

High heat PLA

Unlocking bioplastic potential for durable applications



Biobased



Reduced carbon footprint



Multiple end of life options



Heat resistance similar to
PP, PS & ABS

The global shift towards a biobased economy has placed pressure on plastic producers to seek alternatives to their oil-based products. Until now, PLA (Poly Lactic Acid) could not be used in injection molded applications where higher heat resistance was required. However, Corbion Purac's breakthrough in lactide monomers for high heat PLA is changing the face of biobased plastics, offering plastic producers an excellent level of performance.

Corbion Purac is a technology leader in biobased plastics innovation. Now Corbion Purac has raised the bar even higher when it comes to high heat PLA performance.

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Most PLA bioplastics of the past had the major drawback that they could not withstand increased temperatures. However, Corbion Purac has developed a high heat solution for PLA-based bioplastics.

PLA is an acronym that describes not just one product, but a range of different polymers. By combining optically pure D and L lactides in different ways, polymers with a range of properties can be produced. At the heart of this technology, you find blends of stereochemically pure PLA homopolymers, a type of PLA that until recently was not commercially available. These new PLA homopolymers open up new markets for bioplastic products, including consumer electronics, high heat packaging, automotive interiors, apparel and many more.

Corbion Purac has demonstrated that this is not just a theory by developing a range of blends in cooperation with our PLA partners, Universities, Institutes, compounders and brand owners.



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A biobased alternative

Corbion Purac's PLA technology can replace PS, PP and ABS type materials in applications where heat performance (HDT B) is a key requirement (see Figure 1). This higher heat performance is achieved by improving the purity of the PLA polymer backbone. With Corbion Purac's stereochemically pure lactides, Corbion Purac's partners can make PLA. PLLA homopolymers and PDLA homopolymers can be produced from Corbion Purac's PURALACT L and D lactides respectively. These PLA homopolymers are an excellent starting point for creating polymer blends with properties comparable to PS, PP and ABS type materials.

Comparable heat performance

Figure 2 and the table below show typical results of using PLA homopolymer blends: a heat performance similar to PS, PP and ABS. **Blend A:** the key driver behind this improvement are PLLA homopolymers that have been nucleated with a small amount of PDLA homopolymers and a traditional nucleant (see blend A in the table below for more details). The increased heat performance of blend A was obtained without adding significant amounts of filler.

Blend B: to achieve a higher modulus, and an even higher temperature resistance, talc was added to blend A (see blend B in the table below).

Blend C: to achieve an ABS type of impact resistance, blend A was impact modified. In order to minimize the drop in modulus, talc was added to this blend (see blend C in the table below).

High heat becomes a reality

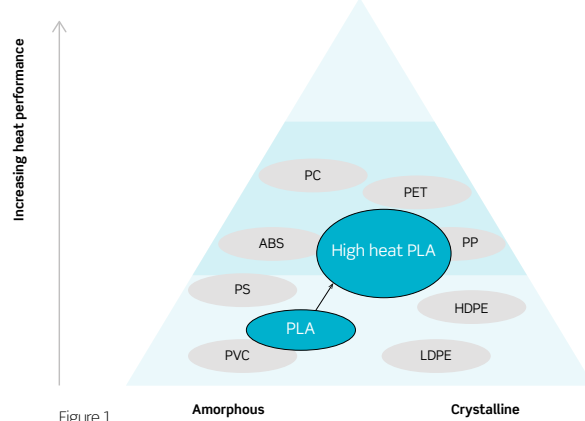


Figure 1

Closing the performance gap

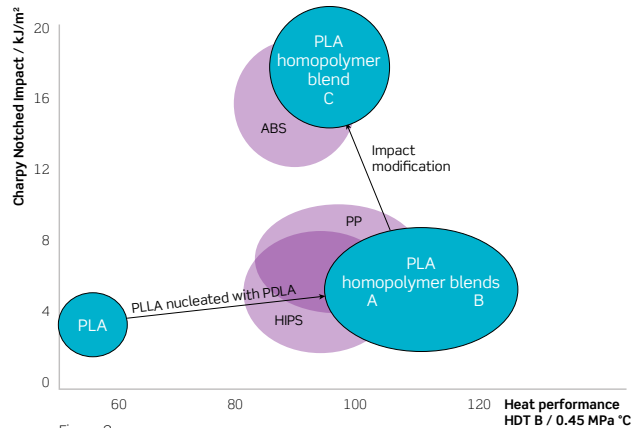


Figure 2

			Corbion Purac PLA sample grades*							
			HIPS	PLA	Blend A	Injection molding		Extrusion/thermoforming		
					Blend A	Blend B	Blend C	Blend K**	Blend D***	Blend E
					General purpose	Mineral filled	Impact modified	Compostable	Mineral filled	General purpose
Physical	Density	g/cm ³	1.05	1.24	1.24	1.35	1.25	1.3	1.4	1.24
	Clarity	yes/no	no	yes	no	no	no	no	no	no
Processing	Flow 210°C/2,16kg	MFI			30	5	3	10	3	10
	Melt temperature	°C	210-240	190-220	190-220	190-220	190-220	190-220	190-220	190-220
	Mold temperature	°C	30-60	25	90-100	90-100	90-100	90-100	90-100	90-100
	Pre-drying	yes/no	no	yes	yes	yes	yes	yes	yes	yes
Mechanical	Tensile modulus	MPa	2000	3300	3000	4000	3500	2500	4000	3000
	Tensile strength	MPa	35	48	45	42	35	30	40	45
	Strain at break	%	35	3	5	17	60	23	10	5
Heat	HDT B, 0.45MPa, flatwise	°C	93	55	105	120	95	85	110	105
Impact	Charpy notched, 23°C	kJ/m ²	8	3	5	6	23	6	5	5

* Developmental grades, all data is preliminary. Corbion Purac does not commercially produce these PLA blends. ** Compliance with EN13432 to be verified on actual end product. *** For high heat applications it is recommended to add 3-7% PURAPOL D070 (nucleating agent).

Interested in our solutions for PLA bioplastics? Go to corbion.com/bioplastics



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Corbion is the global market leader in lactic acid, lactic acid derivatives and lactides, and a leading company in emulsifiers, functional enzyme blends, minerals and vitamins. For the plastics industry, Corbion Purac offers lactides and PLA resins for general purpose and high performance bioplastics. PLA (Poly Lactic Acid) is a biobased plastic with a low carbon footprint and is used in packaging, disposables, fibers, electronics and automotive markets. Corbion operates 11 production plants, in the USA, the Netherlands, Spain, Brazil and Thailand, and markets its products through a worldwide network of sales offices and distributors.

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