



who is a natural
at mousse styling?

Styleze™ ES-1 polymer



consumer needs

trends and insights driving the hair care category

consumer insight

tailored for their particular hair type or their own styling ritual

desire transparency and scrutinize ingredient lists and claims

product specificity
personalized products and services

fresh, natural and pure
natural, sustainable, "clean(er) labels"

customization
unique, adaptable products

on-the-go
easy-to-consume, on-the-go products

consumer insight

want more options for their specific needs and help them express themselves

seek targeted claims to make more efficient product choices

go natural & sustainable

- proliferation of 'natural' containing products
- increased label certifications: vegan, cruelty-free, etc.
 - brands are launching with ISO 16128-2 calculations on label
 - concept: create a trusted transparent brand with QR code – label-free?
- **consumers willing to pay a premium but won't sacrifice performance**

protection

- waste-derived
- responsible sourcing
- free from
- natural ingredients
- anti-pollution
- milder ingredients
- water efficient

green beauty trend



Consumers are increasingly seeking information on ingredients, reflecting a move towards greener lifestyle choices designed to avoid certain compounds in products such as parabens, sulphates or silicones. This trend is having a huge impact on the beauty and personal care market. Products containing natural botanicals, milder, responsibly sourced and even edible ingredients able to tackle pollution often carrying "free from" claims are on the rise.

Euromonitor, Hair Care Ingredient Trends, March 2017

tell a sustainable story

- transparency is a key driver in this space
- consumers demand open, honest information from the brands they trust
 - how product is made, what is in it and where the ingredients are sourced
 - less is more... align the ingredient to the claim



Source: Euromonitor; GlobalData; Mintel

[1] GlobalData consumer survey Q1, 2017- Global

[2] Base: 1,000 German internet users aged 16+; Source: Lightspeed/Mintel

[2] Base: 1,974 Spanish internet users aged 16+ who have bought beauty and personal care products in the last six months; Source: Lightspeed/Mintel

[3] Base: 1,033 US women aged 18+ who use beauty products; Source: Lightspeed/Mintel

our solution

styleze™ es-1 polymer

delivering long-term hold, naturally*

consumer benefits

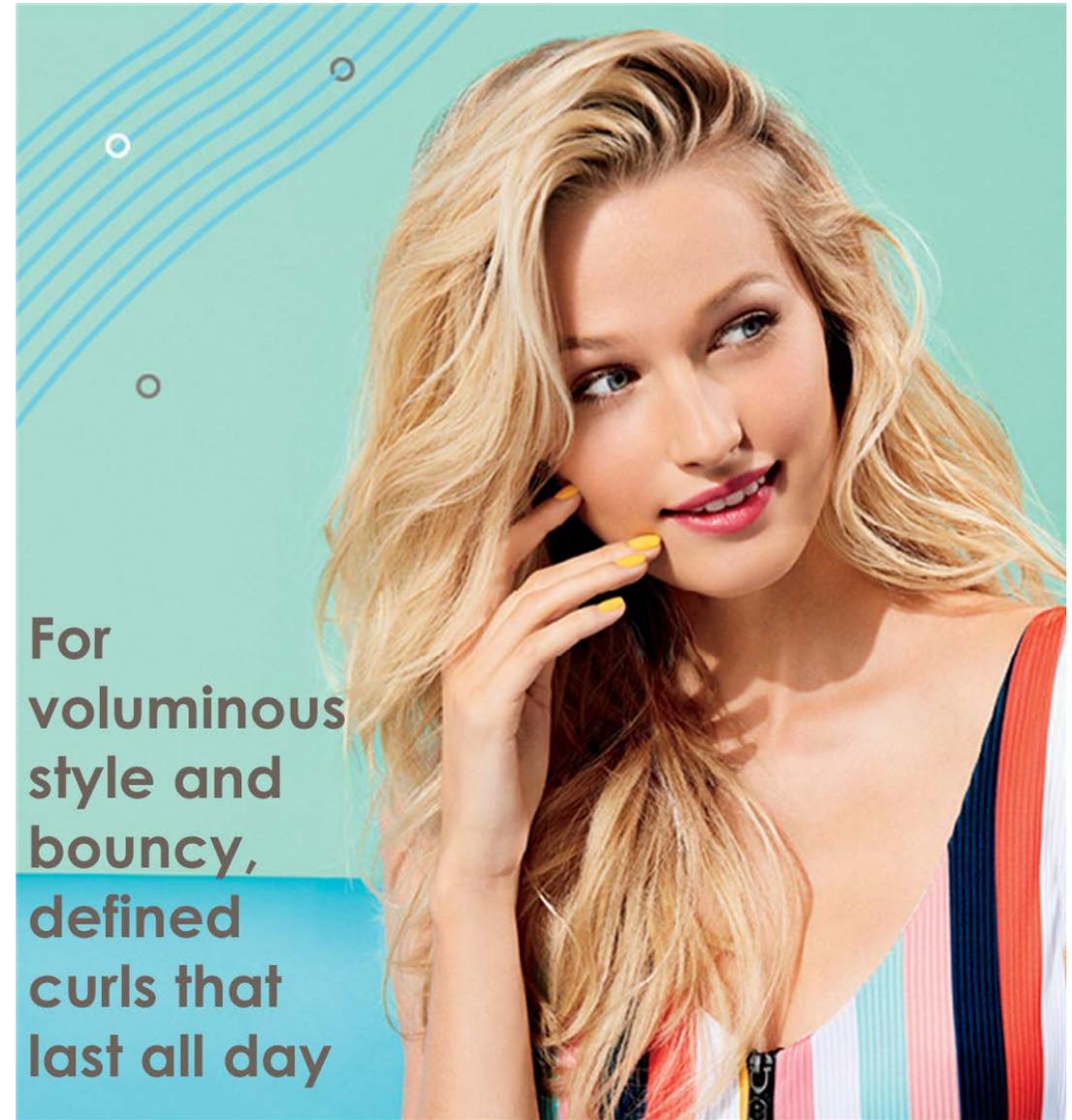
- o bouncy, defined curls that last all day
- o voluminous style

performance benefits

- o enhanced curl formation (definition/shape) & curl integrity
- o improved high humidity hold (48 hours)
- o improved foam bloom and stabilization
- o improved style durability

