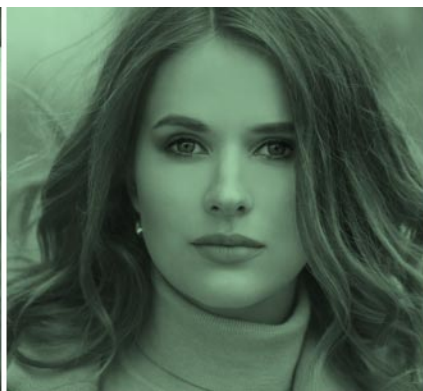


Reducing Irritation in Rinse-Off Cleansers

Dennis Abbeduto, Personal Care Business Manager



WASH YOUR HANDS



Outline

- Mild Cleansing Trends and Drivers
- Surfactant Induced Irritation
- SugaNate: A Zero Irritation Primary Anionic Surfactant
- Demonstrating Reduced Irritation
 - SLS/SCS/SLES
 - AOS/SLMI
 - Lower irritation concentrates
- Wrap-up.

Mild Cleansing Trends and Drivers

- Clean Beauty trend toward benign formulation
 - Lower irritation
 - Remove “suspect” ingredients, by-products
 - Simple, efficacious formulations
- Increase in hand hygiene
 - Hand washing
 - Alcohol sanitizers
- Increased self-perception of “sensitive skin”
- Consumers turning increasingly away from traditional facial cleansers
 - Oil based and cream cleansers increasing in use
 - These solutions are well suited for makeup removal, but don’t clear pores as well
 - And what about hands?

Surfactant Induced Irritation

- Surfactants can illicit skin irritation by a variety of means
 - Dissolve intracellular lipids
 - Disorder lipid matrix
 - Degrade protein (unfold, dissolve)
 - Induce or attenuate allergic reaction
- Irritation can be reduced by a variety of means
 - Reducing surfactant monomer concentration (mixed surfactants)
 - Increasing size of micelles (nonionic surfactants, ethoxylates)
 - Decrease micelle surface charge density (large head groups)
 - Decrease skin pore size (difficult to do).

