

vercet ™

# RESINS

FOR COATINGS & ADHESIVES

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# CREATING PERFORMANCE THROUGH CHEMISTRY

Building upon decades spent advancing materials chemistry innovation, NatureWorks offers solutions based on lactides and lactide intermediates that help innovators within the coatings, adhesives, sealants, and elastomers (C.A.S.E.), toner and surfactant industries realize:



Significant, measurable product performance benefits



Move through the R&D process more efficiently and with minimal risk



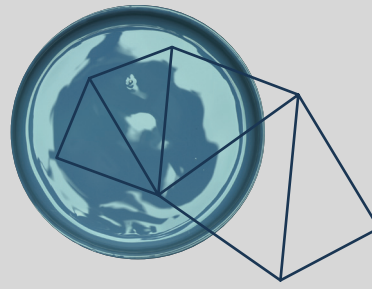
Decrease systems costs via an optimized supply chain

## POLYMERIC RESINS

### CUSTOM SOLUTIONS FOR SOLVENT-BORNE COATINGS & HOT MELT ADHESIVES

Using Vercet resins for coatings & adhesives enables unique properties including a tunable work-life, more end-of-life options, excellent adhesion, and low dispensing temperatures for substrates such as fiber board, paper food packaging, and woods.

COATINGS		ADHESIVES	
SUBSTRATES	MARKETS	SUBSTRATES	MARKETS
Wood Wood Laminates Paper Metals Textiles	Flexible Packaging Food Service Architectural (Decorative)	Wood Wood Laminates Paper Metals	Flexible Packaging Packaging - Carton and Case Seal
PERFORMANCE BENEFITS		PERFORMANCE BENEFITS	
Excellent oil, grease, and solvent resistance Great heat seal Notable transparency and gloss More end-of-life options incl. recycling and composting Renewably-sourced building block		Tunable work-life (seconds to minutes) Low dispensing temperatures Tunable viscosity Excellent adhesion to wood, paper, & plastic Renewably-sourced building block	



We achieve this by coupling tunable Vercet™ lactide-based chemistries with the knowledge of scientists and engineers who understand how to dial in the full capabilities of this versatile product line.

## PROPERTIES

### TUNABLE SET TIME, VISCOSITY, & WORK-LIFE IN ADHESIVES

Physical Properties <sup>1</sup>	Vercet Resin Grades <sup>2</sup>				Method
	A1000	A1010X	A1020X <sup>3</sup>	A1030X	
Specific Gravity	1.24				ASTM D792
Tg-Range (°C)	54-57	48-56			NW Internal DSC Method, Tg mid-point, 2 <sup>nd</sup> heat
Viscosity (Pa*s)	120°C	Too high	Too high	30-50	NW Internal Brookfield Method (#27 Spindle)
	150°C	Too high	200-230	5-10	
	180°C	>1,000	20-35	Too low	
Solubility	Soluble in ethyl acetate, acetone, 2-butanone				

1. Typical properties; not to be construed as specifications.

2. X suffix denotes experimental grade resin

3. Pellets of A1020X may cold flow due to its low viscosity and could require additional handling.

### TRANSPARENCY, GLOSS, & SOLUBILITY IN COATINGS

Physical Properties <sup>1</sup>	Vercet Resin Grades <sup>2</sup>				Method
	C1000X	C1010	C1020X <sup>3</sup>	C1030X <sup>3</sup>	
Specific Gravity	1.21-1.24				ASTM D792
MFI	120°C	NM <sup>4</sup>	NM	~60	NW Internal Method g/10 min @ 2.16 kg
	150°C		NM	~85	
	180°C	~800	~20	NM	
Viscosity <sup>5</sup>	15% solids	16	14 (6.5% solids)	7	NW Internal Method ISO 4 Cup Measured at ~21°C
	30% solids	135	48 (10% solids)	54	
Solubility	Soluble in ethyl acetate, acetone, 2-butanone				
Approx. solubility in ethyl acetate (wt%)	20-30%	≤ 15%	30-40%	40-50%	

