



Patent Pending

# Suga<sup>®</sup>Citrate L1C

100% Biobased APG Citrate  
Cleanse • Thicken • Reduce Irritation



## Clean and Simple

100% Naturally-Derived,  
Sulfate-Free, PEG-Free,  
1,4-Dioxane free *with low irritation*

# Suga<sup>®</sup>Citrate Clean and Simple



**Suga<sup>®</sup>Citrate** is the newest generation natural surfactant, meeting all the demands of today's consumer. It is an extremely low irritation anionic surfactant derived entirely from renewable plant sources. SugaCitrate functionalized alkyl polyglucosides deliver many highly desirable product features. Luxurious cleansers with excellent foam, rich viscosity, and low irritation are easily achievable.

## BENEFITS

- 100% naturally-derived
- PEG-free (1,4- Dioxane free)
- Non-irritating to skin and eyes
- Readily biodegradable
- Retains clarity at low temperature
- High clarity, low color, low odor
- Shipped without preservatives
- Cost-effective sulfate-free primary surfactant
- Suitable for use with nearly all surfactant classes including quaternary compounds, amides, amphoteric and nonionics
- Compatible with a wide variety of formulation additives, including popular extracts, humectants, and preservatives.
- Especially well-suited for
  - Clean beauty products
  - Highly sustainable cleansers
  - Baby care
  - Facial care
  - Sensitive skin needs



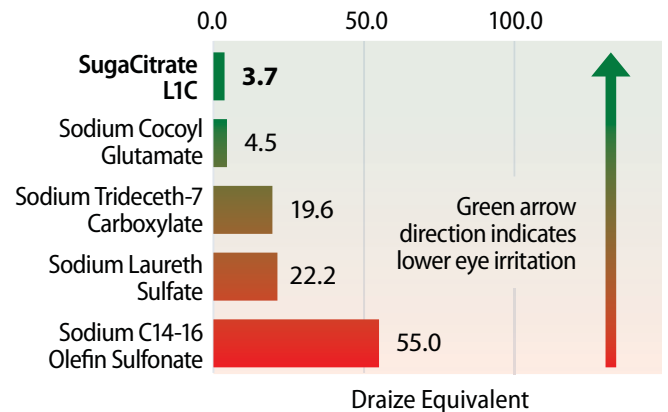
## APPLICATIONS

- Sulfate-free cleansers
  - Mild cleansing
  - Foaming
  - Viscosity building
  - Irritation reduction
- Wipes
  - Mild cleansing
  - Wetting
- Syndet Bars
  - Mild cleansing
  - Foaming
  - Irritation reduction



## EYE IRRITATION TESTING

The following data correlates to the OECD TG 405 Acute Eye Irritation/Corrosion (Draize) results of products that represent a variety of irritants. Tests are globally approved, completely cruelty-free and mathematically correlated to the Draize equivalent score. All tests conducted at 10% Solids, pH 6.0.



**Draize Equivalent**

0.0 – 0.5 / Non-irritating	25.1 – 50.0 / Moderately irritating
0.6 – 2.5 / Practically non-irritating	50.1 – 80.0 / Severely irritating
2.6 – 15.0 / Minimally irritating	80.1 – 100.0 / Extremely irritating
15.1 – 25.0 / Mildly irritating	100.1 – 110 / Maximally irritating



SugaCitrate L1C is "Derived Natural" with a **Natural Origin Index of 1.00** in accordance with ISO 16128 guideline.



## PERFORMANCE

### Irritation Potential in Sulfate-Based Cleanser (Chart 1)

SugaCitrates L1C is extremely effective at reducing irritation potential in cleansing formulations, without negatively impacting other important attributes.

The Zein test is an in-vitro test that measures irritation potential by measuring the denaturation of a proxy protein (zein). As the zein denatures, water solubility increases.

This study demonstrates that the milder but undesirable Sodium Laureth-2 Sulfate can be replaced with a combination of Sodium Lauryl Sulfate and SugaCitrates L1C. This combination exhibits lower irritation with even better viscosity building performance.

### Viscosity Build in Sulfate-Based Cleanser (Chart 2)

Incorporating SugaCitrates L1C into gel cleanser formulations results in faster, higher viscosity building. Formulations with no added salt are achievable, meeting the demand for those claims.

