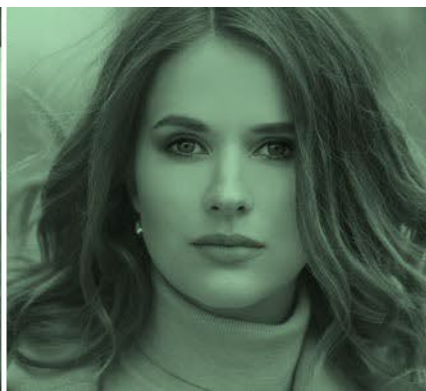


Suga[®]Citrate L1C MB – Improved!

Dennis Abbeduto – Manager, Care Chemicals



Remember Oral Hygiene!



Sustainable Beauty Has Been Here All Along

- Safe for the consumer
 - Low irritation
 - Low toxicity
 - Functional
- Safe for the environment
 - Not reliant on petrochemicals
 - Not environmentally destructive at any point in life cycle
 - Not persistent in the environment
- Net good for the world
 - Fair trade
 - Inclusive



New Chemistry Challenges Abound

- APG-modified anionic surfactants have faced challenges
 - APG-carboxylate – Not 100% biobased
 - APG-phosphate – Negative perception
 - APG-sulfonate – Inorganic sulfate residual
- Is sulfonate good or bad?
 - Sodium C14-16 Olefin Sulfonate
 - Sodium Cocoyl Isethionate
 - Sodium Methyl Cocoyl Taurate
 - Sodium Laurylglucosides Hydroxpropylsulfonate

Introducing: Suga[®]Citrate L1C MB

- **New APG CITRATE using our own patented APG derivatization technology**
- **Replace or augment alkyl sulfate and sulfonate surfactants**
- 100% biobased, end to end
- Low irritation – Not an eye irritant at 10% solids
- Non-sensitizing (OECD TG 442D, 442E)
- Safe for people and the environment
- Enable a wide variety of formulation benefits



Suga®Citrate L1C MB Applications

- Use as a primary or secondary anionic surfactant in all types of sulfate-free systems for
 - Mild cleansing
 - Foaming
 - Viscosity building
 - Irritation reduction
- Wipes
 - Mild cleansing
 - Wetting
- Syndet bars
 - Mild cleansing
 - Foaming
 - Irritation reduction



Suga[®]Citrate L1C MB Irritation

MatTek[®] Epi-Ocular Test

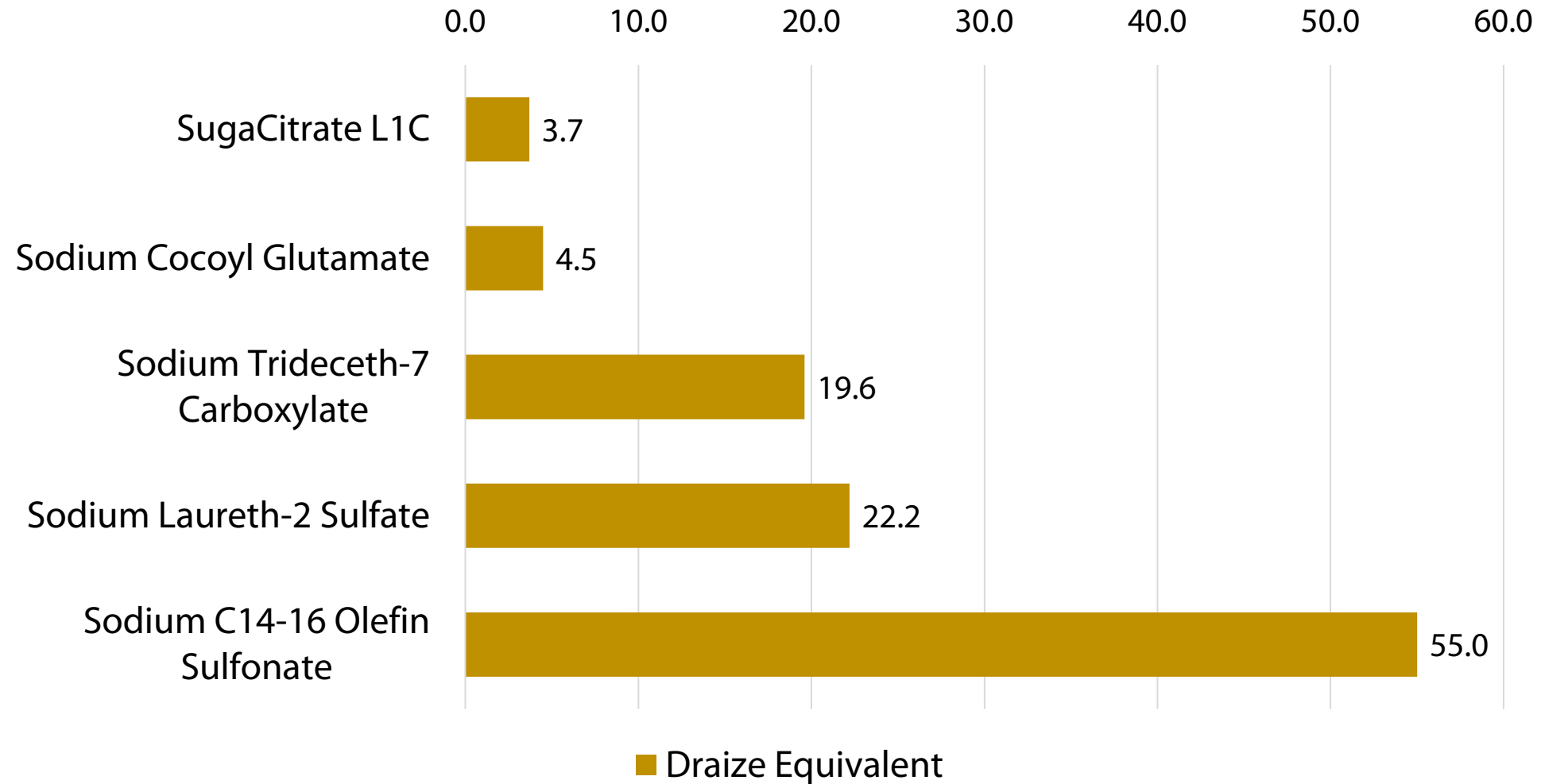
In vitro epidermal keratinocytes (10% solids @ ph 6.0)