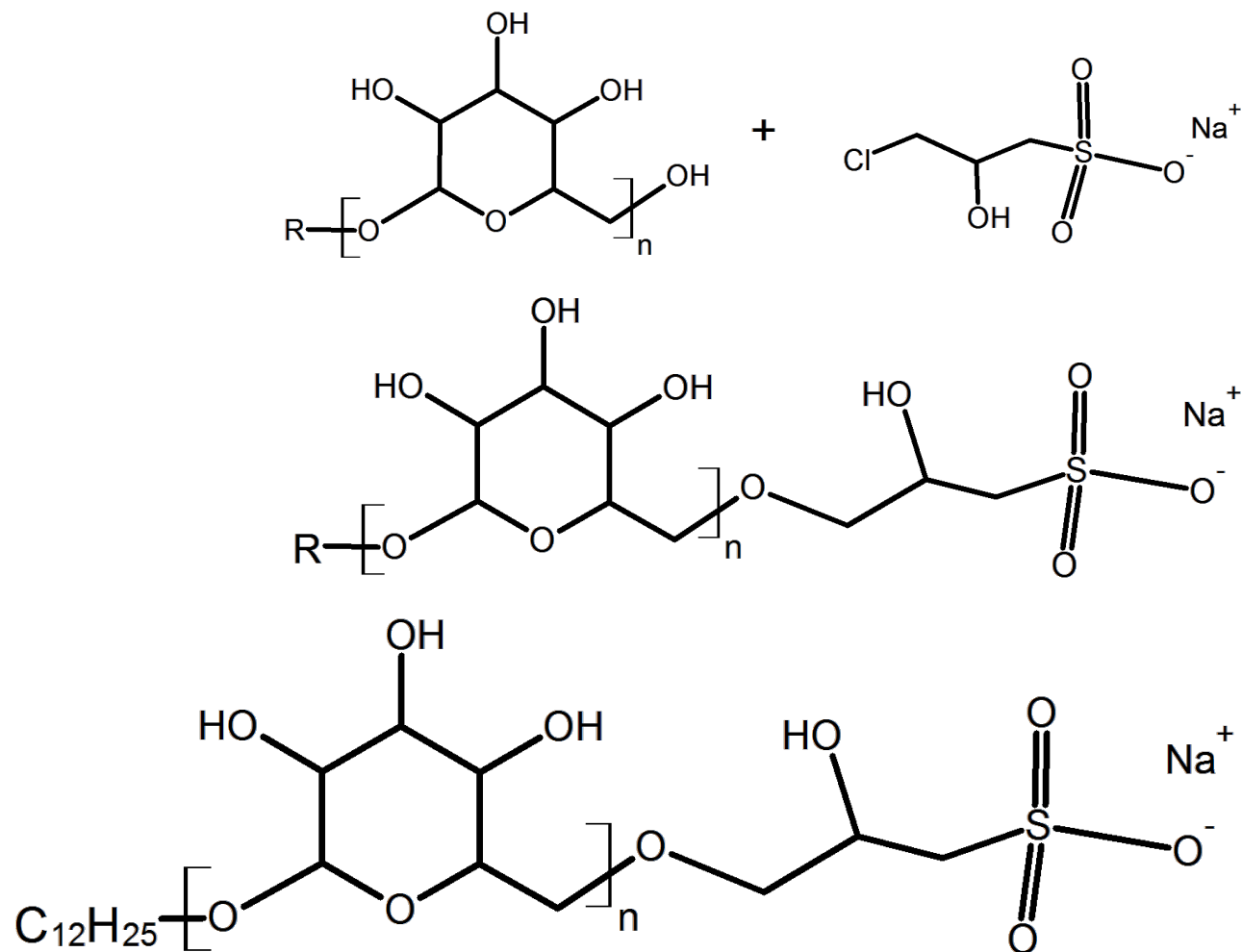
Suga[®]Nate 160NC

100% biobased anionic with zero irritation

SugaNate 160NC

Chemistry

APG Derivative Synthesis



100% Bio-Based

Sodium Laurylglucosides Hydroxypropylsulfonate

SugaNate 160NC

Benefits and Applications

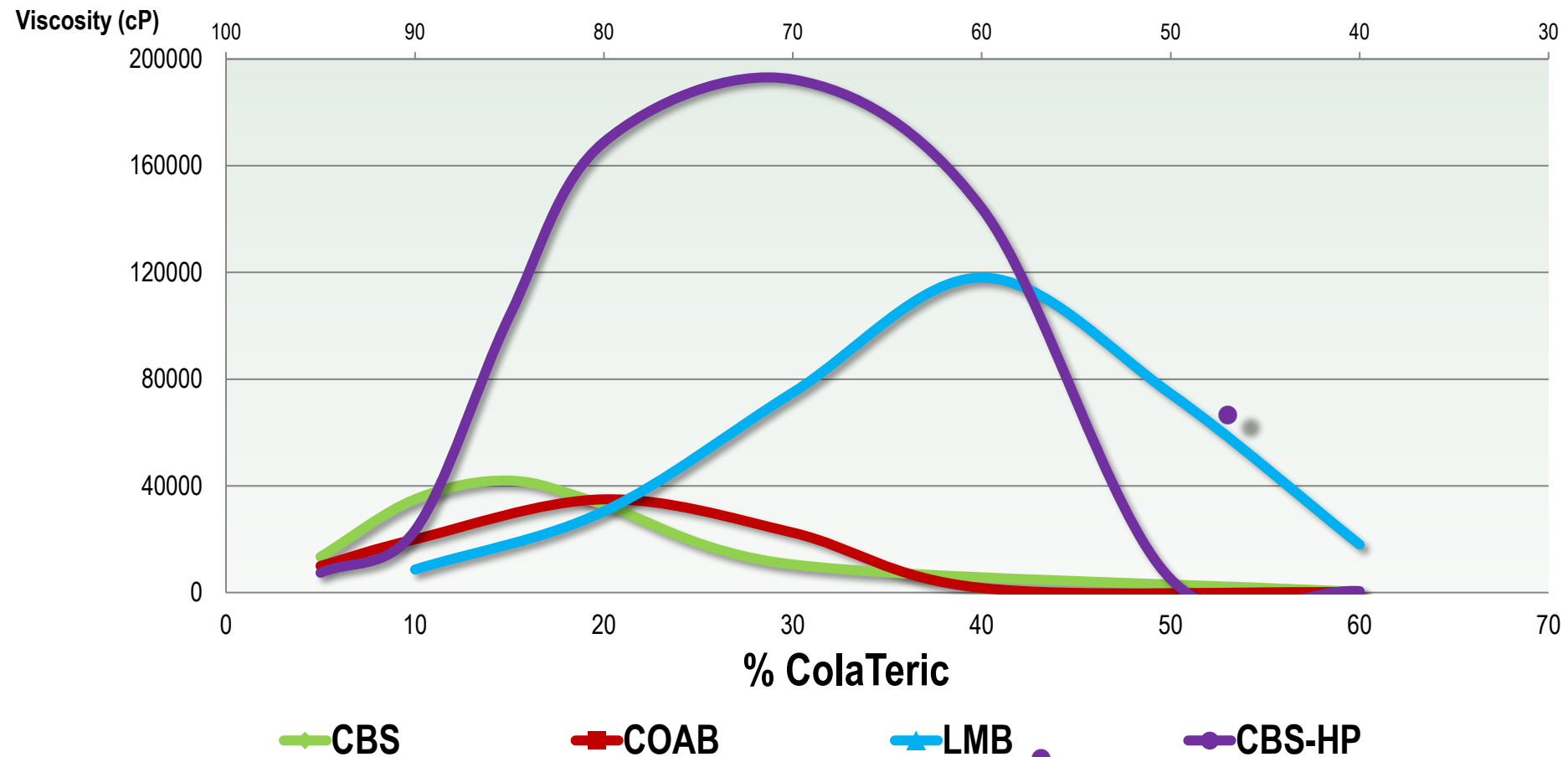
SugaNate Benefits

- 100% Naturally-derived, renewable feedstock sources
- Superior to traditional sulfates and sulfonates for toxicity and irritation
- Non-irritating to eyes and skin
- PEG-free, Dioxane-free
- Biodegradable and safe for the environment
- Stable over a broad pH range
- Builds a dense, stable foam
- Supplied preservative-free

SugaNate 160NC is “Derived Natural” with a Natural Origin Index of 1.0 in accordance with ISO 16128 guideline.

Viscosity Performance

Blend Viscosity of SugaNate 160NC with ColaTerics



SugaNate 160NC

Toxicological Properties

SugaNate 160NC Skin Safety

Acute Skin Irritation

- 48 Hour Occlusive skin patch test on human volunteers - 53 Test Subjects
 - 53/53 showed no visible skin reaction
 - No potential for dermal irritation

