

**More than Silicones from Dow
Personal Care**

Seek **Together™**



OUR ESG-ALIGNED AMBITION DRIVES LONG-TERM VALUE

Our ambition is to be the most **innovative**, **customer-centric**, **inclusive** and **sustainable** materials science company in the world.

Innovating with our customers at the design table to meet evolving market needs

Enhancing customer experience with digitalization and sustainability-infused business models



Committing to inclusion, diversity and equity for our Company and for our communities

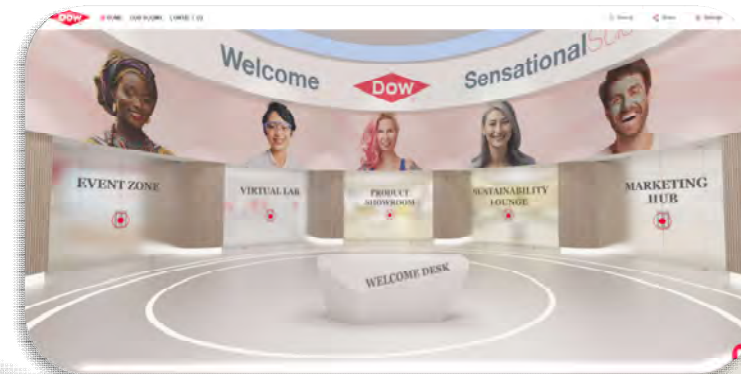
Driving ambitious sustainability targets to address carbon neutrality and plastics circular economy



Dow Hair Care Academy



Dow Personal Care Virtual Experience Center



Embracing your natural hair texture



Sustainable Beauty@Dow Personal Care

How can you achieve outstanding performance with products that are safe for people and the planet?



Sustainability – What's your word?



Consumers and brands are constantly searching for products with associated labels to cater to their demands for naturality and sustainability.

25%

of US BPC consumers agree that they would be willing to pay more for products that use sustainable ingredients

Source: Waste-not Skincare/Mintel, December 2020

40%

of German consumers would trade up to more environmentally friendly beauty products

Source: Lightspeed/Mintel, March 2021



Materials with sustainability in the forefront

EcoSense™
Universal
Fluid 1100



EcoSmooth™
Rice Husk
Cosmetic
Powder



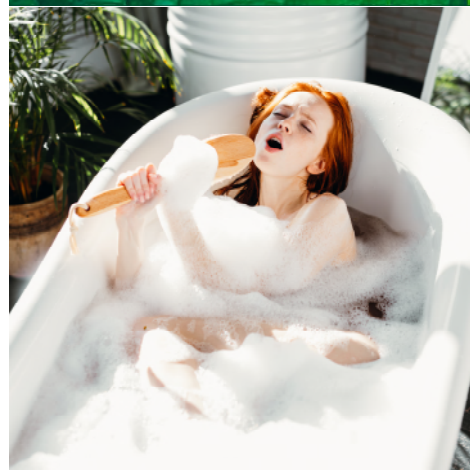
EcoSense™
Sophorolipid
Surfactant



MaizeCare™
Clarity
Polymer



UCARE™
Extreme
Polymer



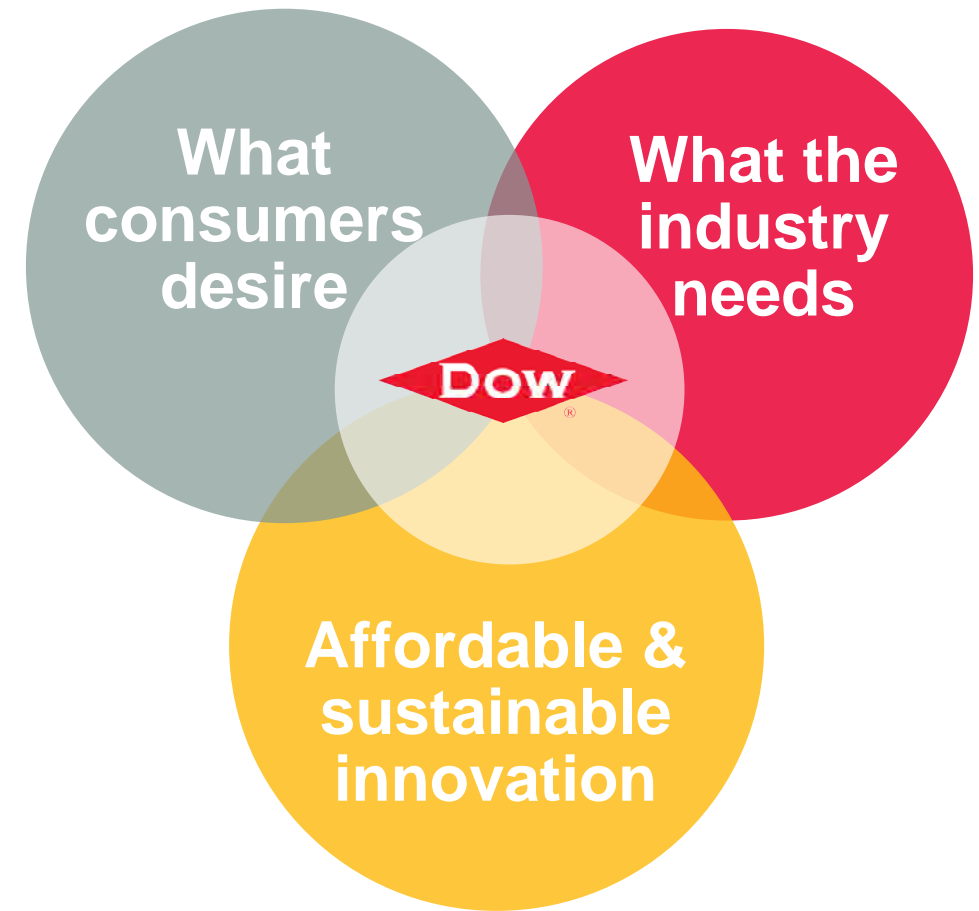


EcoSmooth™ Universal Fluid 1100

Discover the sensational versatility of our new bio-based & biodegradable carrier, a challenger to Silicone fluid performance

Does your alternative to silicone fluid technology really work?

- Replacing high-performing & cost-effective silicone fluids continues to be a technology challenge.
- Since 2016, more than 50 products* have been launched claiming to be an alternative to silicone technology.
- New materials force a complete reformulation, driving cost increases that are a barrier to most brands.
- Not all consumers like the change in sensory when silicone fluids are removed, which impacts brand equity.
- As a worldwide silicone technology expert, Dow has looked extensively for technologies that can offer an honest comparable performance to silicone chemistry.
- Today, since no single chemistry can reproduce the breadth of applicability of silicone fluids, Dow is launching the EcoSmooth™ Universal Fluid platform that aims to include technologies that can match some silicone fluid behaviors in formulations.



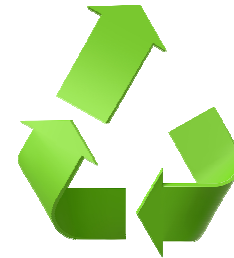
* Source: Product description checks on UL Prospector database

Upcycling! EcoSmooth™ Universal Fluid 1100 is a versatile ingredient for a sustainable & purpose driven brand

- Once consumers start understanding what an upcycled ingredient is, brands can use these new terms in their communication platforms to enhance the natural derived benefits as well as the positive impact in the environment through circularity.
- Achieving a zero waste goal is a significant challenge for any beauty brand. One solution is to use ingredients made with or from upcycled materials.
- Dow is supporting brands' journey toward a more sustainable future by launching EcoSmooth™ Universal Fluid 1100, a performing material made in part with feedstocks from what is left on the fields of sugar cane or corn harvests.



After recycling
comes upcycling!
Do you know it?



EcoSmooth™ Universal Fluid 1100

INCI Name: Ethyl PG-Acetal Levulinate

Typical properties

Appearance	Crystal clear liquid
Active content	100%
Viscosity	3.5 cPs
Flash point	111.5 °C
Refractive index at 25 °C	1.430
Volatility	Low
Specific gravity	1.03 at 23.9 °C
Surface tension	31.03 mN/m at 22.2 °C
Shelf life	2 years
China compliance	Not listed in the catalog of cosmetic ingredients
Biodegradability	Ultimately biodegradable (ASTM E 1720 -01*)
Source	Plant-based
Naturality origin index (ISO 16128)	0.7
COSMOS by Ecocert	Application in progress

These values are not intended for use in preparing specifications

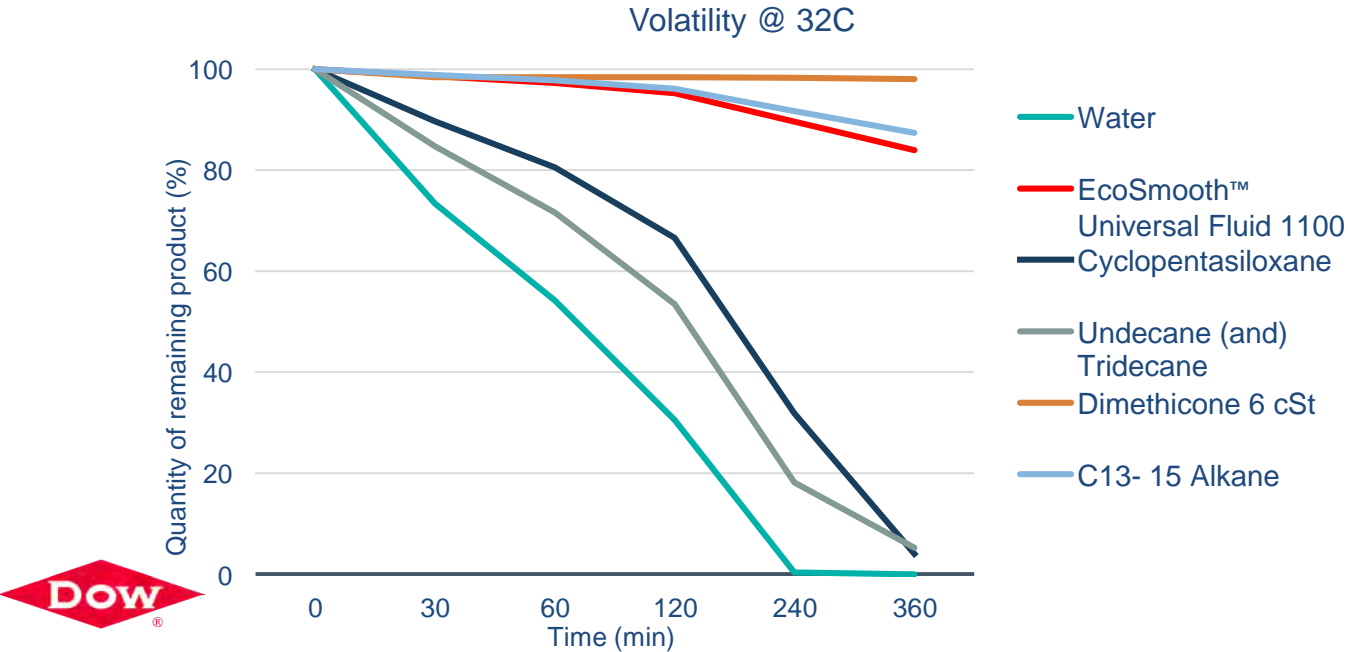
* Similar guidelines to OECD Guideline 301B