ET-50 test is **144.5 minutes**

Results indicate ‘minimally irritating’ classification.

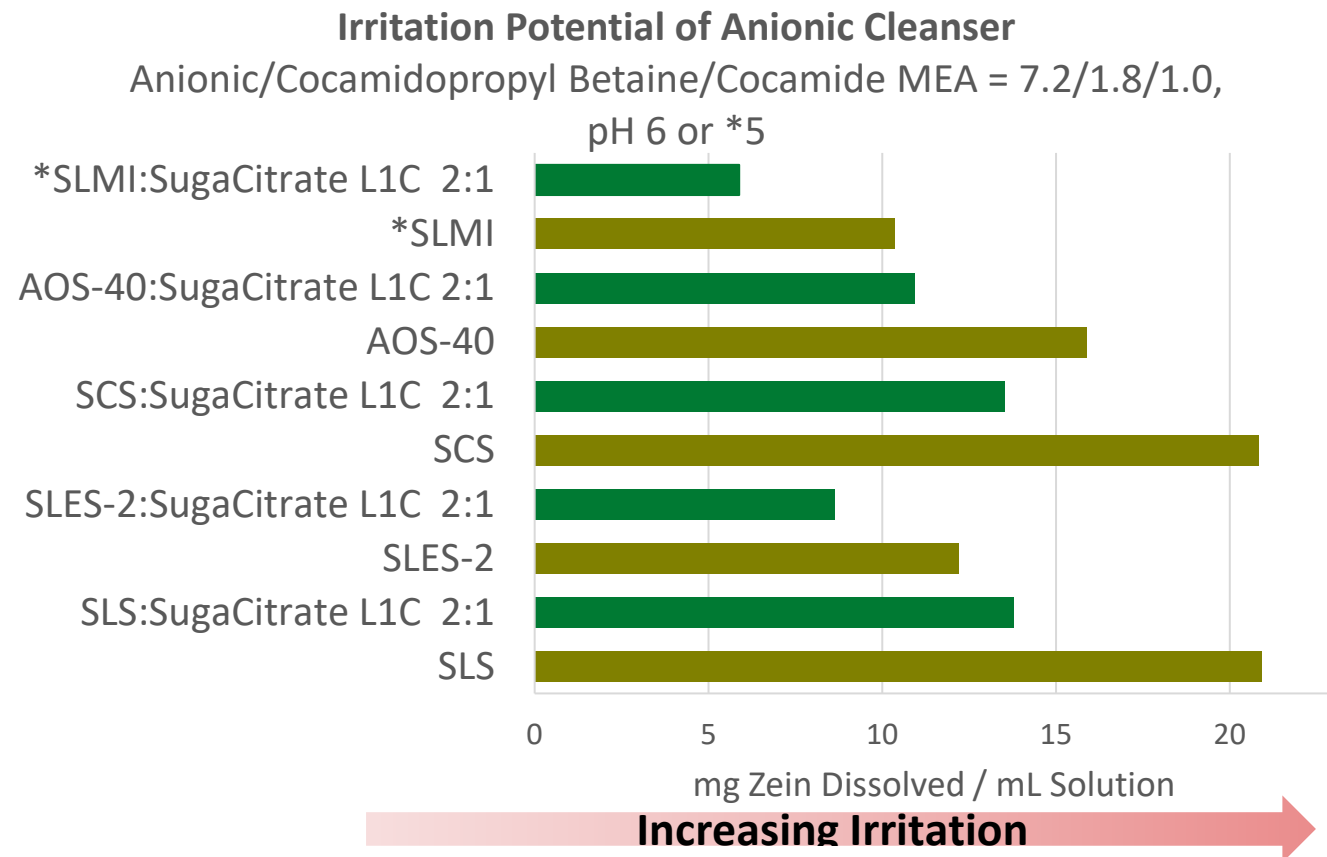
EpiOcular ET-50 (mins)	Irritancy Classification	Example
256 – 26.6	Non-Irritating, Minimal	PEG-75 Lanolin, Tween 20
26.5 – 11.8	Mildly Irritating	3% Sodium Dodecyl Sulfate
11.7 – 3.45	Moderate Irritation	5% Triton X-100
< 3.45	Severe, Extreme	5% Benzalkonium Chloride