Skin Sensitization

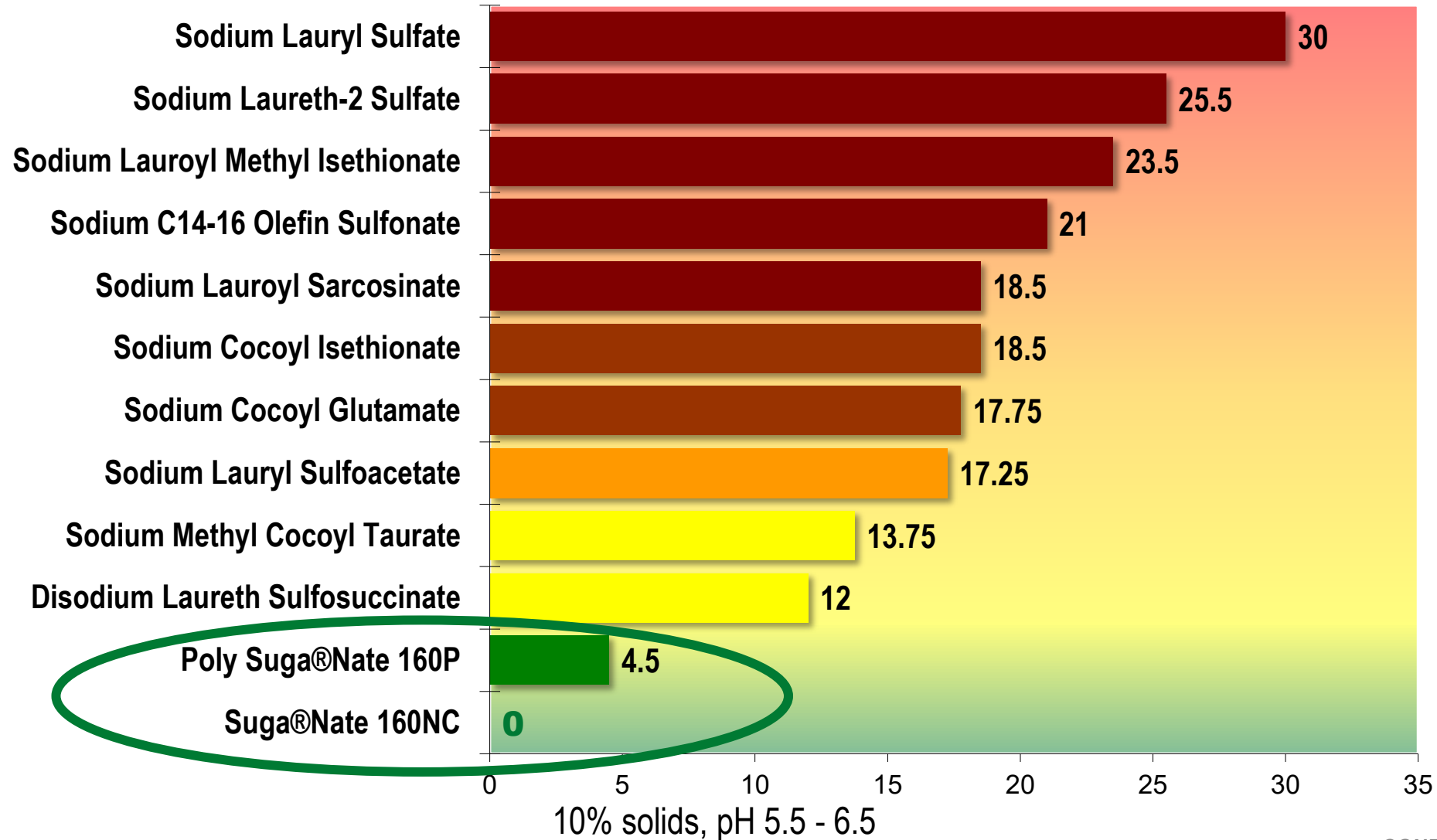
- Repeat Insult Patch testing (HRIPT)
 - SugaNate 160NC does not indicate a potential for dermal irritation or allergic contact sensitization.

SugaNate 160NC Eye Safety

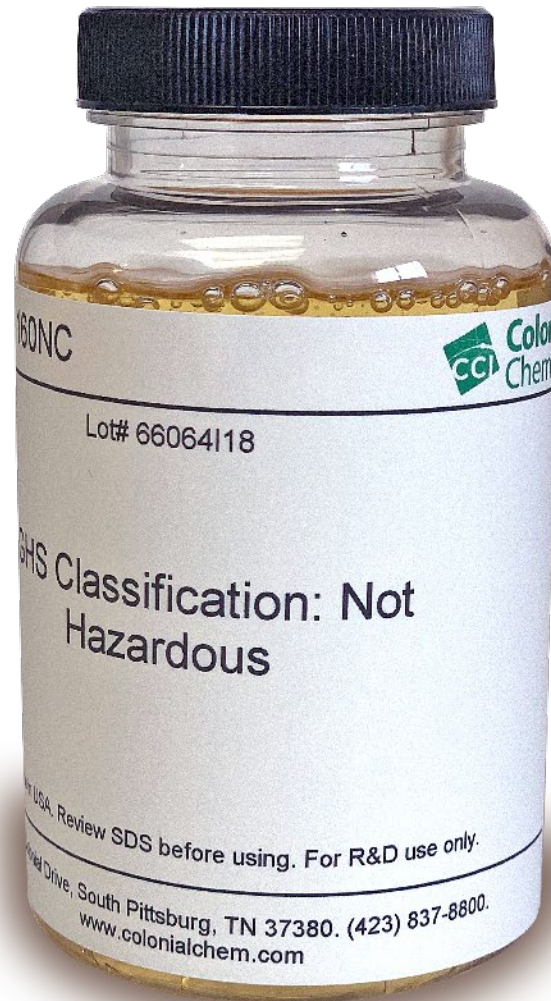
- HET-CAM: Hen's Egg Test Chorioallantoic Membrane
 - Practically no ocular irritation potential in vivo, score of Zero
- MatTek Epi-Ocular: In vitro epidermal keratinocytes
 - Results indicate SugaNate 160NC has a 'non-irritating' classification
 - ET-50 > 256 minutes
 - Draize equivalent = 0.0

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

Sulfate-Free HET-CAM Comparison



Clean Label



**GHS
Warning
Labels**

SugaNate 160NC Environmental Safety

Biodegradability

- OECD 301 Ready Biodegradability Test (301E)
 - 80-82% biodegradable in 28 days
- OECD 311 Anaerobic Biodegradability Test
 - 76% biodegradable in 60 days

Bacteria Reverse Mutation Assay

- Ames test, OECD 471
 - No detectable genotoxic activity at the non-cytotoxic concentrations of SugaNate160NC, neither in the absence nor in the presence of the S9 enzyme activation.