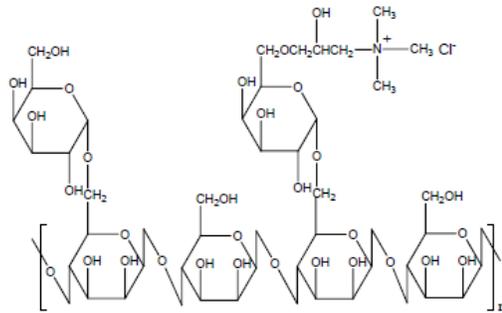
sustainability

- o 89% natural per ISO 16128-1 & 16128-2
- o readily biodegradable (OECD 301D)
- o COSMOS-validated



chemistry

INCI: guar hydroxypropyltrimonium chloride



typical properties

appearance	yellow free flowing powder
pH, 1% as-is	10.0
viscosity, 1%,2 hr.	45 cP
nitrogen	1.4%
moisture, max	12.0%

features

- cationic guar gum, modified
- low molecular weight
- medium charge density
- recommend use level 0.25-2%
- applications
 - mousses
 - cream gels
 - combing creams

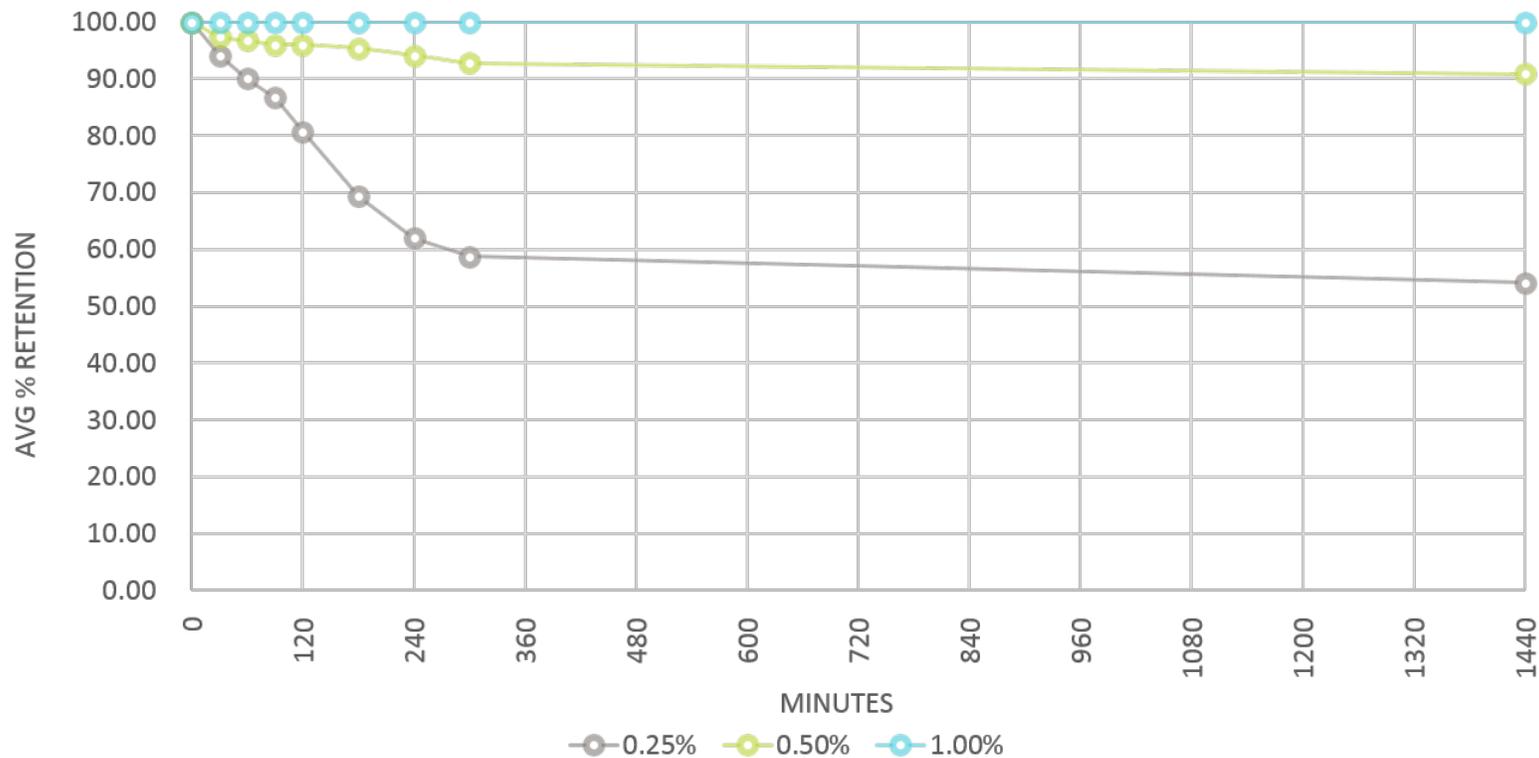
legal and regulatory information

- Ashland has IP protection (filed)
- globally registered
- full safety package is available on request

how Styleze™ ES-1 polymer performs

effective humidity resistance

Achieve >95% 24-hour hold with 1.0% Styleze™ ES-1 polymer



Study:
Styleze™ ES-1 polymer evaluated at varying concentrations (0.25%, 0.5%, 1.0%) to determine level of humidity resistance.

weather resistivity

Styleze™ ES-1 polymer stands up against exposure to humid conditions.

- study: 5-second immersion test
- protocol
 - evaluate 1% active Styleze™ ES-1 polymer vs. PVP K-90
 - treat mannequin with test polymer
 - hold mannequins upside down for 24-hours to dry at room temperature
 - submerge mannequin under water for 5-seconds
 - remove mannequin and stand upright to evaluate the effect of water exposure

Results:
Styleze™ ES-1 polymer noticeably shields out the effect of water and does not lose its hold properties.

