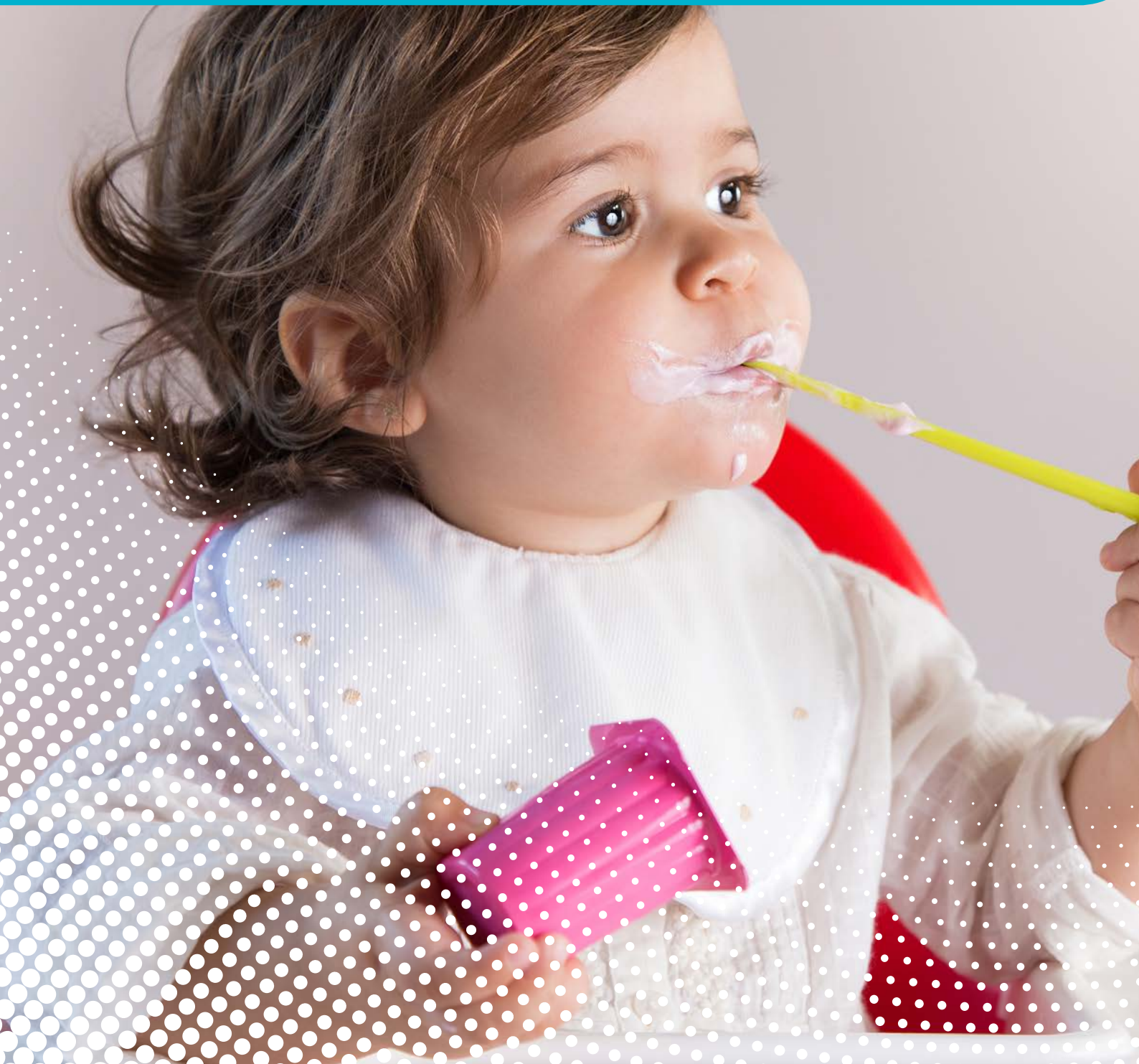


Polymer Additives & Chemical Specialties



Antistats, Antifogs, Mold Release and Lubricants

Our product line is diverse. As the mono content varies, as the double bonds increase or decrease, performance properties are altered. The chemistry affects solubility, affinity for water, migration in polymers, lubrication properties, volatility, shelf-life, crystallinity, and surfactant activity. Consequently, Corbion offers a wide range of glycerol ester solutions to antistat, antifog, lubrication, dispersion, release, and polymer processing problems. In addition to our standard products, custom solutions can be developed and produced to meet a customer's specific requirements.

