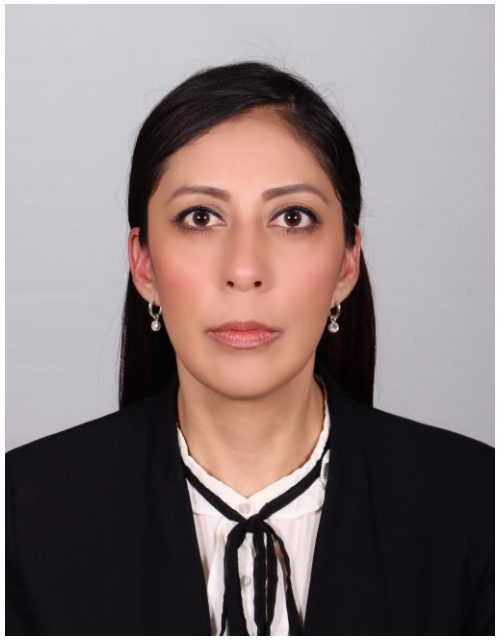
Sustentabilidad en Cuidado Personal

La tendencia que se vuelve realidad a través de las tecnologías de Dow

Seek Together™

General Business



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TS&D Consumer Solutions

Home and Personal Care

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Agenda

- Maizecare
- Ucare Extreme Polymer
- FA PEPS
- Sunspheres Bio
- Cold Process
- Q&A

MAIZECARE™

style polymer by DOW

MAIZECARE™
style polymer by DOW

1 **Convenient and customizable:** Consumers seek products created for them that bring a level of convenience to their everyday lives. **Recent innovations that speak to these demands: dual-chamber packs** for bespoke blends, **mascara-wand applicators** for on the go, and **overnight formulas** for easier styling in the morning.

2 **Claims travel: Claims like anti-aging, pollution- and color-protecting, scalp caring, and hair loss-minimizing** are just some of the new claims now surfacing in haircare styling products.

3 **More "natural" growth:** Globally, natural NPD is **least active in hairstyling** (vs. other hair product segments) with room for brands to better tap into natural/clean beauty trends.

37% of consumers said they bought more natural and organic personal care products in 2016 than the previous year

Made by Nature, Styled by You

With a proven portfolio in hairstyling, Dow is excited to launch MaizeCare™ Style Polymer – a bio-based, hair fixative with performance from soft to stiff styling

- ✓ We now have fixatives for bio-based (MaizeCare™) and acrylic (ACUDYNE™) applications
- ✓ MaizeCare™ Style is compatible with a range of other ingredients including rheology modifiers like the ACULYN™ series to create unique textures
- ✓ This new polymer enables creativity across our product portfolio

Product Family	INCI	Chemical Structure	Performance	Applications	Format
MaizeCare™ Style	**Hydrolyzed Corn Starch**	**Bio-based**	**Hair Fixative, Film Former, soft to stiff styling**	**Hair Styling, all formats (excluding aerosols)**	**Powder**
ACULYN™ Rheology Modifiers	Acrylates/(Steareth-20) Methacrylate Copolymer	Acrylic	Rheology Modifiers	Hair Styling, all formats	Liquid
ACUDYNE™ Hair Styling Polymers	Acrylates/Hydroxyesters Acrylates Copolymer	Acrylic	Hair Fixative, Film Former, Heavy Hold	Hair Sprays (aerosols)	Liquid
DOWSIL™ Silicone	Various	Silicone	Conditioning, protection & sensory	Leave-in conditioners	Various

Creating MaizeCare™ Polymers

Natural Inputs

Patented Mechanical & Thermal Transformation

MaizeCare™ Polymers

Corn-based ingredient

Supports market demand for natural formulations

100%

Natural Origin Content ISO 16128

Delivers various styling benefits

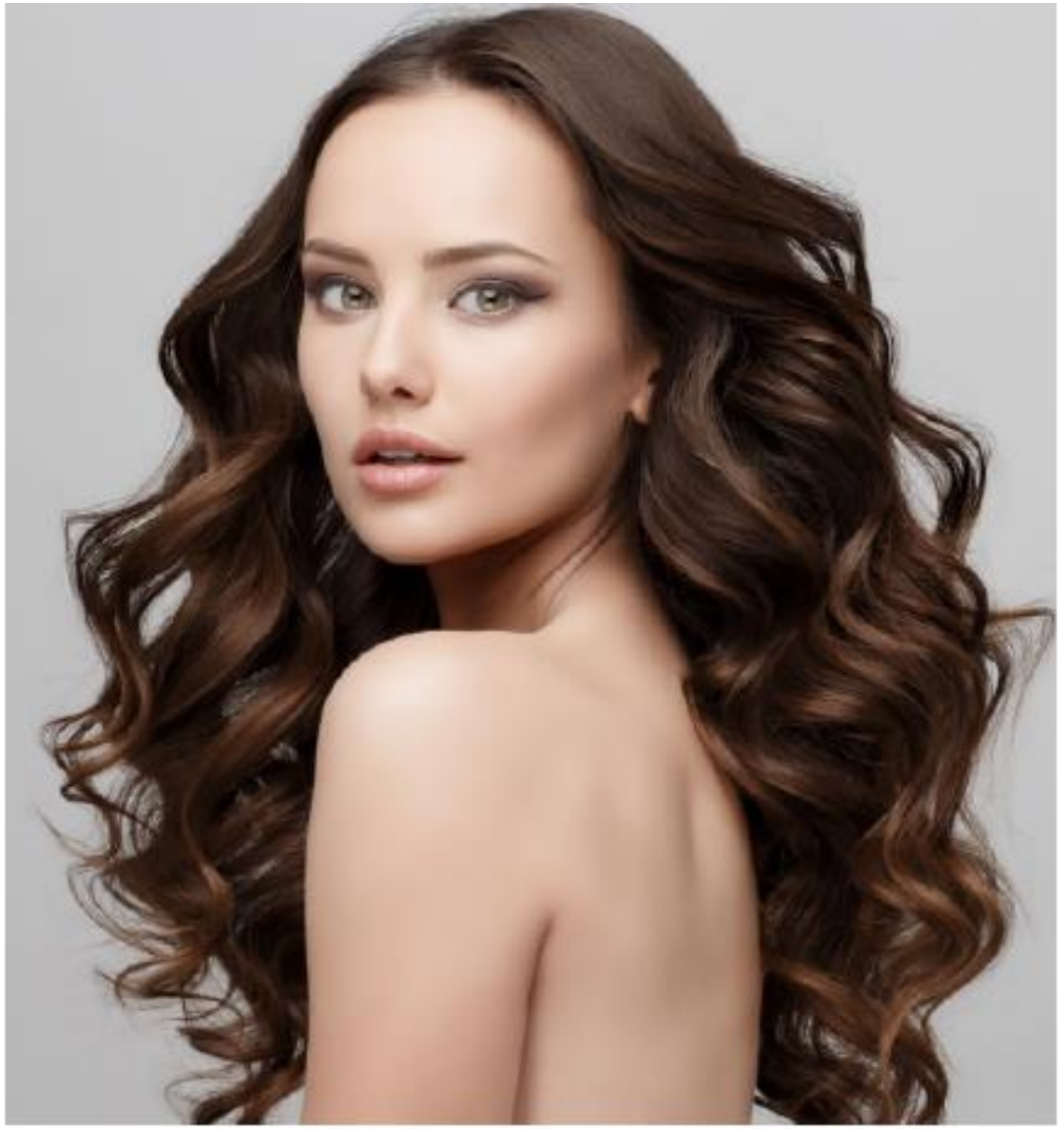
MaizeCare™ Style

I can *create the look you desire*

I can enable *stiff, sleek to subtle definition*

I can be what you want – *a wax, cream, gel or spray*

I can outperform as a bio-based polymer



MaizeCare™ Polymers

MaizeCare™ Style is a bio-based polymer, derived from corn, that provides styling benefits in haircare formulations. In formulation, MaizeCare™ Style acts as a film-former and styling aid that can range from exceptional stiffness to soft-touch styling.

Proposed INCI: Hydrolyzed Corn Starch

- Easy-to-use powder; aqueous dispersion forms a natural film
- 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.

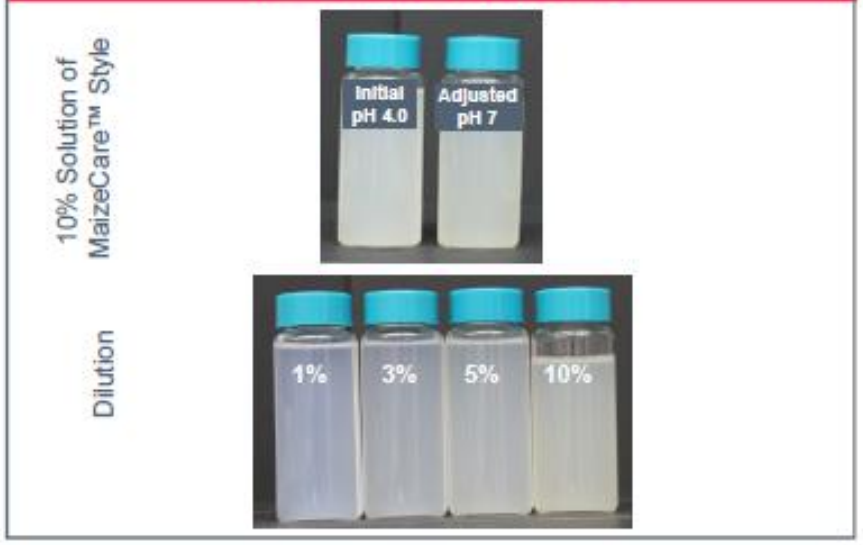
MaizeCare™ Style Polymer

Formulation Tips for Using MaizeCare™ Polymers

- ✓ Cold and hot water dispersible
- ✓ Utilize rheology modifiers to improve particle suspension
- ✓ Clearer appearance is possible when color is added
- ✓ Formulation clarity is impacted as a result of polymer loading

Cold H_2O Dispersibility

Heat (75°C) H_2O Dispersibility



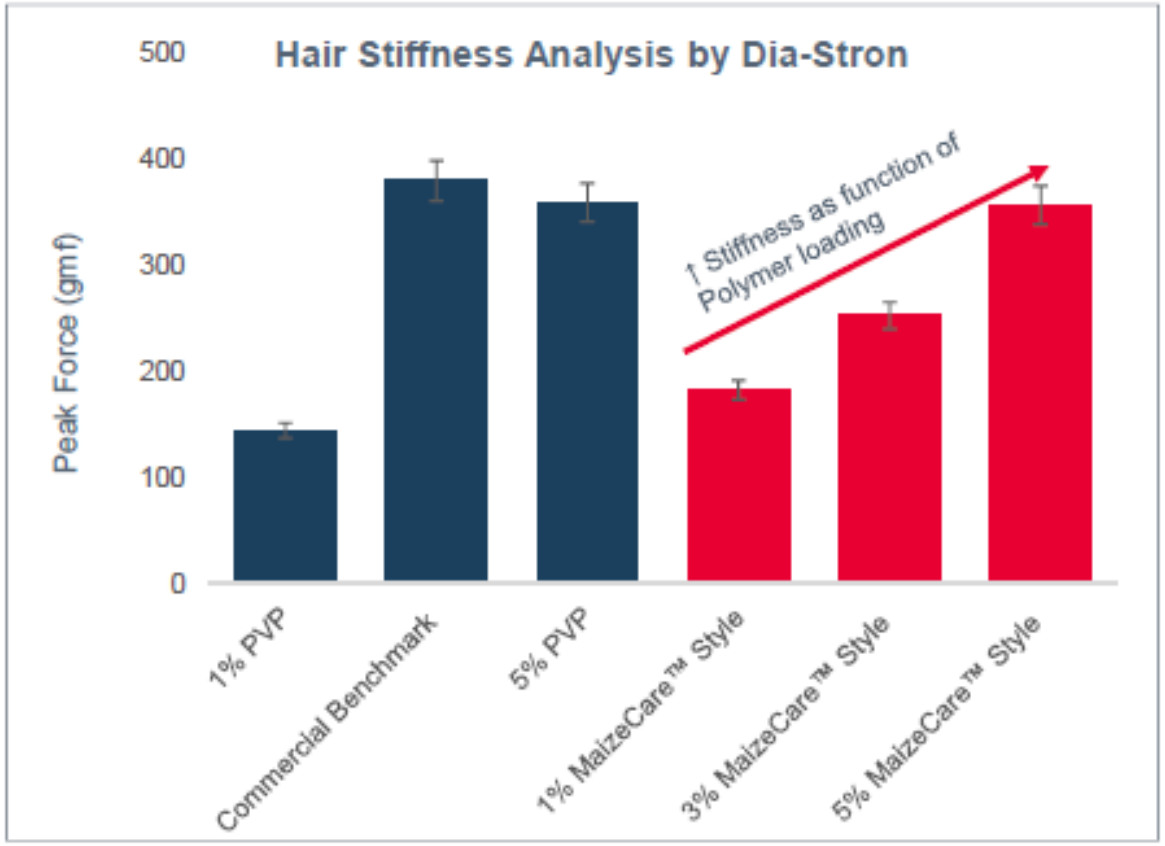
Performance Testing – Styling Gel Formulation

	Ingredient	Wt %	Wt %	Wt %	Wt %	Wt %
Phase	Label	MaizeCare™ Style 1%	MaizeCare™ Style 3%	MaizeCare™ Style 5%	PVP 1%	PVP 5%
A	Water	56.98	54.98	52.98	56.98	52.98
	Carbopol 980	0.50	0.50	0.50	0.50	0.50
	Disodium EDTA	0.10	0.10	0.10	0.10	0.10
	Glycerin	3.00	3.00	3.00	3.00	3.00
	PVP	–	–	–	1.00	5.00
B	**MaizeCare™ Style**	**1.00**	**3.00**	**5.00**	–	–
	Water	37.00	37.00	37.00	37.00	37.00
	Euxyl PE	0.99	0.99	0.99	0.99	0.99
	TEA	0.43	0.43	0.43	0.43	0.43
	Total	100.00	100.00	100.00	100.00	100.00
	Final pH	6.98	7.14	7.20	7.04	7.35

Styling Gel formula used to conduct application testing

NOTE: Any variation in the formulation/procedure noted may cause performance to change.