SugaNate 160NC NGO Listings

- NSF/ANSI 305-2012
- Approved for EPA's Safer Choice
- **Whole Foods Market**® list of premium body care products
- USDA Biopreferred Product
- Certified Biobased 100%
- Halal Certified
- GreenStar® Rating of **10.0**



Demonstrating Reduced Irritation

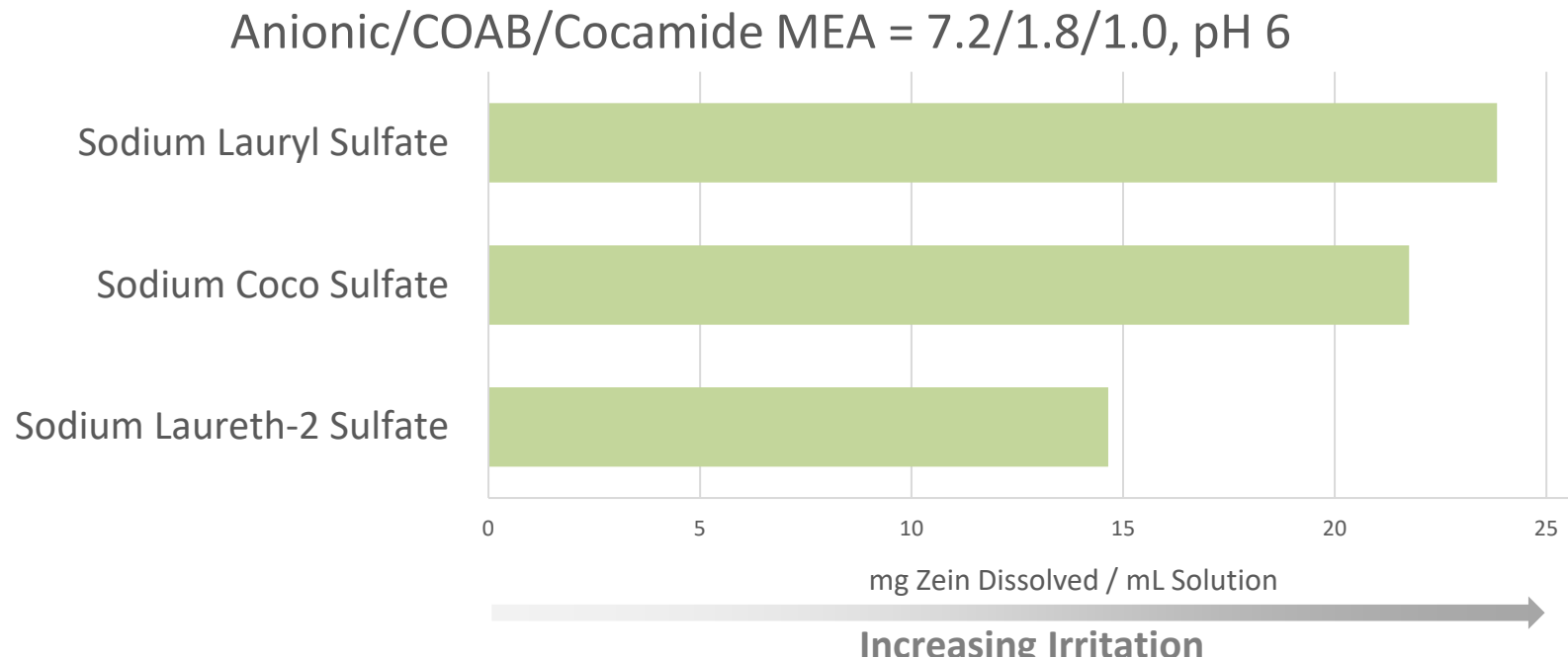
- Zein Test for In-vitro Irritation
 - Uses zein (corn) protein
 - Uses protein denaturization to assess irritation
 - Zein protein is insoluble in water
 - As surfactant denatures the protein, water solubility increases
 - Remaining insoluble protein is filtered, dried, and weighed
 - Results are presented here in mg Zein dissolved / mL product