Coating Additives for Expandable Polystyrene Particles

Corbion's PATIONIC 909 and PATIONIC 919 are commonly used additives in the production of EPS. These products have a high chemical purity and are characterized by a narrow particle size distribution (Figures 1 and 2), which creates a more stable, continuous and homogeneous coating layer around the EPS beads.

Corbion's PATIONIC 909/919 additives have antistatic properties that will reduce agglomeration of EPS beads during processing.

In addition, these PATIONIC 909/919 additives contribute to reduced cooling times during the molding step and result in an easier release of the foamed part from the mold. Besides improved handling and processing, PATIONIC 909/919 additives will also contribute to a better appearance and performance of the foamed product (e.g. for insulation, packaging).

- ▶ Antistatic properties
- ▶ Improves mold release
- ▶ Enhances appearance
- ▶ Improves foam structure
- ▶ Enhances cooling
- ▶ Kosher & Halal certified

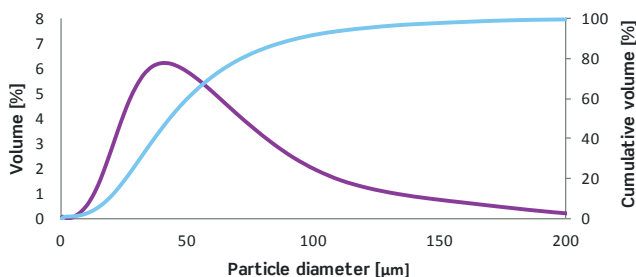


Figure 1. Particle size distribution plot of PATIONIC® 909

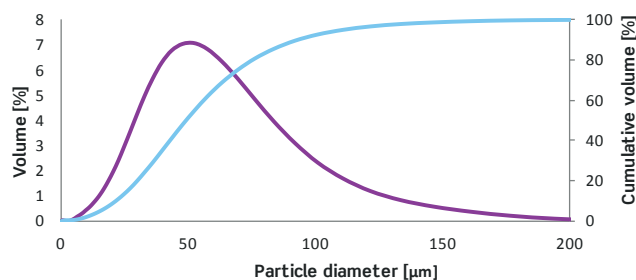


Figure 2. Particle size distribution plot of PATIONIC® 919



Acid Neutralizers for Increased Molding Rates in Polyolefins

Polypropylene is most often manufactured using Ziegler-Natta catalysts. The residues of these catalysts promote corrosion of metal surfaces and contribute to the decomposition and discoloration of the polypropylene during processing.

Research has shown that PATIONIC 1240 (a calcium lactate-based additive) can be used as an acid neutralizer without the negative effects caused by calcium stearate (Figure 3).



- ▶ Reduces processing time
- ▶ Enhances color retention
- ▶ Improves corrosion resistance