after 24-hours

after 5-second
submersion

Styleze™ ES-1 polymer



PVP K-90

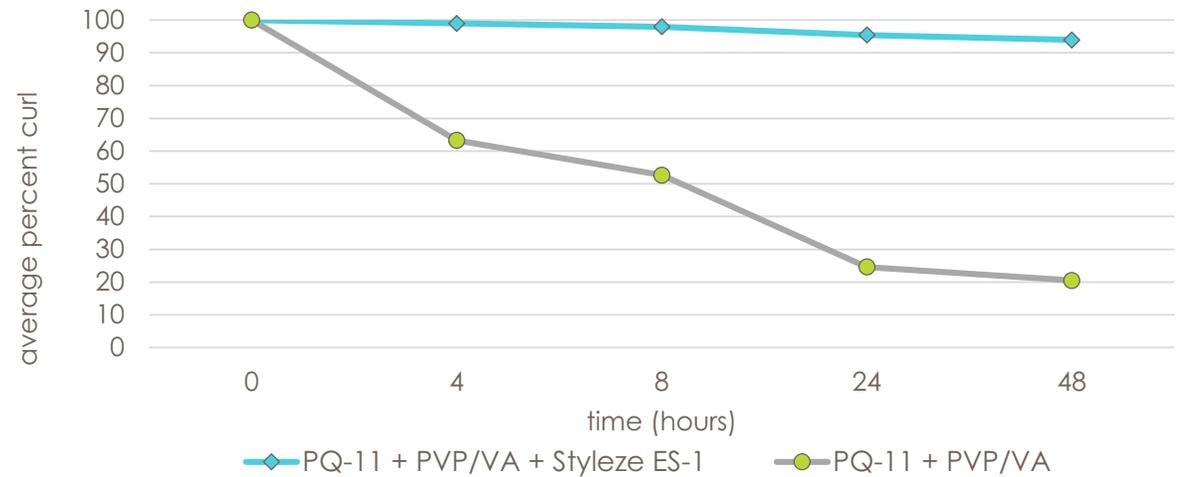


boosts holding power of mousse formulations

To demonstrate the performance boosting benefits, Styleze™ ES-1 polymer was used in a classic mousse formulation containing PQ-11 and PVP/VA.

12585-	195-1	215-1
	wt%	wt%
concentrate		
Deionized Water	87.49	85.56
Polyquaternium-11 (Gafquat™ 755N polymer)	2.50	4.15
VP/VA Copolymer (PVP/VA W735)	2.00	3.34
Cetrimonium Chloride (Carsoquat CT-429*)	0.20	0.20
Styleze™ ES-1 polymer	1.00	
Phenoxyethanol and Caprylyl Glycol (Optiphen™ preservative)	0.75	0.75
Lactic Acid	0.06	
propellant		
A-46 (Isobutane/propane)	6.00	6.00
Total	100.00	100.00
Polymer	2.50%	2.50%

*trademark of a third party



Styleze™ ES-1 polymer helps significantly boost the humidity resistance & holding power of a PQ-11 & VP/VA system.

curl enhancement and maintenance benefits

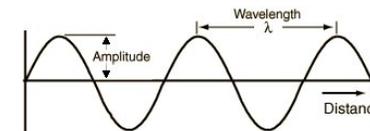
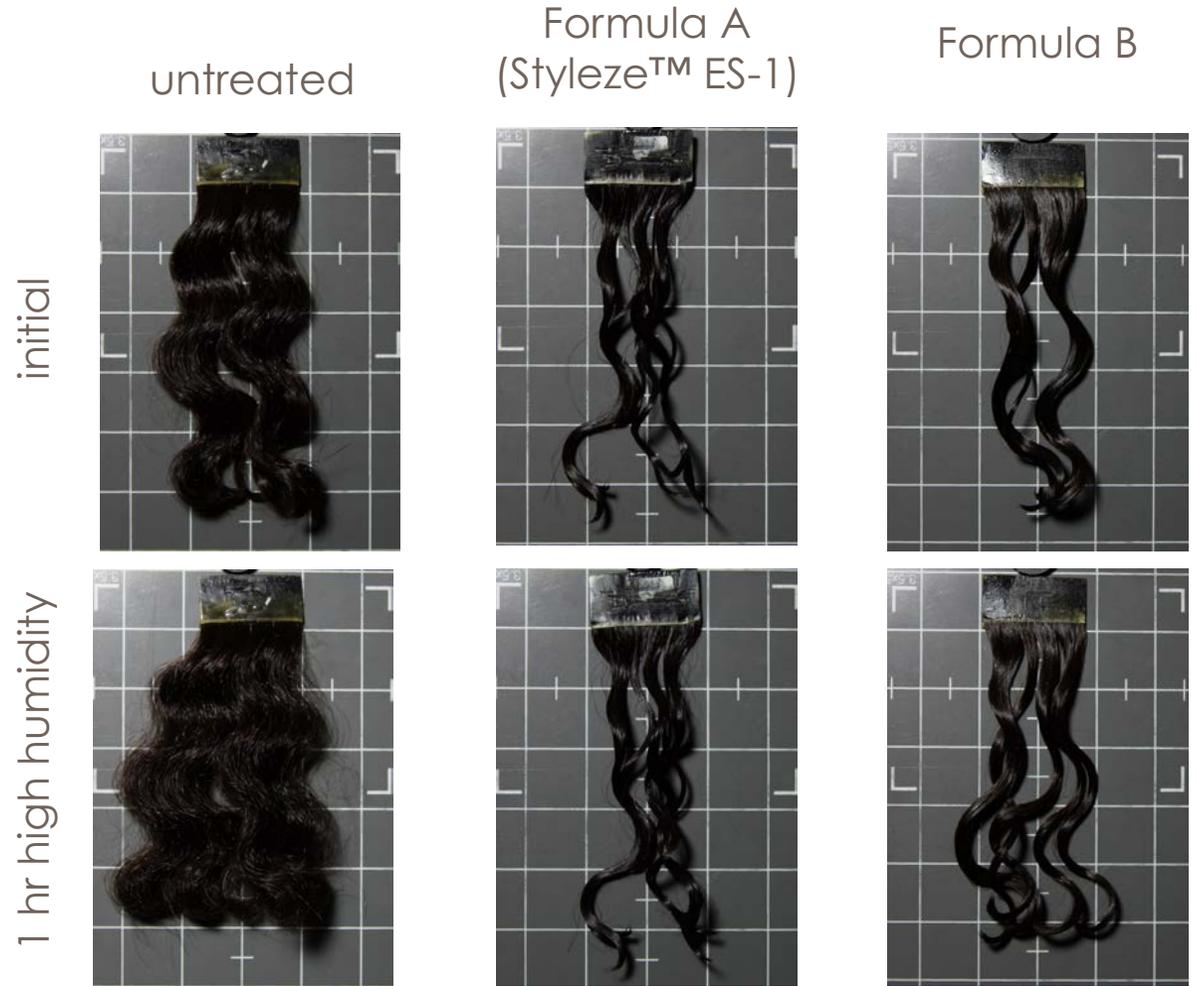
The addition of **Styleze™ ES-1 polymer** (formula A) delivers a **more defined curl** (as visually identified by a smaller wave frequency & higher amplitude) and **maintains the curl** at high humidity exposure.