Physical properties

Products	Spreadability (mm)	Refractive index	Flash point (°C)
EcoSmooth™ Universal Fluid 1100	14.3	1.430	111.5
Dimethicone 2 cSt	23.3	1.390	87
Cyclopentasiloxane	19.0	1.402	77
Undecane (and) Tridecane	16.7	1.418	81
Caprylyl Methicone	15.0	1.413	110
C13-15 Alkane	14.0	1.430	110

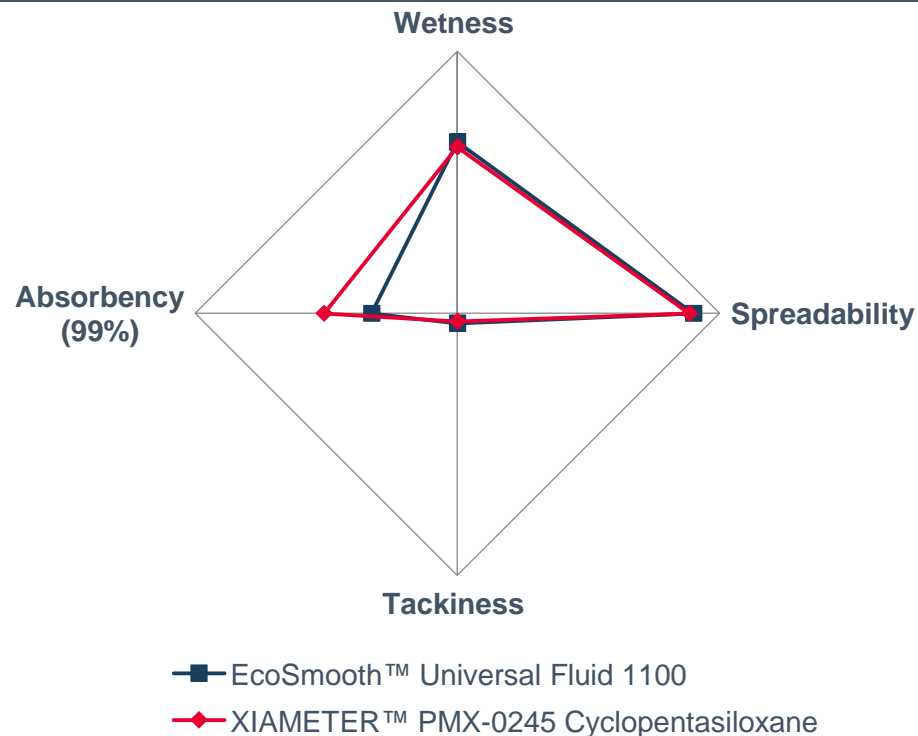
These values are not intended for use in preparing specifications



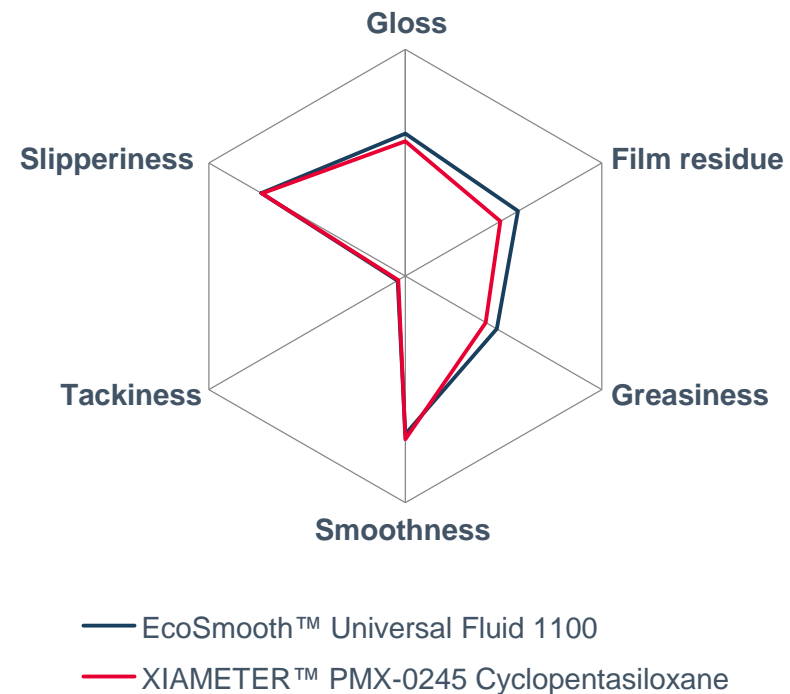
Sensory profile – Neat materials (18 panelists)

Comparison with XIAMETER™ PMX-0245 Cyclopentasiloxane

Before Absorption



After Absorption



EcoSmooth™ Universal Fluid 1100 can be an alternative to Cyclopentasiloxane, providing similar wetness, spreadability and tackiness. The difference in the absorbency sensorial parameter can be tackled by adding more volatile ingredients.





EcoSmooth™ Rice Husk Cosmetic Powder

Natural and Upcycled
The Ingredient of Choice for the
Eco-conscious Consumer

EcoSmooth™ Rice Husk Cosmetic Powder

Where sustainability, performance and consumer needs converge



Natural source rice husk



Upcycled ingredient



Optical soft-focus
and sensorial benefits



Water and sebum
absorption

EcoSmooth™ Rice Husk Cosmetic Powder

INCI name: Silica



Natural Positioning

- Natural source
- Upcycled feedstock
- Plant origin
- ISO 16128 - 100%

Regulatory

- Non-GMO
- No microplastic
- Listed in the catalog of cosmetic ingredients in China



Performance

- Optical benefit
- Sensorial benefit
- Water absorption
- Sebum absorption
- Humectancy benefit
- Compaction benefit
- Alternative to traditional mineral-sourced silica
- Alternative to PMMA and Nylon powder



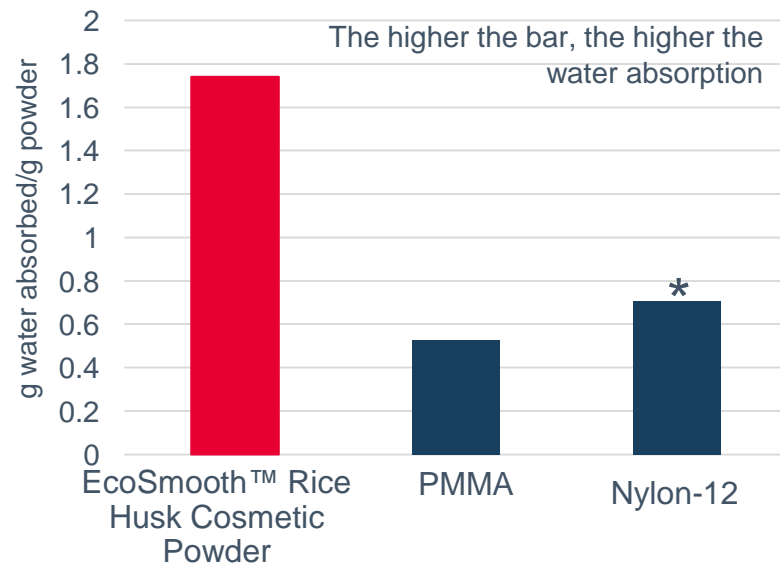
Typical Properties*

Appearance	White powder
SiO ₂ content, ignited basis (%)	> 98
Whiteness index (%)	> 90
D50 (µm)	4 - 7
Surface area (m2/g)	500 - 700
Bulk density (g/ml)	0.1 - 0.2
pH suspension at 5%	5 - 7.5
Shelf life	2 years



Performance in application

EcoSmooth™ Rice Husk Cosmetic Powder Absorbs More Water than PMMA and Nylon-12



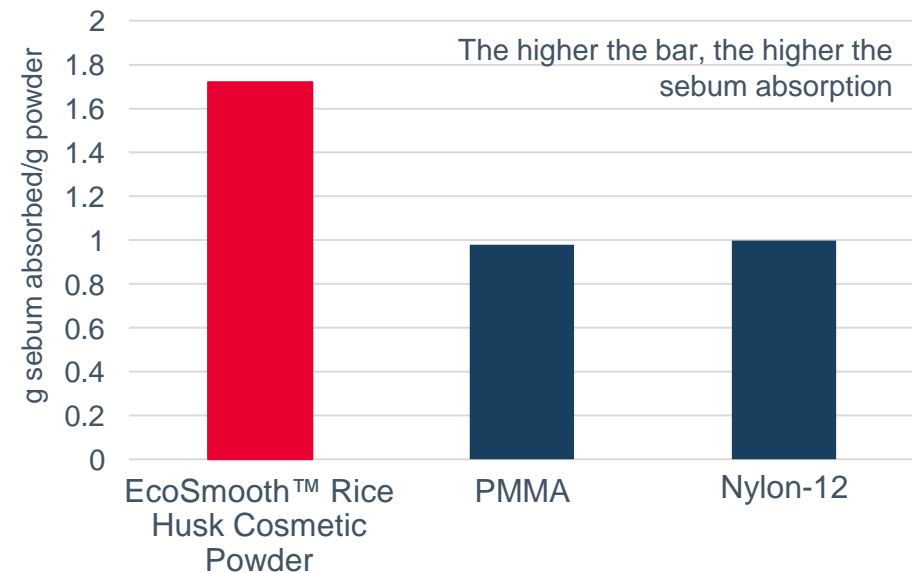
* absorbs only under very high shear

Test conditions:

- Weigh 0.1 - 0.5 g of powder (based on density)
- Add water drop by drop
- Mix with a spatula to allow the water absorption
- Record the amount of water absorbed per 1g powder



EcoSmooth™ Rice Husk Cosmetic Powder Absorbs More Artificial Sebum than PMMA and Nylon-12



Test conditions:

- Weigh 0.1 - 0.5 g of powder (based on density)
- Add artificial sebum drop by drop
- Mix with a spatula to allow the sebum absorption
- Record the amount of sebum absorbed per 1g powder

Performance in application Sensory



Formulation touchedeRIZ CPF #4536

Anhydrous primer – 90% natural origin content

Phase	Trade name / Supplier	INCI name	Wt%
A	Beeswax White/Henry Lamotte	Cera Alba	15.00
	Cetiol Ultimate/BASF	Undecane (and) Tridecane	43.75
B	Unipure White LC 987 BA/ Sensient Cosmetic Technologie	CI 77891 (and) Persea Gratissima (Avocado) Oil (and) Hydrogenated Vegetable Oil (and) Tocopherol	0.69
	Unipure Yellow LC 182 BA/ Sensient Cosmetic Technologie	CI 77492 (and) Persea Gratissima (Avocado) Oil (and) Hydrogenated Vegetable Oil (and) Tocopherol	0.035
	Unipure Black LC 989 BA/ Sensient Cosmetic Technologie	CI 77891 (and) Persea Gratissima (Avocado) Oil (and) Hydrogenated Vegetable Oil (and) Tocopherol	0.003
	Unipure Red LC 181 BA/ Sensient Cosmetic Technologie	CI 77491 (and) Persea Gratissima (Avocado) Oil (and) Hydrogenated Vegetable Oil (and) Tocopherol	0.022
C	EcoSmooth™ Rice Husk Cosmetic Powder/Dow	Silica*	3.00
	DOWSIL™ EL-TIPS Silicone Elastomer Blend/Dow	C13-15 Alkane (and) Dimethicone/Vinyl Dimethicone Crosspolymer	37.50

* EU :Silica (nano)