### Viscosity Build in Sulfate-Free Cleanser (Chart 3)

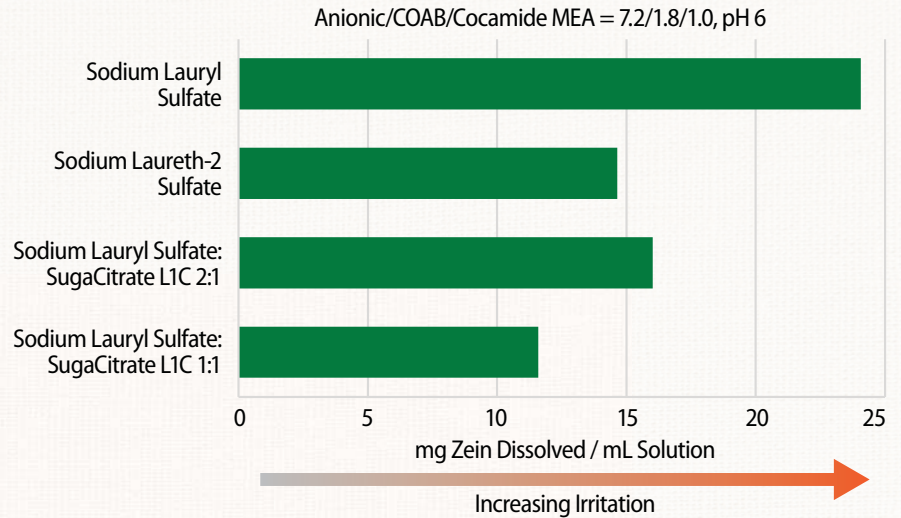
This chart demonstrates multiple variables which can be altered in this sulfate-free system to modify viscosity response, including:

- pH
- Salt
- Addition of a mid-HLB surfactant (Sodium Stearoyl Lactylate, or SSL)

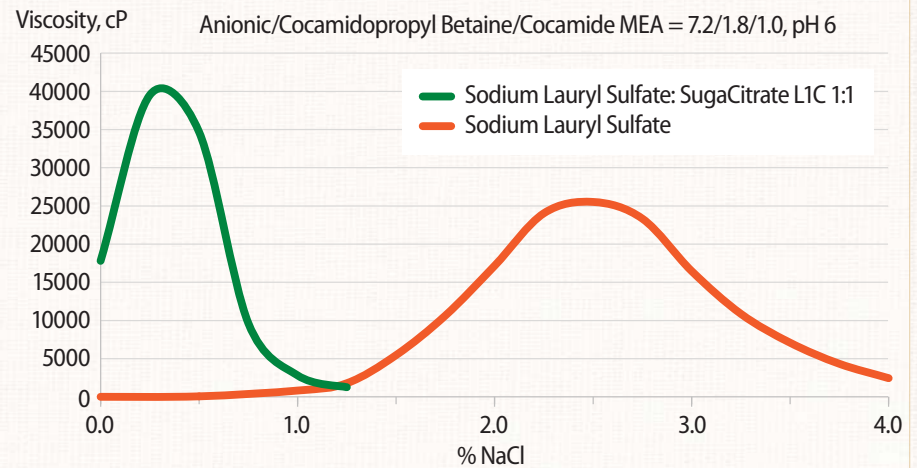
#### Sulfate-Free Cleanser Formulation

Ingredient	0.75% SSL	1.0% SSL
Water	72.75	72.50
Suga®Citrates L1C	16.00	16.00
Poly Suga®Glycinate C	2.50	2.50
Cola®Teric CBS-HP	5.00	5.00
Sodium Methyl Cocoyl Taurate	3.00	3.00
Sodium Stearoyl Lactylate	0.75	1.00
Citric Acid 50%	qs to pH	qs to pH

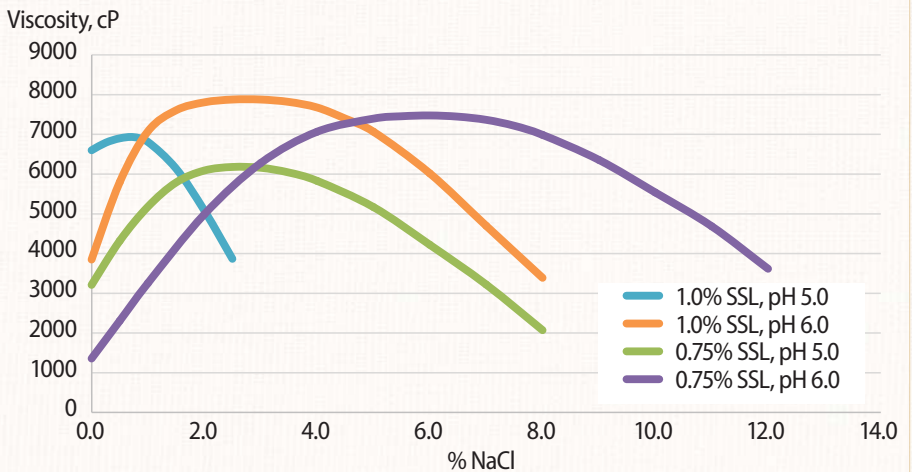
## 1. Irritation Potential of Sulfate-Based Cleanser



## 2. Viscosity Build in Sulfate-Based Cleanser



## 3. Viscosity Build in Sulfate-Free Cleanser



## Clean & Simple Shampoo

No. 1055

Designed with safe, mild ingredients to create a gentle, sulfate-free, silicone-free shampoo that effectively washes away dirt and oils. Hair is left healthy and light without any build-up with daily use or when hair needs a "cleanse."