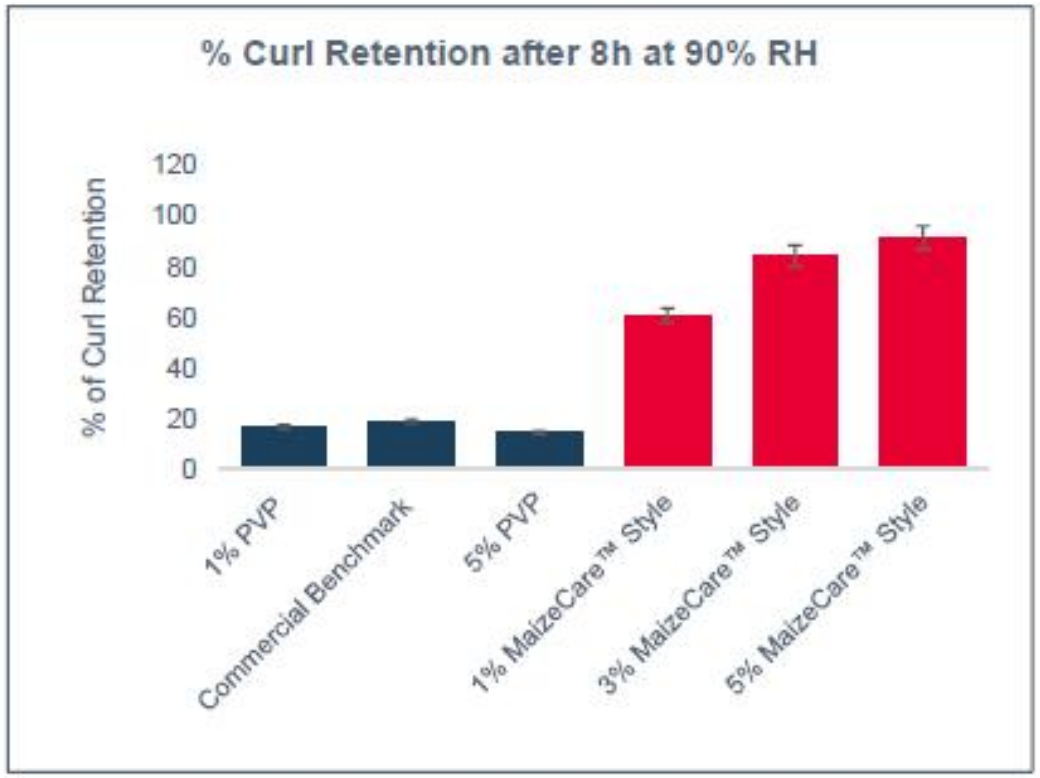
Styling Gel: Subtle to Stiff Styling Definition



Commercial Benchmark contains 2.8% PVP

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

Styling Gel: Long Lasting Curls



Commercial Benchmark contains 2.8% PVP

- ✓ MaizeCare™ Style exhibits superior humidity resistance to PVP
- ✓ MaizeCare™ Style increases curl retention as a function of polymer loading

“Ah” Maize Me – Cream Gel (CPF 4164)

Phase	INCI	Trade Name	Supplier	Wt%
A	Water			78.46
	Hydrolyzed Corn Starch	**MaizeCare™ Style Polymer**	**Dow**	**3.00**
	Propanediol	Zemea Propanediol	Dupont	1.00
	Polysorbate 60	Tween 60	Croda	1.35
B	Butyrospermum Parkii (Shea) Butter	Shea Butter	Bramble Berry	0.50
	Theobroma Cacao (Cocoa) Seed Butter	Cocoa Butter	Bramble Berry	1.50
	Persea Gratissima (Avocado Oil)	Avocado Oil	The Sage	0.10
	Prunus Amygdalus Dulcis (Sweet Almond Oil)	Sweet Almond Oil	Bramble Berry	0.10
	Cetyl Alcohol	Crodacol C70-PA	Croda	2.00
	Caprylic/Capric Triglyceride	Crodamol CGTCC-LQ	Croda	5.00
	Sorbitan Palmitate	SPAN 40	Croda	1.65
C	**Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer (and) Dimethicone (and) Trideceth-6 (and) PEG/PPG-18/18 Dimethicone**	**ACULYN™ Siltouch Rheology Modifier**	**Dow**	**2.00**
	Phenoxyethanol (and) Ethylhexylglycerin	Euxyl PE 9010	Schulke Inc.	0.99
	Fragrance	Green Coconut	Givaudan	0.15
	Acrylates/Steareth-20 Methacrylate Crosspolymer	**ACULYN™ 88**	**Dow**	**2.00**
	Aminomethyl Propanol	AMP Ultra PC 2000	Angus	0.20

Processing Instructions:

1. Weigh and heat the water to approximately 75°C.
2. While the water is heating and mixing, weigh and sift in MaizeCare™ Style Polymer. Cover the vessel to avoid water loss during heating.
3. Once the MaizeCare™ Style Polymer is fully dispersed, add the remaining Phase A ingredients.
4. Combine Phase B ingredients in a separate vessel and heat to approximately 75°C while mixing.
5. When all the ingredients are dissolved and dispersed, add Phase B to Phase A, at approximately 500-600 RPM.
6. Allow the formulation to mix for approximately 5-10 minutes, and let it cool.
7. Add Phase C ingredients in the order listed, at approximately 50°C.
8. Transfer the formulation to the final container.
9. Let the formulation sit overnight to achieve final viscosity.

NOTE: Any variation in the formulation/procedure noted may cause performance to change.

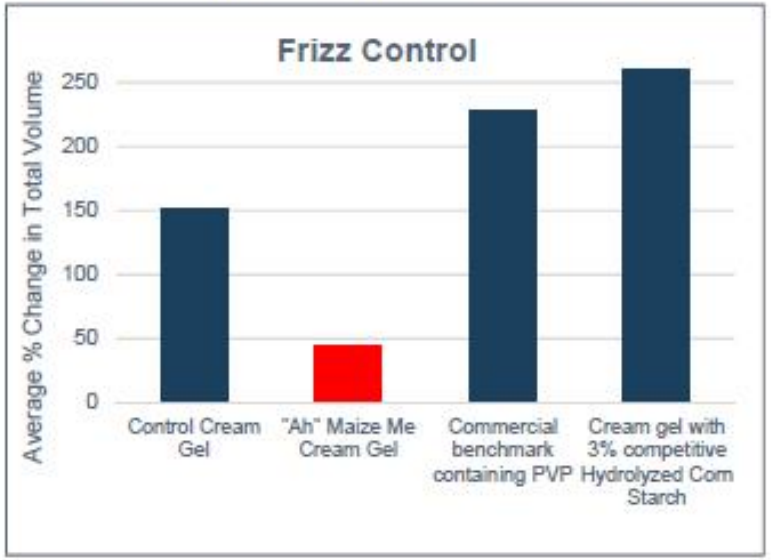
“Ah” Maize Me – Cream Gel (CPF 4164)

Frizz Control

✓ Better frizz control compared to commercial benchmark containing PVP, control cream and 3% competitive Hydrolyzed Corn Starch with 95% confidence level

Treatment: 0.10 g / g hair on frizzy hair

Test Conditions: 80% relative humidity / 25°C for 8 hours



“Ah” Maize Me – Cream Gel (CPF 4164)

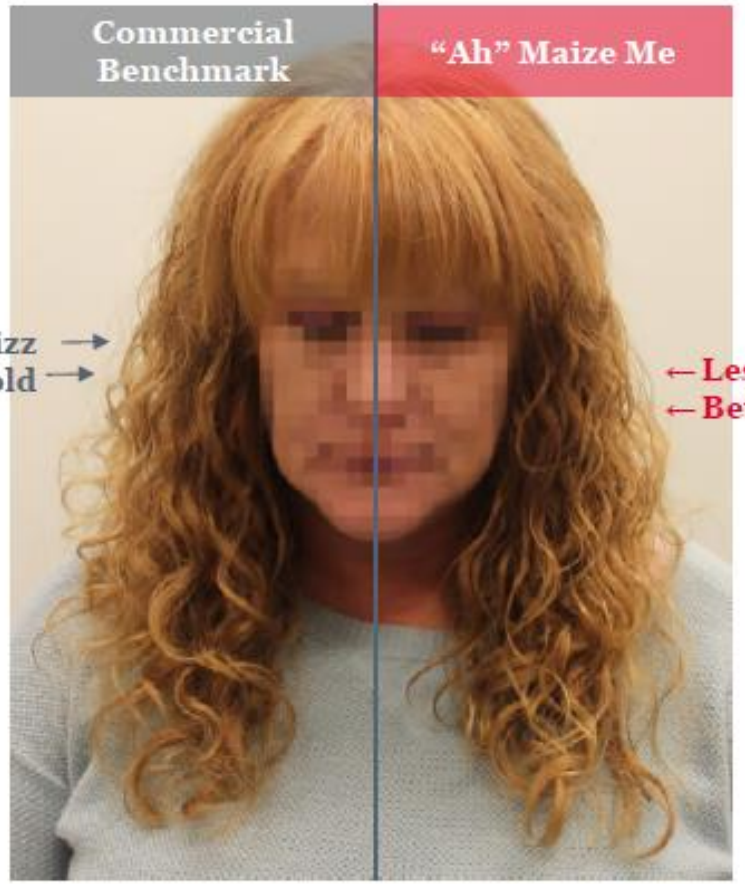
Half-head test with a top-selling commercial cream (left) and “Ah” Maize Me (right)

- ✓ MaizeCare™ Style exhibits better frizz control and better curl definition compared to a commercial benchmark containing PVP

Treatment: applied 3 g of each sample to damp hair

Before Treatment

After 8 Hours

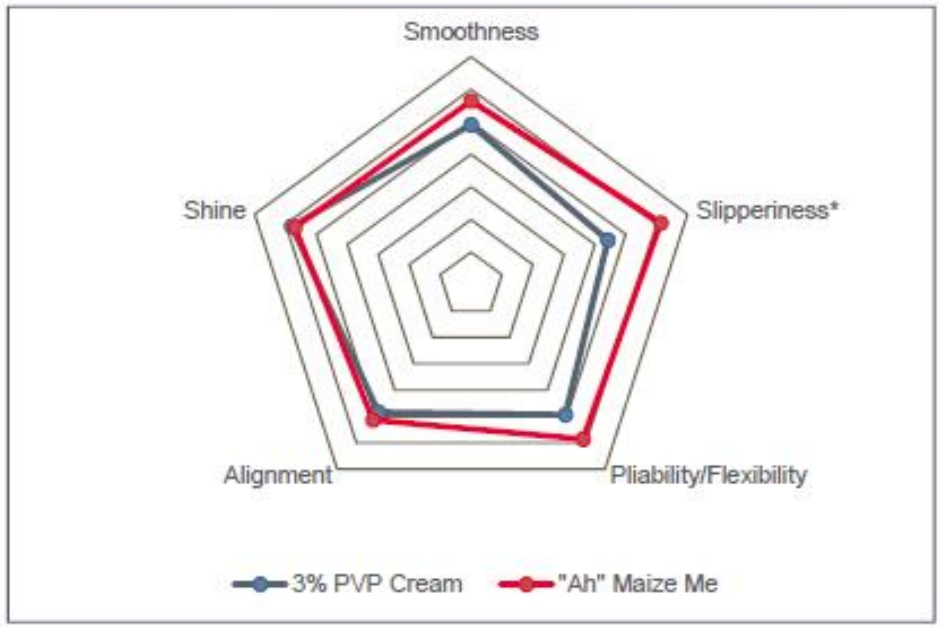


“Ah” Maize Me – Cream Gel (CPF 4164)

Sensory Comparison Panel Study

- ✓ A paired comparison study was conducted with “Ah” Maize Me and a cream gel containing 3% PVP
- ✓ Panelists reported improved slipperiness and similar smoothness, pliability/flexibility, alignment and shine

Treatment: applied 0.1 g/g of each formulation to damp, dark bleached hair.



Statistically different from “Ah” Maize Me: * ≥95%

UCARE™ Extreme Polymer

Hair dilemma

It is all about how it makes you feel!

Hair happiness

- **32%** of women adore their hair
- **68%** are only happy with their hair sometimes
- **50%** wish they had someone else's hair altogether

15 minutes a day

- **58%** spend only 10-15 minutes a day on their hair
- **33%** spend 16-30 minutes a day on their hair
- **9%** spend more than 30 minutes a day on their hair

Her hair boosts her mood

80% agree – good hair helps improve the way women feel about themselves

- Prettier 39%
- More confident 37%
- Happier 21%
- Doesn't affect their mood 21%
- Younger 20%
- Sexier 20%

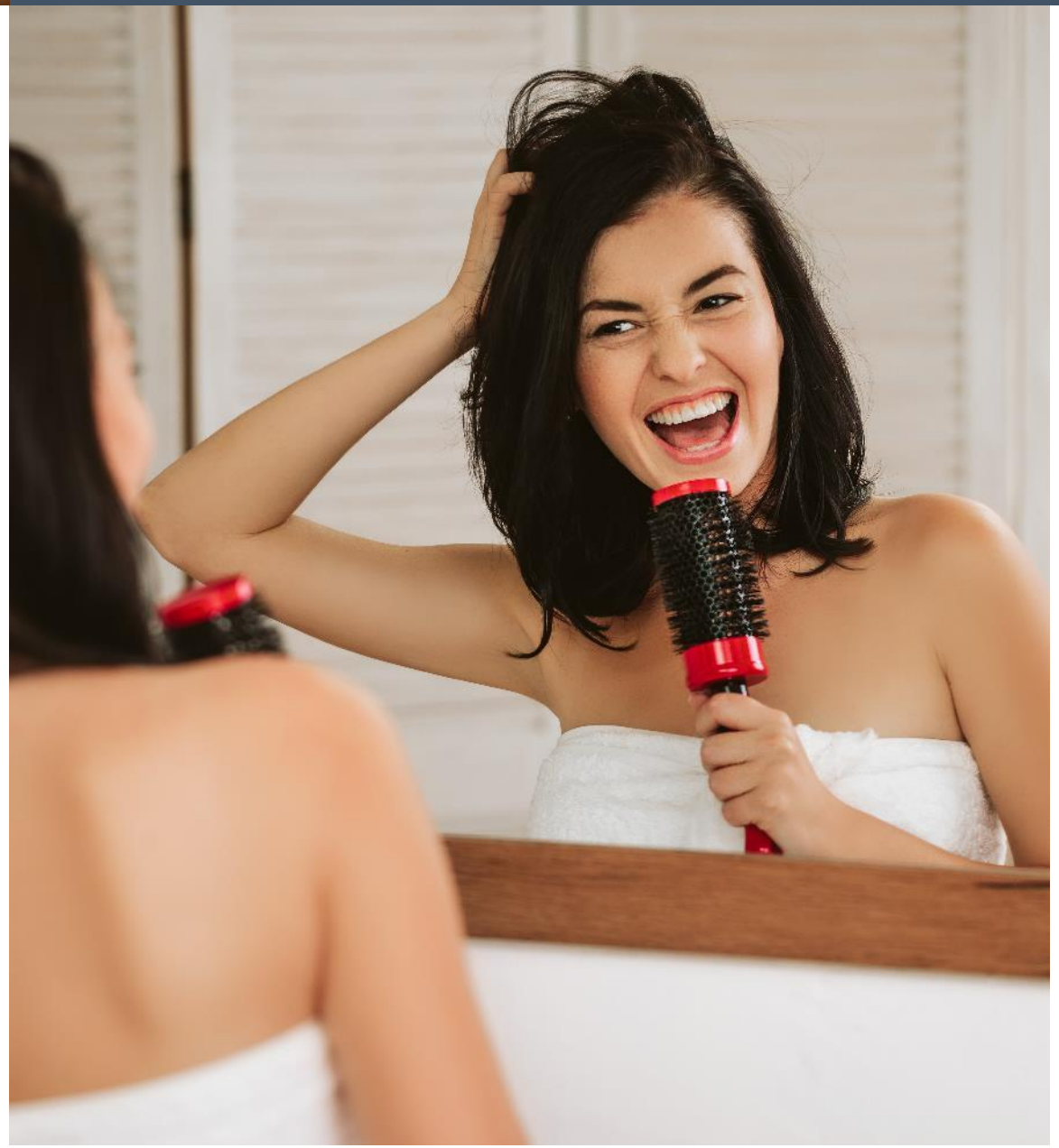
Source: Hair RX study, 2017 | study sample 1000 women