Comparative Irritation via MatTek EpiOcular

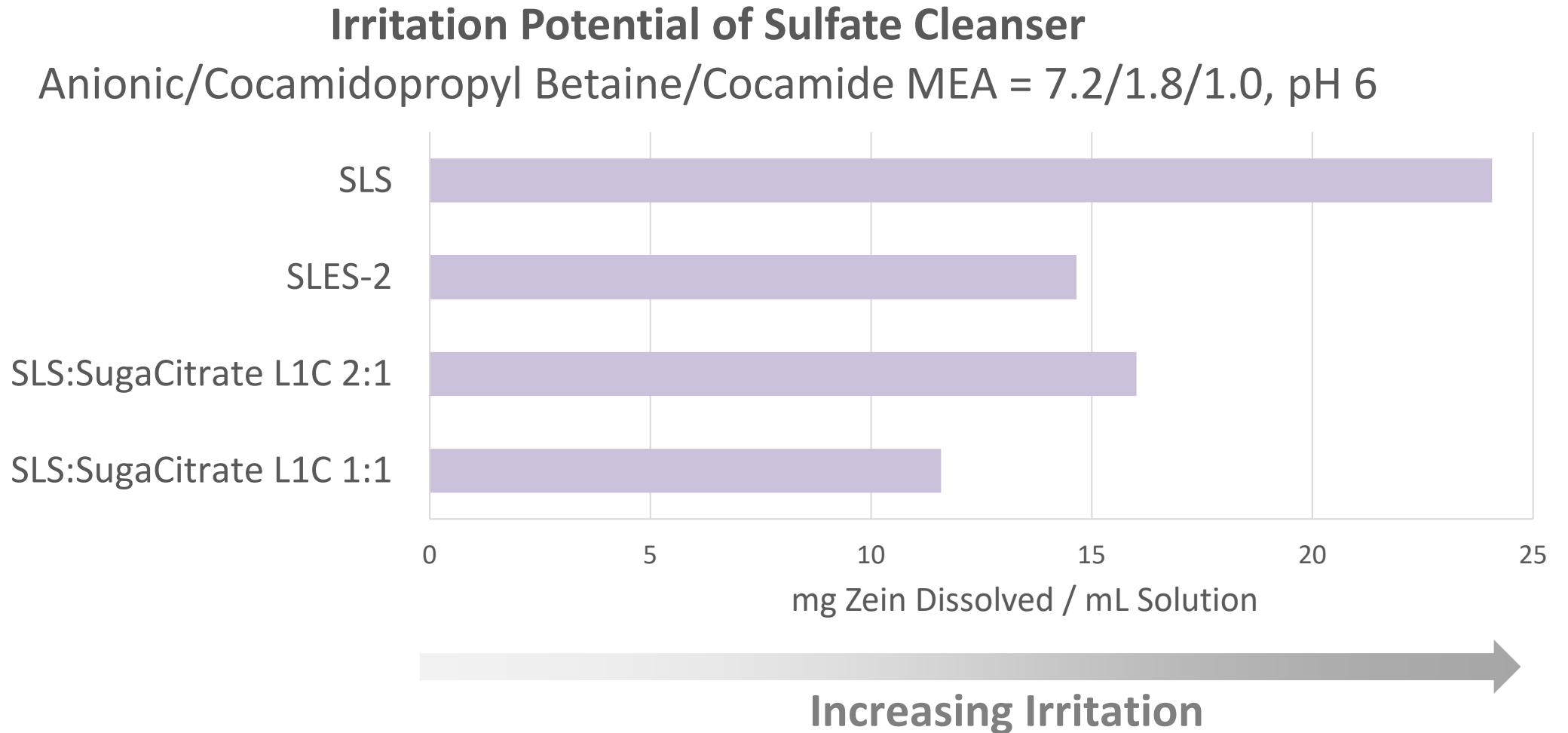


Reducing Irritation

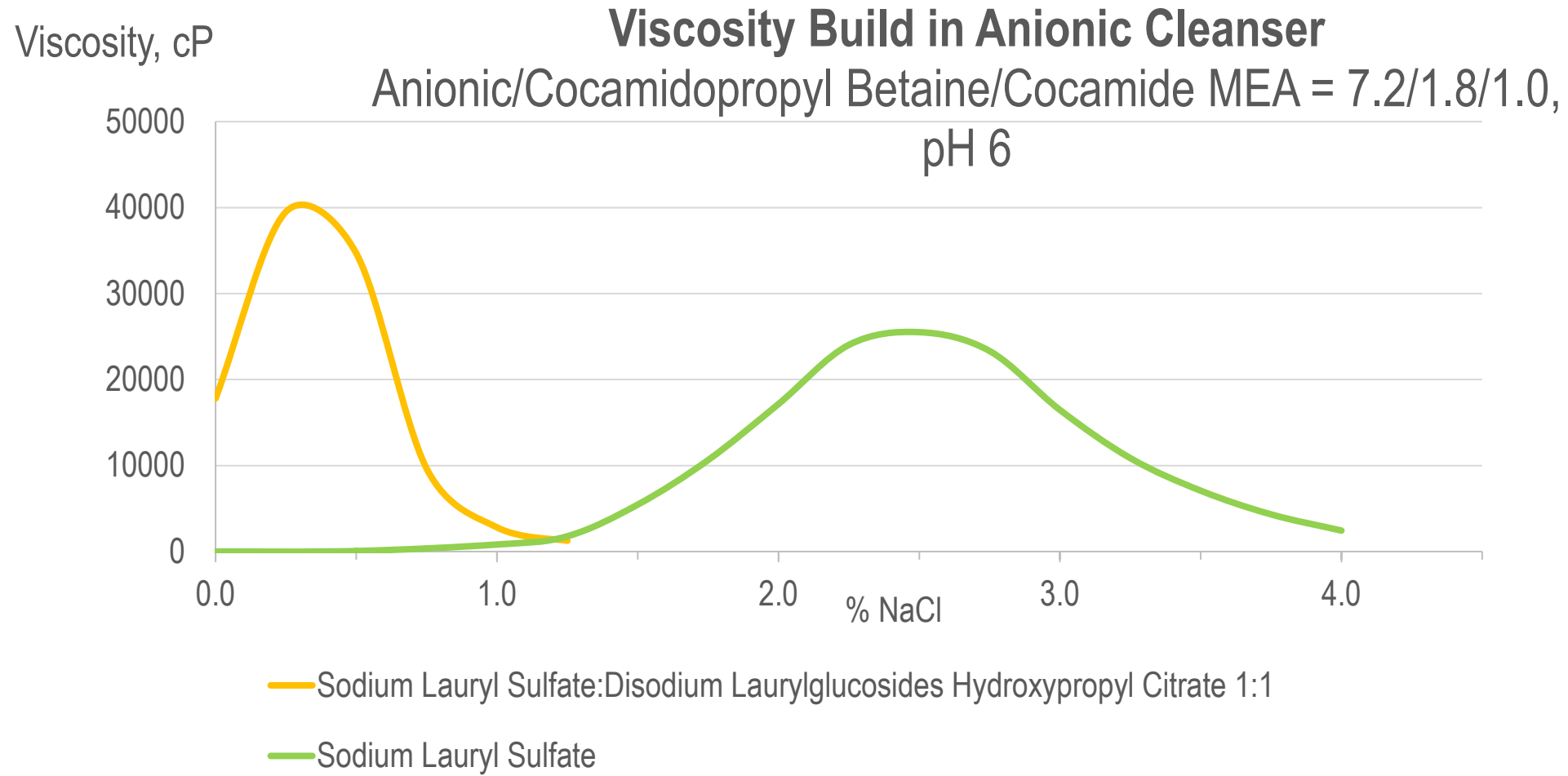
- Incorporating low irritation Suga[®]Citrate L1C MB also substantially lowers irritation in other systems, without large negative impacts to other key formulation properties