- Model Formulation

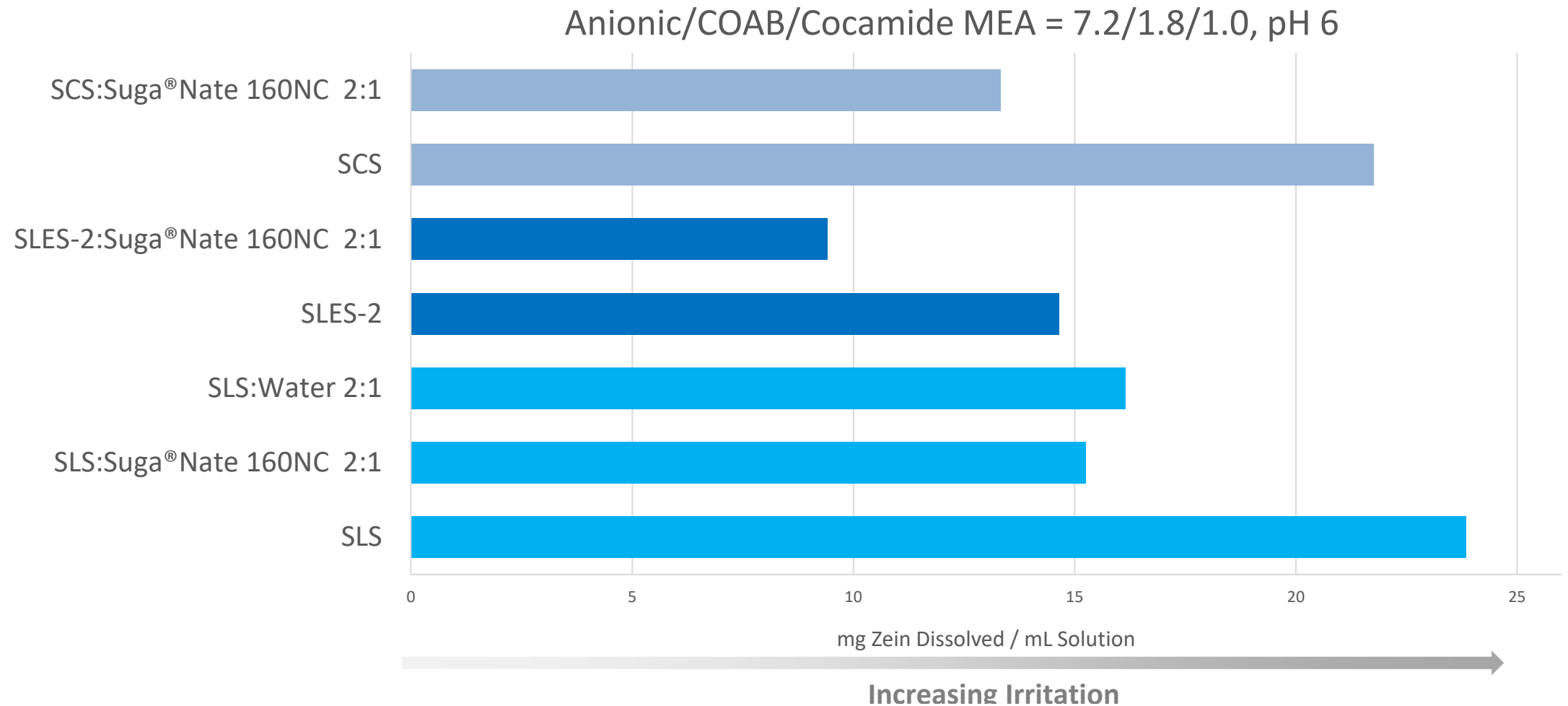
Component	Concentration
Anionic surfactant or blend	7.2% solids
Amphoteric (Cocamidopropyl Betaine)	1.8% solids
Alkanolamide (Cocamide MEA)	1.0% solids
Water, citric acid	Qs to 100%, pH 6