protocol:

- 0.5 g of each mousse formula applied to damp curly hair tress

	A	B
Formula #	12585-195-1	12585-215-1
Styleze™ ES-1 polymer	1.00	
Polyquaternium-11 (Gafquat™ 755N)	2.50	4.15
VP/VA Copolymer (PVP/VA W735)	2.00	3.34
Polymer	2.50%	2.50%

- scrunched to accentuate the curl
- diffuse dried
- evaluated for immediate curl formation
- evaluated for curl maintenance after 60 min. exposure to high humidity



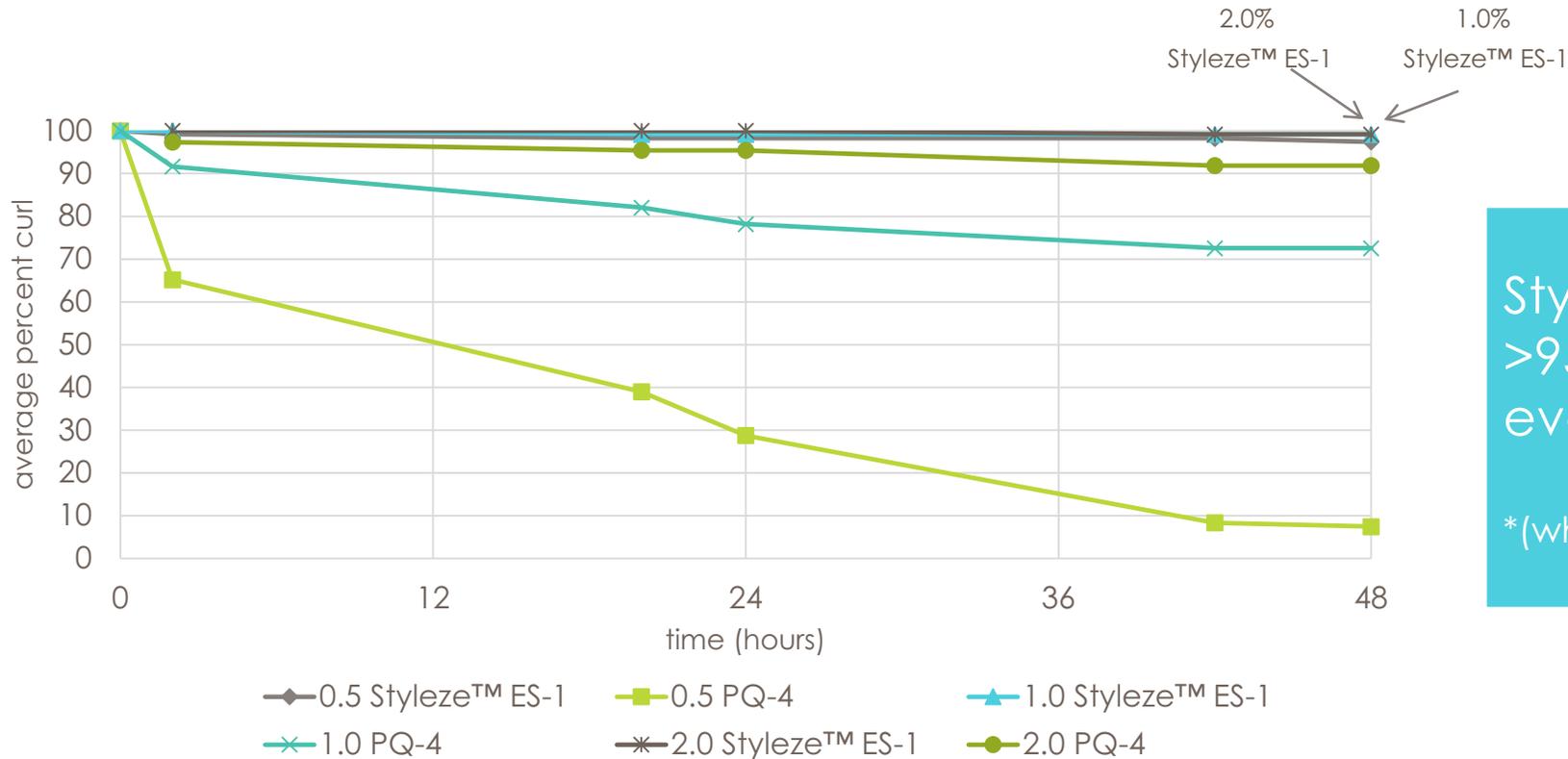


Styleze™ ES-1 polymer delivers improved performance benefits

versus competitive benchmark

improved style retention & humidity resistivity compared to PQ-4

Polyquaternium-4 is used in many mousse formulations. We have used PQ-4 as a positive control to demonstrate the improved benefits of Styleze™ ES-1 polymer.



