



Poly Suga[®]Quat

Naturally-derived Conditioning Surfactants



Greener, Milder and Silkier

Naturally-derived,
EO-free, 1,4-Dioxane-free
with low irritation

The natural choice for conditioning

Poly Suga®Quat products are unique and innovative for the personal care industry and made from naturally-derived, renewable resources. Poly Suga®Quat products are free of EO, 1,4-dioxane and residual acrylic monomers. These products give excellent conditioning for hair, and are much milder for eyes and skin in a formulation as compared to many traditional quaternaries. Poly Suga®Quat products do not build up on hair and offer excellent combability performance on both wet and dry hair. Poly Suga®Quat products do not contain preservatives when shipped, providing a means to formulating preservative-free products or reducing reliance on commonly used preservatives.



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 preservation of formulations

Applications

- Hair Conditioners
- Clear 2-in-1 Shampoos
- Body Washes
- Detanglers
- Clear Hair Rinse
- Styling Products
- Baby Products
- Hand Sanitizers
- Relaxers
- Shower Gels

POLY SUGA®QUAT SERIES

| | INCI | CAS No. |
|-----------------|-------------------|--------------|
| L-1010P | Polyquaternium 78 | 1023302-86-4 |
| L-1210P | Polyquaternium 80 | 1309865-14-2 |
| S-1210P | Polyquaternium 81 | 1309865-12-0 |
| TM-8610P | Polyquaternium 77 | 1309865-11-9 |

LISTINGS:

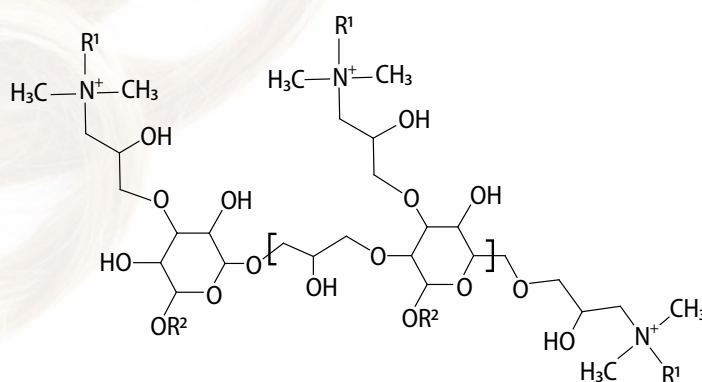
Canada (NDSL); US (TSCA); EU (REACH)
New Zealand (NZIoC); China (IECIC) (L-1010P and L-1210P only)

Greener for Environmental Safety

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.

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 flexibility in developing products with specific attributes.

| | GreenStar™ | % Biobased | R ¹ Group | R ² Group |
|-----------------|-------------|------------|----------------------|----------------------|
| L-1010P | 8.13 | 86.6 | Lauryl | Decyl |
| L-1210P | 8.26 | 87.9 | Lauryl | Lauryl |
| S-1210P | 8.43 | 89.4 | Stearyl | Lauryl |
| TM-8610P | 7.44 | 78.0 | Methyl | Coco |



Milder for Gentle and Frequent Use

Poly Suga®Quat product test results demonstrate eye and dermal mildness, especially when compared to other surfactants used in sulfate-free formulations.

Eye Irritation

HET-CAM: Hen's Egg Test Chorioallantoic Membrane:

| | |
|-------------------------------|-------|
| Poly Suga®Quat L1010P | 13.25 |
| Poly Suga®Quat S1210P | 12.50 |
| Poly Suga®Quat TM8610P | 14.50 |

Only moderate ocular irritation potential, compare to conventional quats used in personal care formulary

Acute Skin Irritation

48 Hour Occlusive skin patch test: *On human volunteers - 53 Test Subjects*: no visible skin reaction, no potential for dermal irritation.

Skin Sensitization

Repeat Insult Patch testing (HRIPT): no potential for dermal irritation or allergic contact sensitization.