UCARE™ Extreme Polymer

Don’t compromise …

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

UCARE™ Extreme Polymer



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

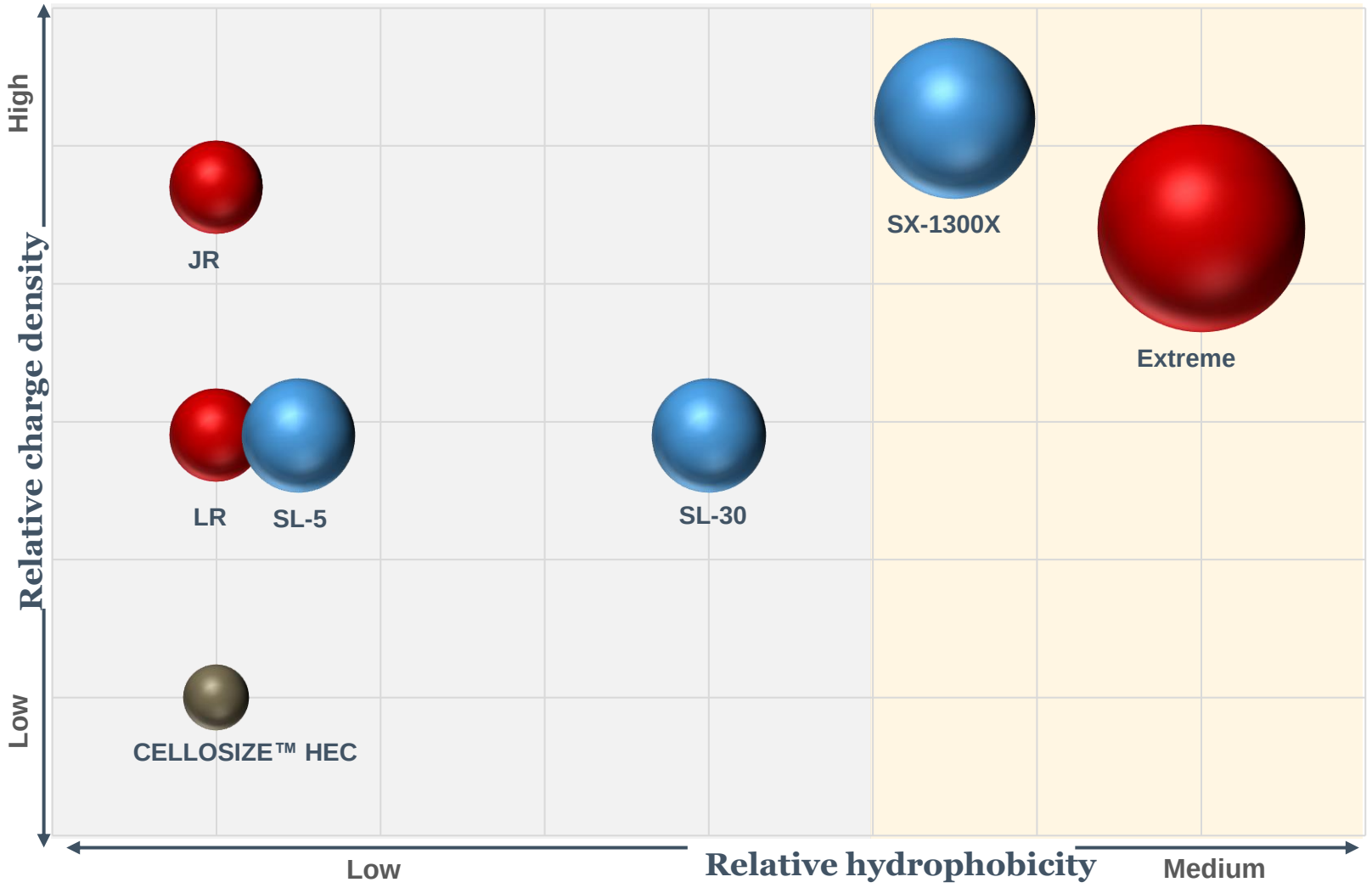
- Conditioning (reduction in combing force)
- Provides natural soft styling (i.e. curl retention)
- Heat protection

For shampoos

- Versatility in conditioning (with or without silicones)

* Aminofunctional silicone

Understanding UCARE™ Extreme Polymer – Rinse-off conditioner



UCARE™ Polymer (PQ-10)

SoftCAT™ Polymer (PQ-67)

The size of the ball indicates the conditioning level in rinse-off conditioner application.

Hair type: bleached Caucasian hair
Treatment: Rinse-off conditioner (0.3% cationic polymer)

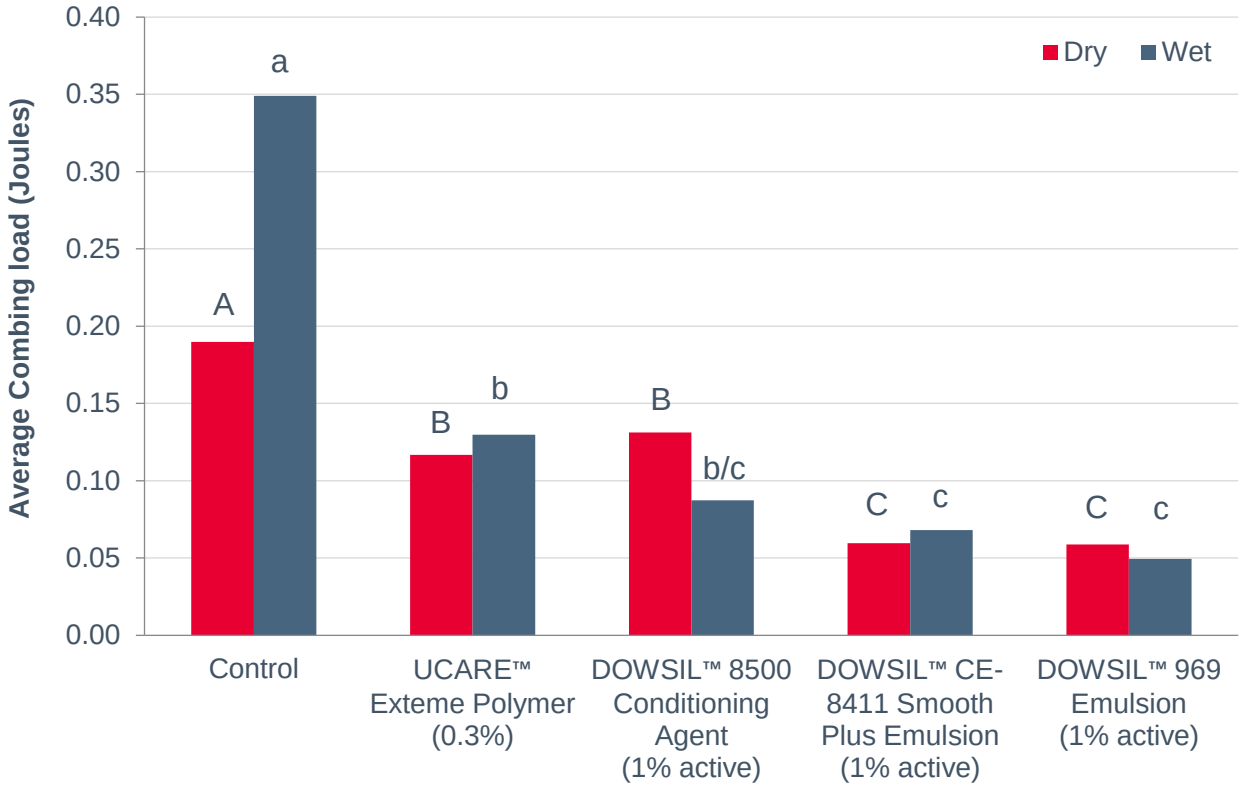
Note: CELLOSIZE™ HEC contains no charge density or hydrophobicity.