- SLMI
 - Sodium Lauroyl Methyl Isethionate
- AOS-40
 - Sodium C14-16 Olefin Sulfonate
- SCS
 - Sodium Coco-Sulfate
- SLES-2
 - Sodium Laureth Sulfate
- SLS
 - Sodium Lauryl Sulfate



Using Suga[®]Citrate to Reduce Product Irritation



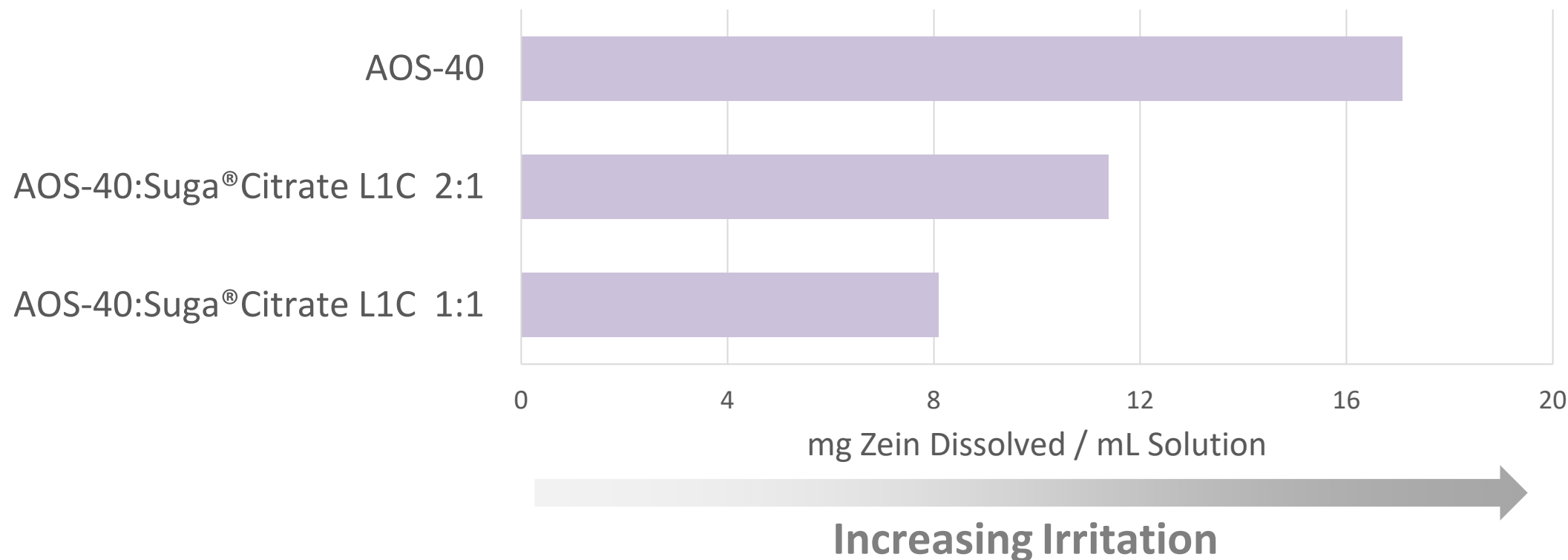
Suga[®]Citrate Impact on Viscosity Building