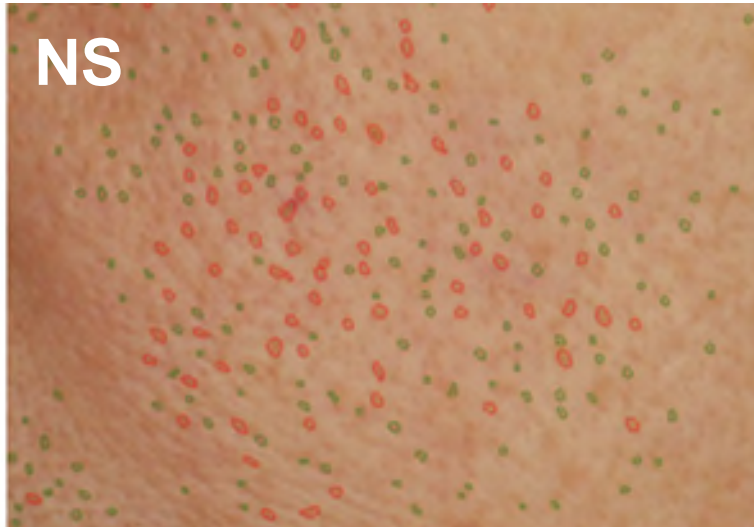
Procedure:

1. Add phase A ingredients in a beaker in a water bath. Start heating to 60 - 65 °C and mix until homogeneous
2. Mix phase B ingredients together with a coffee grinder until a homogeneous color is obtained
3. Add phase B to phase A under mixing
4. Add phase C ingredients in order listed mixing well between each addition until homogeneous
5. Remove the water bath and start cooling down to room temperature with mixing



Formulation touchedeRIZ CPF #4536

Anhydrous primer – immediate and long-term pores masking



Timetable	Number of fine pores	Number of large pores
Naked Skin (NS)	172	78
Time 0	20	3
Time 15 minutes	15	3
Time 1 hour	11	4
Time 6 hours	10	3
Average reduction vs. NS	88%	95%





DOW

EcoSense™ Sophorolipid Surfactants

Natural and Eco-friendly Bio-
surfactants

Go Greener | Development journey of bio-surfactant



EcoSense™ Sophorolipid Surfactants

Natural Sourced to Performance Bio-Surfactants

Natural Inputs



...Transformation / Fermentation



EcoSense™



Natural source from Canola
oil / Sugar



Supports market demand
for natural formulations,
biodegradable, 100%
renewable raw materials

100%

Natural Origin
Content
ISO 16128



Delivers
mildness, cleansing,
emulsification, essential
oil solubilization



EcoSense™ Sophorolipid Surfactants

Where sustainability meets performance

Sustainability

- Low carbon footprint process
- Low aquatic toxicity
- Readily bio-degradable
- 100% Bio-based (USDA certified)
 - Made from Canola oil & sugar
- Don't contain EO and 1,4 dioxane
- No intentionally added sulfate
- Vegan
- Non-GMO
- Potential Sustainable claims: Ecocert, Leaping Bunny

Benefits/Features

- Milder vs. traditional surfactants
 - **Improve mildness** in SLES/CapB* systems
 - **Improve mildness** in Amino-acid surfactant systems
 - Can be used for leave-on applications
- Compatible with commonly-used ingredients
- Ability to emulsify oils
- Effective solubilization of essential oils/fragrances
- Easy to handle, cold processable
- Highly concentrated
- Two products that provide flexibility of optimal blend
- Low foaming impact
 - Doesn't compromise foaming formulations as co-surfactants
 - Foaming can be improved by combination with Amino acid surfactants

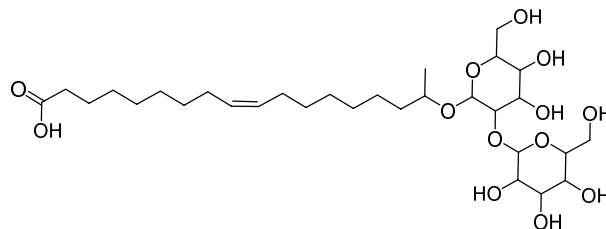
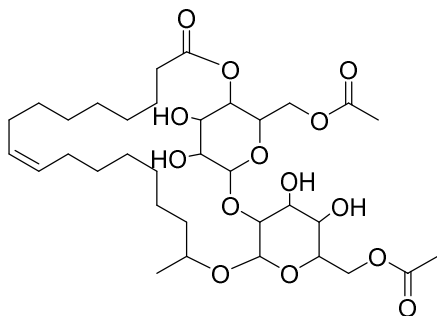


*Cocamidopropyl betaine (CAPB)

Dow Sophorolipids Surfactants

Novel and unique bio-surfactants

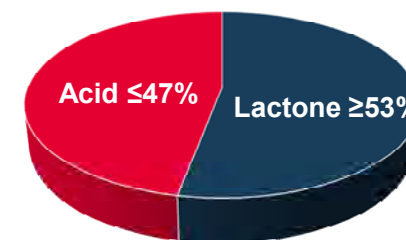
- **Belong to Glycolipids** family (Sophorolipids, Rhamnolipids, Mannosylerythritol lipids)
- **Mixture of lactonic form + acidic form**
- Our EcoSense™ Surfactants contain **the highest active %** among the market products at 60%
- We have one version with a higher acid component that is **the highest acid sophorolipids %** among market products
- Two products provide blending flexibility of fine-tuned properties



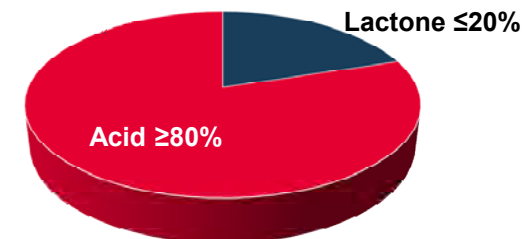
Higher lactone Surfactant	Higher Acid Surfactant
Low foam	Higher foam
Limited water soluble	Highly water soluble

Compositions based on dry active

~60% Active High lactone EcoSense™ Surfactant

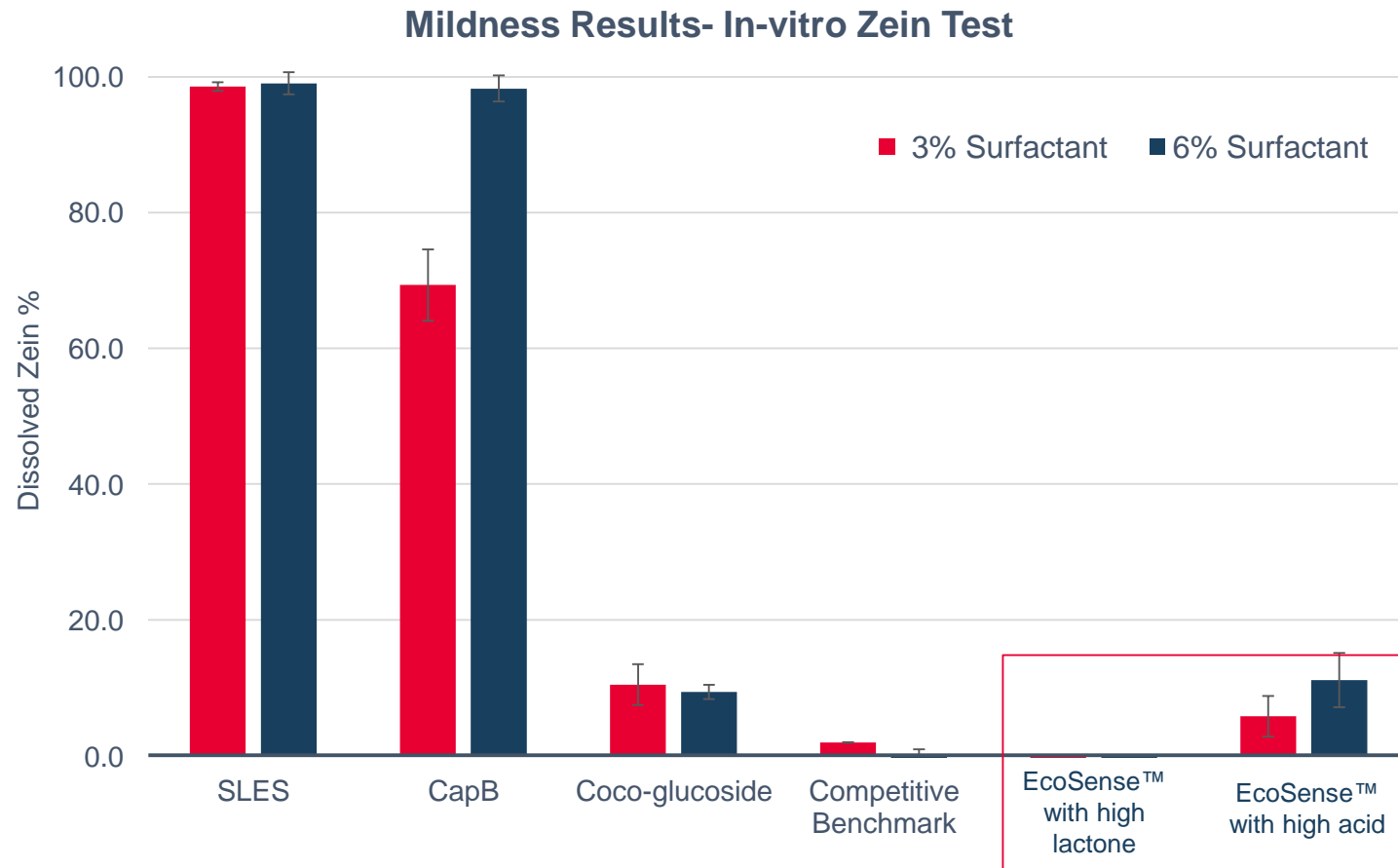


~60% Active High acid EcoSense™ Surfactant



Sophorolipids| Mildness via Zein test

▪ EcoSense™ Sophorolipids vs. SLES/CapB



- Zein – a yellow corn protein that closely resembles the keratin present in skin/hair
- Protein is water insoluble – surfactant will damage Zein protein to make it water soluble.
- Dissolved Zein = initial Zein weight - insoluble Zein after filtration/drying
- **Low dissolved zein % = low irritation of this surfactant**

Test condition:

Pre-weigh Zein

Make a Zein water solution

Add 3% / 6% active glycolipid to Zein solution

Filter and dry the un-dissolved Zein

Calculate dissolved Zein %



Face wash

CPF 4557 (for oily, sensitive skin)

Phase	Trade name / Supplier	INCI name	Wt%
A		Water	66.25
	Versene™ Na2 Crystal/ Dow	Disodium EDTA	0.15
		Glycerin	5.00
	Zemea Propanediol/Dupont	Propanediol	3.00
	Cellosize™ QP 100 MH/ Dow	Hydroxyethylcellulose	0.65
	Cellosize™ Texture 40-0101/Dow	Hydroxypropylmethylcellulose	0.15
B		Sodium Hydroxide (50% solution)	qs
		Sodium Cocoyl Glutamate	15.00
	Amphosol CDB-HP / Stepan	Cocamidopropyl betaine	2.90
	NEW! EcoSense™ Tradename TBD/ Dow (60% active)	INCI TBD (glycolipid surfactant)	3.00
	Green Tea / Symrise	Fragrance	0.40
C		D- Panthenol	3.00
		Sodium Benzoate	0.50
		Citric acid (50% solution)	qs

