A New Generation of Highly Sustainable Conditioning Aids

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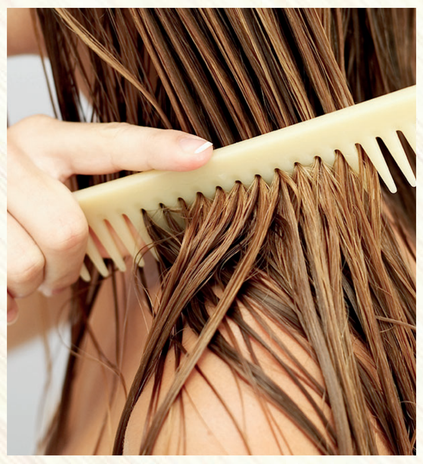
Overview

Poly Suga®Quat products are unique and innovative conditioning surfactants for the personal care industry. They have a very high renewable carbon content, low irritation, and high performance. Poly Suga®Quat products are free of PEG and residual toxic monomers and are much milder for eyes and skin as compared to many traditional quaternaries. Poly Suga®Quat products do not build up on hair, can offer excellent combing reduction on both wet and dry hair from shampoos and conditioners, and can enhance the performance of 2 in 1 shampoos. Poly Suga®Quat products do not contain preservatives when shipped and can even offer antimicrobial benefits, providing a means to reducing reliance on commonly used preservatives.



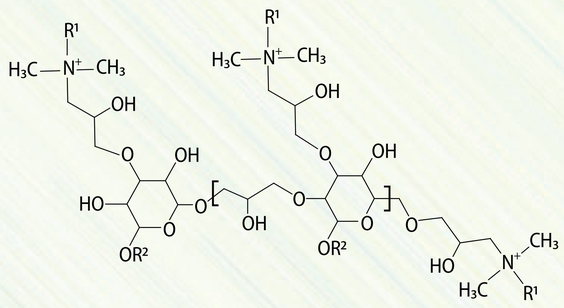
1. Greener Starting Materials

Poly Suga®Quat products are derived from polymerized alkyl polyglucosides. The polymeric APG backbone is derivatized by attaching cationic groups along the backbone, which provide conditioning properties. This process yields products that are naturally-derived and cationic in character with more substantivity to skin and hair than nonionic APG versions. The sugar moiety decreases the irritation substantially over traditional quats, allowing the formulator an expanded use of naturally-derived materials in a variety of formulations.

	ISO 16128	*% Biobased*
L-1010P	**.96**	86.6
L-1210P	**.96**	87.9
S-1210P	**.97**	89.4
TM-8610P	**.95**	78.0

2. Customizable Performance

Poly Suga®Quat products are made from short and long chain quats reacted onto polymerized alkyl polyglucoside sugars. The alkyl polyglucosides vary in the alkyl group carbon chain length, giving formulators ultimate flexibility in developing products with highly specific attributes.



	R^1 Group	*R^2 Group*
L-1010P	Lauryl	Decyl
L-1210P	Lauryl	Lauryl
S-1210P	Stearyl	Lauryl
TM-8610P	Methyl	Coco

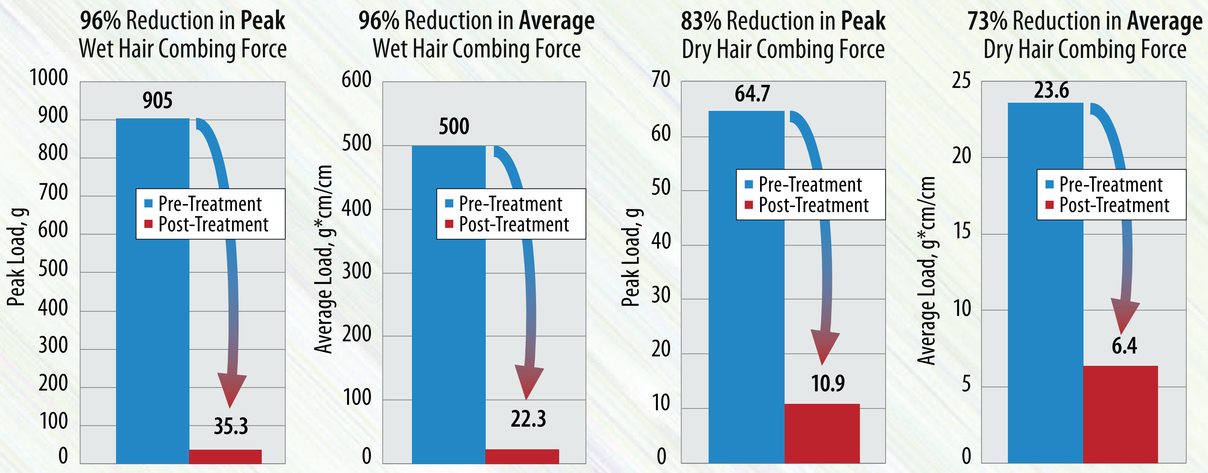
3. Wide Range of Applications

COMBABILITY TESTING

Poly Suga®Quat S1210P was tested in a conditioner formulation on lightly bleached brown hair to determine the effect on combability under both wet and dry hair conditions.