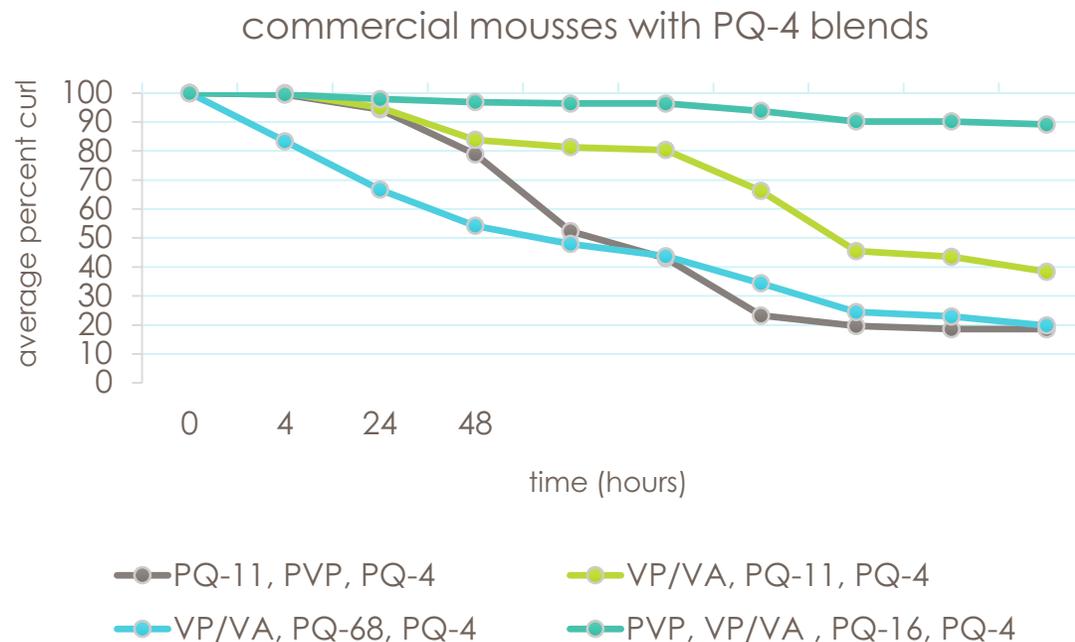
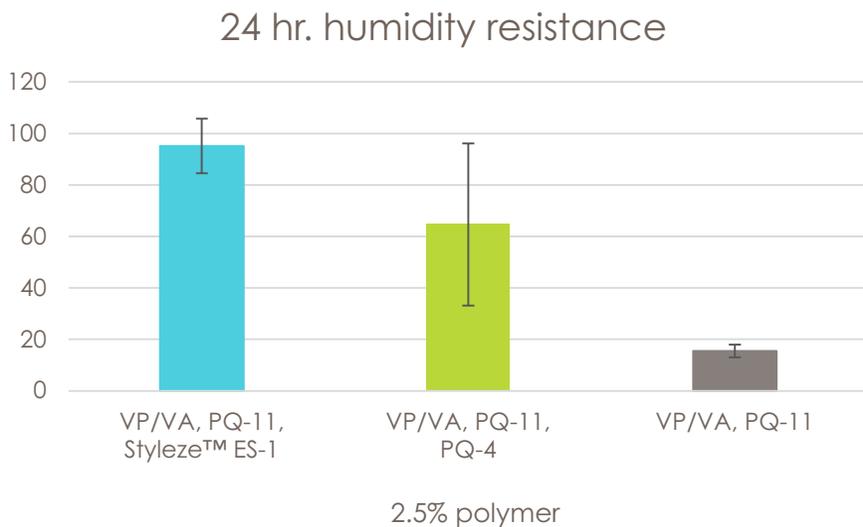
Styleze™ ES-1 polymer provides >95% hold properties* vs. PQ-4 even after 48 hours.

*(when comparing use levels of 1% & 2%)

boosts holding power of polymer blends

Styleze™ ES-1 polymer has been demonstrated to boost HHCR of polymer blends.

When comparing commercial controls containing PQ-4, these blends do not deliver gain improved HHCR result due to the addition of PQ-4.



enhance, maintain, and better define curls

Styleze™ ES-1 polymer delivers...

- a better defined curl pattern,
- reduction in frizz,
- and curl maintenance

...at high humidity exposure vs PQ-4.

evaluation:

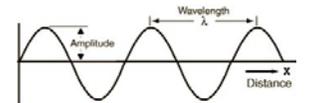
- 1% PQ-4 aq. solution
- 1% Styleze™ ES-1 polymer aq. solution

protocol:

- 0.5 g solution applied to damp curly hair tress
- scrunched to accentuate the curl
- diffuse dried
- evaluated for immediate curl formation
- evaluated for curl maintenance after 180 min. exposure to high humidity

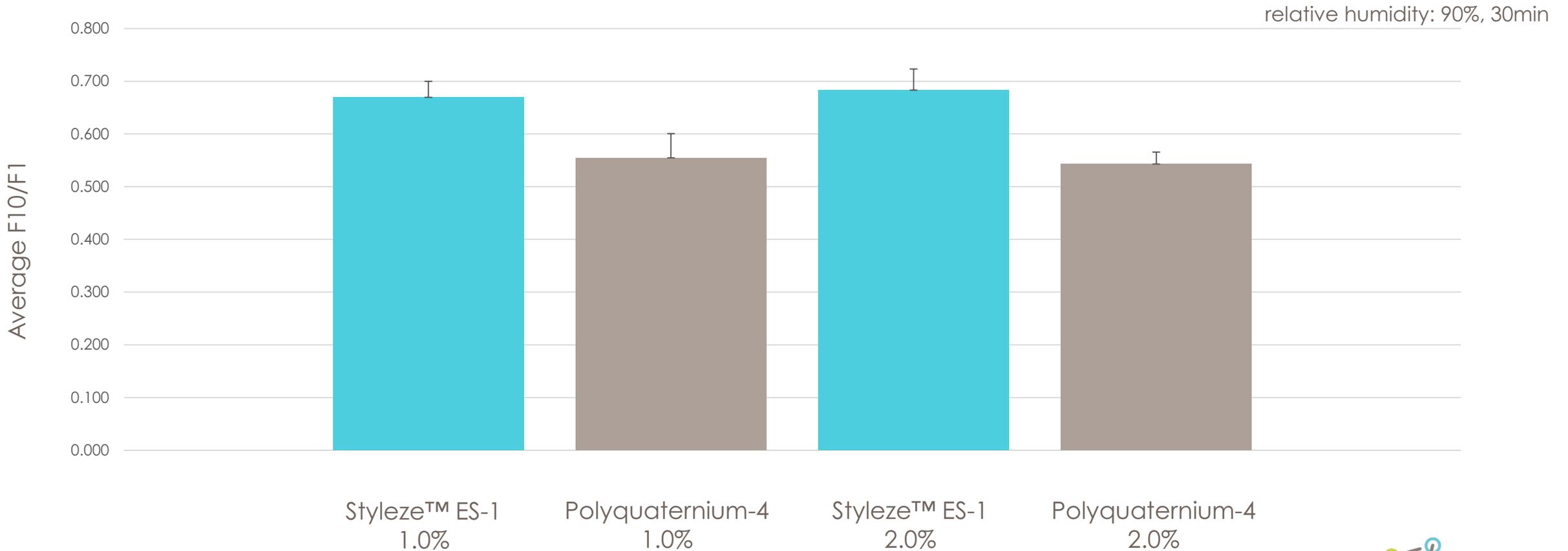


defined curl:
visually identified by a
smaller wave frequency
and higher amplitude



for lasting styles, even under humid conditions

Styleze™ ES-1 polymer delivers improved style durability vs. PQ-4.



delivers long term (48-hour) styling benefits vs. PQ-4 mousse

Styleze™ ES-1 polymer a perfect solution for consumers who want their styles to last... even through the next day.