Reducing Irritation of Sulfates

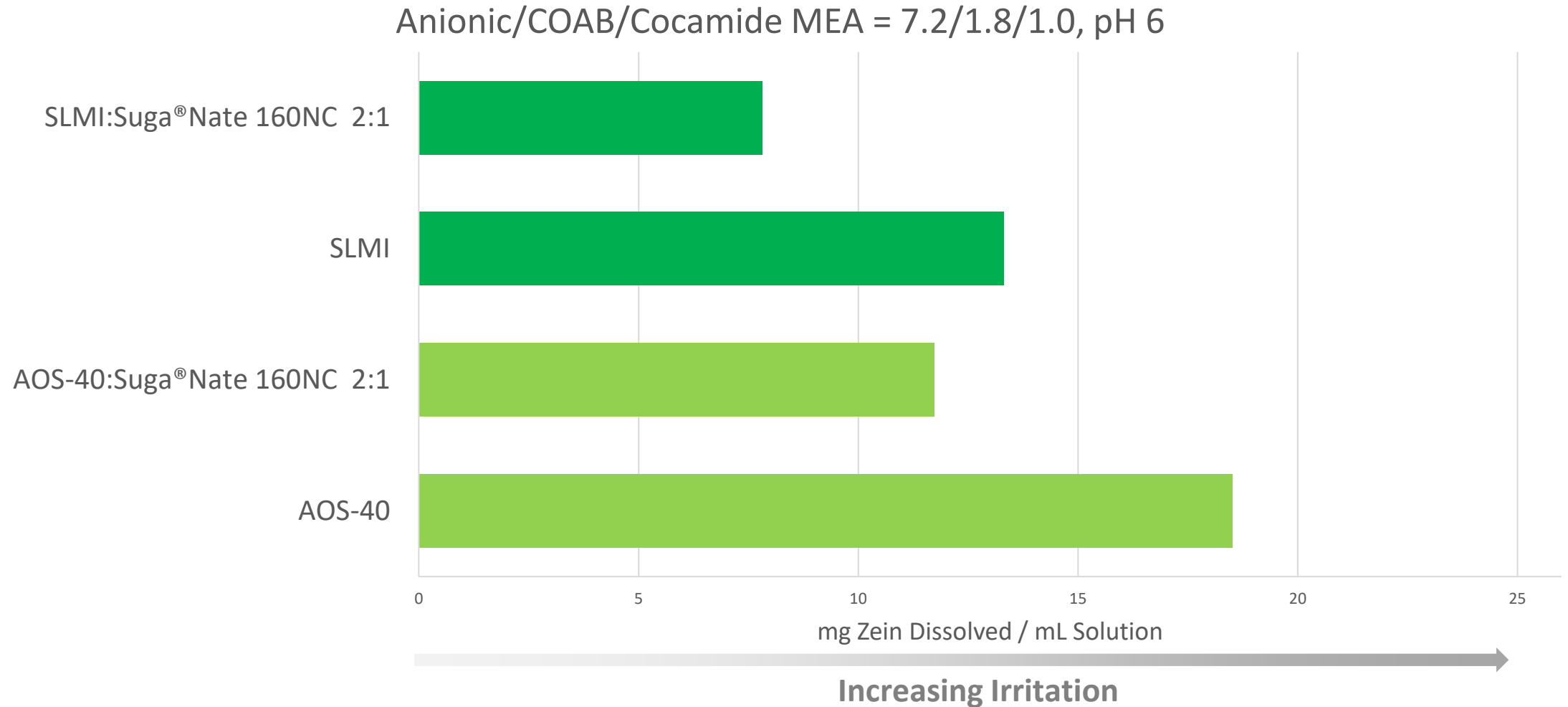
- Even if “sulfate-free” is not a priority, NY State dioxane limits are coming:
 - 2ppm limit by Dec 31, 2022
 - 1ppm limit by Dec 31, 2023
 - These limits will be very hard to achieve, even with “low dioxane” ether sulfates
- SLES is preferred to SLS because of reduced irritation potential