Attributes

- Pleasant texture
- Clear formulation
- Creamy and gentle foam
- Oil/sebum control
- Soft sensory feel
- Improved sensory during the wash
- Smooth feeling after washing





UCARE™ Extreme Polymer

Don't compromise ...

go beyond conditioning with our
new bio-derived & biodegradable
cellulose technology

UCARE™ Extreme Polymer

Product overview

- It is a cationic cellulosic polymer
- It contains a **more hydrophobic backbone** compared to traditional UCARE™ Polymers – offering **unique performance** benefits
- Can be used as the **principal conditioning agent** or in **combination with silicones or natural oils**

UCARE™ Extreme Polymer	
INCI	Polyquaternium-10
Product form	Powder
Solubility in water	Soluble
Recommended use level	0.1-0.3%
% Nitrogen	1.50 – 2.20
Bio-based carbon content (%)	48
Shelf life	2 years
Recommended applications	Rinse-off conditioners, leave-in conditioners, shampoos
China regulatory status	Listed in the Catalogue of Cosmetic Ingredients
Cellulose origin	Wood (GMO-free)
Source of certification	PEFC*
Degradability	Biodegradable**

* Program for the Endorsement of Forest Certification

** Inherent primary biodegradability with pre-adaptation according to OECD 302B test(s) guidelines (reaches > 20% biodegradation in OECD test(s))



UCARE™ Extreme Polymer – benefits from this new technology

For formulators

- High weight efficiency – low use level
- Improves natural content in formula
- Soluble in water
- Viscosity enhancer
- Good compatibility with broad range of surfactants and thickeners
- Allows versatility in formulation format
- Listed in the Catalogue of Cosmetics Ingredients in China

In application – consumer benefits

For rinse-off conditioners

- No compromise on performance – it can feel like a silicone* on wet/dry hair (reduction in combing force especially on damaged hair)
- Reduces hair breakage
- Restores hydrophobicity - healthy hair
- Improves hair manageability & enables extreme alignment in comparison to silicone

For leave-in conditioners

- Conditioning (reduction in combing force)
- Provides natural soft styling (i.e. curl retention)
- Heat protection

For shampoos

- Versatility in conditioning (with or without silicones)



* Aminofunctional silicone

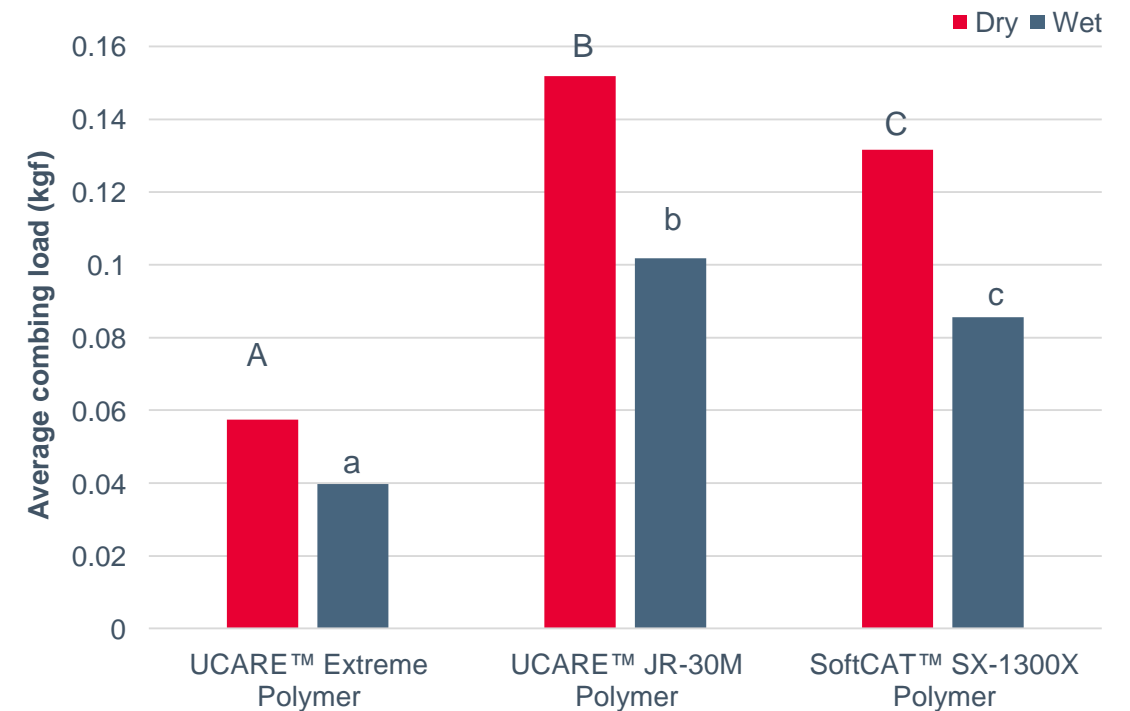
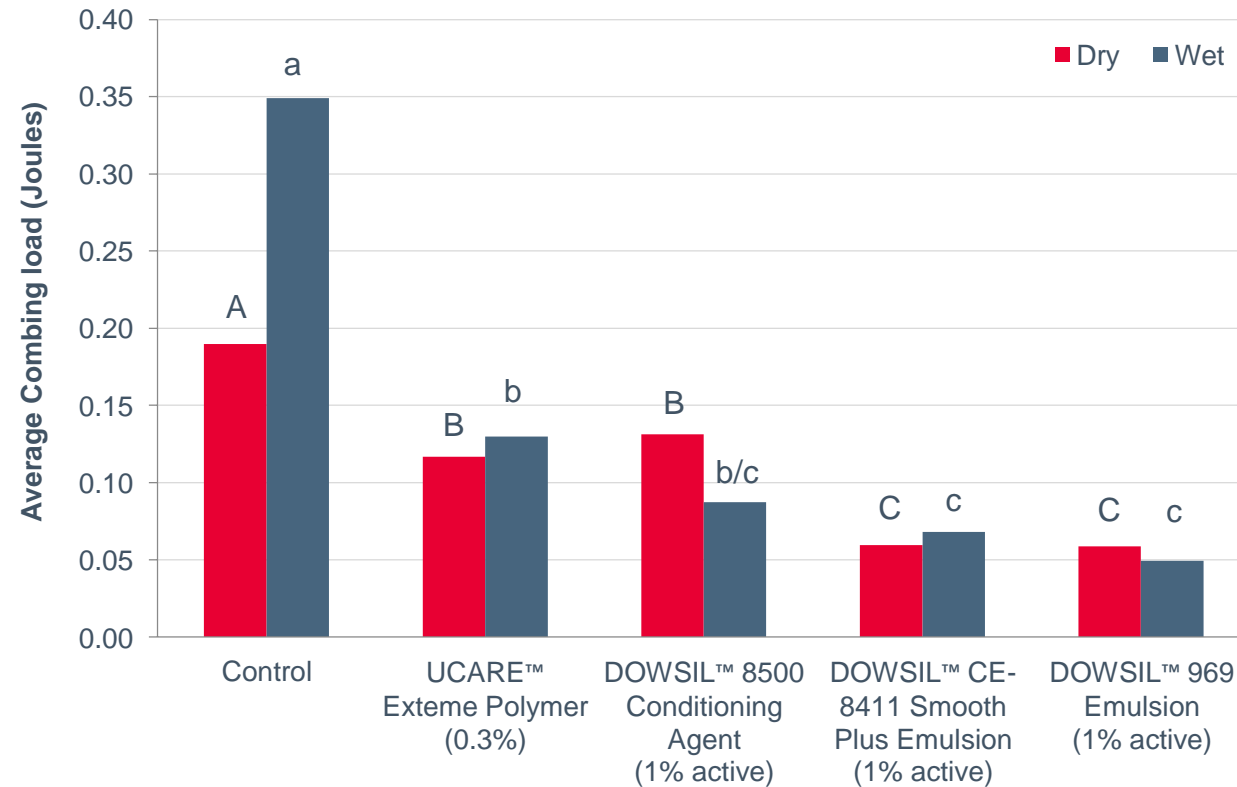
Rinse-off conditioner



Enhanced combability

Comparison with silicones and cationic polymers

UCARE™ Extreme Polymer provides better performance than other Dow cationic polymers. The performance of UCARE™ Extreme Polymer at 0.3 wt.% is close to amodimethicone at 1 wt.%.



Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone
 Measured using Diastron MTT175 (left graph) and Instron tensile tester (right graph)

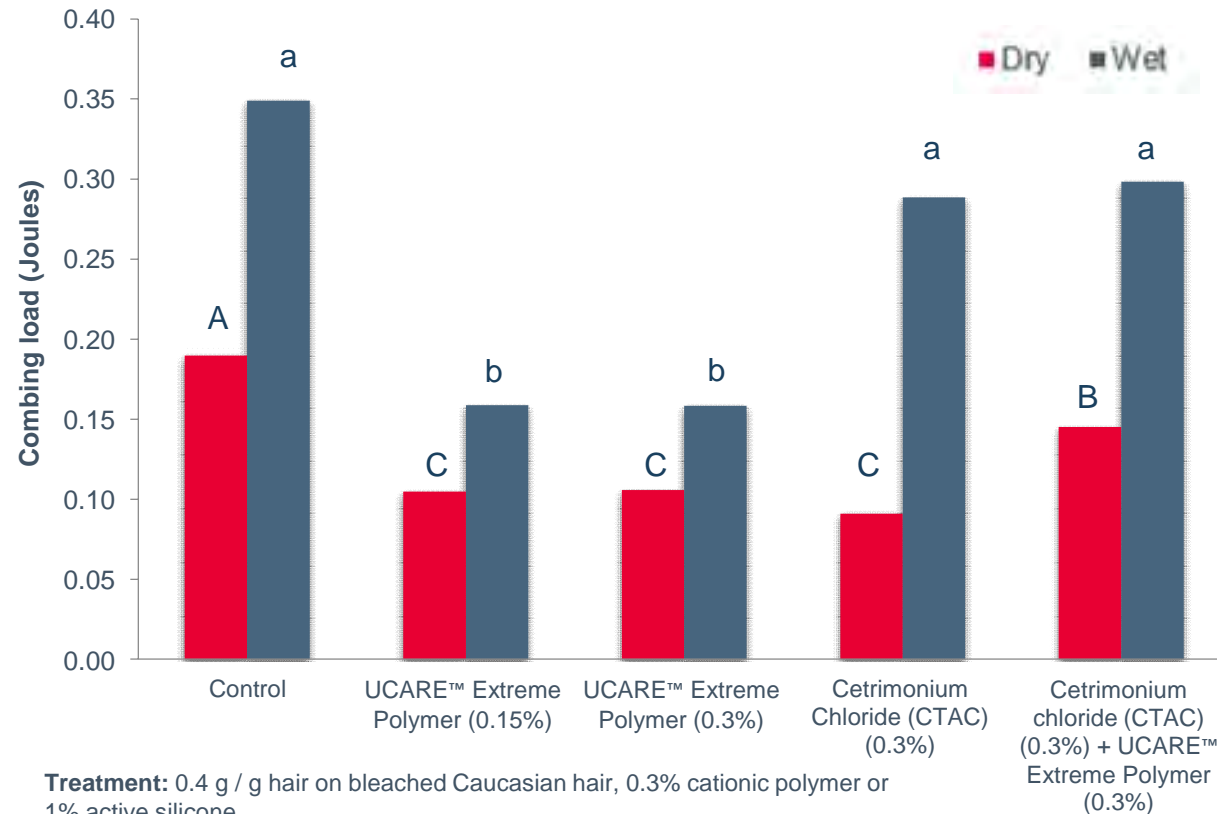
Statistics: Different letters show a statistical difference at 95% confidence



Enhanced combability

Comparison with competitive conditioning agents

UCARE™ Extreme Polymer provides **better wet combing performance** than competitive non-silicone conditioning agent and similar wet combing performance to competitive silicone.