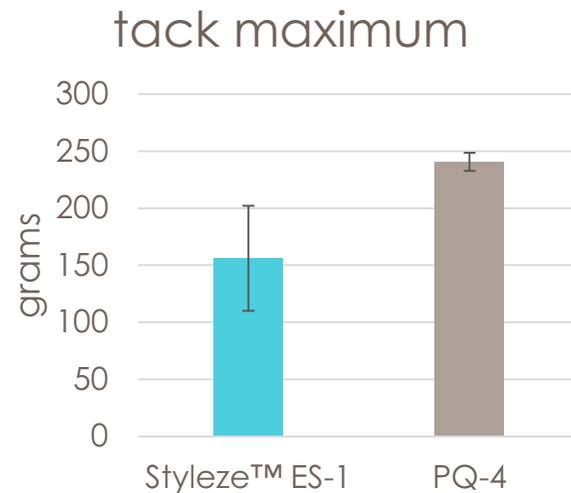
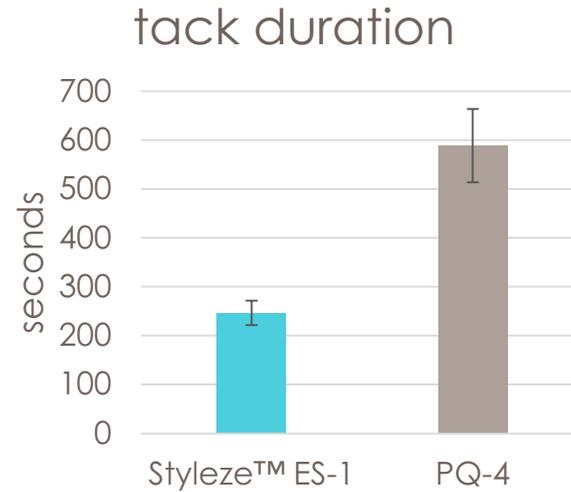
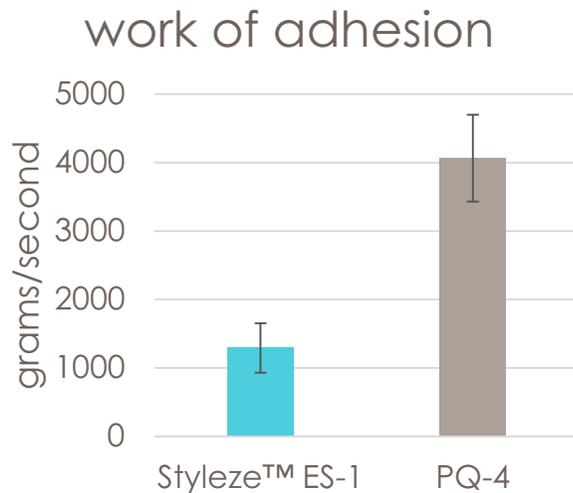
Styleze™ ES-1 polymer mousse formula (A) delivers improved 48-hour style durability compared to a PQ-4 mousse formula (C) under humid conditions.



	A	B	C
Formula #	12585-195-1	12585-215-1	12730-124
Styleze™ ES-1 polymer	1.00		
Polyquaternium-11 (Gafquat™ 755N)	2.50	4.15	2.50
VP/VA Copolymer (PVP/VA W735)	2.00	3.34	2.00
Polyquaternium-4			1.00
Polymer	2.50%	2.50%	2.50%

delivers improved aesthetics with reduced tack

Styleze™ ES-1 polymer is less tacky than PQ-4* as measured by function of tack duration, work of adhesion and tack magnitude via a Texture Analyzer.



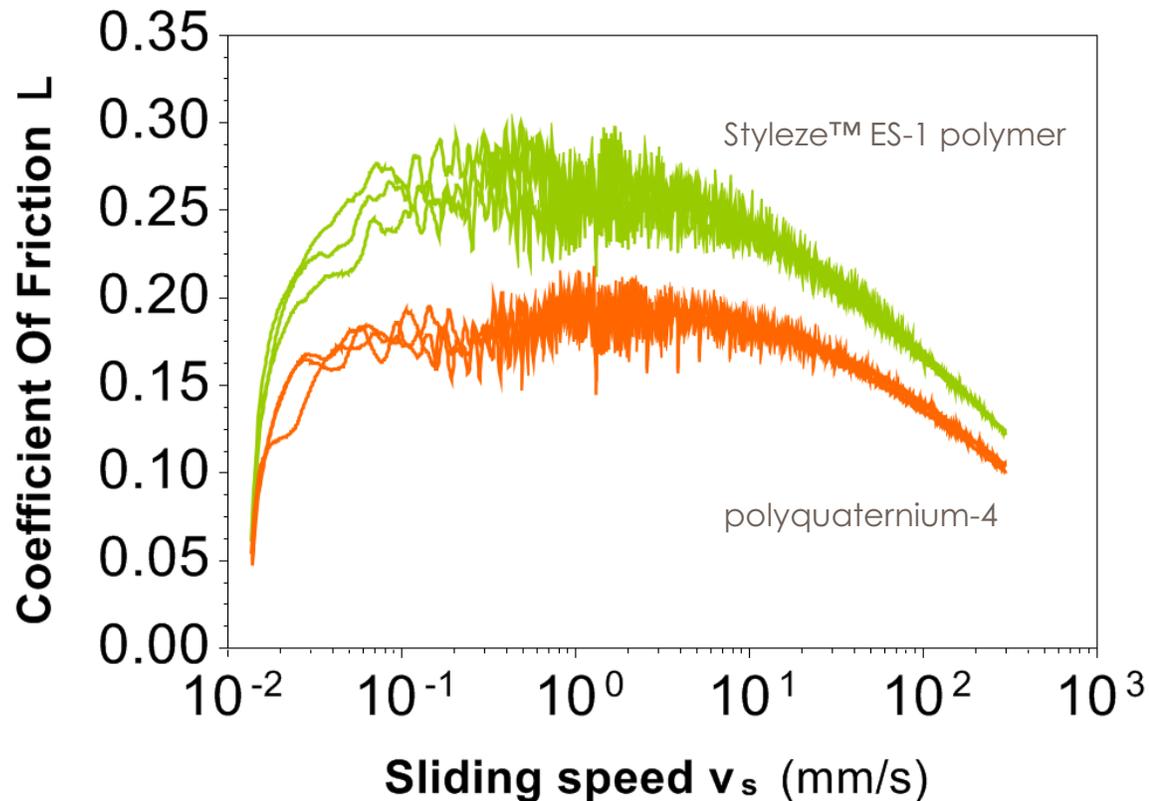
polymer solution on PMMA plate

*evaluation of the polymers was carried by preparing 2% (w/w) solutions in deionized water.

provides reduced slip and a cleaner feel in hand

Results:

The data in the following chart supports the 'slimy' feel in hand experienced with polyquaternium-4.