Using Suga[®]Citrate to Reduce Product Irritation

Irritation Potential of Sulfate-Free Cleanser

Anionic/Cocamidopropyl Betaine/Cocamide MEA = 7.2/1.8/1.0,
pH 6



Suga[®]Citrate L1C MB Environmental Impact

Biodegradability

- OECD TG 301B (Ready biodegradability)
 - Readily biodegradable
 - 82% at 28 days

Aquatic Toxicity

- OECD TG 201 Algae (Desmodesmus sups.)
 - Not toxic to the environment
 - ErC50 (72h) 24.3mg ai/L
 - NOEC (72h) 12.78mg ai/L

Bioaccumulation

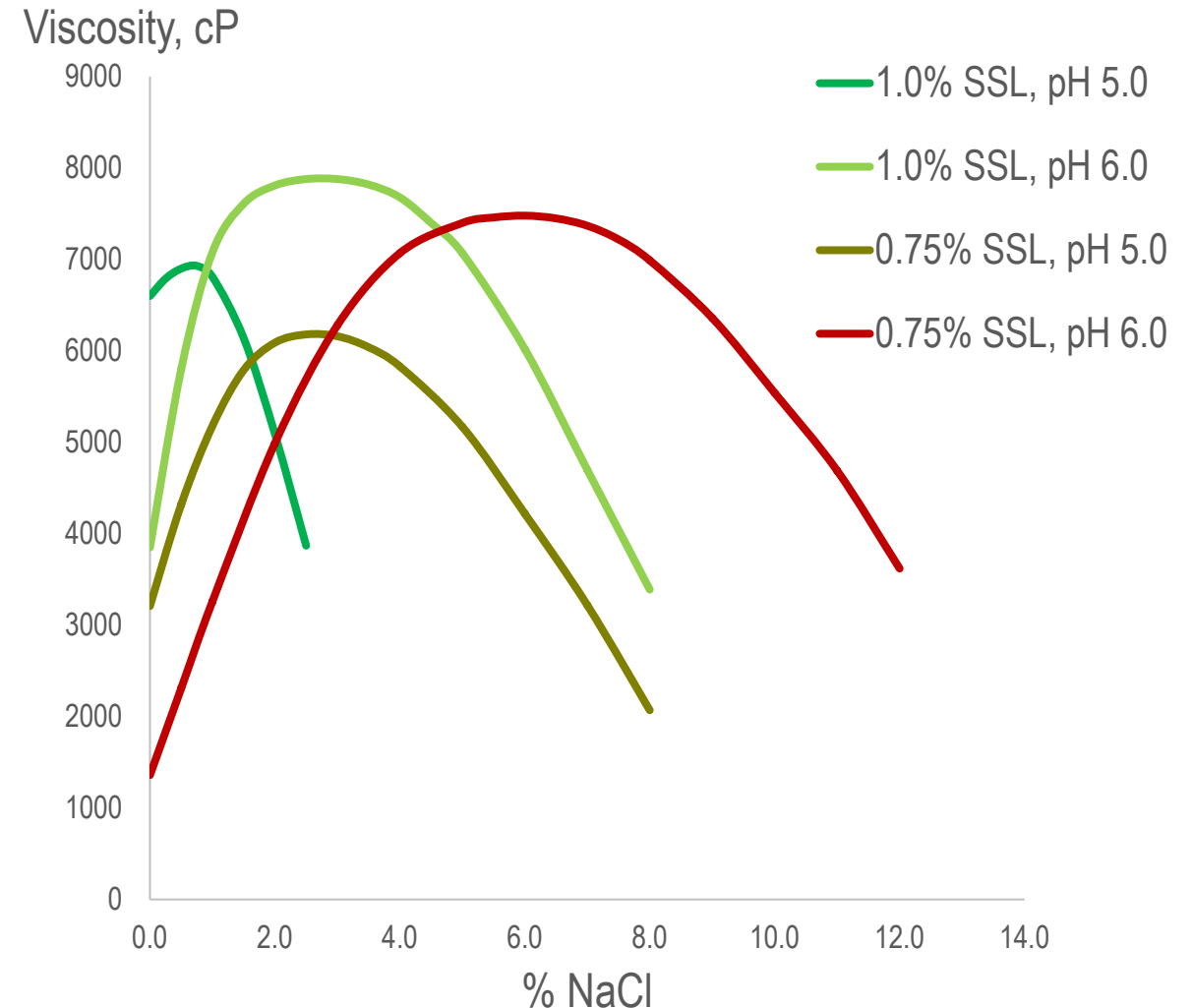
- Low potential for bioaccumulation
 - $\log K_{ow} < 4$



Formulating Ultra-Mild, Yet Effective Cleansers

- Suga[®]Citrate L1C MB can be used to generate very low irritation cleansers with good viscosity

Ingredient	
Water	73.00
Suga[®]Citrate L1C MB	16.00
Poly Suga[®]Glycinate C	2.50
Cola[®]Teric CBS-HP	5.00
Cola[®]Mate SMCT-40	3.00
Sodium Stearoyl Lactylate	Graph
Citric Acid 50%	qs to pH