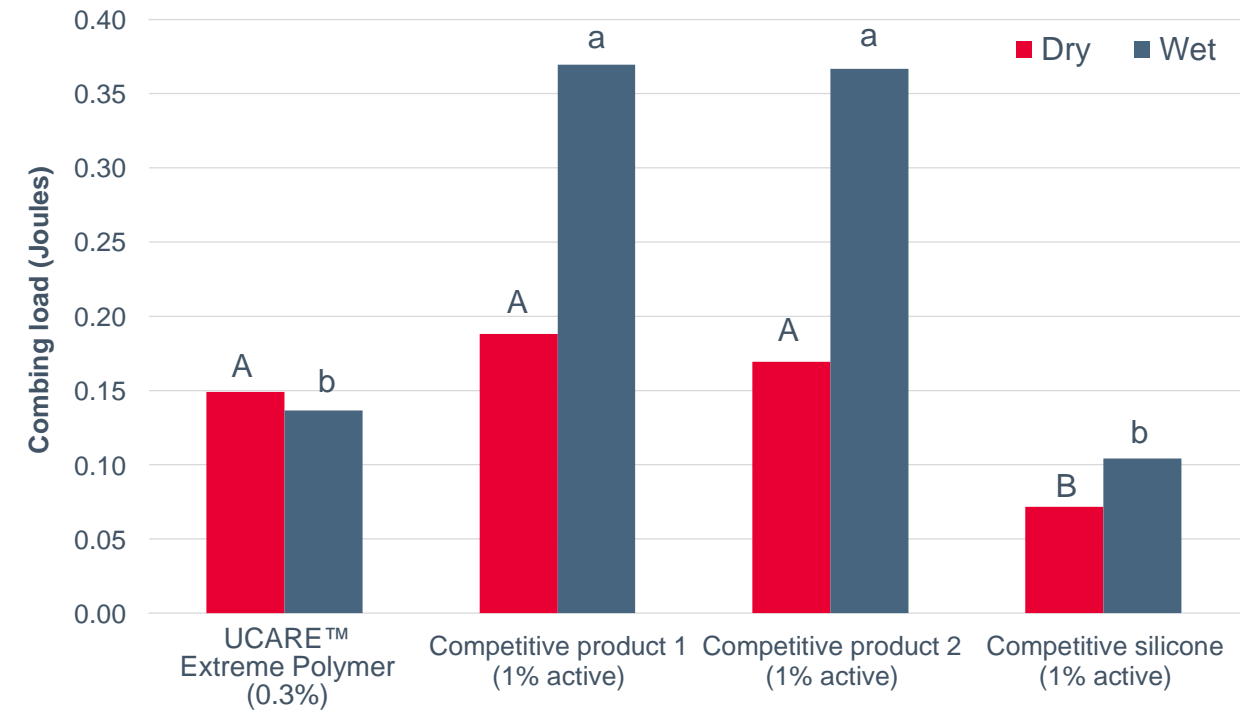


Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone

Measured using Instron tensile tester

Control: conditioner without cationic polymer

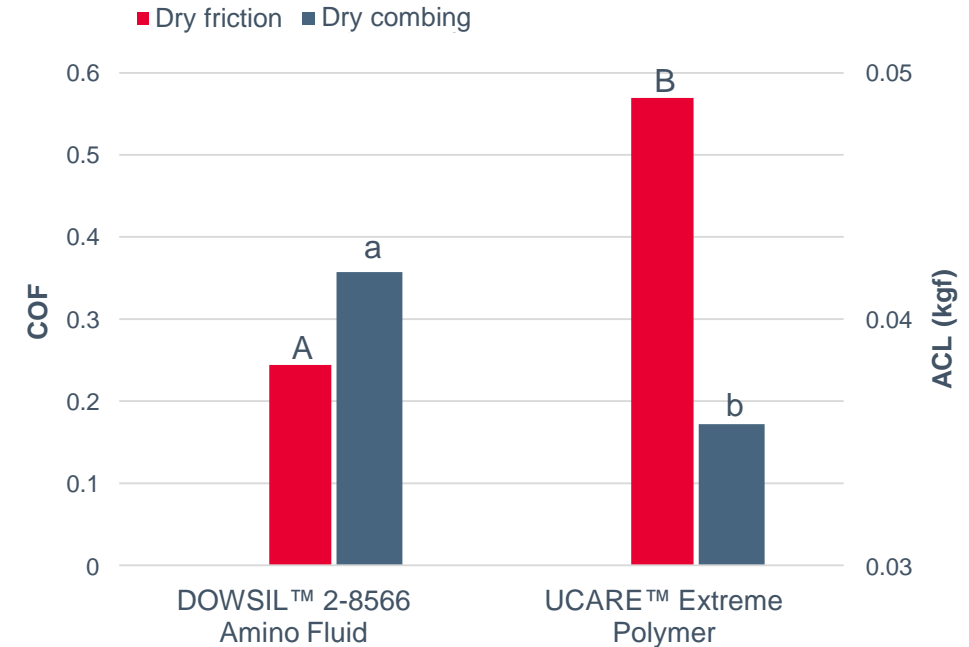
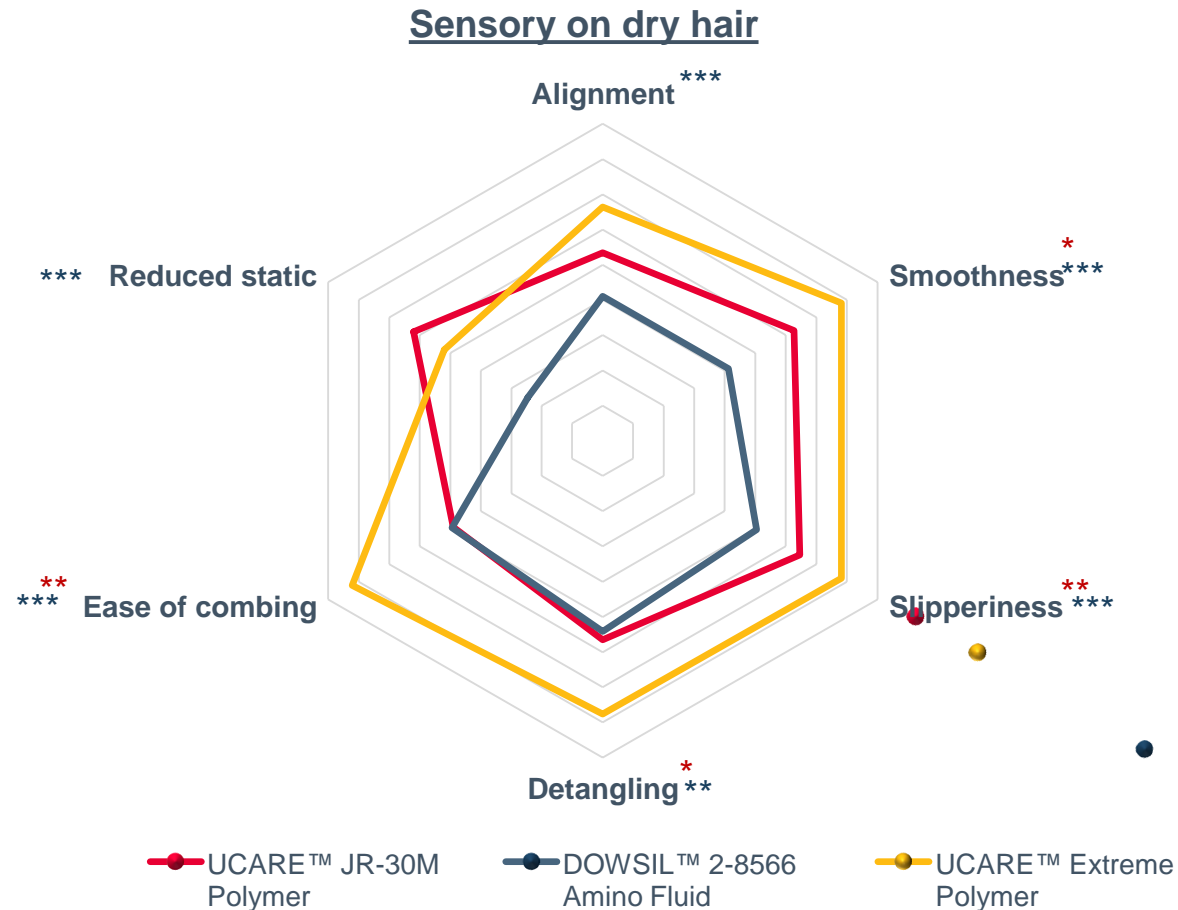
Statistics: Different letters show a statistical difference at 95% confidence



Competitive product 1	Hydrolyzed wheat protein
Competitive product 2	Orbignya Speciosa Kernel Oil (and) Hydrogenated Soybean Oil (and) Cocos Nucifera (Coconut) Oil (and) Linum Usitatissimum (Linseed) Seed Oil
Competitive silicone	Amodimethicone/ Morpholinomethyl Silsesquioxane Copolymer (and) Trideceth-5 (and) Glycerin

Sensory panel studies

UCARE™ Extreme Polymer **provides better feel and dry combing** compared to amodimethicone and cationic polymer benchmarks regardless of the friction results.



The reduced friction results as measured by a Diastron equipment may not be a true indicator of the actual sensory experience.

Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone
 Measured using Diastron MTT175 and Instron tensile tester
 Sensory Panel # Participants: 20

Statistics:

- Combing/Friction: Different letters show a statistical difference at 95% confidence
- Sensory: Significant difference at *** ≥99.9%; ** ≥99%; * ≥95%

