Nouryon

SolAmaze™ Natural polymer

Biodegradable film-forming polymer for water resistance

INCI: Diisostearoyl Polyglyceryl-3 Dimer Dilinoleate (and) Caprylic/Capric Triglyceride

When formulating high performing sunscreens, formulators have learned to fully trust synthetic ingredients providing outstanding water-resistance and pleasant consumer aesthetics. However, these ingredients, often based on petrochemically derived raw materials, are under scrutiny from NGOs and the media for their persistence in the environment and arguable sustainability. Regardless of the scientific facts they tend to sensationalize the microplastic discussion rather than promote good science. Due to this trend in the market, consumers are demanding more sustainable product solutions while the performance must be at least equivalent.

SolAmaze Natural polymer is a novel bio-based, biodegradable, film-forming polymer that offers superior water resistance and pleasing aesthetics for high SPF emulsion sunscreens. SolAmaze Natural polymer is globally approved and was developed to maintain the performance of leading synthetic polymers while reducing the persistence in the environment.

Recommended applications

- Traditional organic sunscreens up to SPF50+
- Fully mineral sunscreen formulations
- Anhydrous sunscreen sticks
- Daily wear moisturizer with SPF
- Color cosmetics
- Face, body, hand and foot creams and lotions

Product highlights

Features	Benefits
Film formation	Proven water resistance and SPF retention at low use levels
Aesthetics	Lightweight feel during and after application
Liquid polymer supplied as 60% active	Easy to incorporate into emulsion sunscreen formulations
Globally accepted INCI name	Useful in a wide range of systems and suitable for use in all regions

Suggested use levels, as supplied

Application	% active
Sun protection	2-5
SPF daily wear moisturizer	2-3
Anhydrous sunscreen sticks	1-5
Tinted sunscreens	2-5
Color cosmetics	1-10
Creams and lotions	1-5

Suggested pH range of final formulation: 4-8.

Biodegradability

The biodegradability of SolAmaze Natural polymer was assessed using the OECD 301D ready biodegradation screening test. The pass-level of this test allowing a ready biodegradation classification is set at 60% and must be reached within the 28-day test period. River water was used as inoculum to assess the biodegradation potential. SolAmaze Natural polymer is classified readily biodegradable after passing the OECD 301D test at day 28.

Formulation guidelines

Supplied as a 60% liquid solution, SolAmaze Natural polymer is easily dispersed in the oil phase of oil-in-water emulsions and is easy to work with in lab and large-scale manufacturing settings. It requires no heat or neutralization and can be used in either hot or cold emulsification processes. The material can be used at typical sunscreen formulation pH ranging from 4 to 8. SolAmaze Natural polymer has an estimated HLB of 4-5 and it is possible that the polymer can interact with the HLB-based emulsification system and should be taken into consideration for calculations. Please reference the formulator's tool kit excel document for additional information.

Compatibility

Sunscreen actives

SolAmaze Natural polymer performs well in the typical sunscreen formulations and has excellent compatibility with commonly used sunscreen actives, including Ethylhexyl Salicylate (Octisalate), Homosalate, Octocrylene, Avobenzone, Ethylhexyl Methoxycinnamate (Octinoxate), Benzophenone-3 (Oxybenzone), Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine, Titanium Dioxide and Zinc Oxide.

Other

SolAmaze Natural polymer is compatible with a wide range of commonly used biodegradable rheology modifiers and emulsion stabilizers such as Hydroxypropyl Starch Phosphate (Structure® XL starch), Dehydroxanthan Gum (Amaze™ XT polymer) and Modified Potato Starch (Structure Solanace™ starch), as well as synthetic ingredients such as Carbomer, Acrylates/C10-30 Alkyl Acrylate Crosspolymer, and other frequently used thickeners and polymeric emulsifiers.

Performance testing

In-vivo water resistance
FDA 2011 Static & 80 minute water resistance
5 panellist screener study*

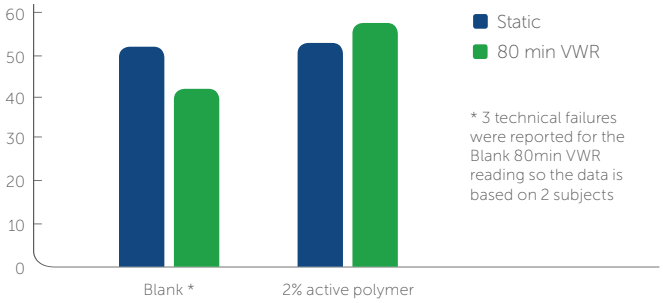
US SPF 50+ Emulsion Sunscreen Chassis 2823-70

	Ingredient	Wt %
Phase A	Deionized water	QS
	Dissolvine® NA2-S chelate	0.10
	Propylene Glycol	2.00
	Phenoxyethanol (and) Ethylhexylglycerin	1.00
	Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.40
Phase B	Avobenzone	3.00
	Homosalate	13.00
	Ethylhexyl Salicylate	5.00
	Octocrylene	8.00
	Glyceryl Stearate (and) PEG-100 Stearate	3.50
	C12-15 Alkyl Benzoate	5.00
	Dimethicone	3.00
	SolAmaze™ Natural polymer (2% active)	2.00
Phase C	Triethanolamine-99%	0.60
	Deionized water	4.00
	50% Citric Acid Solution	0.13

pH 6.0-7.0
Viscosity 15,000-25,000 cps, Brookfield, spindle C, 10 rpm, 25°C

In-vivo SPF

US SPF 50+ Emulsion Sunscreen Chassis 2823-70



SolAmaze Natural polymer provides excellent water-proofing, SPF retention, and reproducibility in high SPF emulsions under the 2011 FDA in-vivo protocol.