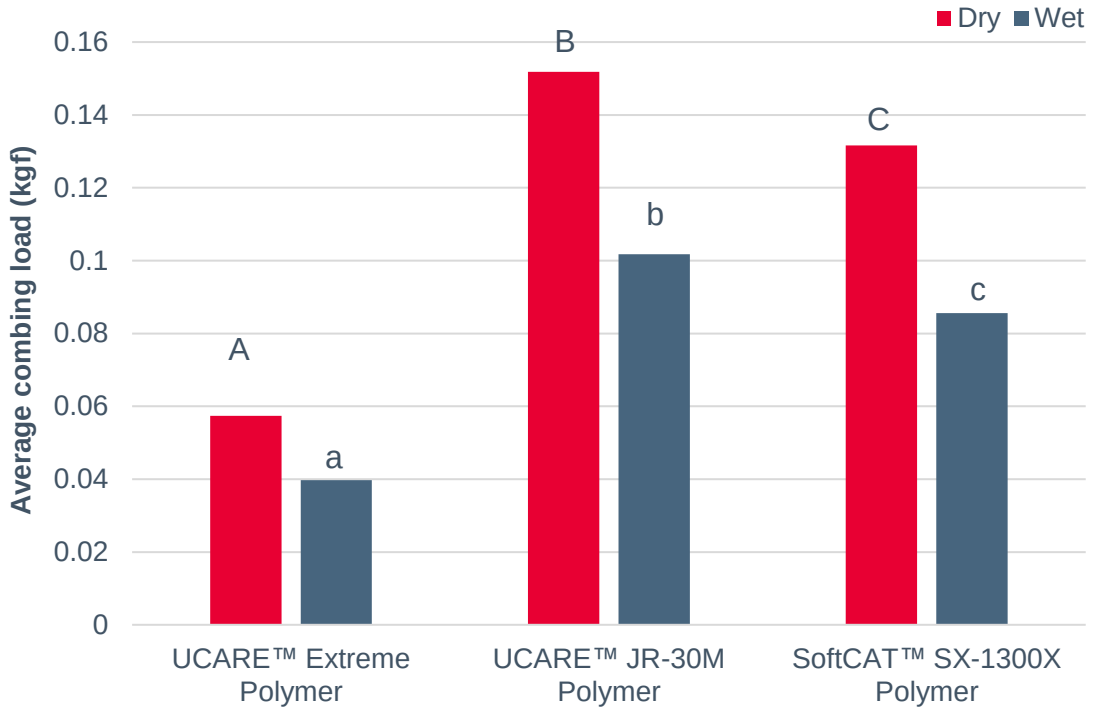
Rinse-off conditioner

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.%.**

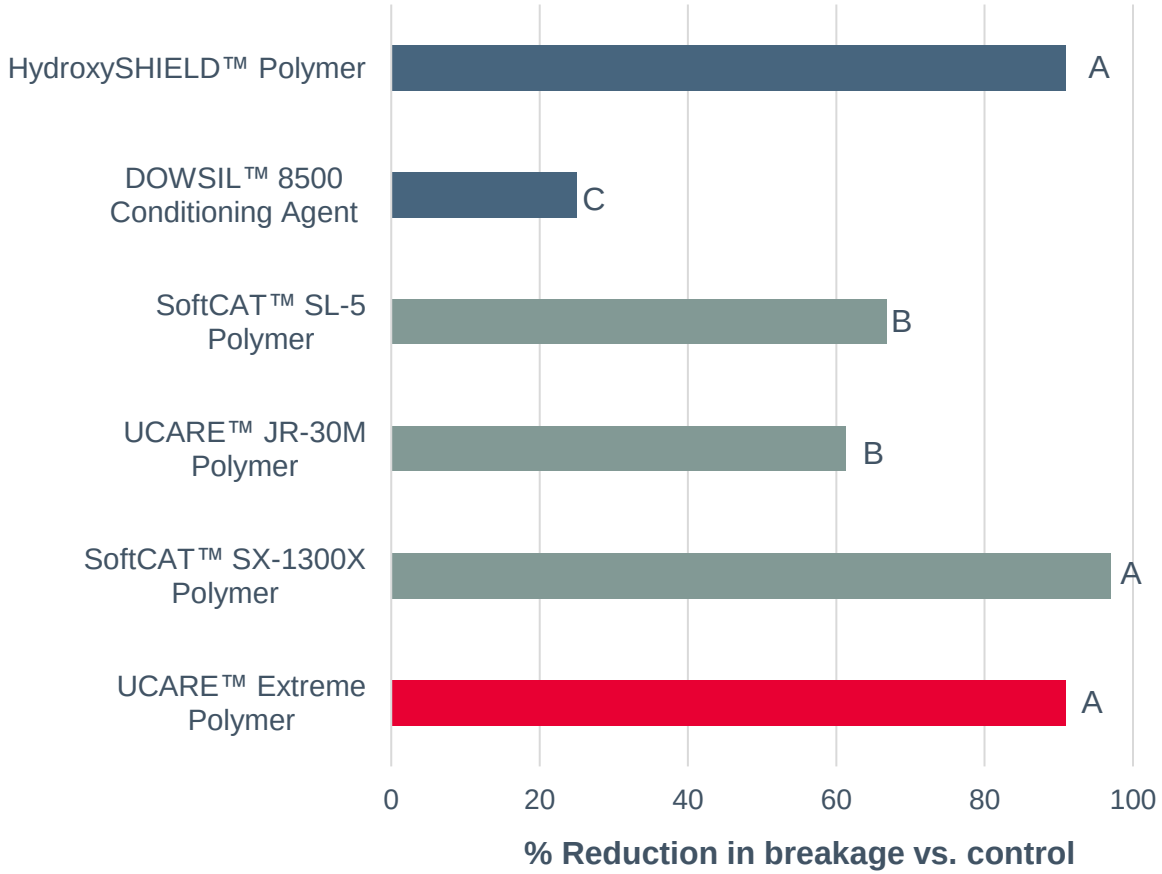


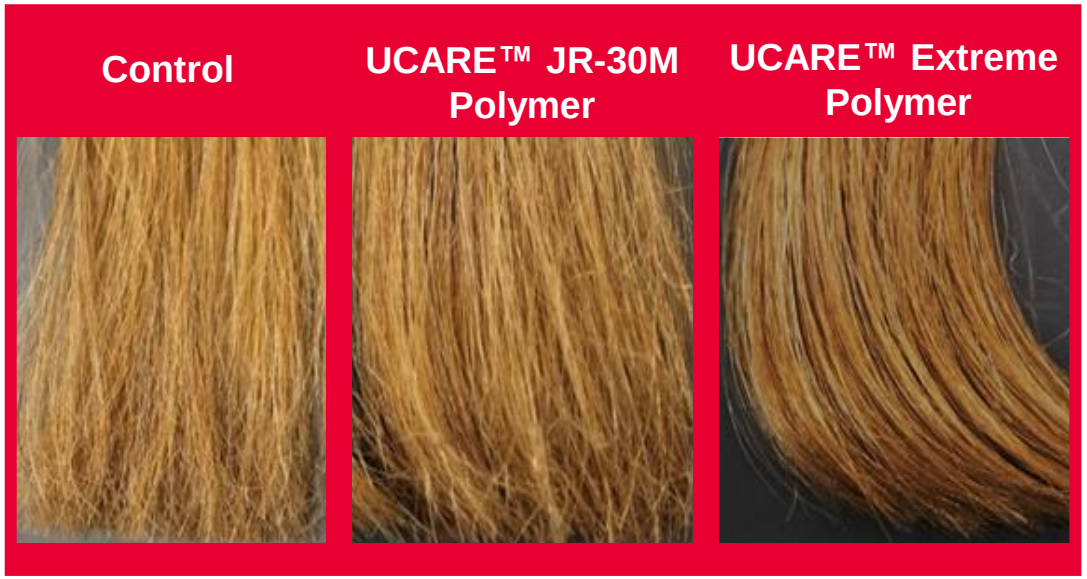


Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone
Measured using Diastron MTT175 (left graph) and Instron tensile tester (right graph)
Statistics: Different letters show a statistical difference at 95% confidence

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.

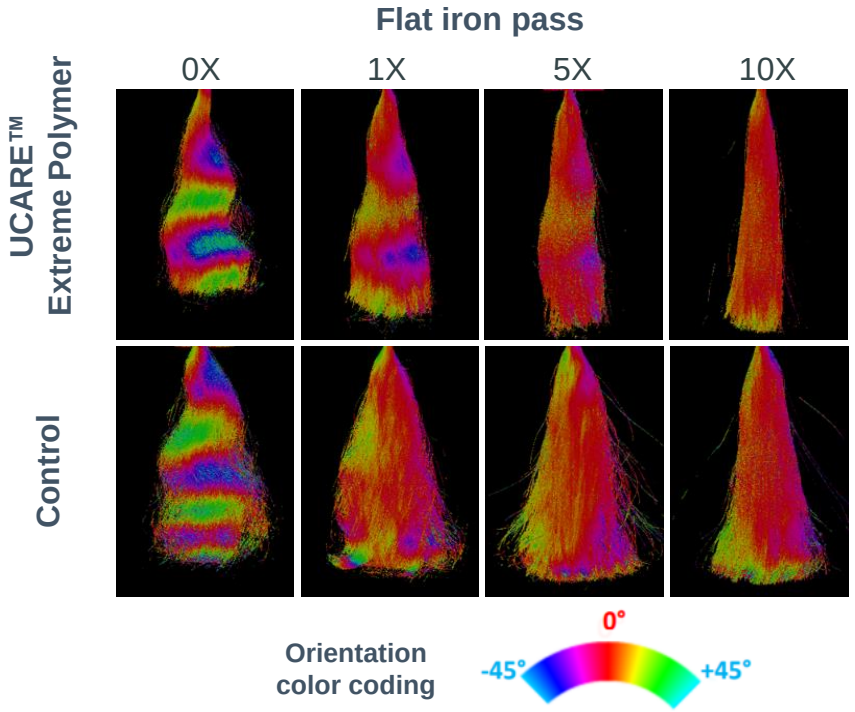


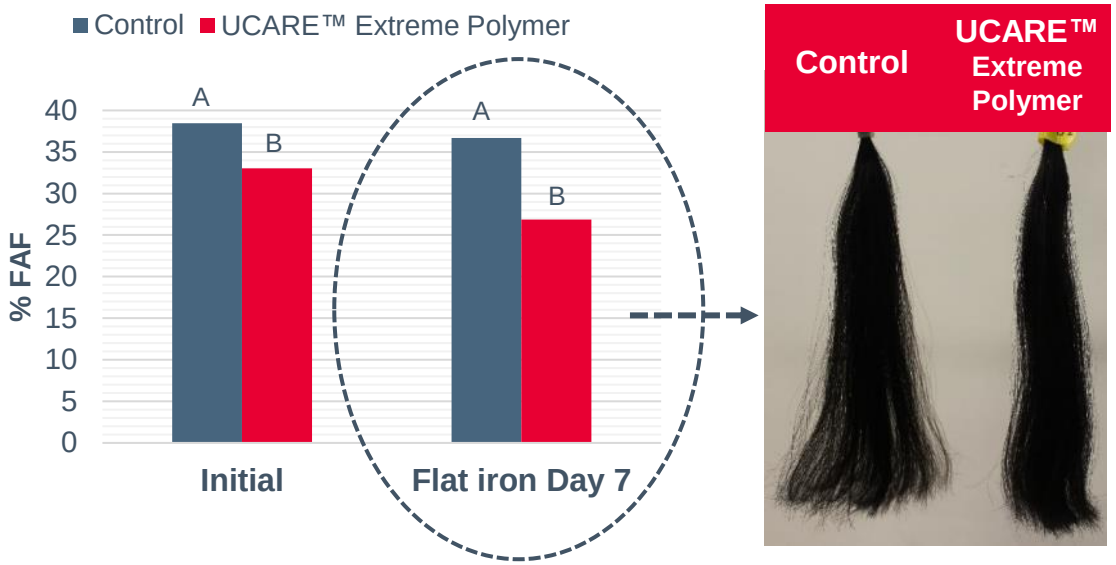


Treatment: 0.4 g / g hair on bleached Caucasian hair, 0.3% cationic polymer or 1% active silicone
Method: measured using repeated combing instrument.
3 tresses/product; 10,000 comb strokes; speed: 20 cycles/min
(80 comb stokes/tress/min); broken hair fibers weighed and % reduction calculated
Control: 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.**





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

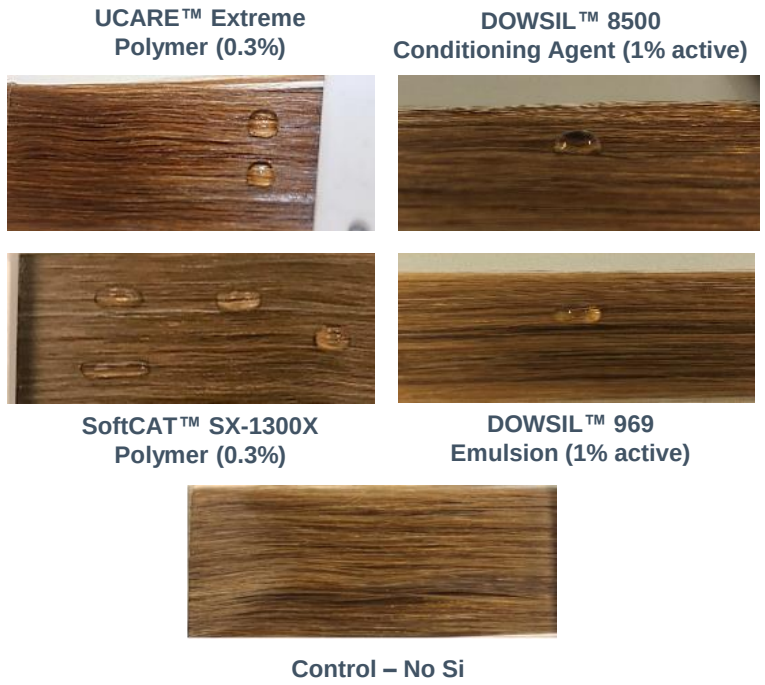
After 1 week at 25°C and 50% RH

- 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

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

DOWSIL™ FA PEPS

Naturality vs. long-lasting performance

Long-lasting performance

New color cosmetics launches over the last five years:

- 37% have a long-lasting claim
- 11% claim a specific duration
- 2% have a claim of 24 hours or more

*Mintel, gnpd

Ideal Properties of Film-formers

Safe for Topical Application	Permeable to Semi-occlusive	Uniform and Continuous	Long-Lasting and Removable	Compatible; Easy to Formulate	Comfort and Sensory Attributes
• Non-irritating • Non-sensitizing	• Breathable Film • Second Skin	• Homogeneous Spreading • Total Protection	• Rub-off Resistance • Wash-off Resistance • Sebum/Sweat Resistance • Non-transfer • Lasts All Day • Easy to Remove	• With Personal Care Ingredients, Including Water	• Flexible • Non-tacky • Smooth • Low Film Residue

The consumers' dilemma

The desire for natural/organic ingredients versus long-lasting performance

How do you address this trade-off?

DOWSIL™ FA PEPS Silicone Acrylate is a high-performing film former that:

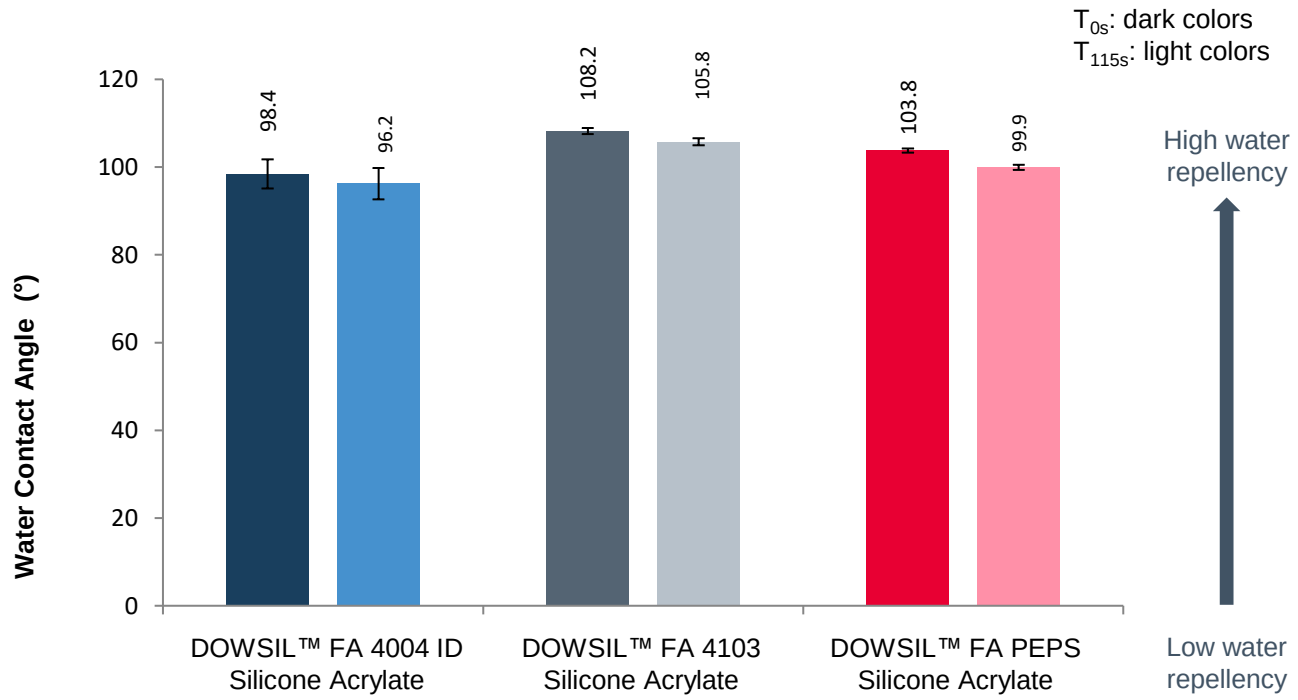
- Delivers long-lasting wear benefits
- Uses a “green” carrier
- Helps meet a natural content of up to 60% (ISO 16128)
- Enhances your sustainability profile
- Enables formulators to design **long-lasting** color cosmetics and skin care products with a higher **natural** content
- Allows for step improvements in your **sustainability journey** while meeting consumers’ expectations for high performance
- Is made from renewable resources, lowering dependence on fossil resources

DOWSIL™ FA PEPS Silicone Acrylate
Identity Card

Silicone Acrylate in bio-based carrier		
INCI Name		Undecane (and) Tridecane (and) Acrylates / Polytrimethylsiloxymethacrylate Copolymer
Appearance		Colorless to yellow liquid – transparent to slightly hazy
Active Content	%	40
Viscosity	mm^2/s	25-400
D4/D5 Level	%	<0.1/<0.1
China Compliant		Yes

Water repellency

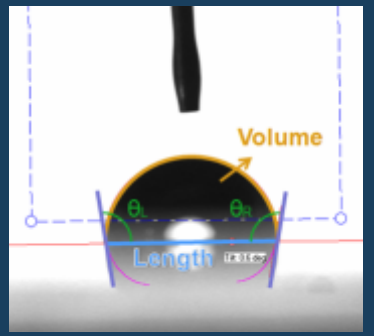
Similar performance to high-performing benchmarks



Test Principle

Evaluates contact angle of a water droplet when deposited on a film coated on glass.

Higher contact angle indicates greater repellency.