1. Typical properties; not to be construed as specifications.

2. "X" suffix denotes experimental grade resin

3. Pellets of C1030X may cold flow due to its low viscosity and could require additional handling.

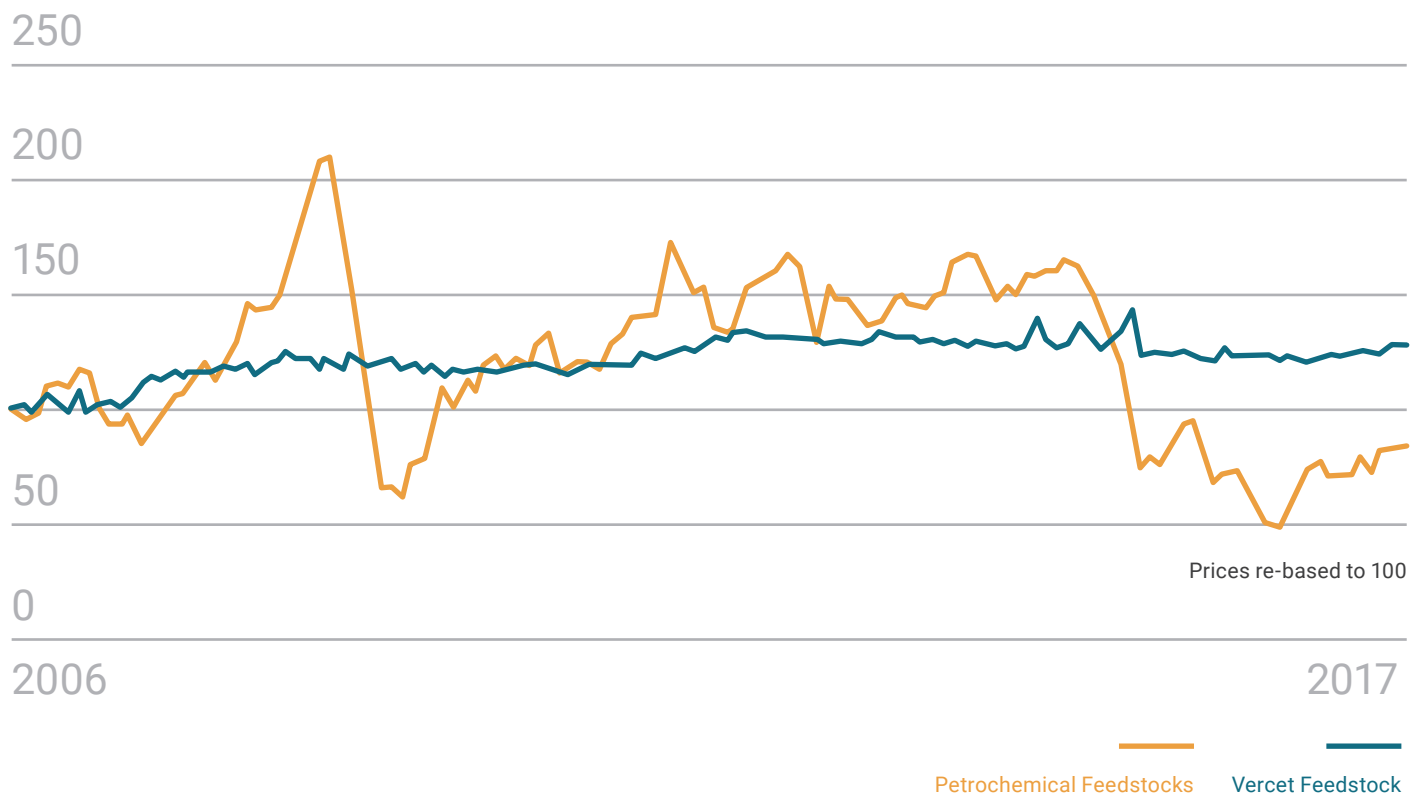
4. "NM" not measured at conditions shown

5. Ethyl acetate, cSt

## BENIGN BY DESIGN

# REDUCING VOLATILITY IN PRICING THROUGH ALTERNATIVE FEEDSTOCKS

Renewably-sourced Vercet lactide-based products bring sensible, elegant, and cost-effective solutions based squarely on the principles of green chemistry to supply chains that, until now, were coupled with traditional fossil-petroleum solutions and their inherent price volatility.



## HOW CAN WE HELP YOU?

To learn more about Vercet custom solutions, please contact a member of our Performance Chemicals team.

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