SolAmaze Natural polymer increases water resistance performance without altering the aesthetics of a formulation.

Aesthetic testing
8 panellists reported at a 95% confidence interval

US SPF 50+ Emulsion Sunscreen Chassis 2823-70

	Attributes	SolAmaze Natural polymer vs blank
Immediate feel	Spreadability	No significant difference
After-feel	Stickiness	No significant difference
	Gloss	No significant difference
	Slipperiness	No significant difference
	Residue	No significant difference
	Greasy	No significant difference
	Oily	No significant difference
	Powdery	No significant difference
	Prefer	No significant difference

Eco-conscious formulating

SolAmaze Natural polymer enables formulators to create more environmentally friendly sunscreens without sacrificing performance.

Naturemade Solar Defense SPF 50+ 2823-86

The Naturemade Solar Defense formulation features three naturally derived and biodegradable Nouryon products for a high performing acrylate free sunscreen.

	Ingredient	Wt %
Phase A	Deionized water	48.12
	Euxyl® PE 9010	1.00
Phase B	Avobenzone	3.00
	Octisalate	5.00
	Octocrylene	8.00
	Homosalate	13.00
	SolAmaze™ Natural polymer (2% active)	2.00
	C13-15 Alkane	2.00
	Caprylic/Capric Triglyceride	2.00
	Sucrose stearate	2.00
	Sucrose stearate	2.50
Phase C	Amaze™ Nordic Barley	4.00
	Structure® XL	1.85
	Propanediol	4.00
	25% Citric Acid Solution	0.20

pH 6.5-7.5
Viscosity 20,000-30,000 cps, Brookfield, spindle C, 10 rpm, 25°C

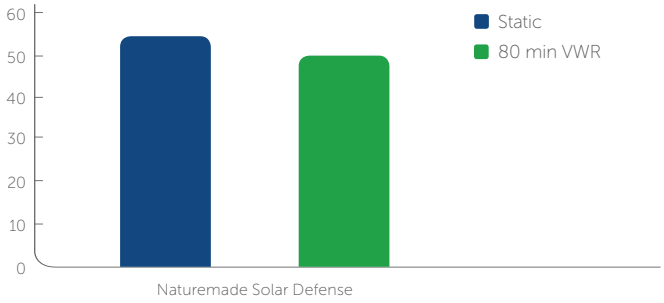
In-vivo water resistance

FDA 2011 Static & 80 minute water resistance

5 panellist screener study*

In-vivo SPF

Naturemade Solar Defense SPF 50+ 2823-86



Aesthetic testing

8 panellists reported at a 95% confidence interval

Naturemade Solar Defense SPF 50+ 2823-86

Amaze Nordic Barley was removed from the formula for aesthetic panel testing.

	Attributes	SolAmaze Natural polymer vs blank
Immediate feel	Spreadability	- (less slip)
After-feel	Stickiness	No significant difference
	Gloss	No significant difference
	Slipperiness	- (less slip)
	Residue	No significant difference
	Greasy	No significant difference
	Oily	+ (less oily)
	Powdery	No significant difference
	Prefer	No significant difference

SolAmaze Natural polymer decreases the oiliness in a high SPF acrylate-free sunscreen.

Natural Sunscreen with a hybrid UV filter system

The Hybrid Mineral Sunscreen Fluid formulation is an ultra-lightweight and fast absorbing formula containing both mineral and organic UV filters.

Hybrid Mineral Sunscreen Fluid 2823-85.A

	Ingredient	Wt %
Phase A	Water	53.69
	Propanediol	4.00
	Amaze™ XT polymer	0.15
	Phenoxyethanol (and) Ethylhexylglycerin	1.50
Phase B	Sucrose stearate	2.00
	Sucrose stearate	2.50
	Homosalate	5.00
	Ethylhexyl Salicylate	5.00
	Zinc Oxide (and) Polyhydroxystearic Acid	8.00
	Octyldodecanol (and) Squalane (and) Caprylic/Capric Triglyceride	3.00
	SolAmaze™ Natural polymer (2% active)	2.00
	Caprylic/Capric Triglyceride	4.00
Phase C	Amaze™ Nordic Barley	4.00

pH 6.5-7.5
Viscosity 20,000-30,000 cps, Brookfield, spindle C, 10 rpm, 25°C

In-vivo water resistance

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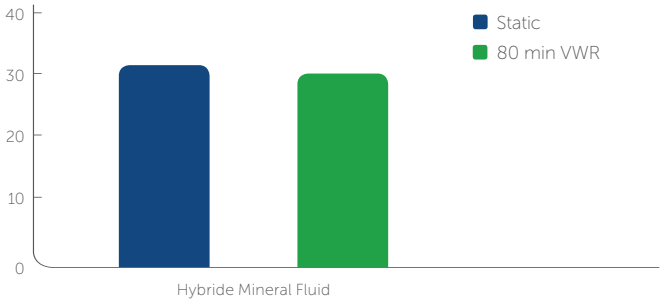
In-vivo SPF