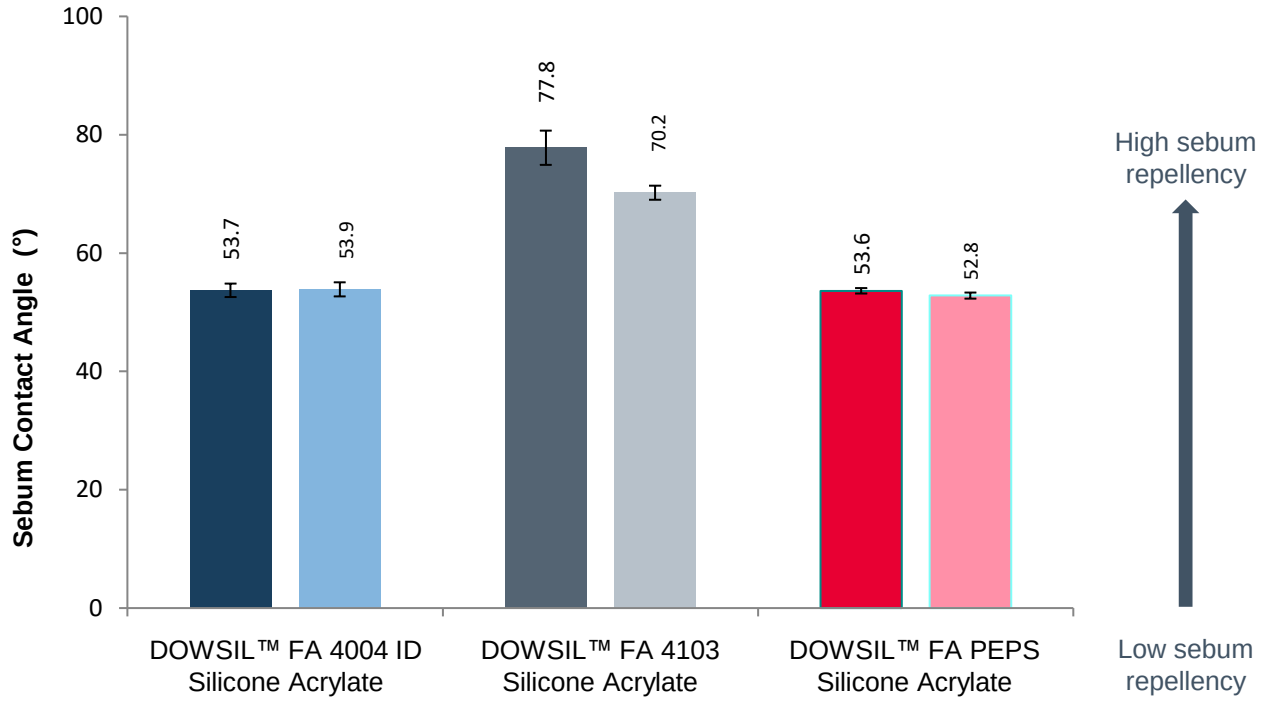


Film composition:

Pure film formers (diluted at 20 wt. % in a solvent carrier) coated on glass slide (50 µm).

Sebum repellency

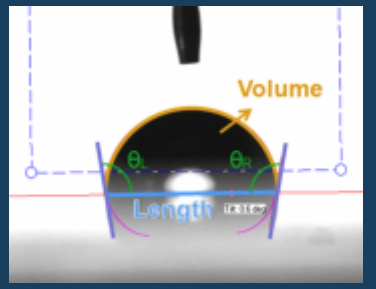
Similar performance to high-performing benchmarks



Test Principle

Evaluates contact angle of a sebum droplet – made of triolein, oleic acid and squalane (3/1/1) – when deposited on a film coated on glass.

Higher contact angle indicates greater repellency.

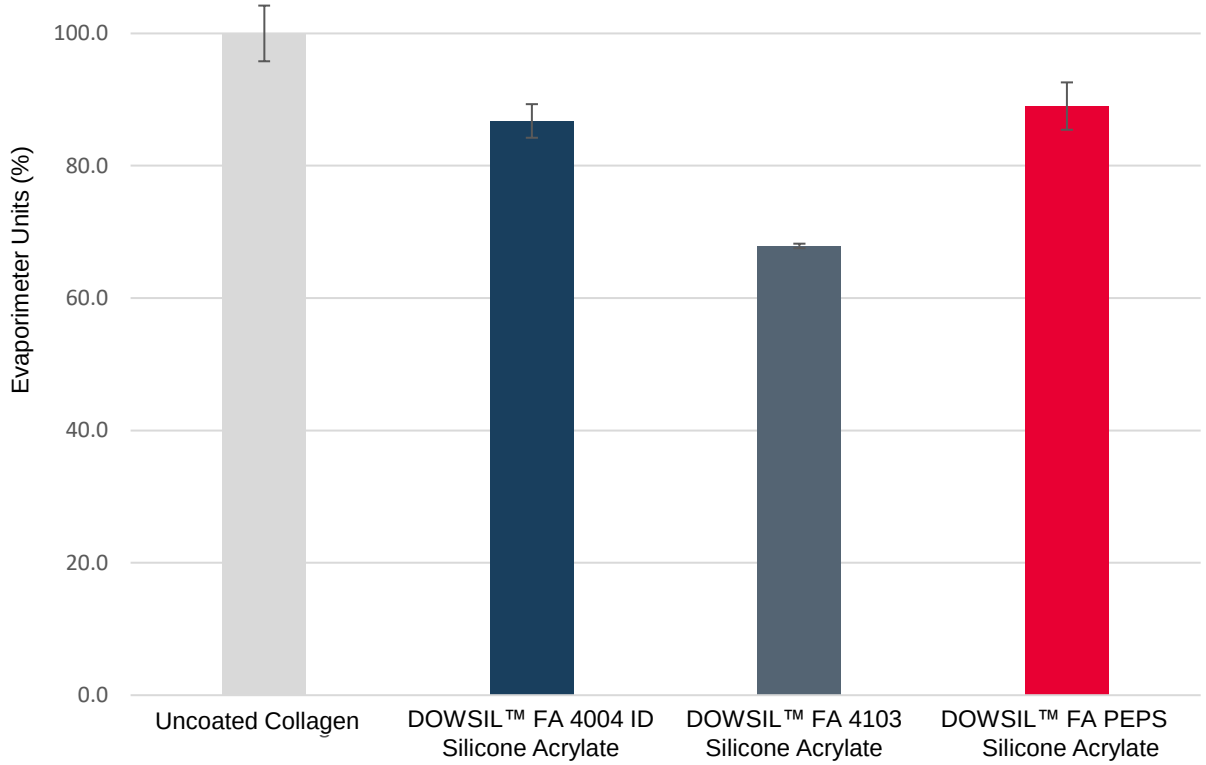


Film composition:

Pure film formers (diluted at 20 wt. % in a solvent carrier) coated on glass slide (50 µm).

Water vapor permeability

Similar performance to high-performing benchmarks



Water vapor permeability compared to uncoated collagen set at 100%

Test Principle

Evaluates ability of water vapor to pass through a film coated on collagen.

Higher % value indicates greater permeability to water vapor.

Film composition:

Pure film formers (diluted at 20 wt. % active level in a solvent carrier) coated on collagen (50 µm).

>80% = Nonocclusive
60-80% = Slightly occlusive
30-60% = Semi-occlusive
<30% = Occlusive

Flexibility tests – visual observation

Similar performance to current offering

	Before elongation	After elongation 100%	
DOWSIL™ FA 4004 ID Silicone Acrylate			• Not tacky • Some cracks
DOWSIL™ FA 4103 Silicone Acrylate			• Not tacky • No cracks
DOWSIL™ FA PEPS Silicone Acrylate			• Not tacky • Some cracks

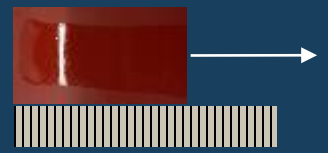
 = Cracks Appear

 = Flexible Film

Test Principle

Evaluates flexibility of a film (coated on elastic band) by observation of cracks after extension and release of band.

Higher density of cracks indicates less flexibility.

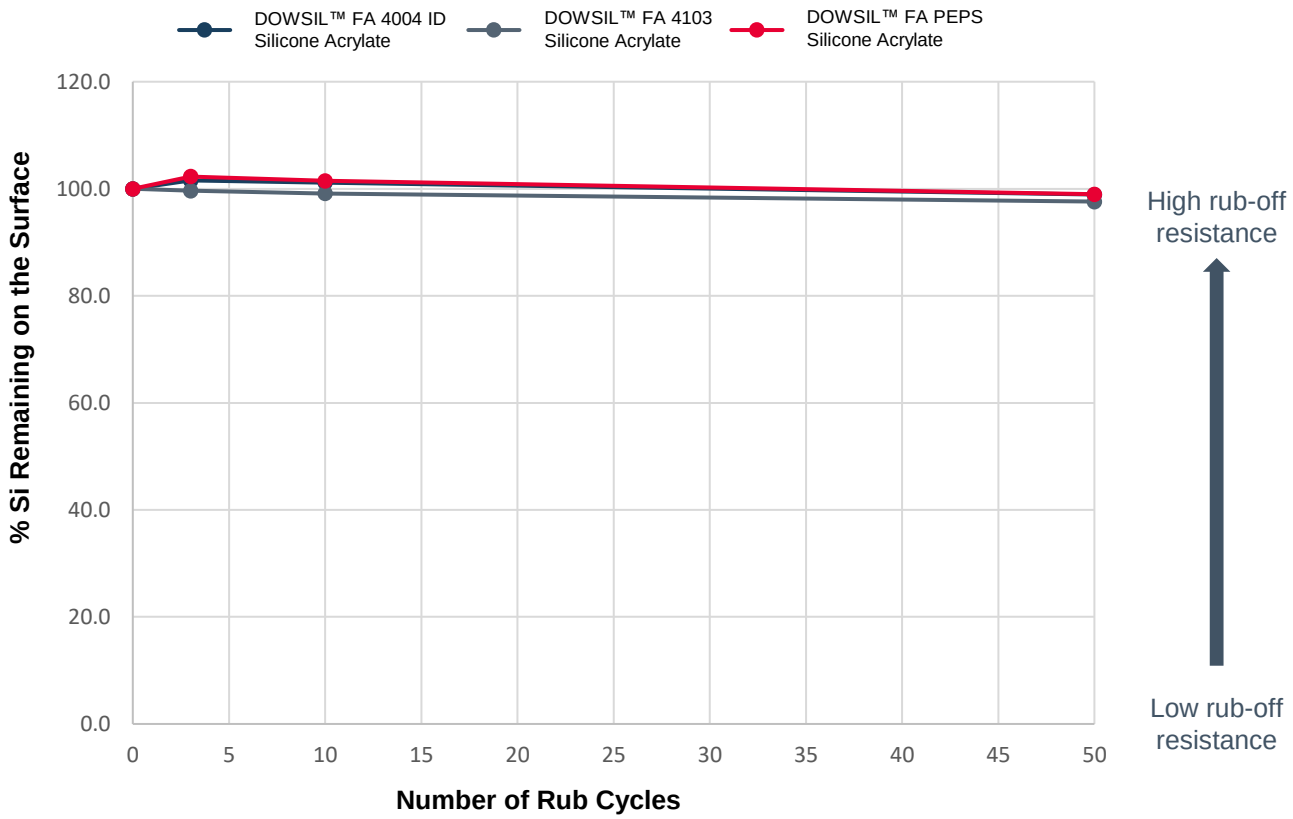


Film composition:

Pure film formers (diluted at 20 wt. % active level in a solvent carrier) coated on red elastic rubber band (50 µm).

Film durability – rub-off resistance

XRF



Test Principle

Resistance to rub-off of a film coated on a skin-mimicking substrate (Vitro-Skin, IMS Inc.). Resistance measured by XRF after friction cycles using washability tester/felt band.

Higher % value indicates greater resistance to rub-off.

Film composition:

Pure film formers (diluted at 20 wt. % active level in a solvent carrier) coated on collagen (50 µm) plus 10% red pigment.

Features

DOWSIL™ FA PEPS Silicone Acrylate meets all desired performance attributes and allows color cosmetics with higher natural content

- Superior water repellency and sebum repellency – translating into long-duration benefits
- Excellent rub-off resistance
- High film elasticity – translating into a comfortable wear experience
- Excellent water permeability – inducing a nonocclusive film for high skin tolerance

SunSpheres™ BIO SPF Booster

The case for more skin protection

- Consumers are increasingly focused on protecting their skin – but overall usage of sun care products could still be improved
- Unclear information around UV filters and ocean pollution have created consumer concerns over sun care products – negatively impacting their use and has had a detrimental effect on recommended skin protection routines.

SunSpheres™ BIO SPF Booster

- SunSpheres™ BIO SPF Booster is a bio-based SPF booster.
- This natural SPF booster works in the presence of both organic and inorganic UV filters.
- SunSpheres™ BIO SPF Booster is readily biodegradable
- This innovative SPF booster demonstrates in vitro and in vivo SPF boosting performance.