Reducing Irritation of Sulfates

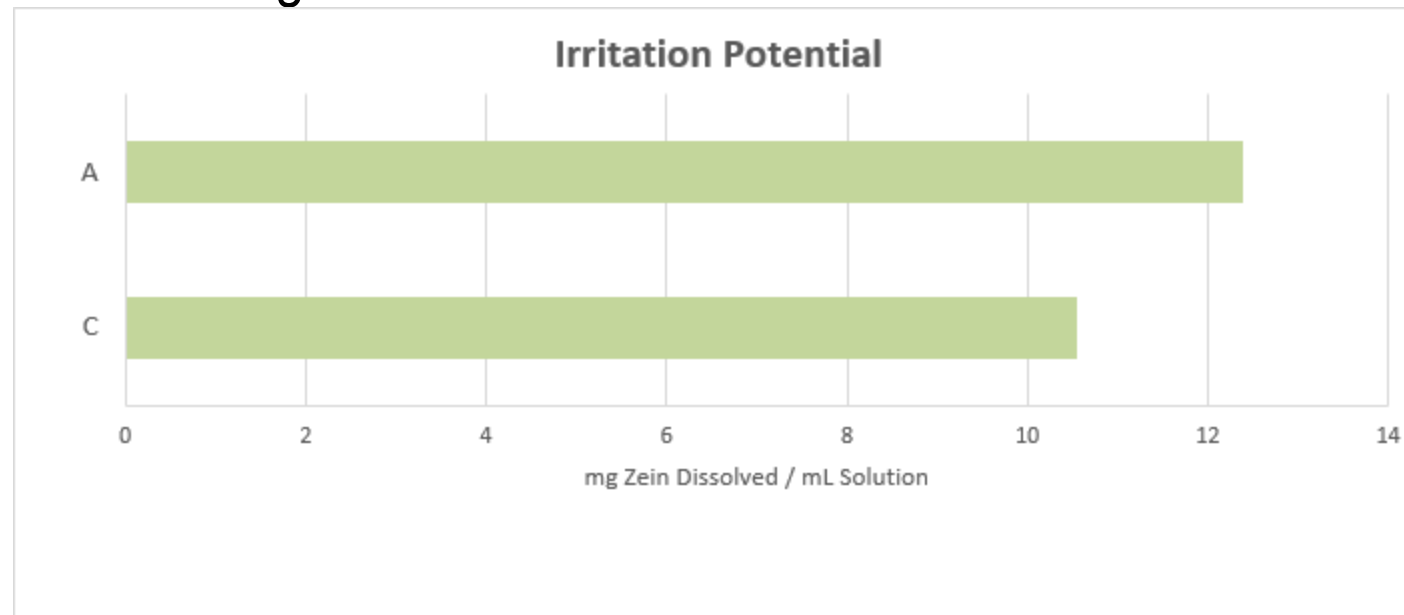


Reducing Irritation of Sulfonates



Ingredient Selection Matters

- ColaDet COCO
 - Sodium Coco-Sulfate, Coco-Glucoside, Cocamidopropyl Hydroxysultaine
 - At 11.6% solids measures 12.4 mg zein / mL solution (System A)
 - Betaine/amide system at 10% solids measures ~22 mg zein / mL solution
- Replaced 25% of surfactant solids with SugaNate 160NC (System C)
 - Reduced test result to 10.5 mg zein / mL solution



How Low Can You Go?

- SugaDet Mild
 - Sodium Laurylglucosides Hydroxypropylsulfonate, Sodium Methyl Cocoyl Taurate, Cocamidopropyl Hydroxysultaine, Sodium Bis-Hydroxyethylglycinate Coco-Glucosides Crosspolymer, Sodium Stearoyl Lactylate
 - Used at 34%, designed to give minimum viscosity of 5,000 cP
- **Zein test result: 3.0 mg zein / mL solution**
- HET-CAM test result: **3.5 Practically Non-Irritating**
- Leading Brand Baby Shampoo HET-CAM: 11-12 **Slight/Moderate.**

Wrap-up

- A variety of ongoing and emerging trends are driving the need for milder cleansing formulations
- SugaNate 160NC is a 100% biobased, zero irritation surfactant
- The Zein test is a quick, easy to run test for screening test formulations
- SugaNate 160NC has demonstrated excellent efficacy in reducing irritation of a variety of sulfate and sulfate-free surfactants
- Extremely low irritation products are possible when formulating with SugaNate 160NC.

Hand Wash Mini-Site

Formulations and Specialty Ingredients for Hand Washes

<https://www.colonialchem.com/featured/hand-washes/>

- Formulations
 - Antiseptic, Pump Foaming, Gel
- Ingredients
 - Concentrates, Cleansers, Moisturizers, Pearls
- Podcast Links

Thank you!

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

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

