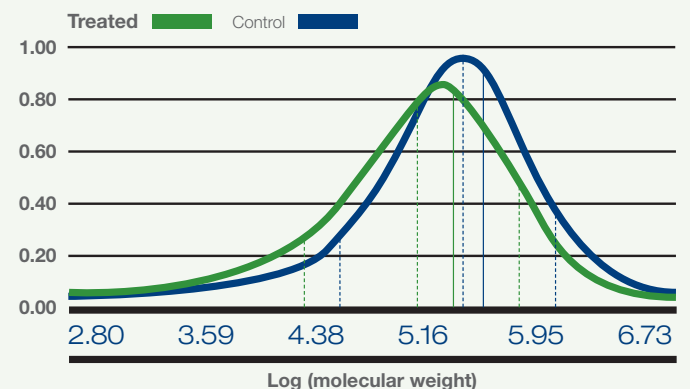
### Biodegradation PET

393 days



### Gel permeation chromatography PP

Independent data



# Sustainable options

Which one is right for your operation?

## Product comparisons

Consideration	SoluPur™ with EcoPure®	PCC-PCR products	SoluPLAs™
Cost	X	X	X
Ease of use	X	X	
Ease of recycling	X	X	
Stability	X	X	X
Clarity	X		X
Comparative environmental improvement	X	X	X
No impact on existing recycle stream	X	X	has dedicated stream (10)
Availability	X	X	X

## Chart specifications for SoluPur with EcoPure from graphs on page 3

Biodegradation various resins 518 days	Cumulative gas volume (mL)	Percent CH <sub>4</sub> (%)	Volume CH <sub>4</sub> (mL)	Mass CH <sub>4</sub> (g)	Percent CO <sub>2</sub> (%)	Volume CO <sub>2</sub> (mL)	Mass CO <sub>2</sub> (g)	Sample mass (g)	Theoretical sample mass (g)	Biodegraded mass (g)	Percent biodegraded (%)	*Adjusted % biodegraded
Inoculum	4483.9	44.1	1975.4	1.41	25.6	1146.2	2.25	1000	0.0	1.67		
Negative	4827.8	50.1	2417.2	1.73	27.6	1332.0	2.62	10	8.6	2.01	3.9	4.9
Positive	20218.3	61.5	12443.0	8.89	35.8	7238.1	14.22	25	11.1	10.54	80.3	100.0
PE grey foam	11056.2	40.2	4441.8	3.17	25.4	2810.0	5.52	6	5.1	3.88	43.0	53.6
HDPE DVD case	16538.0	40.6	6712.7	4.79	24.3	4014.7	7.89	20	17.1	5.75	23.8	29.6
PE t-shirt bags	13712.3	50.2	6880.1	4.91	30.4	4173.5	8.20	10	8.6	5.92	49.6	61.8
PS coffee lids	15094.3	50.4	7600.3	5.43	28.8	4349.3	8.54	20	17.1	6.40	27.6	34.4

Biodegradation PET 393 days	Cumulative gas volume (mL)	Percent CH <sub>4</sub> (%)	Volume CH <sub>4</sub> (mL)	Mass CH <sub>4</sub> (g)	Percent CO <sub>2</sub> (%)	Volume CO <sub>2</sub> (mL)	Mass CO <sub>2</sub> (g)	Sample mass (g)	Theoretical sample mass (g)	Biodegraded mass (g)	Percent biodegraded (%)	*Adjusted % biodegraded
Inoculum	3581.5	43.0	1541.4	1.1	26.0	930.6	1.83	1000	0.0	1.32		
Negative	3080.2	49.3	1519.7	1.09	28.0	863.5	1.70	10	8.6	1.28	-0.6	-0.7
Positive	18621.8	61.6	11474.5	8.2	36.0	6704.3	13.17	25	11.1	9.74	76.1	100.0
PET	11947.7	56.5	6751.0	4.82	30.9	3690.0	7.25	20	12.4	5.59	34.5	45.3

\* The adjusted percent is not within the method but is informative and very likely the actual degraded amount when biomass is considered.

Gel permeation chromatography	Run #	Mn	Avg	Mw	Avg	Mz	Avg	Mw/Mn	Avg
PP w/EcoPure	1	20,773	20,563	197,481	198,241	534,076	532,079	9.51	9.64
	2	20,354		199,001		530,083		9.78	
PP control w/o EcoPure	1	36,023	36,194	312,348	315,245	899,307	899,036	8.67	8.71
	2	36,364		318,142		898,765		8.75	

For more information or to speak with a representative, please visit [www.plasticscolor.com](http://www.plasticscolor.com) or call 800-922-9936.



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