SunSpheres™ BIO SPF Booster

FSC Wood pulp based ingredient

Supports market demand for natural formulations

0.97

Natural Origin Index ISO 16128

Delivers various benefits including thickening and shear thinning…

SunSpheres™ BIO SPF Booster
ID Card
INCI Name: Microcrystalline cellulose

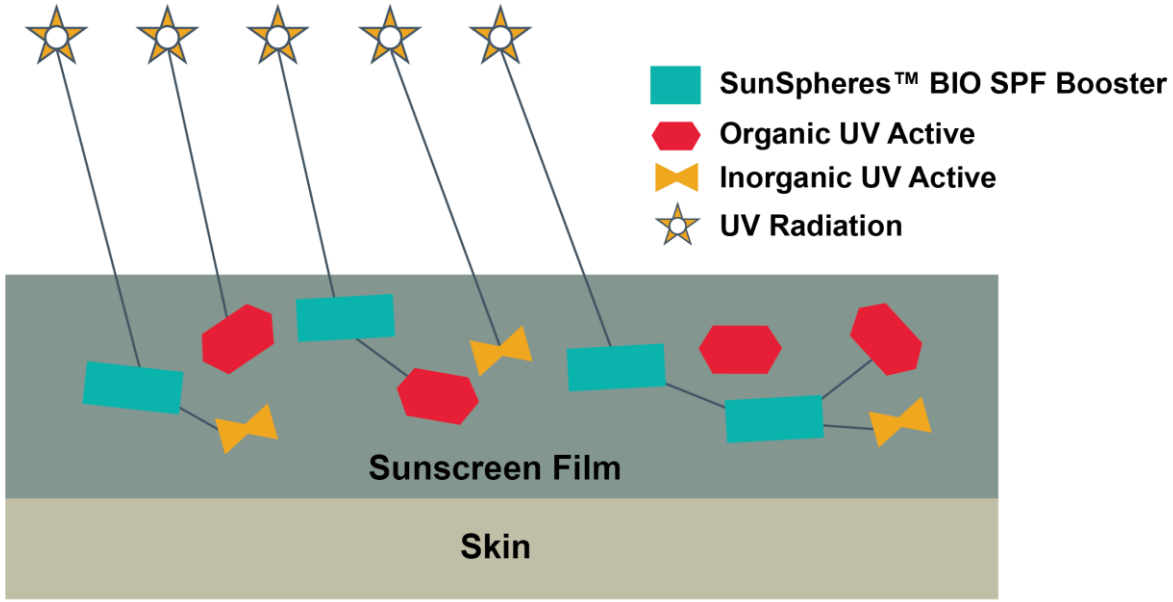
Typical Properties	
Appearance	White / off-white powder
Active content %	≥94% (may contain 0-6% of water)
Bulk density	0.6-0.8 (g/cm^3)
Natural origin index (ISO 16128)	0.97
Recommended use level	1-3%
COSMOS by Ecocert	Application in progress
Biodegradability	Readily biodegradable (OECD 301)
Source	FSC certified wood pulp
Shelf life	2 years
China compliance	Listed in the catalogue of cosmetic ingredients

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

How SunSpheres™ BIO SPF Booster works

SunSpheres™ BIO SPF Booster works by a light scattering mechanism with effective UV scattering attributed to:

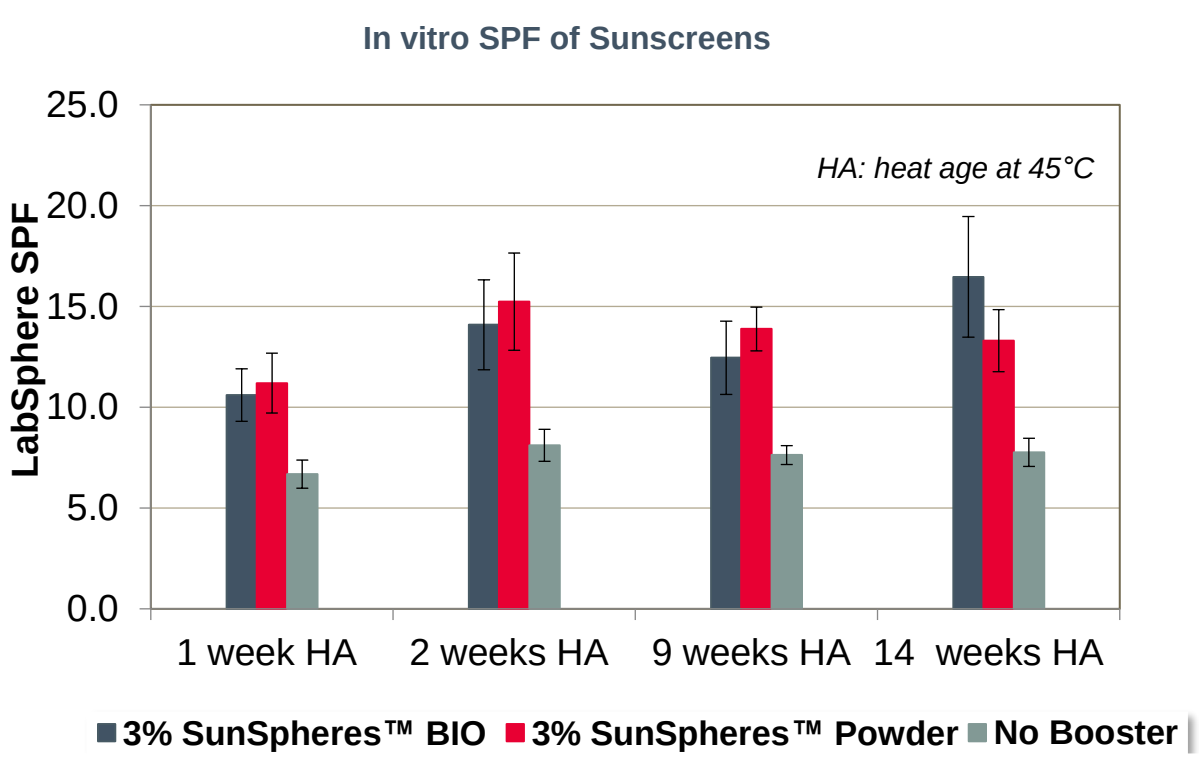
- High refractive index (1.51-1.56) due to its high crystallinity (>70%)
- Crystal size (100-250 nm)
- Agglomerate size (1-50 µm)



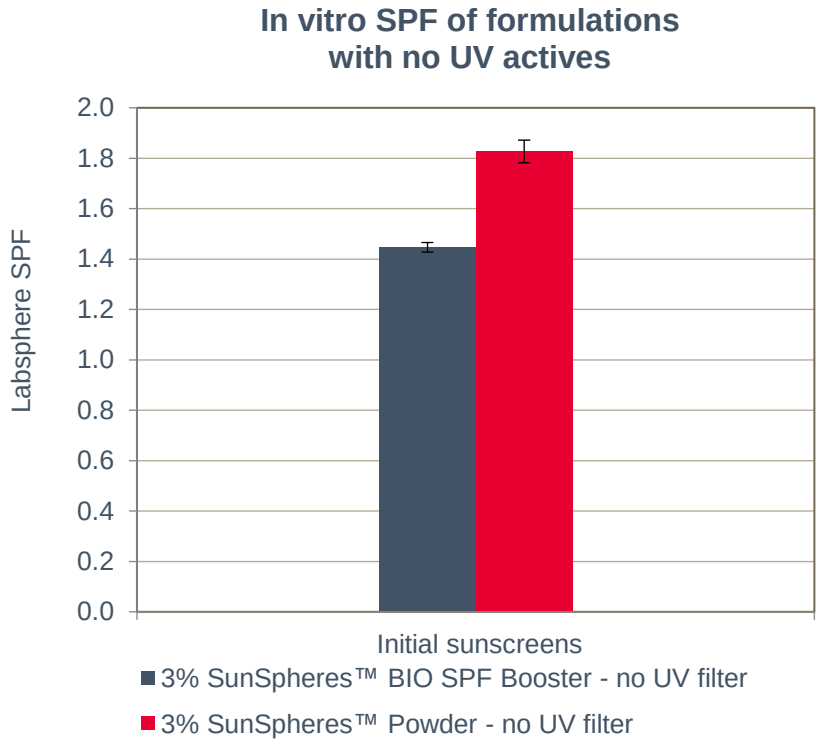
In vitro assessment

In vitro SPF

SunSpheres™ BIO SPF Booster does not exhibit any SPF value in absence of UV filters.
SunSpheres™ BIO SPF Booster should be used with UV filters.



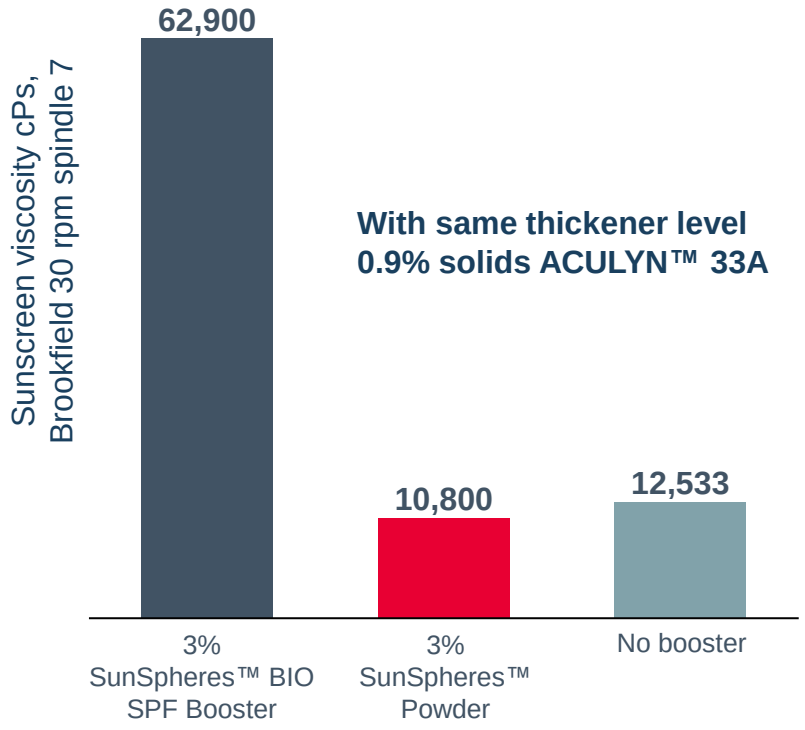
SPF boosting performance maintained after aging 14 weeks at 45°C

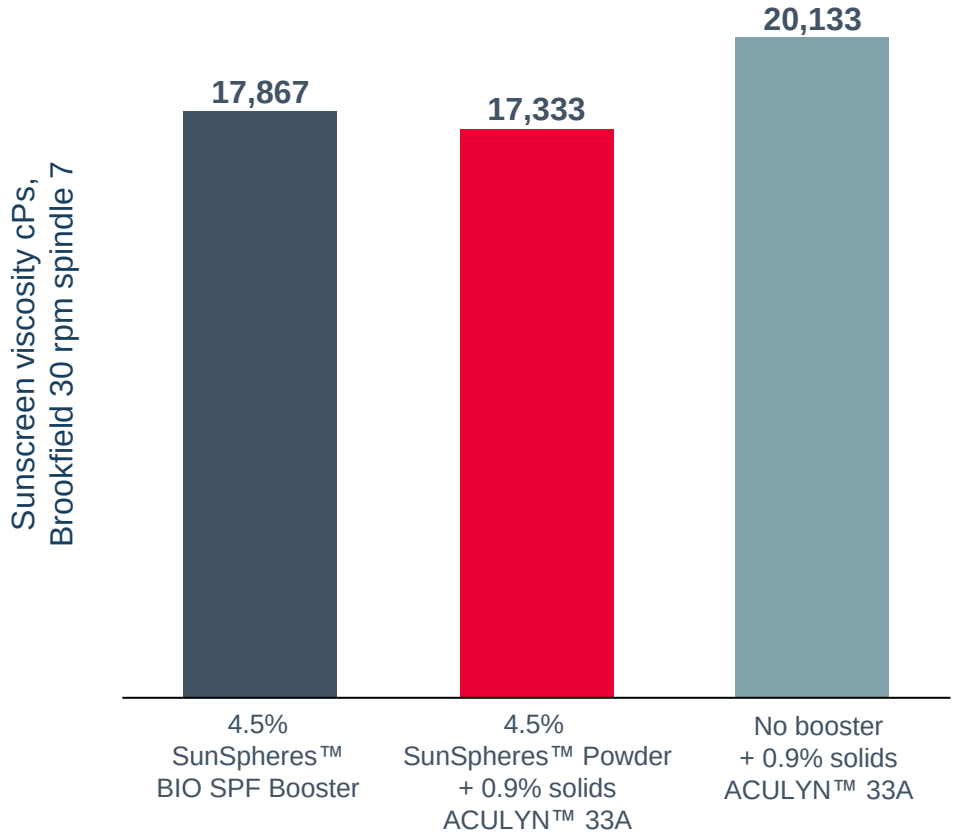


SunSpheres™ BIO is <u>not</u> a UV active ingredient

Viscosity effects

SunSpheres™ BIO SPF Booster thickens formulations and allows for formulators to decrease thickeners (i.e., polymers, fatty alcohols) while maintaining stability of formulations.





In vivo assessment

SunSpheres™ BIO SPF Booster – in vivo results

UV Filters	Formulations	Average in vivo SPF (5 subjects FDA 2011 Static)	Standard deviation	% SPF Boost over Control	% SPF Boost / 1% SunSpheres™
Avobenzone 3% Homosalate 5% Octisalate 5% Octocrylene 4%	O/W Sunscreen Control – no booster	23.80	2.75		
	O/W Sunscreen With 1.5% SunSpheres™ BIO SPF Booster	36.70	4.36	54	36
	O/W Sunscreen With 3% SunSpheres™ BIO SPF Booster	36.59	2.81	54	18
	O/W Sunscreen With 3% SunSpheres™ Powder	37.61	2.75	58	19
Avobenzone 3% Homosalate 8% Octisalate 4.5% Octocrylene 6%	Commercial Sunscreen Product SPF 30	35.69	4.06		

- SunSpheres™ BIO demonstrated SPF boost in in vivo testing with organic UV filters
- SunSpheres™ BIO achieved the same SPF boost at half the dosage of SunSpheres™ Powder in the formulation tested

NB: As a reference SunSpheres™ Powder is typically used from 3% up to 5%

SunSpheres™ BIO SPF Booster – in vivo results

UV Filters	Formulations	Average in vivo SPF (5 subjects FDA 2011 Static)	Standard deviation	% SPF Boost over Control	% SPF Boost / 1% SunSpheres™
Titanium Dioxide 9% Zinc Oxide 7%	O/W Sunscreen Control – no booster	22.57	1.68		
	O/W Sunscreen With 1.5% SunSpheres™ BIO SPF Booster	34.87	5.57	54	36
	O/W Sunscreen With 3% SunSpheres™ BIO SPF Booster	34.61*	6.44	53	18
Zinc Oxide 21.6%	Commercial Sunscreen Product SPF 50	61.01	4.72		

*based on 4 subjects

SunSpheres™ BIO demonstrated SPF boost in in vivo testing with inorganic UV filters

Cold Process

Skin Care vs Body care claims

Skin Care

The claims are almost the same!

Body Care

How to address Formulators Challengues & Consumer Desires?