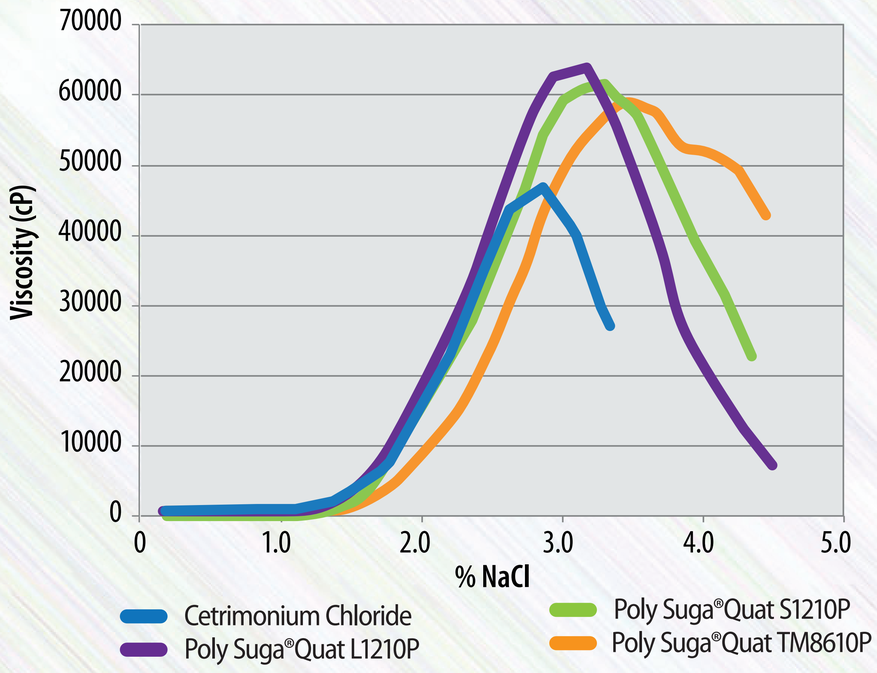
Test Formulation:	**Poly Suga®Quat S1210P**	6.00
	GMS SE/AS	2.50
	Cetearyl Alcohol	5.00
	Water, preservative	qs to 100.00

Results: The formulation demonstrated excellent conditioning of lightly bleached brown hair, with an 96% reduction in both peak and average wet combing force. There is also an 83% reduction in peak dry combing force and a 73% reduction in average dry combing force.



SHAMPOO COMPATIBILITY

Poly Suga®Quat products do not inhibit viscosity performance in shampoos and can even enhance viscosity peformance.



Poly Suga®Quat 1.5 / SLS 15.0 / SLES 15.0 / COAB 6.0 (as supplied)

IMPROVED CONDITIONING IN ANIONIC CLEANSERS

Coacervation refers to the generation and separation of an insoluble complex within a solution.