Suga®Citrate L1C MB in Formulation

Clean & Simple Face Wash

2070

INCI Name	Trade Name	%	Function
Water	Water	qs to 100.00	Carrier
Disodium Laurylglucosides Hydroxypropyl Citrate	Suga®Citrate L1C MB	15.00	Ultra-mild primary surfactant
Disodium Lauryl Sulfosuccinate	Cola®Mate LA-40	7.00	Foam boosting co-surfactant
Babassuamidopropyl Hydroxysultaine	Cola®Teric BBS	7.00	Viscosity build
Cocamidopropyl Hydroxysultaine	Cola®Teric CBS-UL	5.00	Viscosity build
Cocamidopropyl PG-Dimonium Chloride Phosphate	Cola®Lipid C	0.50	Skin conditioning, antimicrobial*
Hydroxypropyl Bis-Hydroxyethylmonium Chloride	Cola®Moist 200	3.00	Humectant
Fragrance	Fragrance ¹	0.15	Fragrance
Benzyl Alcohol and Ethylhexylglycerin and Tocopherol	Euxyl® K 900 ²	0.70	Preservative

¹Orchidia Fragrances, ²Schülke & Mayr

TYPICAL PROPERTIES

Appearance: Clear, Viscous Liquid
 pH 5.0 – 5.5
 Viscosity 2,000 – 4,000 cP
 Surfactant Solids 16.4 – 17.6%

Suga®Citrate L1C MB in Formulation

Grapefruit Body Wash

2072

INCI Name	Trade Name	%	Function
Water	Water	qs to 100.00	Carrier
Sodium C14-16 Olefin Sulfonate	Colonial AOS-40 UP	12.00	Primary anionic
Disodium Laurylglucosides Hydroxypropyl Citrate	Suga®Citrate L1C	6.00	Ultra-mild primary anionic
Cocamidopropyl Betaine	Cola®Teric COAB	7.00	Secondary amphoteric
Oleamidopropyl Betaine	Cola®Teric OAB	2.00	Viscosity build
Hydroxypropyl Bis-Hydroxyethyldimonium Chloride	Cola®Moist 200	3.00	Humectant
Sodium Chloride	Sodium Chloride	1.25	Thickener
Sodium Benzoate and Potassium Sorbate	Euxyl® K712 ¹	1.00	Preservative
Fragrance	Uplifting Grapefruit ²	0.20	Fragrance
Citric Acid	Citric Acid, 50%	qs to pH 5.0 – 5.5	pH Adjuster

¹Schülke & Mayr, ²Orchidia Fragrances

TYPICAL PROPERTIES

Appearance:	Clear, Viscous Liquid
pH	5.0 – 5.5
Viscosity	5,000 – 8,000 cP
Surfactant Solids	11.8 – 12.8%

Suga® Citrate L1C MB

100% Biobased Anionic Surfactant

INCI Name	Disodium Laurylglucosides Hydroxypropyl Citrate
Global Clearances	US TSCA Exempt, REACH Registered, Canada Schedule 5, AUS Notified Introduction >10MT, NZIOC, Japanese INCI, Korean INCI
Physical Form	Clear Liquid, 40% solid matter
Key Features	Completely bio-renewable Readily biodegradable Reduces irritation of other primary surfactants Improves viscosity response of other primary surfactants No added preservatives
Suggested Applications	Face, feminine hygiene, sensitive skin cleansers: 5 – 25% Hand and body washes: 2 – 10% Shampoos: 1 – 5%
Certifications	ISO 16128 (1.0), USDA BioPreferred Certified 99% Biobased, Leaping Bunny Compliant, RSPO Mass Balance, COSMOS Approved, Kosher and Halal available upon request.

New Product News



Cola®Mid CFPA (MB)