Save Time and Energy Costs with ACULYN™

Hot Process

Number of steps for process emulsification: **7+**

Processing time ~ 6 Hours

Approximate **energy consumption**: **~410,25 kW***

VS

Cold Process

Number of steps for process emulsification: **4+**

Processing time ~ 4 Hours

Approximate **energy consumption**: **~9,28 kW***

**Source: TROMBETtA, FERNANDA. 2019 COMPARAÇÃO ENTRE O PROCESSO A QUENTE E O PROCESSO A FRIO NA FABRICAÇÃO DE CREMES CORPORAIS. PONTIFÍCIA UNIVERSIDADE CATÓLICA DE CAMPINAS*

Save Time and Energy Costs with ACULYN™

- No need to heat
- No need to cool
- No need to mix at high speeds

This translates to potential

- Reduction in overall energy consumption and energy costs
- Improvement in asset utilization
- Reduction in overall processing time

ACULYN™ Rheology Modifiers

Organic, anionic or nonionic thickeners that act as a viscosity controller, **emulsifying agent** and particulate suspension in the formulations

Applications

- Skin care and cleansing
- Liquid Soap/ Shower Gel / Foams/ Mousses / Moisturizing Gels/ Alcohol Gels/ Lotions/ Creams
- Sunscreen (creams, lotions, sprays(emulsions))
- Haircare: Shampoos/ Conditioners/ Hairdyes/ Hairgel / finishers (masks/ ampoules/ leave on/ sprays)

Benefits

- Soft, non-greasy, non-sticky
- Used in variety of applications and product forms
- Clear and transparent formulations if desired
- Simple and quick neutralization and jellification
- Emulsify any oil or wax as long as it is molten

Anionic ACULYN™ Rheology Modifiers O/W Systems

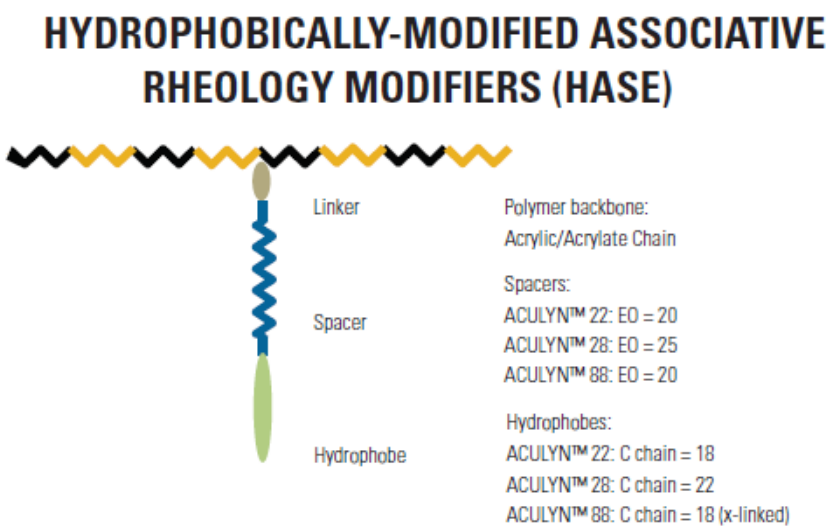
Use as emulsifiers in surfactant-free systems

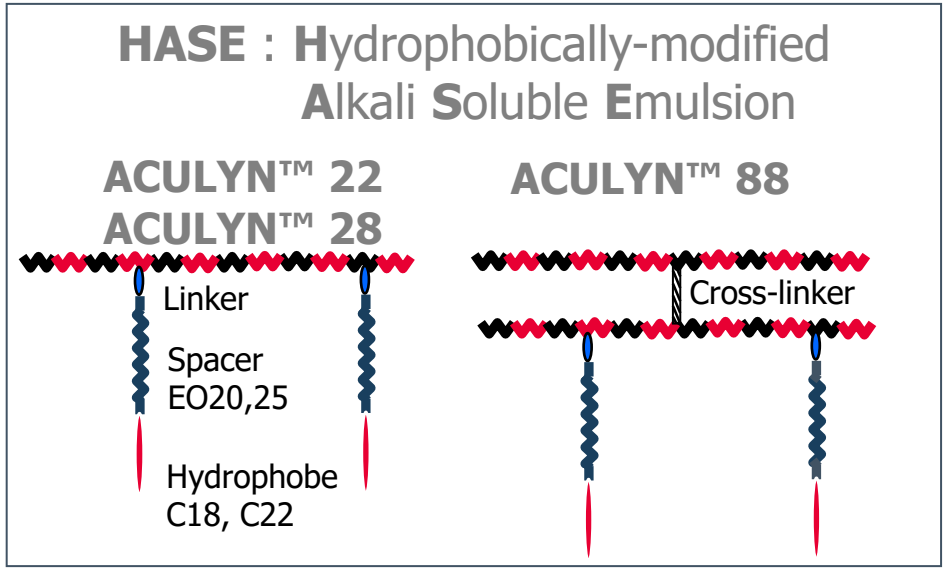
	Aculyn™ 22	Aculyn™ 28	Aculyn™ 88
% solids	30	20	29
pH	2.7	3	3.8
Preservation	n/a	n/a	Na benzoate
Salt tolerance	Very Good	Good	Good
Particles Suspension capability	Poor	Moderate	Good
Efficiency in surfactant-based formula	Excellent	Excellent	Excellent
Gel clarity	Very Good	Excellent	Excellent
CTFA / INCI Names	Acrylates / Steareth-20 Methacrylate Copolymer	Acrylates / Beheneth-25 Methacrylate Copolymer	Acrylates / Steareth-20 Methacrylate Crosspolymer

Anionic ACULYN™ Rheology Modifiers

Mechanisms of Polymeric Thickening and Emulsifier HASE

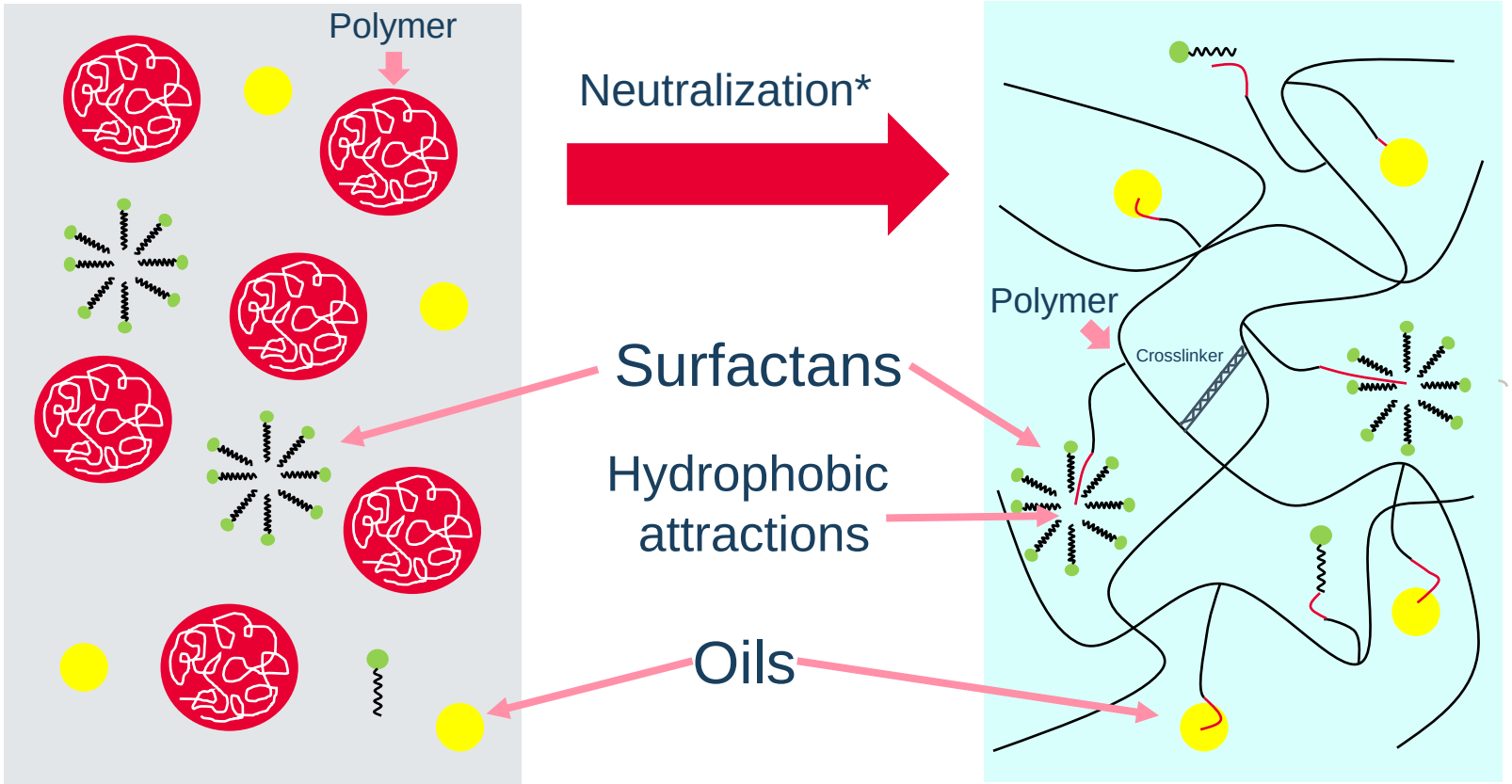
1. Controls rheology by chain entanglement
2. Hydrophobic attractions





Anionic ACULYN™ Rheology Modifiers

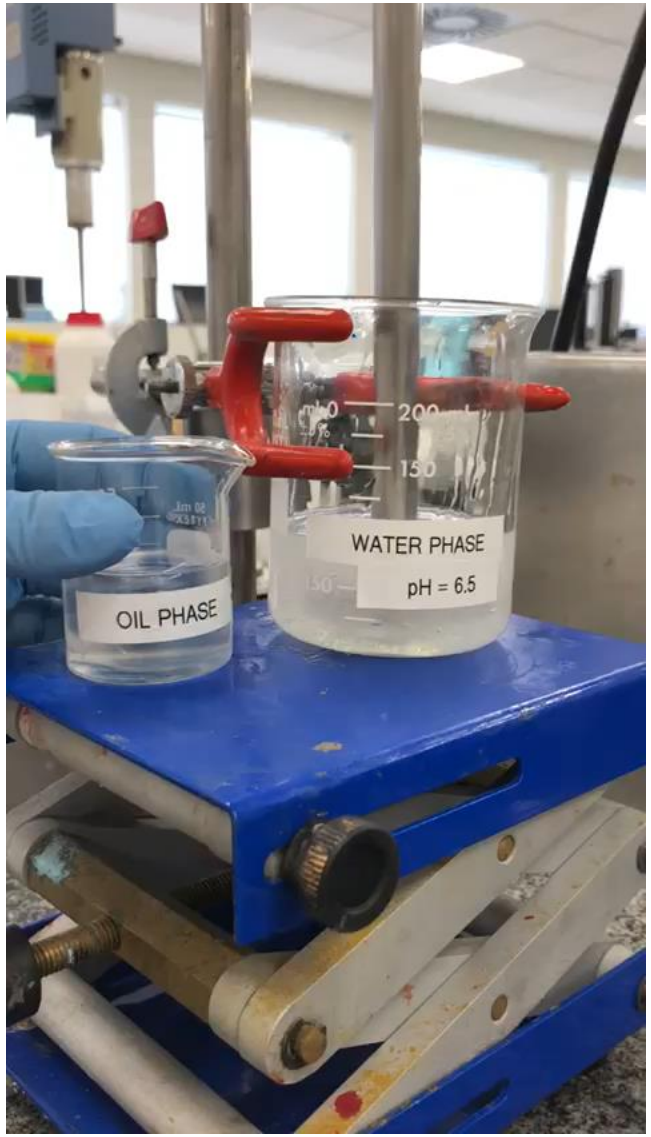
Mechanisms of Polymeric Thickening and Emulsifier HASE



*NaOH, KOH, NH4OH, MEA, TEA, DEA, AMP

Anionic ACULYN™ Rheology Modifiers

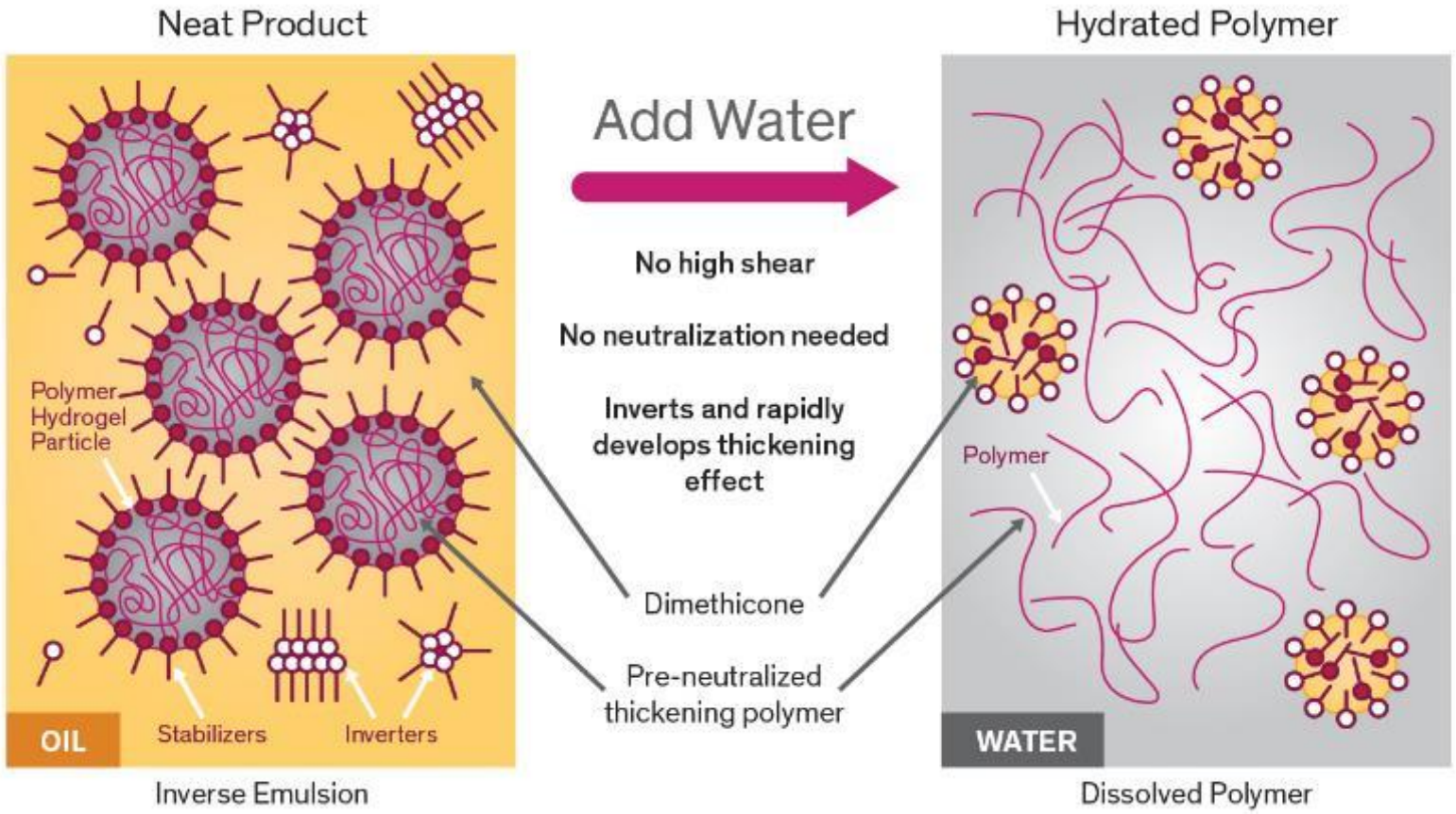
Mechanisms of Polymeric Thickening and Emulsifier HASE



ACULYN™ Siltouch Rheology Modifier

INCI / CTFA Name	Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer (and) Dimethicone (and) Trideceth-6 (and) PEG/PPG-18/18 Dimethicone
Appearance	White liquid emulsion
Solids	27%
Viscosity at 1% in aqueous solution (20 rpm, 25C)	18,000 – 25,000 cPs
Shelf Life	18 months
Recommended use level	2 – 7% as is
China compliant	Yes

A flexible technology for instant thickening



Rapidly and easily builds water phase viscosity

ACULYN™ Siltouch Rheology Modifier is able to emulsify a wide array of oils

Oil Nature	Emulsifies	3% ACULYN™ Siltouch Emulsifies
Mineral Oil	X	Up to 40% oil
Caprylic/Capric Triglycerides	X	Up to 40% oil
Isopropyl Myristate/Caprylic/Capric Triglycerides	X	Up to 20% oil
Silicone Gum Blend	X	Up to 40% oil
Silicone Elastomer Blend	X	Up to 40% oil
Marula Oil	X	Up to 20% oil
Meadowfoam Seed Oil	X	Up to 20% oil
Sweet Almond Oil	X	Up to 20% oil

Acqua for Me

This watery body lotion can be used anytime your skin needs a moisturization!