Silkier for Better Performance



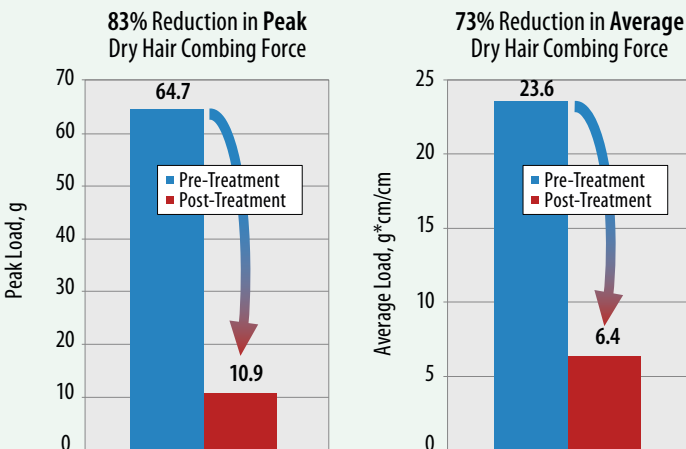
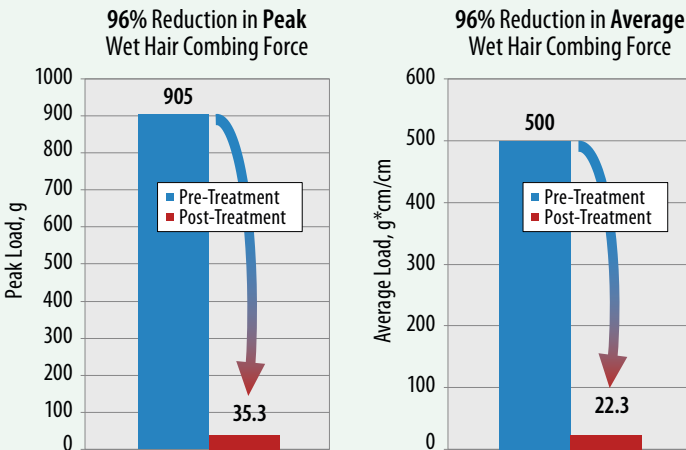
COMBABILITY TESTING

Poly Suga®Quat S1210P was tested in a 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.

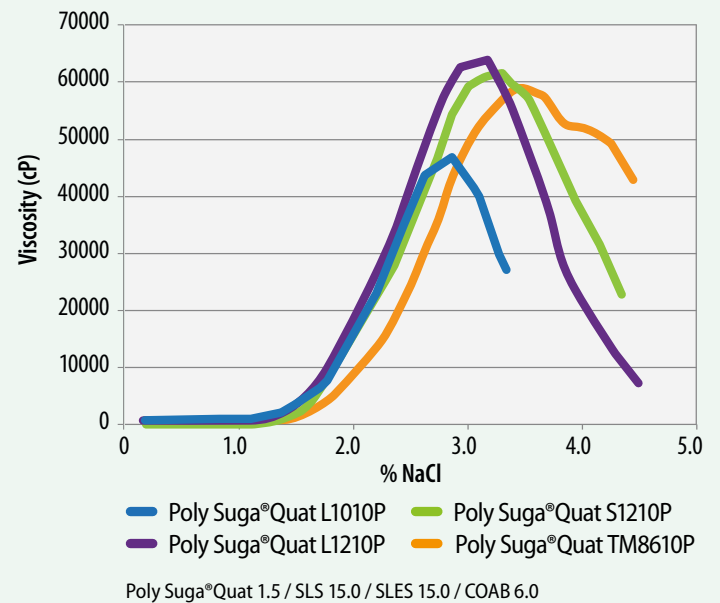


TYPICAL PROPERTIES

| | L-1010P | L-1210P | S-1210P | TM-8610P |
|--|---------|---------|---------|----------|
| Appearance | Clear | Clear | Clear | Clear |
| pH (10% aqueous) | 7.0 | 7.0 | 7.0 | 7.0 |
| Solids, % | 30.0 | 30.0 | 30.0 | 30.0 |
| Viscosity, cP | 100 | 500 | 500 | 100 |
| Color, Gardner | 1 | 2 | 2 | 1 |
| Ross-Miles Foam Height, mm (1% active solution, 25°C, DI water) | | | | |
| Immediate | 165 | 170 | 145 | 180 |
| 1 minute | 155 | 160 | 135 | 160 |
| 5 minute | 145 | 155 | 130 | 155 |
| Draves Wetting, sec. | | | | |
| | 5.6 | 10.6 | 18.8 | 3.6 |

VISCOSITY DEVELOPMENT

Excellent viscosity development is achieved with the addition of salt.



ANTIMICROBIAL ACTIVITY

ZONE INHIBITION STUDY

Samples of Poly Suga®Quat S1210P in 2.0%, 1.0% and 0.5% concentrations were evaluated for gross antimicrobial activity against several test organisms. Combined results of the assays are:

| Organism | Score | Summary |
|--|-------|-----------|
| <i>Pseudomonas aeruginosa</i> (Gram negative bacteria) | 1 | Excellent |
| <i>Candida albicans</i> (yeast) | 3 | Good |
| <i>Aspergillus niger</i> (mold) | 4 | Moderate |

Poly Suga®Quat S1210P demonstrated antimicrobial activity against all three of the test organisms employed.