Evaluation

apparatus:

- 3-balls on plate tribology attachment on a rheometer

surfaces:

- balls: steel with smooth surface
 - strips: rough 3M transpore tape
- settings (this study):
- load force - 5N , $T = 25^{\circ}\text{C}$
 - angular velocity: ramp
 - $n=3$, fresh surfaces for each run

three balls on plate



video demo of apparatus



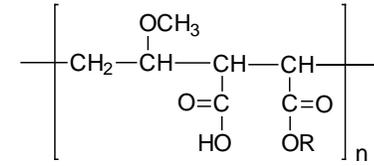
formulation & guidelines

functional blends

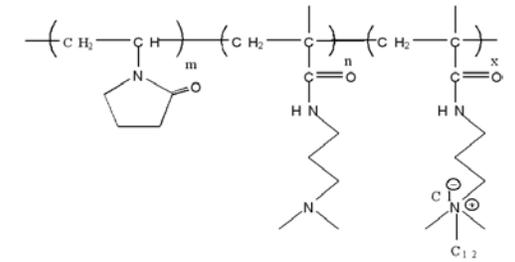
Blending Styleze™ ES-1 polymer with a variety of chemistries can deliver a range of performance variants

- anionic*
 - half ester of PVM/MA copolymer*
- cationic/pseudo cationic
 - polyquaternium 4, 11, 16, 28, 55, 68, 69, etc.
 - tertiary amines: VP/acrylates copolymer
- amphoteric
 - polyimide-1
- nonionic
 - PVP/VA copolymer, PVP

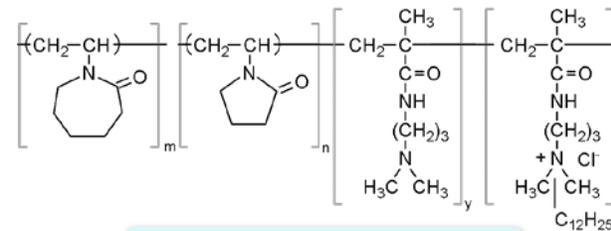
* Proper neutralization and processing required



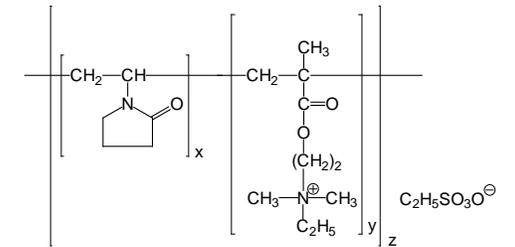
Gantrez™ / Omnirez™ polymer
half ester of PVM/MA Copolymer



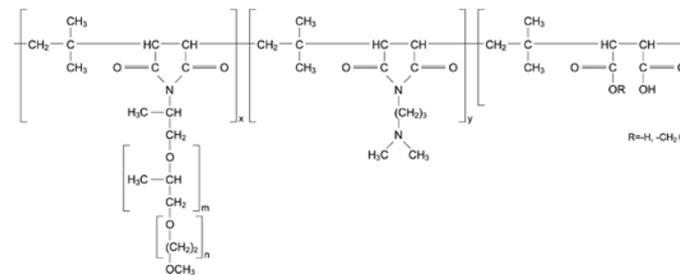
Styleze™ W polymer
polyquaternium-55



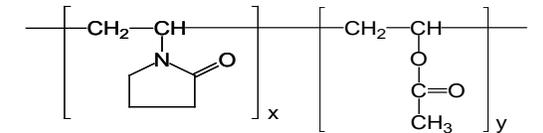
AquaStyle™ 300 N polymer
polyquaternium-69



Gafquat™ polymer
polyquaternium-11



Aquaflex™ XL-30 polymer
polyimide-1



PVP/VA copolymer

formulation guidelines

- water

- disperse at RT under agitation; mix well
- reduce pH 5-7; continue mixing
- add additional ingredients individually
- if working with anionic ingredients, process separately and add once the anionic is properly neutralized and Styleze™ ES-1 polymer is dispersed and pH adjusted

- ethanol

- solubility limited, though 6% VOC acceptable

- propellants

- hydrocarbon – enhanced foaming
- dimethyl ether – non ethanol sprayable systems

curlboost defining mousse

formula #12585-195-1

ingredients (trade name INCI)		% w/w	supplier
concentrate			
Deionized water	Aqua	87.49	
Gafquat™ 755 N polymer	Polyquaternium-11	2.50	Ashland
PVP/VA W-735	VP/VA Copolymer	2.00	Ashland
Carsoquat CT-429*	Cetrimonium Chloride	0.20	Lonza
Styleze™ ES-1 polymer	Guar Hydroxypropyltrimonium Chloride	1.00	Ashland
Optiphen™ preservative	Phenoxyethanol (and) Caprylyl Glycol	0.75	Ashland
Ritalac*	Lactic Acid	0.06	Rita
propellant			
Hydrocarbon a-46	Propane (and) Isobutane	6.00	Diversified CPC
total		100.00%	

*trademark of a third party

Procedure

1. Add water and begin mixing.
2. Add ingredients one at a time and mix until uniform.
3. Fill cans while continuing to mix, vacuum crimp and charge with propellant.

Description

Rich, creamy white mousse

Packaging

Valve: Aptar 2x20 inverted mousse

Spout: Aptar Aspire

dreamy curls 24-hr weightless foam

formula #12817-19

ingredients (trade name INCI)		% w/w	supplier
Deionized Water	Aqua	95.66	
Styleze™ ES-1 polymer	Guar Hydroxypropyltrimonium Chloride	1.00	Ashland
Citric Acid (20% aq. solution)	Citric Acid	0.24	Local
Benecel™ E4M HPMC	Hydroxypropyl Methylcellulose	0.10	Ashland
Amphosol* CA	Cocamidopropyl Betaine	1.00	Stepan
Glycerin USP	Glycerin	1.00	Jeen International
Optiphen™ BSB-W preservative	Benzyl Alcohol (and) Aqua (Water) (and) Sodium Benzoate (and) Potassium Sorbate	1.00	Ashland
total		100.00%	

*trademark of a third party

Procedure

1. Add Water to main container and mix with propeller agitation.
2. Add Styleze™ ES-1 into the vortex to disperse.
3. Add Citric acid and mix for 10-15 min approximately.
4. Add Benecel™ E4M and mix until no particles seen.
5. Add Amphosol CA, Glycerin and Optiphen™ BSB-W one by one. Mix until uniform.