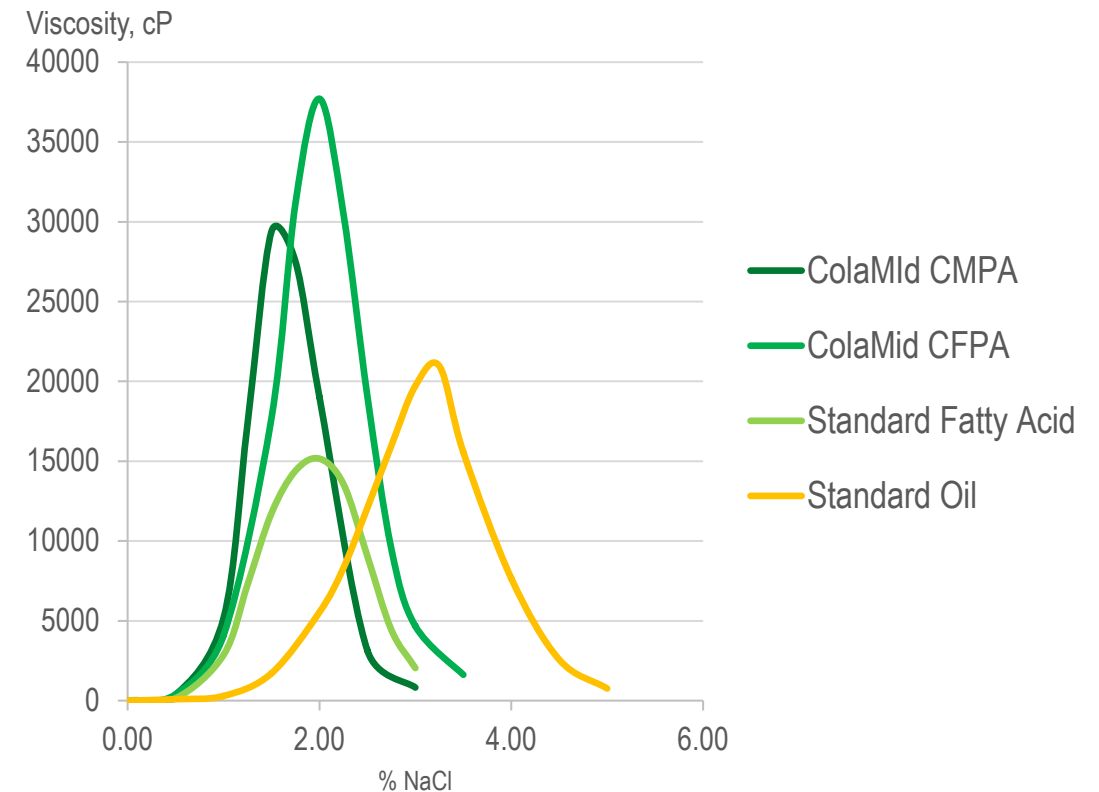
Cost Effective Cocamide MIPA

INCI Name	Cocamide MIPA
Global Clearances	US (TSCA), Canada (DSL), EU (REACH), Australia (AIIIC/AICIS), China (IECSC/IECIC), Japan, (ENCS), New Zealand (NZIoC), Taiwan (TSCI)
Physical Form	Waxy solid
Key Features	Low irritation Highly efficient thickener for surfactant systems Skin conditioning Readily biodegradable
Suggested Applications	Solid form products • Emolliency Shampoos, body washes, gel cleansers • Viscosity boosting, foam stabilization
Certifications	ISO 16128 (NOI 0.73), RSPO Mass Balance available

Cola[®]Mid CFPA Performance

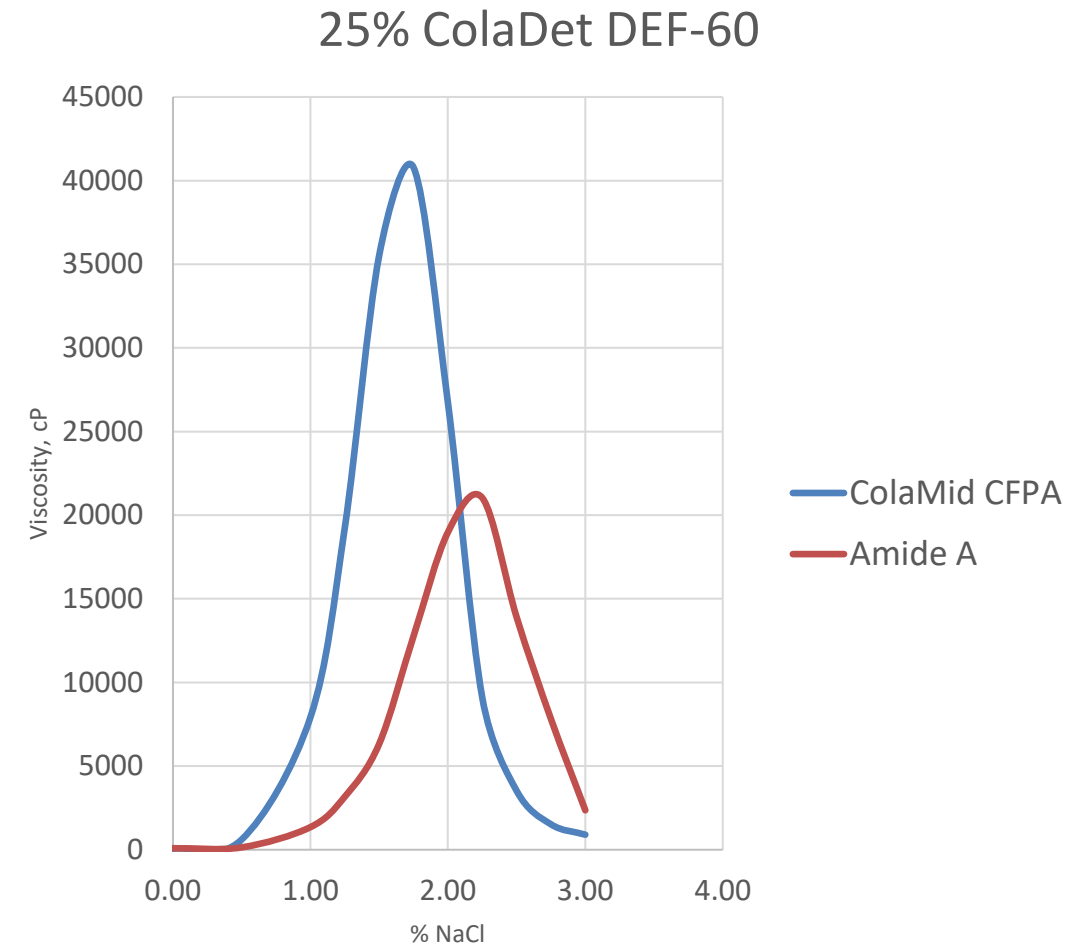
- Cola[®]Mid CFPA was evaluated as a component of our Cola[®]Det DEF-60
- Performance was compared to 3 alternative feedstocks
 - Cola[®]Mid CMPA (methyl ester)
 - Standard Coconut Fatty Acid
 - Standard Coconut Oil
- Cola[®]Mid CFPA provides highest peak viscosity
- Peak viscosity is at a similar salt level