	TRADE NAME / INCI NAME	%
1	Water	qs to 100.00
2	UCARE™ Polymer JR-30M / Polyquaternium-10	0.20
3	Cola®Teric CBS / Cocamidopropyl Hydroxysultaine	7.00
4	Suga®Citrate L1C / Disodium Laurylglucosides Hydroxypropyl Citrate	13.00
5	Cola®Mate LA-40 / Disodium Lauryl Sulfosuccinate	12.00
6	Poly Suga®Quat S1210P / Polyquaternium-81	2.00
7	Fragrance	0.30
8	Euxyl®K 900 / Benzyl Alcohol and Ethylhexylglycerin and Tocopherol	0.70

### PROCEDURE:

Combine ingredients 1–2 and mix until completely hydrated. Add ingredients 3–4 in order and begin heating to 45–50°C. Once at temperature, add ingredient 5 and mix until completely dissolved. Add ingredients 6–8 while beginning to cool and continue mixing until clear. If necessary, adjust to pH 5.0–5.5 with citric acid (viscosity is pH dependent, increasing at lower pH).

### TYPICAL PROPERTIES:

Appearance:	Clear, viscous liquid
pH:	5.0 – 5.5
Viscosity:	5,000 – 10,000 cP
Surfactant Solids:	13.6 – 14.5%
Stability:	Passes 6 weeks @45°C and 3 Freeze/Thaw cycles

**INCI** Disodium Laurylglucosides  
Hydroxypropyl Citrate

**CAS** 2481100-10-9

### TYPICAL PROPERTIES

Appearance @ 25°C	Clear Liquid
Appearance @ 5°C	Clear Liquid
pH (10% Aqueous)	7.0
% NaCl	3.0
% Solids, 2G 1H@110°C	40
Color, Gardner '98	1
Draves Wetting, secs (1% active)	5.5
Ross-Miles Foam Height (1% active solution, 25° C, DI water), mm	Immediate 150 1 minute 130 5 minutes 130

## Clean & Simple Face Wash

No. 2070

Sulfate-free daily face wash designed with safe, mild ingredients to create a gentle lather that effectively lifts away dirt and oils. Skin-conditioning and moisture-locking ingredients leaves skin feeling healthy, not tight or dry.

	TRADE NAME / INCI NAME	%
1	Water	qs to 100.00
2	Suga®Citrate L1C / Disodium Laurylglucosides Hydroxypropyl Citrate	15.00
3	Cola®Mate LA-40 / Disodium Lauryl Sulfosuccinate	7.00
4	Cola®Teric BBS / Babassuamidopropyl Hydroxysultaine	7.00
5	Cola®Teric CBS / Cocamidopropyl Hydroxysultaine	5.00
6	Cola®Lipid C / Cocamidopropyl PG-Dimonium Chloride Phosphate	0.50
7	Cola®Moist 200 / Hydroxypropyl Bis-Hydroxyethylidimonium Chloride	3.00
8	Fragrance	0.15
9	Euxyl®K 900 / Benzyl Alcohol and Ethylhexylglycerin and Tocopherol	0.70

### PROCEDURE:

Combine ingredients 1–2 and heat to 45–50°C. Add ingredient 3 and mix until completely dissolved. Add ingredients 4–7 while beginning to cool. Once uniform, add ingredients 8–9 and continue mixing until clear. Adjust pH as necessary with citric acid (viscosity is pH dependent, increasing at lower pH).

### TYPICAL PROPERTIES:

Appearance:	Clear, viscous liquid
pH:	5.0 – 5.5
Viscosity:	2,000 – 4,000 cP
Surfactant Solids:	16.4 – 17.6%
Stability:	Passes 6 weeks @45°C and 3 Freeze/Thaw cycles



Suga®Citrate L1C contains **100%** USDA certified biobased content via the USDA BioPreferred® Program.

### STORAGE AND HANDLING

Suga®Citrate L1C should be stored in closed containers. Shelf life is 12 months from date of manufacture. Suga®Citrate L1C is shipped in 55-gallon drums, net weight (net weight 460 lb/208.6 kg). Complete Safety Data Sheet may be downloaded at [www.colonialchem.com](http://www.colonialchem.com).



**Colonial Chemical**  
Innovative Specialty Surfactants  
[www.colonialchem.com](http://www.colonialchem.com)