Hybrid Mineral Sunscreen Fluid SPF 30 2823-85.A

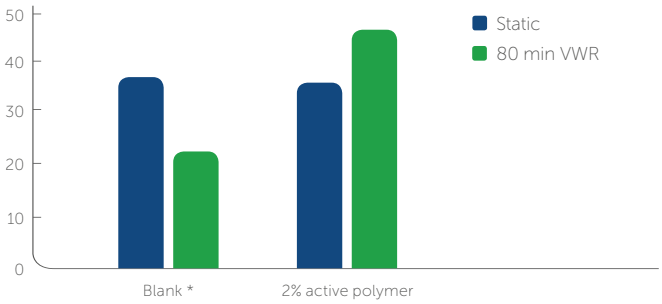


In-vivo water resistance

Vitro skin

In-vivo SPF

Hybrid Mineral Sunscreen Fluid SPF 30 2823-85.A



SolAmaze Natural polymer decreases the oiliness in a high SPF acrylate-free sunscreen.

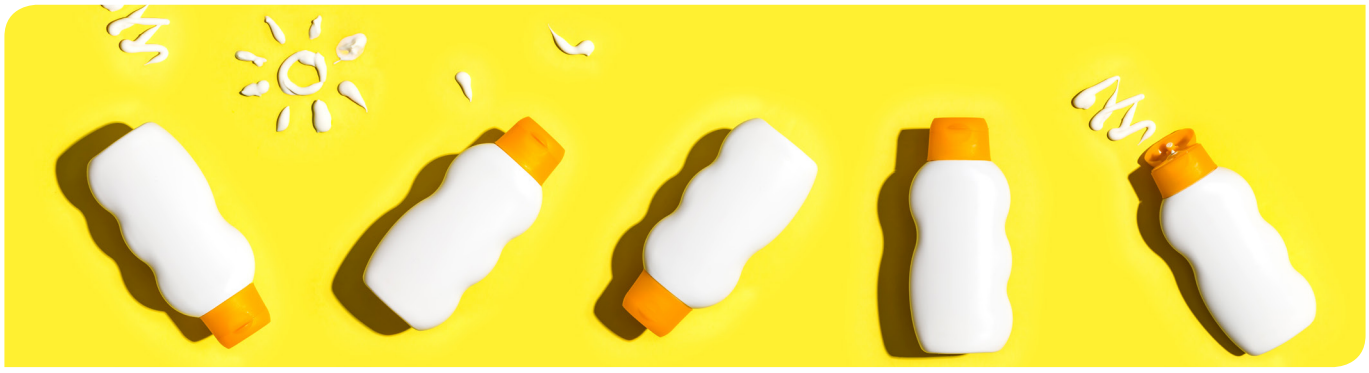
Aesthetic testing

Hybrid Mineral Sunscreen Fluid SPF 30 2823-85.A

Amaze Nordic Barley was removed from the formula for aesthetic panel testing.

	Attributes	SolAmaze Natural polymer vs blank
Immediate feel	Spreadability	No significant difference
After-feel	Stickiness	No significant difference
	Gloss	No significant difference
	Slipperiness	No significant difference
	Residue	No significant difference
	Greasy	No significant difference
	Oily	No significant difference
	Powdery	No significant difference
	Prefer	No significant difference

SolAmaze Natural polymerdoes not affect the aesthetics of a formula containing zinc oxide when tested in a sensory panel.



Storage and handling

Store at less than 45°C. Mix before use.

Good industrial hygiene practices should be followed when working with this polymer. Please read the SDS before working with this or any other chemical. This product has a 12-month shelf life.

Health and safety

A health and safety summary related for SolAmaze Natural polymer is available on request. Information on SolAmaze Natural polymer relating to EU Cosmetic Directive 76/768/EEC is also available upon request.

The suitability of the final formulations should be confirmed in all respects by appropriate evaluation. The marketer is advised to evaluate the final formulation with regard to performance and health and safety.

Contact us directly for detailed product information and sample request
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Nouryon

Nouryon is a global, specialty chemicals leader. Markets and consumers worldwide rely on our essential solutions to manufacture everyday products, such as personal care, cleaning goods, paints and coatings, agriculture and food, pharmaceuticals, and building products. Furthermore, the dedication of more than 7,900 employees with a shared commitment to our customers, business growth, safety, sustainability and innovation has resulted in a consistently strong financial performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands. Visit our website and follow us @Nouryon and on LinkedIn.

August 2021

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