Attributes

- Watery Feel
- Light, thin texture
- Rich and smooth feel
- Non greasy feel

Featured Products

- **ACULYN™ 88 Rheology Modifier** acts as emulsifier up to 40% of oil phase. Easy to incorporate
- **DOWSIL™ FZ-3196 Fluid** a less greasy, moderate volatility solvent, brings a unique light and silky smooth feel with excellent spreadability
- **UCON™ Fluid AP** provides emolliency and soft after-feel
- **DOWSIL™ HMW 2220 Non-Ionic Emulsion** imparts a rich and smooth feel
- **Ecosense™ 919** helps Aculyn™ 88 to associate and achieve emulsion stability

Acqua for Me

Phase	Ingredients	INCI Name	Supplier	%
A	Water	Water		82.75
	Versene Na2 Crystal	**Disodium EDTA**	**DOW**	0.1
	ACULYN™ 88	**Acrylates/Steareth-20 Methacrylate Crosspolymer**	**DOW**	3.5
	PG USP/ EP	**Propylen Glycol**	**DOW**	3
	Ecosense™ 919	**Coco-Glucoside**	**DOW**	1
	TEA 99	**Triethanolamine**	**DOW**	0.6
	Neolone PH 100	Phenoxyethanol	Dupont	0.5
B	Polymol 812	Capric Caprilic Triglyceride	AQIA	3
	UCON™ Fluid AP	**PPG-14 Butyl Ether**	**DOW**	1
	DOWSIL™ FZ 3196 Fluid	**Caprylyl Methicone**	**DOW**	3
	BHT	Butylated hydroxytoluene	Labsynth	0.05
	DOWSIL™ HMW 2220 Emulsion	**Divinyldimethicone / Dimethicone Copolymer (and) C12-13 Pareth-3 (and) C12-13 Pareth-23**	**DOW**	2
C	Fragrance	Fragrance	Symrise	0.3
	Blue colorant (0.1%)	Colorant	Sensient	0.2

Procedure:

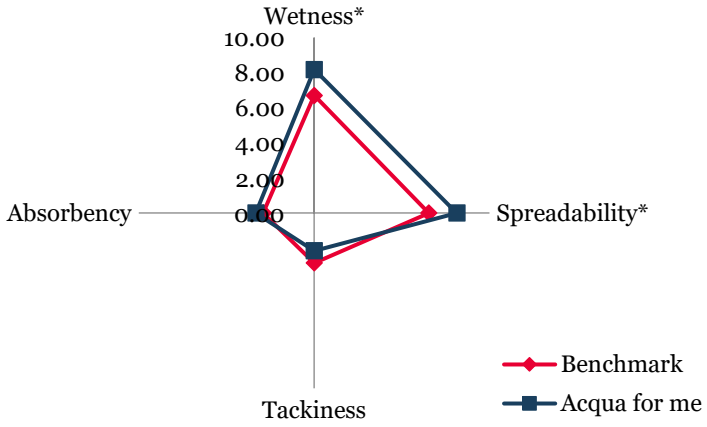
1. Mix all ingredients from Phase A in the order listed. Adjust pH for 6,5 with TEA 99 and then add preservative in the mixture.
2. Disperse ingredients from Phase B separately in the order listed.
3. Mix Phase B into Phase A under stirring.
4. Add phase C
5. Adjust pH as needed.

Formulations	pH	Viscosity (LV, s64,1 rpm)	% Solids
Benchmark	5,98	363600 cP	26.70
Acqua for me	6,49	9000 cP	11.09

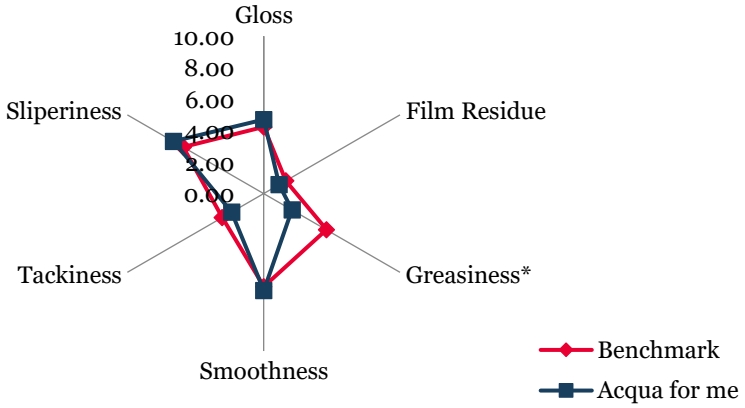
Formulation is stable at 45°C and 25°C for more than 3 months

Sensory Evaluation and Skin Hydration

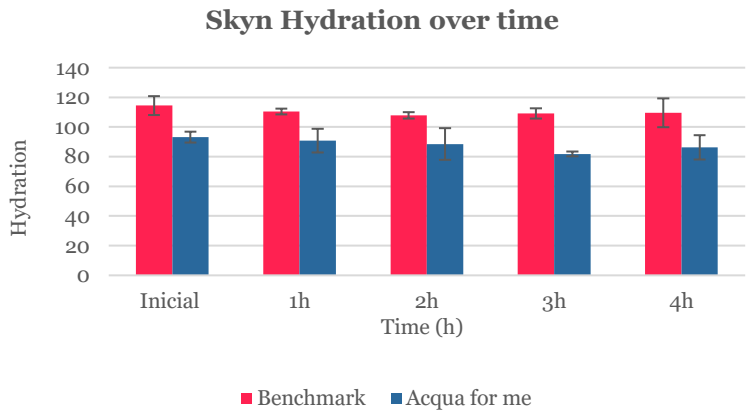
Before Absorption



After Absorption



* Significative difference (95% confidence level)



Skyn Type	Arms, hands, legs and elbow
Ver dry	< 35
Dry	35 – 50
Hydrated	> 50

Sensory evaluation performed with a trained panel and Skin Hydration by Corneometer performed with different subjects

Delight for Me

CPF#4340

An indulgent experience with this creamy texture that spread smoothly in your body

Attributes

- Non greasy feel
- Good skin moisturizing
- Silky smooth feel
- Good spreadability
- Creamy texture

Featured Products

- **ACULYN™ Siltouch Rheology Modifier** a flexible technology for instant emulsification and oil dispersion across a wide pH range
- **ACULYN™ 44 Rheology Modifier** a nonionic thickener usable over a wide pH range and compatible with cationic ingredients. Delivers a rich, creamy texture to formulations
- **UCON™ Fluid AP** provides emolliency and soft after-feel
- **DOWSIL™ FZ-3196 Fluid** a less greasy, moderate volatility solvent, brings a unique light and silky smooth feel with excellent spreadability
- **XIAMETER™ PMX-200 Silicone Fluid 350 cs** provide emolliency, substantivity, lubrication, slippery effect and spreadability in skin and color cosmetic applications
- **DOWSIL™ PMX-1403 Fluid** Imparts a silky, lubricious feel and long lasting benefits

Delight for Me

CPF# 4340

Phase	Ingredients	INCI Name	Supplier	%
A	Water	Water		71.5
	Versene Na2 Crystal	**Disodium ethylene-diaminetetraacetate tetrahydrate**	**DOW**	0.1
	ACULYN™ 44	**PEG-150/Decyl Alcohol/SMDI Copolymer**	**DOW**	1
	ACULYN™ Siltouch	**Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer (and) Dimethicone (and) Trideceth-6 (and) PEG/PPG-18/18 Dimethicone**	**DOW**	3
	PG USP/ EP	**Propylen Glycol**	**DOW**	3
	Neolone PH 100	Phenoxyethanol	Dupont	0.5
B	**UCON™ Fluid AP**	**PPG-14 Butyl Ether**	**DOW**	3.4
	Mineral Oil	Mineral Oil	Pharmaspecial	5
	Crodamol IPP	Isopropil palmitate	Croda	6
	DOWSIL™ PMX -200 Fluid 350 cs	**Dimethicone**	**DOW**	4
	DOWSIL™ PMX-1403 Fluid	**Dimethicone and Dimethiconol**	**DOW**	1
	DOWSIL™ FZ-3196 Fluid	**Caprylyl Methicone**	**DOW**	1
C	Fragrance	Fragrance	Symrise	0.3
	Nude colorant (0.1%)	Colorant	Sensient	0.2

Procedure:

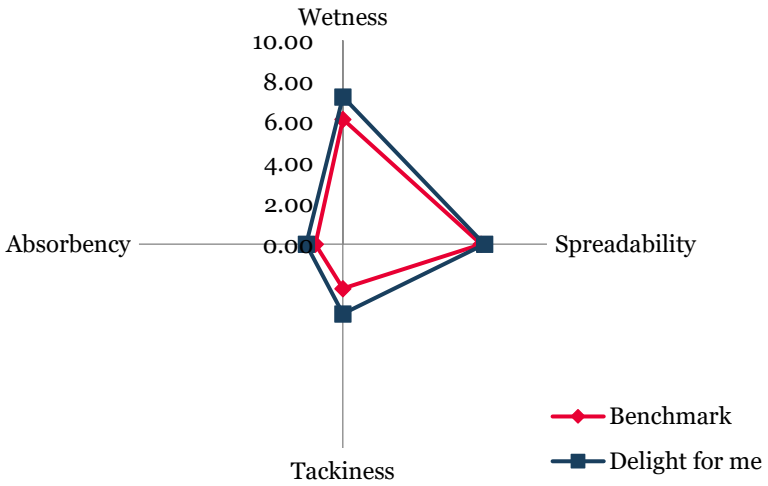
1. Mix all ingredients from Phase A in the order listed.
2. Disperse ingredients from Phase B separately in the order listed.
3. Mix Phase B into Phase A under stirring.
4. Add phase C
5. Adjust pH as needed.

Formulations	pH	Viscosity (LV, s64,1 rpm)	% Solids
Benchmark	6.73	221400 cP	16.40
Delight for Me	5.4	193200 cP	21.80

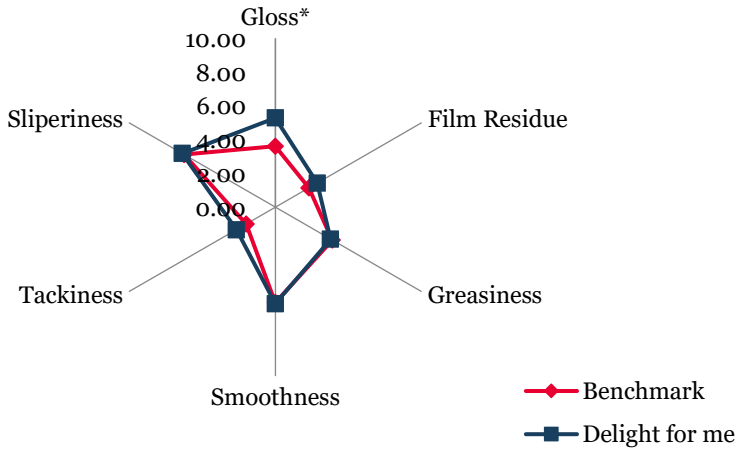
Formulation is stable at 45°C and 25°C for more than 3 months

Sensory Evaluation and Skin Hydration

Before Absorption



After Absorption



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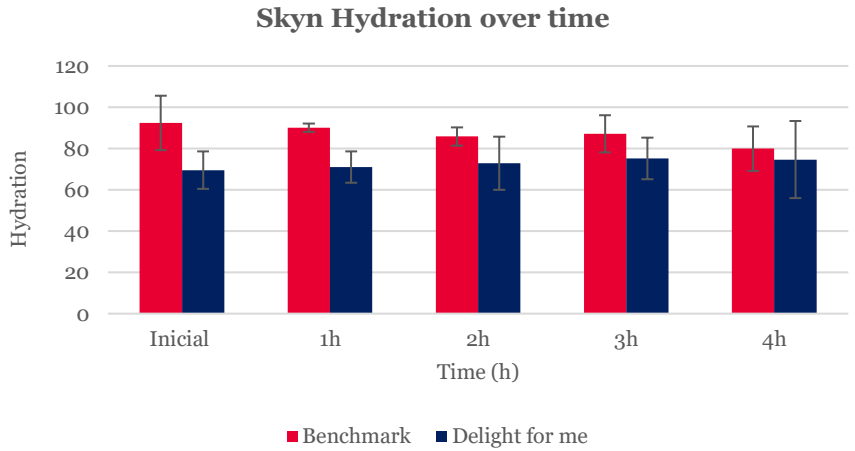

Sensory evaluation performed with a trained panel and Skin Hydration by Corneometer performed with different subjects

Seek

Together™