25% ColaDet DEF-60, pH 6



Cola®Mid CFPA Competitive Performance

- Cola®Mid CFPA was evaluated as a component in our Cola®Det DEF-60
- Performance is compared to a competitive product (Cocamide MIPA) “Amide A”
- Cola®Mid CFPA demonstrates clear superiority
 - Higher peak viscosity
 - Reduced added salt



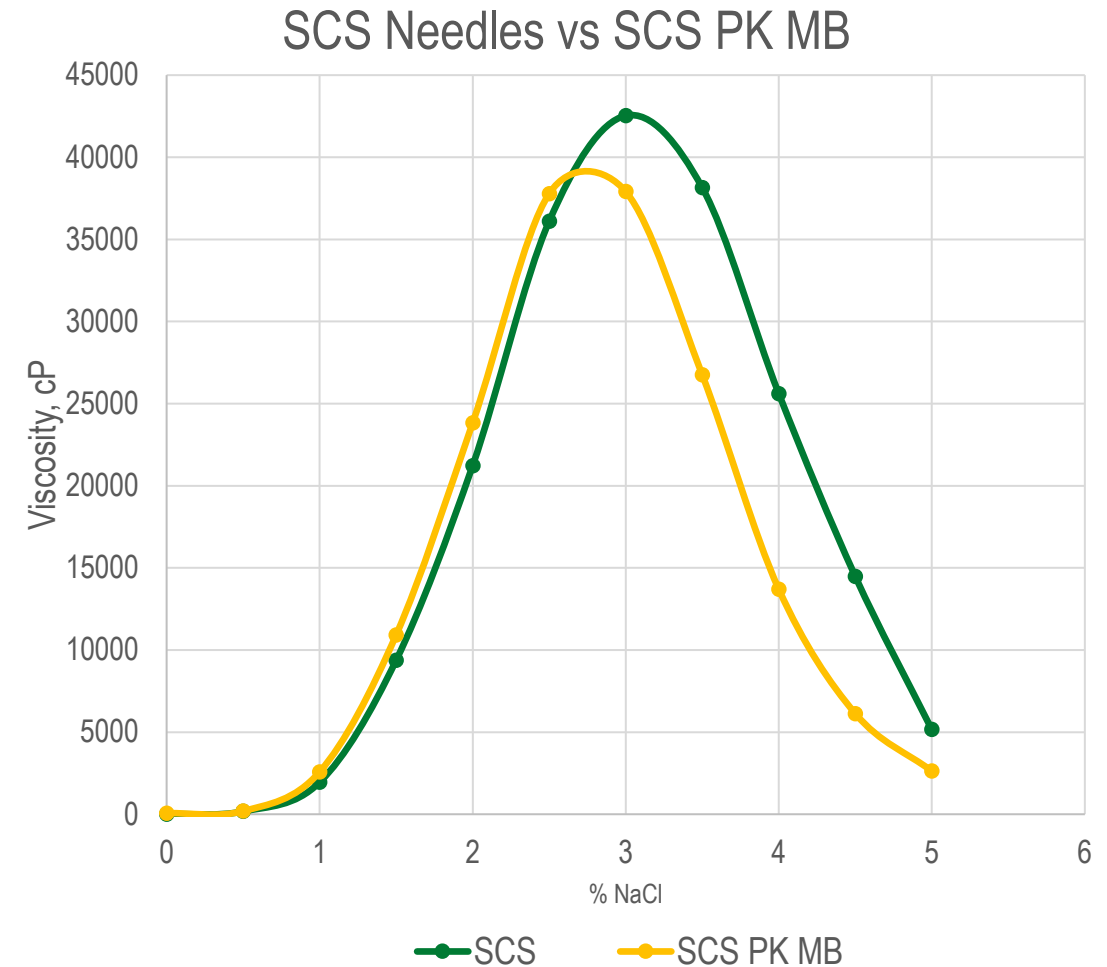
Colonial SCS PK MB

Sodium Coco-Sulfate, RSPO Mass Balance

INCI Name	Sodium Coco-Sulfate
Global Clearances	USA (TSCA), Canada (DSL), EU (REACH), Australia (AIC), Korea (KECI), China (IECSC/IECIC); Philippines (PICCS), New Zealand (NZIOC), Taiwan (TCSI)
Physical Form	Solid Needles
Key Features	100% biobased anionic surfactant Sustainable RSPO Mass Balanced sourcing Very high foaming Outstanding viscosity response
Suggested Applications	Solid form products • Foaming, cleansing Shampoos, body washes, gel cleansers • Luxurious foaming and strong viscosity response
Certifications	ISO 16128 (NOI 1.0), RSPO Mass Balance available, COSMOS Eligible

Product Performance vs Standard

- Colonial SCS Needles and Colonial SCS PK MB were evaluated as components in our Cola®Det COCO
- No substantial difference in performance was observed



Thank you!

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Product TDS/SDS/Formulations: <https://www.colonialchem.com>

Formula Girls Podcast: <https://apple.co/3dUq5fh>