The Natural Choice for Greener, Milder and Silkier Formulations

Conditioner (Silicone-Free)

No. 1017

Silicone free, natural based conditioner that hydrates your scalp and tames your fly-aways without leaving behind a greasy build up.

| INGREDIENT / INCI | % |
|--|--------------|
| 1 Water | qs to 100.00 |
| 2 Poly Suga®Quat S1210P / Polyquaternium-81 | 6.50 |
| 3 Sensomer™ 10M Polymer / Polyquaternium-10 | 0.10 |
| 4 Lanette® O / Cetearyl Alcohol | 5.50 |
| 5 Green Tea / Fragrance | 0.20 |
| 6 Glydant Plus® / DMDM Hydantoin (and) Iodopropynyl Butylcarbamate | 0.30 |

White Opaque Liquid, pH: 6.0, Viscosity: 30,000 cP

- Heat water to 65°C. While heating, add 2, 3. At 65°C, add 4 and mix until completely melted. Homogenize and cool below 55°C. Add remaining ingredients.

Antibacterial Hand Soap (Higher Viscosity)

No. 4017

Hand soap removes germs while leaving hands soft and moisturized. Rinses away easily, safe for children and ideal for repeated use.

| INGREDIENT / INCI | % |
|--|--------------|
| 1 Water | qs to 100.00 |
| 2 Jaguar® HP-105 / Hydroxypropyl Guar | 0.70 |
| 3 Jaguar® C162 / Hydroxypropyl Guar (and) Hydroxypropyl Guar Hydroxypropyltrimonium Chloride | 0.50 |
| 4 Citric Acid, 50% | 0.10 |
| 5 Glycerin | 2.00 |
| 6 Cola®Teric COAB / Cocamidopropyl Betaine | 12.00 |
| 7 Poly Suga®Quat L1010P / Polyquaternium-78 | 4.00 |
| 8 Plantaren® 2000N UP / Decyl Glucoside | 8.00 |
| 9 White Lily / Fragrance | 0.10 |
| 10 Preservative | qs |
| 11 StepanQuat® 50 NF / Benzalkonium Chloride | 0.25 |

Clear liquid, pH 5.0 – 5.5, Viscosity: 8,000 – 10,000 cP

- Slowly add ingredients 2-3 to 1 with strong mixing to evenly disperse. Once completely dispersed, reduce to moderate mixing and add ingredient 4 to pH 3.5 – 4.5. Mix for at least 30 minutes. Add remaining ingredients in order with adequate mixing between additions. Adjust pH to 5.0 – 5.5 with citric acid.

STORAGE AND HANDLING

Poly Suga®Quat products should be stored in sealed containers at temperatures not exceeding 120°F (49°C). Shelf life is 24 months from date of manufacture. Poly Suga®Quat products are shipped in poly 55-gal drums, net weight 450 lbs (204.1 kg). Safety Data Sheet may be downloaded at www.colonialchem.com.

Poly Suga®Quat series are covered under patent # 7,507,399

High-Fragrance 2-in-1 Shampoo

No. 1025

DEA-free ingredients, for a high efficiency, economy 2-in-1 shampoo that cleans while conditioning ingredients smooth fly-away hairs.

| INGREDIENT / INCI | % |
|--|--------------|
| 1 Water | qs to 100.00 |
| 2 Jaguar® C-162 / Hydroxypropyl Guar (and) Hydroxypropyl Guar Hydroxypropyltrimonium Chloride | 0.10 |
| 3 Cola®Det DEF-26 / Sodium Lauryl Sulfate (and) Sodium Laureth Sulfate (and) Cocamidopropyl Hydroxysultaine and Lauramide MIPA | 30.00 |
| 4 Poly Suga®Quat S1210P / Polyquaternium-81 | 2.00 |
| 5 Cola®Det DEF-35 / Sodium Lauryl Sulfate (and) Glycol Distearate (and) Lauramide MIPA (and) Cocamidopropyl Betaine (and) Disodium Cocamido MIPA Sulfosuccinate | 2.50 |
| 6 Fragrance | 2.50 |
| 7 Preservative | qs |

Opaque Liquid, pH 6.0, Viscosity: 8,000 – 10,000 cP

- Combine ingredients 1-2. Adjust pH to 5.0 and mix until completely hydrated and homogeneous. Add remaining ingredients. Adjust pH to 6.0.

Foaming Hand Soap

No. 4002

Produces a dense, cushiony foam using mild, high-foaming surfactants to minimize irritation and repeat washing without dryness.

| INGREDIENT / INCI | % |
|--|--------------|
| 1 Water | qs to 100.00 |
| 2 Glycerin | 2.00 |
| 3 Cola®Lux MCO / Myristamine Oxide | 6.00 |
| 4 Poly Suga®Quat TM8610P / Polyquaternium-77 | 2.00 |
| 5 Zemea® / Propanediol | 0.50 |
| 6 Fruity Pineapple WS / Fragrance | 0.20 |
| 7 Euxyl® PE 9010 / Phenoxyethanol Ethylhexylglycerin | 0.60 |

Clear Liquid, pH 6.0, Viscosity: 20 cP

- With mixing, combine 1-6. Heat to 40°C. Add 7. Mix until clear. Adjust pH as necessary.



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Innovative Specialty Surfactants



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