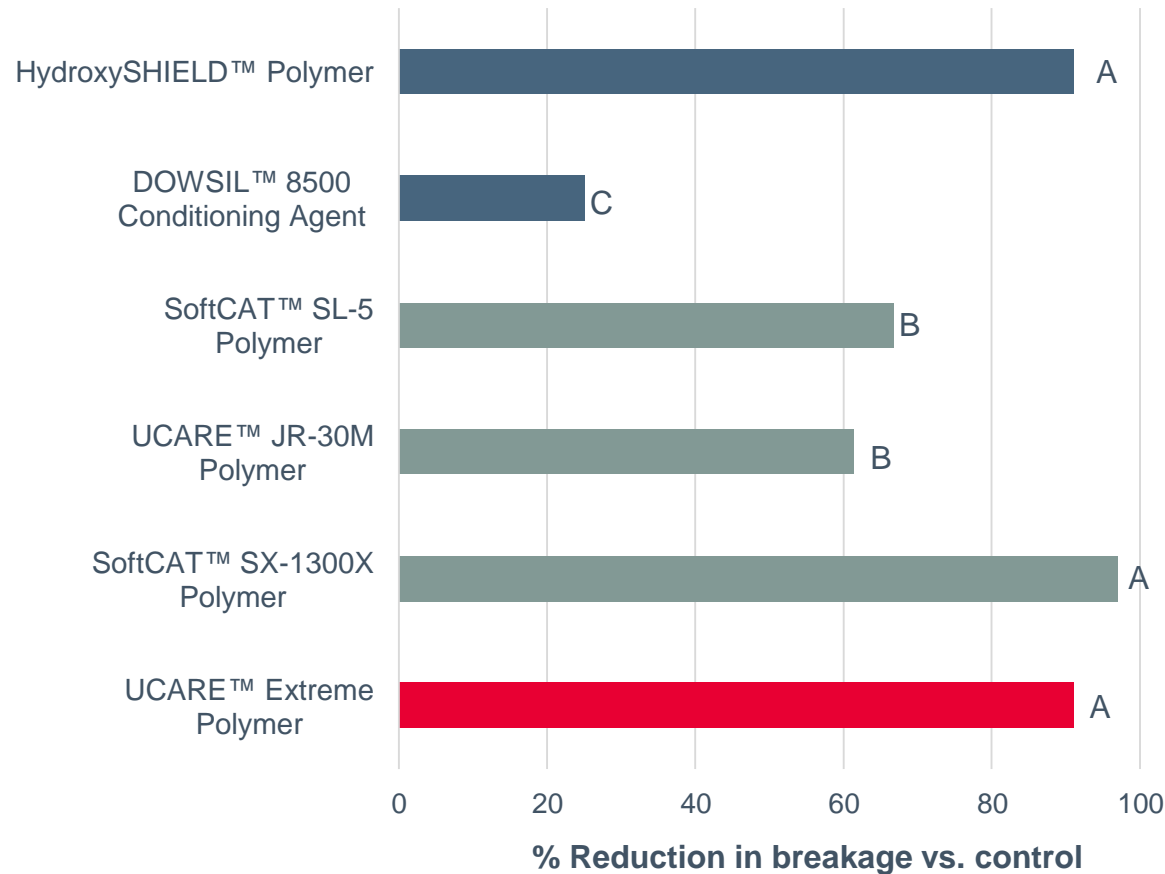
Blue *: Statistical difference between UCARE™ Extreme Polymer and DOWSIL™ 2-8566 Amino Fluid

Red *: Statistical difference between UCARE™ Extreme Polymer and UCARE™ JR-30M Polymer



Reduced breakage

UCARE™ Extreme Polymer **provides up to 90% reduced breakage** compared to the control, 66% compared to DOWSIL™ 8500 Conditioning Agent and 30% compared to UCARE™ JR-30M Polymer.



Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone

Method: measured using repeated combing instrument.

3 tresses/product; 10,000 comb strokes; speed: 20 cycles/min

(80 comb strokes/tress/min); broken hair fibers weighed and % reduction calculated

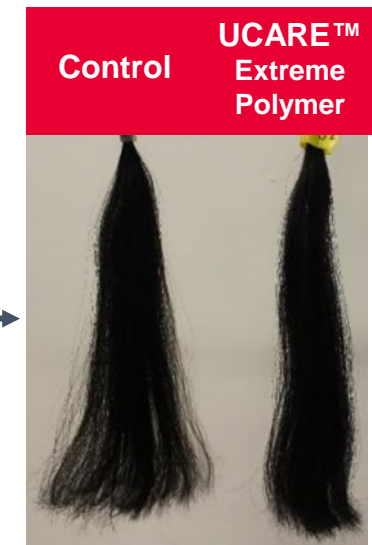
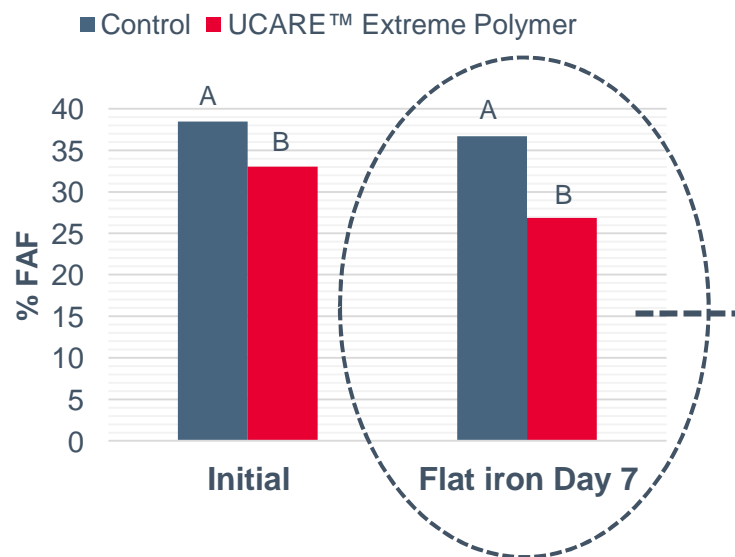
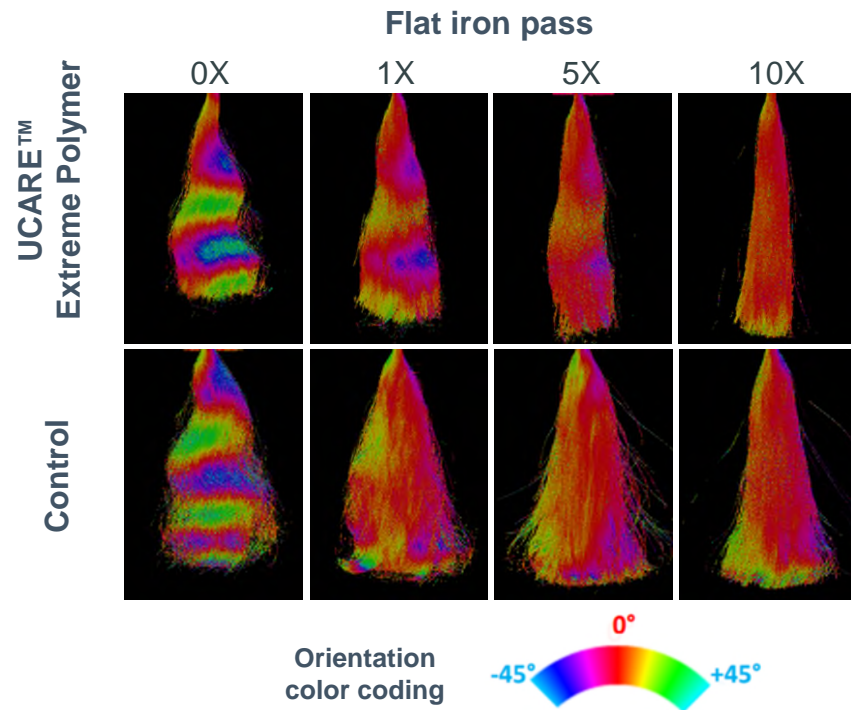
Control: conditioner without silicone

Statistics: Different letters show a statistical difference at 95% confidence



Improved hair alignment

UCARE™ Extreme Polymer improves hair manageability and hair alignment. Less flat iron passes may result in less heat damage.



After 1 week at 25°C and 50% RH

% FAF = fly-away frizz (3D measurement using Bolero)

- Tress treated with UCARE™ Extreme Polymer reached maximum alignment after 6 passes.
- Less frizzy after one week at room temperature and 50% RH.

Treatment: 0.4 g / g hair on frizzy hair type A (Brazilian) hair, 0.3% modified HEC; flat iron at 200°C, 10s each, for a total of 10 passes

Measured using RUMBA (hair alignment) and BOLERO (frizz)

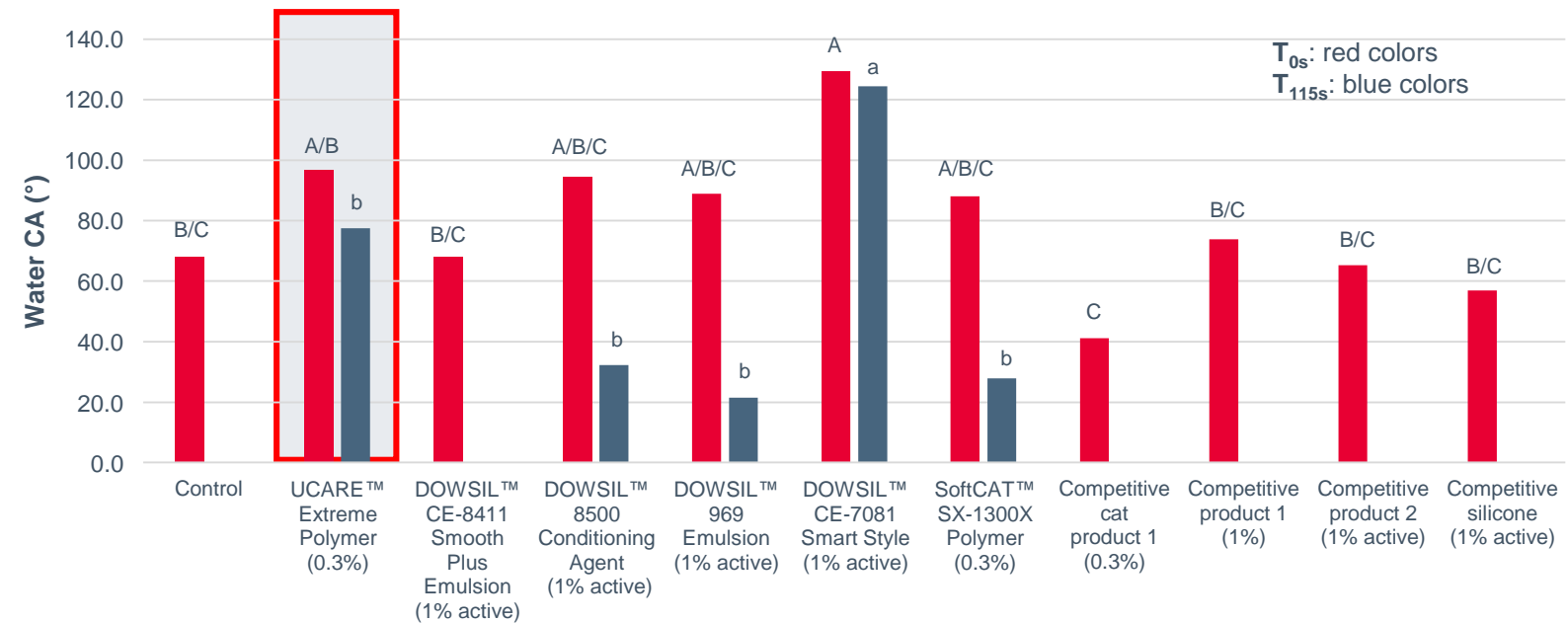
Control: conditioner without UCARE™ Extreme Polymer

Statistics: Different letters show a statistical difference at 95% confidence



Restored hydrophobicity

Hair treated with UCARE™ Extreme Polymer retains a high degree of hydrophobicity. The higher the contact angle, the more hydrophobic, the healthier the hair.



Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone

Control: conditioner without silicone or cationic polymers

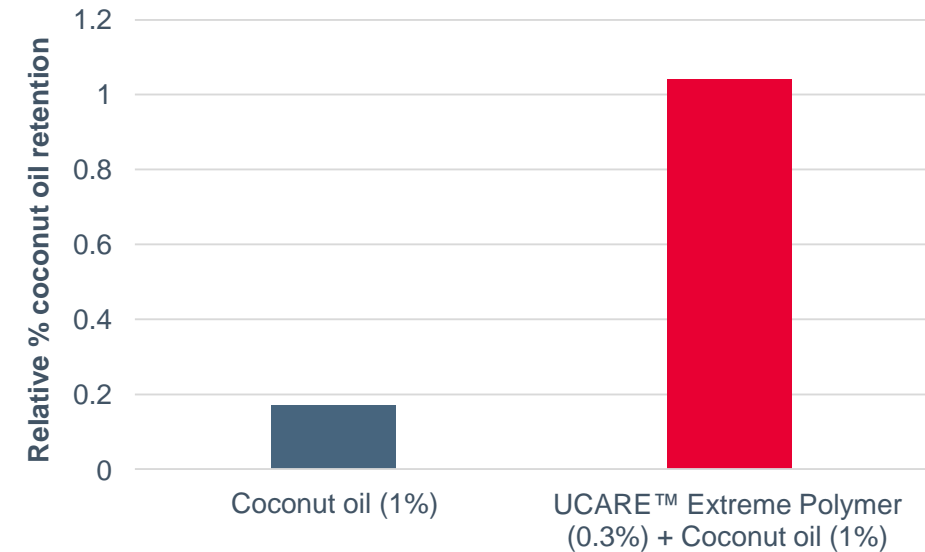
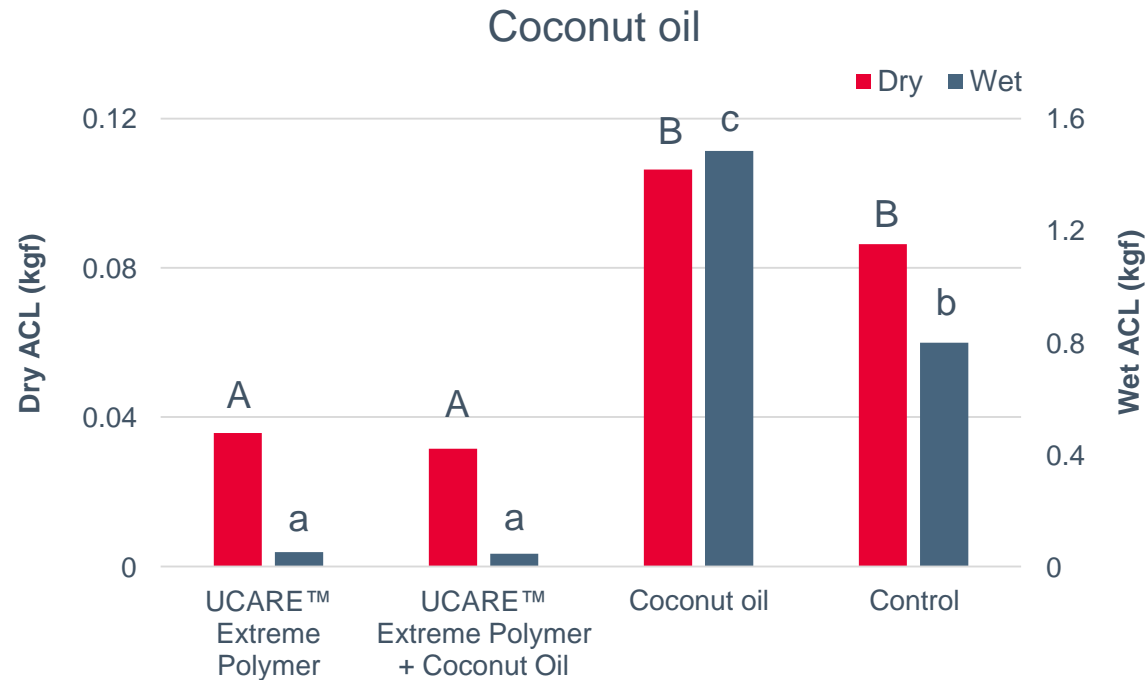
Test condition: 30 µL of water on bleached hair treated with different types of cellulose or silicone; picture taken immediately



Competitive cat product 1	Guar Hydroxypropyltrimonium Chloride
Competitive product 1	Hydrolyzed Wheat Protein
Competitive product 2	Orbignya Speciosa Kernel Oil (and) Hydrogenated Soybean Oil (and) Cocos Nucifera (Coconut) Oil (and) Linum Usitatissimum (Linseed) Seed Oil
Competitive silicone	Amodimethicone/ Morpholinomethyl Silsesquioxane Copolymer (and) Trideceth-5 (and) Glycerin

Efficient deposition aid for natural oil

UCARE™ Extreme Polymer is **compatible with natural oil** and **improves its deposition on hair**.



Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% UCARE™ EP and/or 1% coconut oil (CNO) and/or 1% silicone in rinse-off conditioner

Measured using Instron tensile tester

Control: conditioner without silicone, cationic polymer or natural oil

Oil Retention Measurement: GC/MS method based on methanol transesterification

Statistics: Different letters show a statistical difference at 95% confidence

Rinse-off conditioner

Summary results

Suggested use level: 0.1-0.3%

- ✓ Enhanced dry combing
- ✓ Enhanced wet combing
- ✓ Reduced breakage
- ✓ Improved styling and manageability
- ✓ Restored hydrophobicity
- ✓ Enhanced viscosity
- ✓ Enhanced sensory
- ✓ Enhanced oil deposition





MAIZECARE™
clarity polymer by 

MaizeCare™ Clarity Polymer

The clarity you want & the
performance you need in a
sustainable hair styling product

Creating MaizeCare™ Polymers



Corn-based ingredient



Natural Origin Content ISO 16128



Supports market demand for natural & clear formulations



Delivers various styling benefits



MaizeCare™ Clarity Polymer – Product Overview



MaizeCare™ Clarity Polymer is a bio-based, biodegradable, 100% natural origin (ISO 16128) hair styling polymer obtained from non-GMO corn starch with excellent gel clarity in water-based formulas. MaizeCare™ Clarity Polymer acts as a film-former and styling aid that can range from exceptional stiffness to soft-touch styling.

INCI: Hydrolyzed Corn Starch

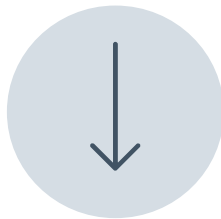
- ✓ Easy-to-use powder; cold water dispersible
- ✓ Comparable performance to synthetic film formers, with added benefit of being non-hygroscopic
- ✓ From a renewable resource with good environmental profile
- ✓ Listed in the Catalogue of Cosmetics Ingredients used in China

Appearance	Off-White Powder
Use Levels, %	0.5-5%
Shelf Life	24 months

These are typical properties, not to be construed as specifications.



Formulation Tips for Using MaizeCare™ Clarity Polymer



Low shear mixing



Cold water dispersible



Disperses in minutes



Performance Testing – Styling Gel Formulation

Key Properties

- ✓ **Exceptional clarity**
(Turbidity < 20 NTU)
- ✓ **Compatible** with synthetic and natural rheology modifiers
- ✓ **High humidity** curl retention and stiffness
- ✓ **100% natural origin**
(ISO 16128)
- ✓ Up to 10% **ethanol compatibility**

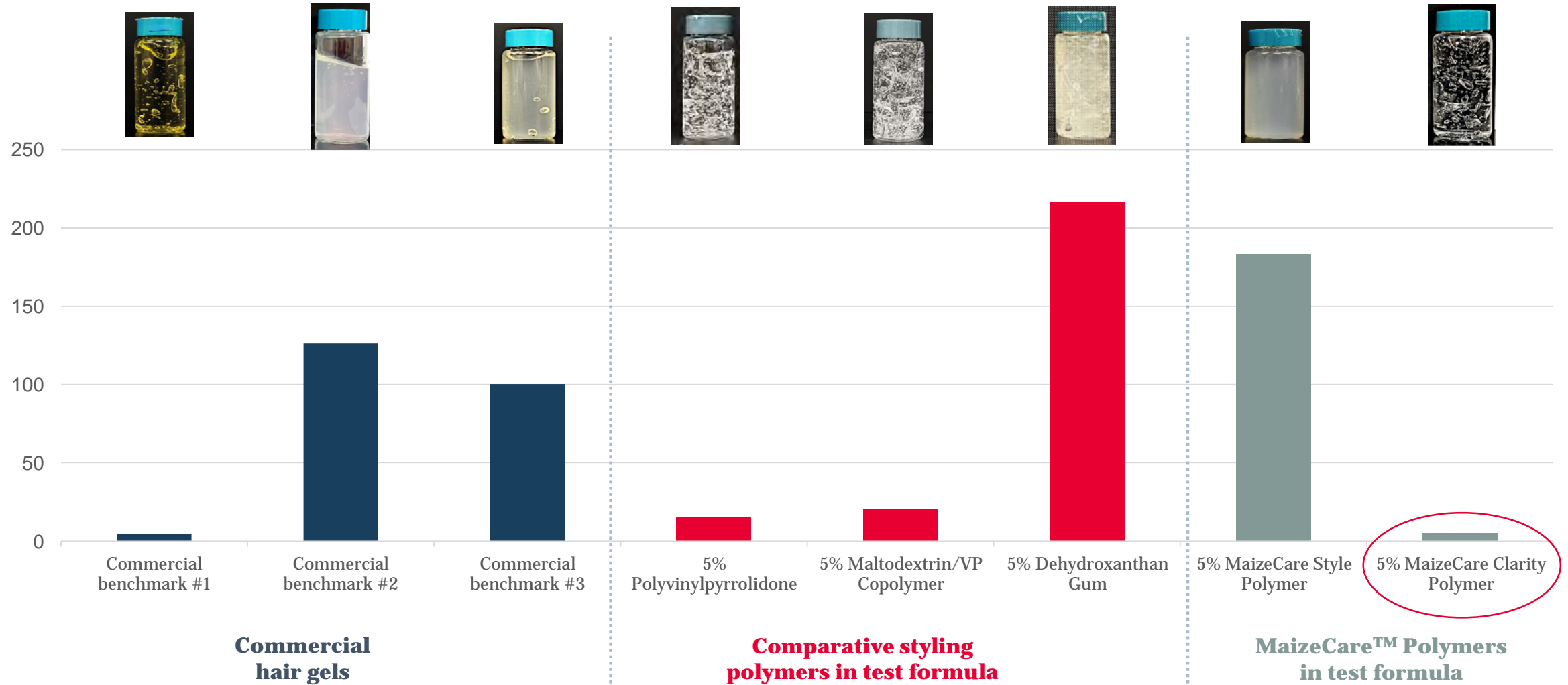


Ingredient	Weight %
Water	90.9
Carbopol 980	1.0
VERSENE™ NA2 Crystals Chelating Agent	0.1
Glycerin	3.0
Fixative Polymer	1.0-5.0
Phenoxyethanol	1.0
Triethanolamine	1.0



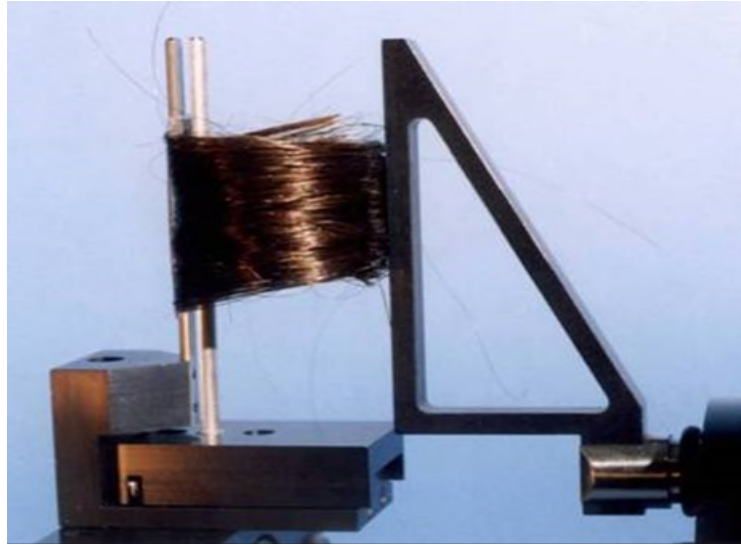
Final pH = 6.5-7.0
Hair Fixative = 3wt%
Turbidity = 2.8 NTU