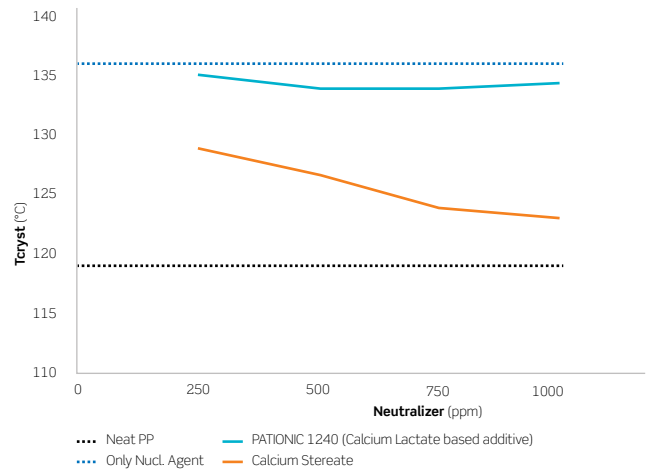


Figure 3. The effect of acid neutralizers on crystallization temperature

Class	Type	Brandname	Application	PP	PE	EPS	PVC	Concentrates
Glycerol Monostearate (GMS)	Distilled Monoglycerides	Pationic® 901, 915	Antistat	✓	✓	✓		
			Mold Release	✓	✓	✓		
		Pationic® 909	Pigment dispersant			✓		✓
	Mono/Diglycerides	Pationic® 1042, 1052	Antistat	✓	✓		✓	
			Mold Release	✓	✓			
Glycerol Monooleate (GMO)	Distilled Monoglycerides	Pationic® 907	Antifog		✓		✓	
			Internal lubricant				✓	
			Pigment dispersant					✓
	Mono/Diglycerides	Pationic® 1061	Antifog		✓		✓	
			Internal lubricant				✓	
			Pigment dispersant					✓
Glycerol Tristearate (GTS)	Triglyceride	Pationic® 919	External lubricant			✓		
			Mold Release			✓		
			General purpose lubricant & dispersant			✓		
Lactic acid derivatives	Lactylates	Pationic® 925, 930	Catalyst Residue Neutralizer	✓	✓			
			General purpose acid acceptor	✓	✓			
			External lubricant				✓	
	Lactate salts	Pationic® 1240	Catalyst Residue Neutralizer	✓	✓			
			General purpose acid acceptor	✓	✓			
Specialty Esters	Glycerol Ester Solutions	Pationic® AS500, 1530	Slurry additive				✓	
			External wet-cake additive				✓	
			Antistat				✓	
			General purpose lubricant & dispersant		✓		✓	✓

	Patonic® 901	Patonic® 907	Patonic® 909 Patonic® 919	Patonic® 1042 K Patonic® 1052 K	Patonic® 1061
Polymer type					
LDPE	500 - 2000 ppm	1000 - 3000 ppm		500 - 2000 ppm	1000 - 3000 ppm
LLDPE	500 - 2000 ppm	1000 - 3000 ppm		500 - 2000 ppm	1000 - 3000 ppm
HDPE	2000 - 3000 ppm			2000 - 3000 ppm	
PP	2000 - 6000 ppm			2000 - 6000 ppm	
EPS			3000 - 6000 ppm		
PVC Rigid		1.0 - 3.0 phr			1.0 - 3.0 phr
PVC Flexible		0.5 - 1.0 phr			0.5 - 3.0 phr
Type	DM (Hard)	VEG DM (Soft)		MONO/DI (Hard)	VEG MONO/DI (Soft)

All PATIONIC® grades are offered in several physical forms including beads, flakes and pastille, and they come in several packaging options including drums, bags and super sacks.