Study Design

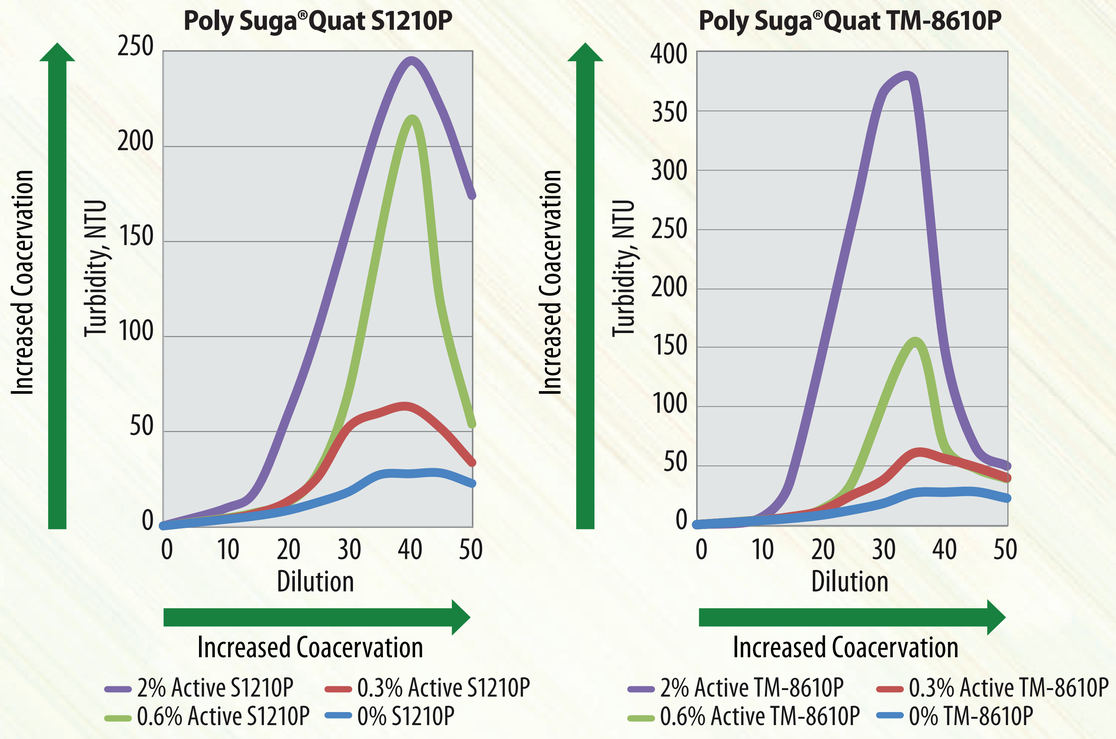
Poly Suga®Quat products were evaluated for their ability to form dilution-activated coacervates in an anionic-based cleansing system containing 0.5% Polyquaternium-10, 11.5% Sodium Laureth Sulfate, 2.6% Disodium Cocoamphodiacetate (active content).

Turbidity measurements were taken over a range of dilutions at ambient temperature.

Results

The results of the study indicate that the addition of Poly Suga®Quat products to anionic systems with polycationic species increases coacervation and broadens the range over which the coacervate complex forms, giving the potential for improved conditioning performance.

Turbidity Results for Dilutions of Base Formula



4. Added Antimicrobial Benefits

ZONE INHIBITION STUDY

Samples of Poly Suga®Quat S1210P at 0.5%, 1.0%, and 2.0% concentrations were evaluated for antimicrobial activity against several test organisms.

Organism	*% solid ingredient*	*S1210P*
P. aeruginosa	0.5	8.3
	1.0	11.7
	2.0	14.7
S. aureus	0.5	9.7
	1.0	11.0
	2.0	15.7
E. coli	0.5	11.0
	1.0	12.3
	2.0	15.0

Organism	*% solid ingredient*	*S1210P*
C. albicans	0.5	9.7
	1.0	12.3
	2.0	15.0
A. brasiliensis	0.5	0.0
	1.0	10.0
	2.0	13.3

Zone of inhibition is measured in mm from the center of the site. Poly Suga®Quat S1210P demonstrated antimicrobial activity against all five of the test organisms.

5. Safe for Consumers

Poly Suga®Quat products demonstrate excellent eye and dermal mildness, especially when compared to other conditioning surfactants.

Eye Irritation

HET-CAM *in-vitro* eye irritation @ 4% solids:

Poly Suga®Quat L1010P 13.25 **Poly Suga®Quat TM8610P** 14.50

Poly Suga®Quat S1210P 12.50

MatTek EpiOcularTM *in-vitro* eye irritation @ 2% solids

Poly SugaQuat S1210P ET-50 = 81.6 Minutes (Minimally Irritating)

Even at high use rates, these products are as mild as many of the mildest surfactants available.

Acute Skin Irritation

48-hour occlusive skin patch test @ 4% solids

Human volunteers - 53 /53 Test Subjects: no visible skin reaction, no potential for dermal irritation.

Skin Sensitization

Repeat Insult Patch testing (HRIPT) @ 4% solids

No potential for dermal irritation or allergic contact sensitization observed

6. Conclusion

BENEFITS

- Derived from renewable resources
- Superior hair conditioning
- Low-Irritation profile
- No greasy build-up
- Excellent wet comb properties
- Controls fly-away hair
- Compatibility with anionics
- Supports viscosity in shampoos
- Enhances formulation preservation

POLY SUGA®QUAT SERIES	*INCI*	*CAS No.*
TM-8610P	Polyquaternium 77	1309865-11-9
L-1010P	Polyquaternium 78	1023302-86-4
L-1210P	Polyquaternium 80	1309865-14-2
S-1210P	Polyquaternium 81	1309865-12-0

ACKNOWLEDGEMENTS

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Innovative Specialty Surfactants