Styling Gel Clarity

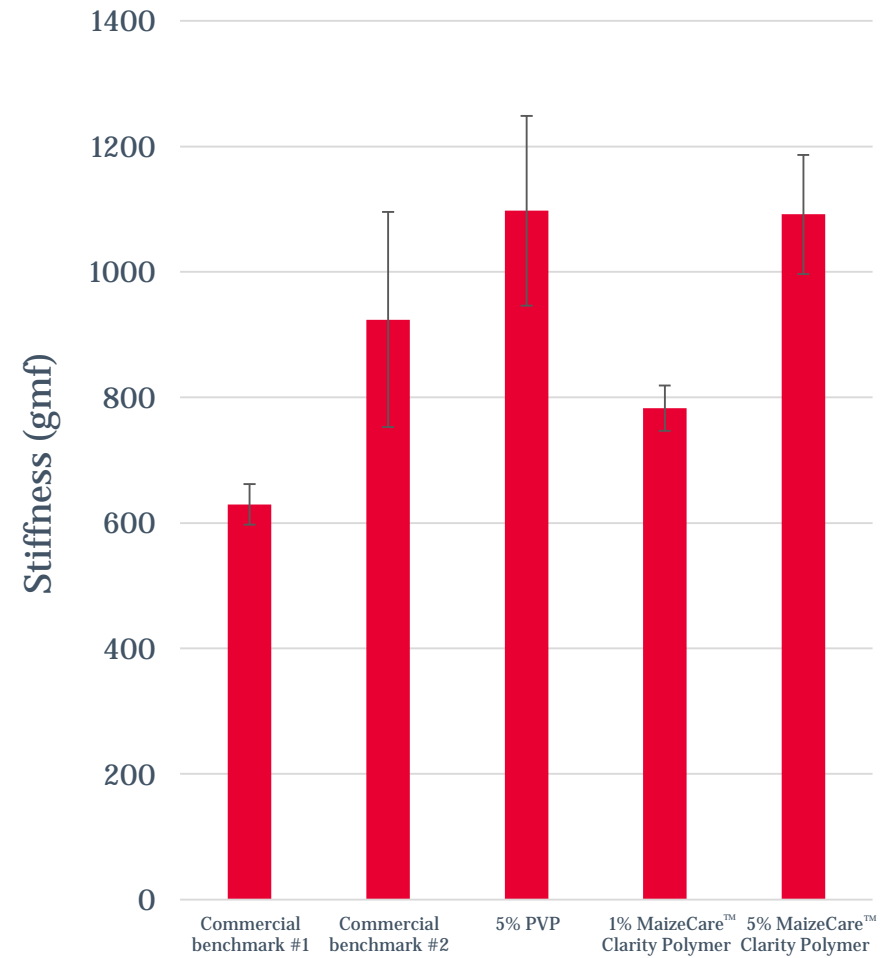


MaizeCare™ Clarity Polymer gives excellent clarity in hair gel formulas that is superior to other natural hair fixatives and comparable to PVP

Styling Gel: Hair Stiffness



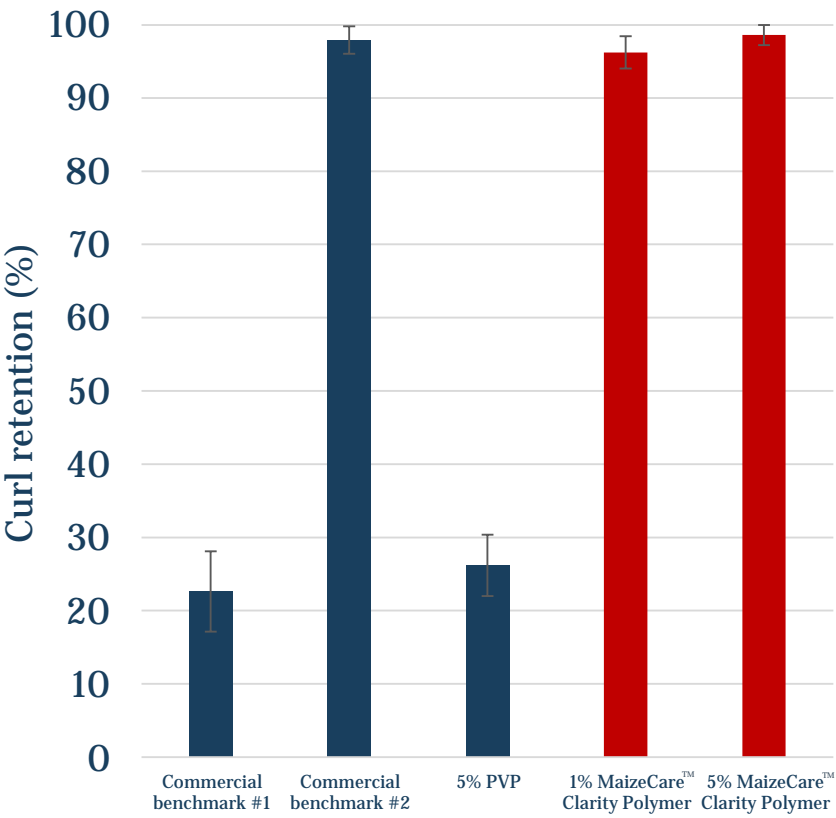
- ✓ Comparable stiffness between MaizeCare™ Clarity Polymer and PVP
- ✓ Increased stiffness as a function of polymer loading



Styling Gel: Long Lasting Curls



Test conditions: 25°C, 80% RH



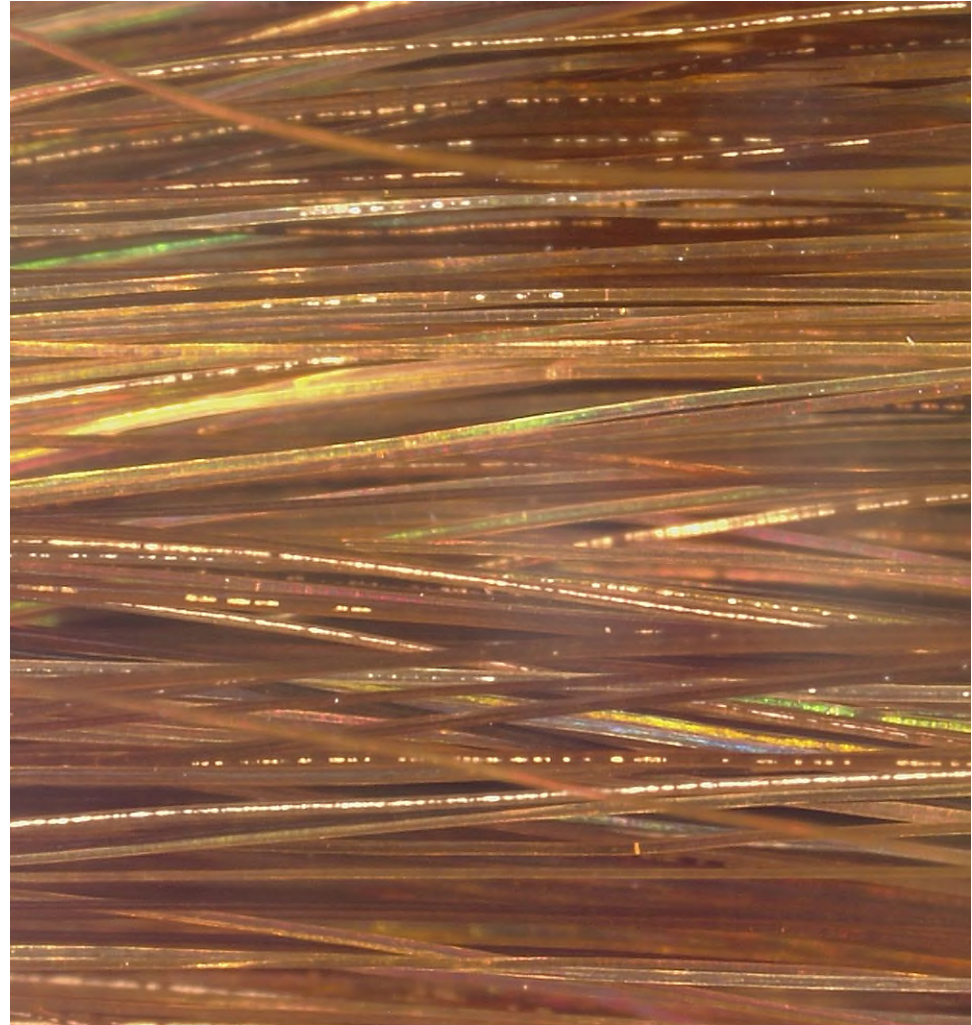
MaizeCare™ Clarity Polymer exhibits superior humidity resistance to PVP

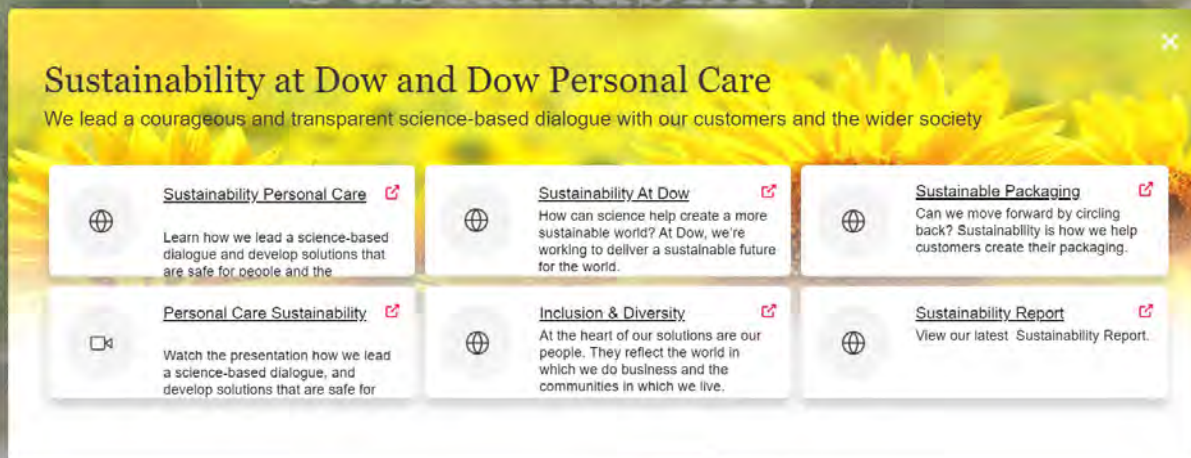


Styling Gel: Optical Microscopy

✓ MaizeCare™ Clarity Polymer does not leave a white residue on the hair.

- ✓ Hair gel with 5% MaizeCare™ Clarity Polymer. 0.35g gel applied to 3.5g hair.
- ✓ Combed through hair 5 times before taking picture.





Learn more

Visit our virtual experience center:

- Visit the Sustainability Lounge
- Find out more about sustainability for Packaging and for Personal Care products
- Be the first to know when new ingredient launches

www.dow.com/virtual/beautyexperience