Chemical Specialties

	condition	unit	PURASOLV® BL	PURASOLV® EHL	PURAC® HS	PURALACT® D3	PURALACT® B3
Trivial name	INCI name		n-butyl lactate	2-ethylhexyl lactate	L-Lactic acid	D-Lactide	L-Lactide
Formula			C ₇ H ₁₄ O ₃	C ₁₁ H ₂₂ O ₃	C ₃ H ₆ O ₃	C ₆ H ₈ O ₄	C ₆ H ₈ O ₄
Molecular weight		g/mol	146,19	202,29	90,08	144,13	144,13
CAS no.			34451-19-9	186817-80-1	79-33-4	4511-42-6	13076-17-0
EC no.			252-036-3	228-503-2	201-169-2	224-832-0	202-468-3
TSCA registration			yes	yes	yes	yes	yes
USA/FDA: GRAS			yes	no	yes	-	-
Typical concentration		%w/w	min. 97	min. 97	min. 88	min.99.5	min. 99.5
Appearance			clear colorless liquid	clear colorless liquid	slightly viscous liquid	white crystalline solid	white crystalline solid
Boiling point		°C/°F	187/369	246/475	125/257 (90% solution)	263/505	263/505
Flash point, ISO 2719	closed cup	°C/°F	79 / 174	113 / 235 ⁽²⁾	-	-	-
Melting point		°C/°F	-20 / -4	-23 / -9	-	96 - 100 / 205 - 212	96 - 100 / 205 - 212
Density	at 20°C/68°F	g/ml	0,98	0,93	1,22	1.33	1.33
Surface tension	at 25°C/77°F	mN/m	29,5	29,8	-	-	-
Viscosity	at 20°C/68°F	cP	3.9	7.7 ⁽¹⁾	5 - 60 (50-90%)	-	-
Vapour pressure	at 20°C/68°F	mBar	0,4	0,02	0,004	0,002	0,002
Vapour pressure	at 100°C/212°F	mBar	50	6		-	-
Relative evaporation rate	n-BuAc=1		0,030	0,003		-	-
Refractive index	at 20°C/68°F		1,420	1,435	1,439	-	-
Log P	octanol/water		1,1	3,17		-	-
Solubility in/of water	at 20°C/68°F	%w/w	4.5 / 13.9	0.03 / 3.5	>90	decomposes to lactoyl lactic acid	decomposes to lactoyl lactic acid
pKa	at 25°C/77°F				3.86		
pH	10%w/w solution in water				1.8		

⁽¹⁾ at 25°C

⁽²⁾ ISO 3679

Why Corbion?



Advanced technology and R&D

At Corbion, we engage in ongoing R&D efforts to improve performance and sustainability of our products and processes.



Consistent high quality

Corbion has mastered the production technology to make high purity, high performance lactic acid, derivatives and emulsifiers at industrial scale.



100 years of experience

Corbion has 100 years of experience in sales, application development and industrial scale production. Corbion is the global market leader in lactic acid, derivatives and lactides.



Global presence

With 10 production facilities and sales offices on every continent, we are always close by to help you with your application development. All our products are available at an industrial scale



Safer and more friendly for our planet

Corbion produces high quality lactic acid and derivatives using a biochemical fermentation process by efficient conversion of sugars. Corbion products are regarded as safe, offering a good alternative to traditional products that have become under increased regulatory pressure.



Corbion factory in The Netherlands



Your reliable partner

Innovation and Application

Our innovation and Application centers are focused on your challenges of tomorrow. Our technical team of chemist, analytical and application technologist are available to provide you with customized solutions.

Deliveries

Corbion works on continuous improvement of its delivery times and reliability. Working to improve consistency within the supply chain is making the network more responsive while streamlining operations.

Prevention

Corbion deploys prevention activities in our plants and throughout our supply chain in order to avoid the occurrence of incidents. We have extensive safety program, quality program, maintenance program as well as risk identification and mitigation measures in place.

Planning

We also have structured emergency response plans, crisis management procedures and business continuity plans in place to ensure we can secure the highest business reliability possible. Corbion aims at creating resilient supply chains for its clients. To that purpose we have multiple production locations.

Let us know how we can help you

● Corbion Headquarters ● Corbion Production Location ● Corbion Sales Office ● Corbion Innovation Center



corbion.com/contact

About Corbion

Corbion is the global market leader in lactic acid, lactic acid derivatives, and a leading company in emulsifiers, functional enzyme blends, minerals, vitamins and algae ingredients. We develop sustainable ingredient solutions to improve the quality of life for people today and for future generations. For over 100 years, we have been uncompromising in our commitment to safety, quality, innovation and performance. Drawing on our deep application and product knowledge, we work side-by-side with customers to make our cutting edge technologies work for them. Our solutions help differentiate products in markets such as food, home & personal care, animal nutrition, pharmaceuticals, medical devices, and bioplastics. In 2016, Corbion generated annual sales of € 911.3 million and had a workforce of 1,684 FTE. Corbion is listed on Euronext Amsterdam.

Interested in solutions for the Chemical Specialty industry? Go to corbion.com/biochemicals



biobased@corbion.com



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