Typical properties

description: hazy, low viscosity liquid

pH: 5.30 ± 0.30

viscosity: <250 cps (RVT Sp#1 @ 5 rpm)

dreamy curls 24-hr weightless foam

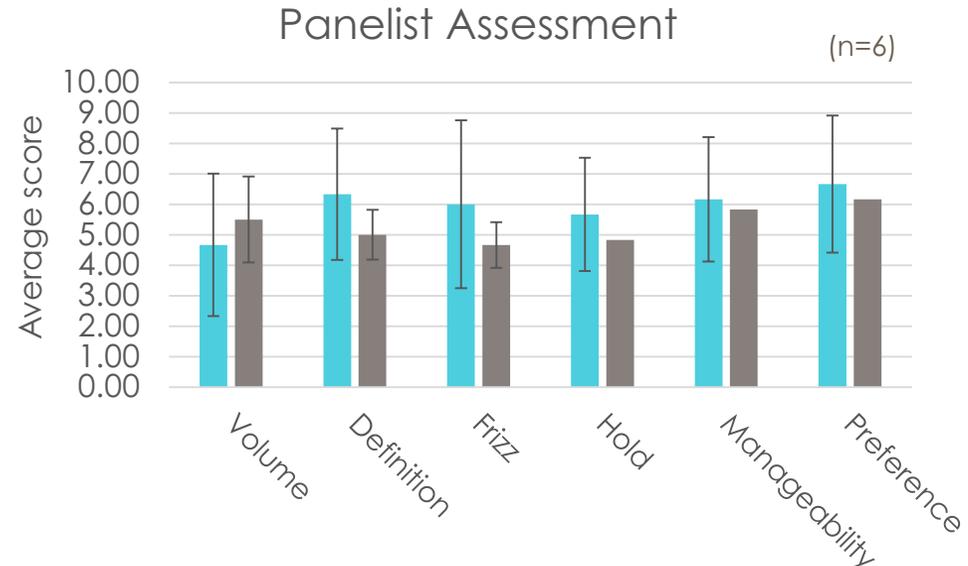
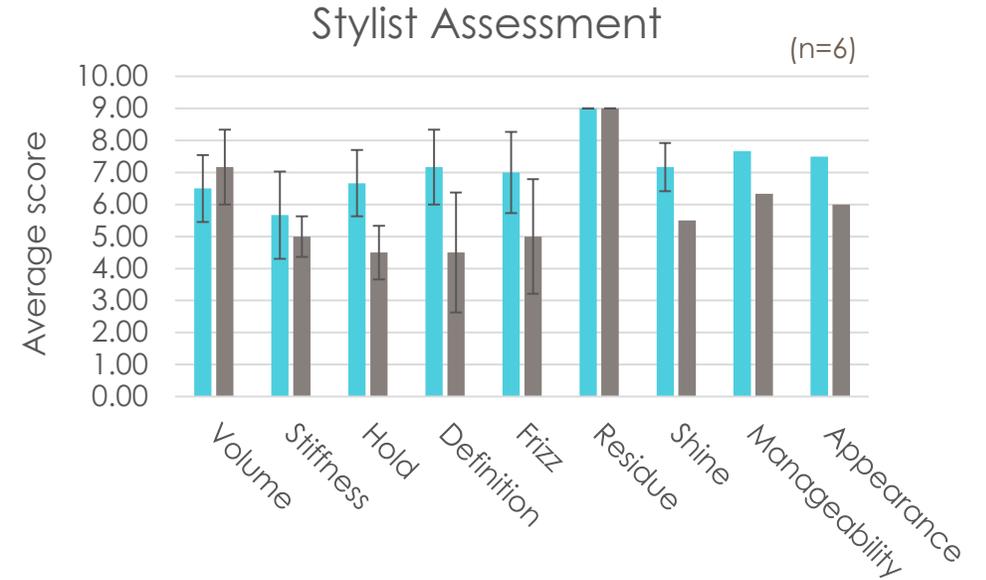
formula #12817-19

salon study

In a blind study, our expert stylist evaluated the **Dreamy Curls 24-hour Weightless Foam** (blue bar) versus a commercial non-aerosol mousse positioned for curls.

The data revealed that this formula **delivered perceivable benefits in key areas such as improved hold and definition with noticeable frizz control and shine.**

Panelists also preferred the **Dreamy Curls 24-hour Weightless Foam** over the commercial benchmark and highlighted the same key benefits of definition, frizz-control, and hold.





summary

styleze™ es-1 polymer

bouncy, defined curls that last all day

ideal solution for natural, sustainable styling formulas

delivers improved style durability vs. competitive benchmark

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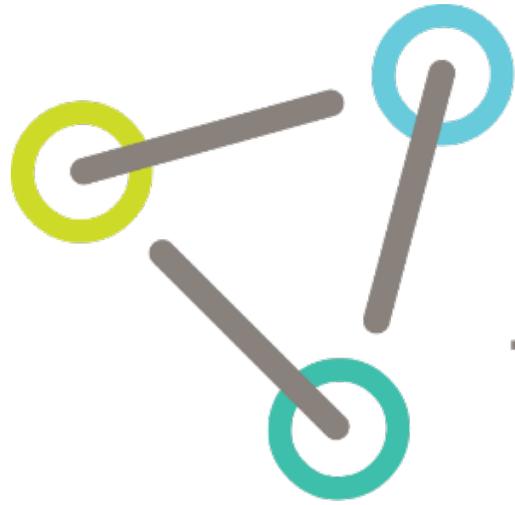
The testing information (the "Testing Information") has been gratuitously provided by Ashland. The Testing Information is based on many factors beyond Ashland's control, including but not limited to, the conditions prevailing when the testing was conducted, and in some cases, is based on data generated with development samples of the Active Ingredient. Although it is intended to be accurate, ASHLAND DISCLAIMS ANY AND ALL LIABILITY, EITHER EXPRESS OR IMPLIED. The Testing Information is confidential or proprietary to Ashland, and may not, except as provided below, be disclosed to any third party. You may not make commercial use of the Testing Information, or make claims with respect to your products based the Testing Information, without the written agreement with Ashland covering such use.

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