



# Defining the Future of Cleaning in Home Care

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Dow Consumer Solutions



# Content

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- Introduction and Market overview
- EcoSense™ 2470 Surfactant
- EcoSense™ HC Sophorolipid Surfactants



# Climate Change is Evident and Emerging as a Major Concern Worldwide



## Water Shortages

- › Worst droughts in 40 years in 2023 in parts of eastern Africa.
- › Winter droughts in France.



## Wildfires

- › 18 million He was burnt in Canada wildfires
- › State of Emergency in Chile
- › International aid was provided to Greece to battle flames



## Temperature Increases

- According to NOAA,
- › September in 2023 was the warmest September on record

# Increasing climate challenges has prompted government to set regulations & consumers to make responsible choices



## Government Regulations

- › Eu Greenwashing Directive
- › Regulations to reduce carbon emission
- › Green deal
- › Ingredient transparency



## Sustainability in Household

### Environmentally conscious consumers

- › Biodegradable ingredients
- › Bio-based
- › Circularity- Recycle & Reuse
- › Net-Zero
- › Low temperature wash

# Growing Consumer Awareness & Willingness to address climate change

Reduce  
Rather Offset  
**>50%**

Of consumers across different regions would prefer companies to reduce carbon emission rather than offset.

Source: Kantar Profiles/Mintel, May 2022, September 2022; Rakuten Insight/Mintel, May 2022  
Source: Dynata/Mintel Consulting Sustainability Barometer; Kantar Profiles/Mintel Consulting Sustainability Barometer; KuRunData/Mintel Consulting Sustainability Barometer; Offerwise/Mintel Consulting Sustainability Barometer, April 2022



Drive Consumer Purchase decision

**31%**

Of **consumers globally** say labelling that shows the eco impact would encourage them to purchase.



Energy based purchase decisions

**42%**

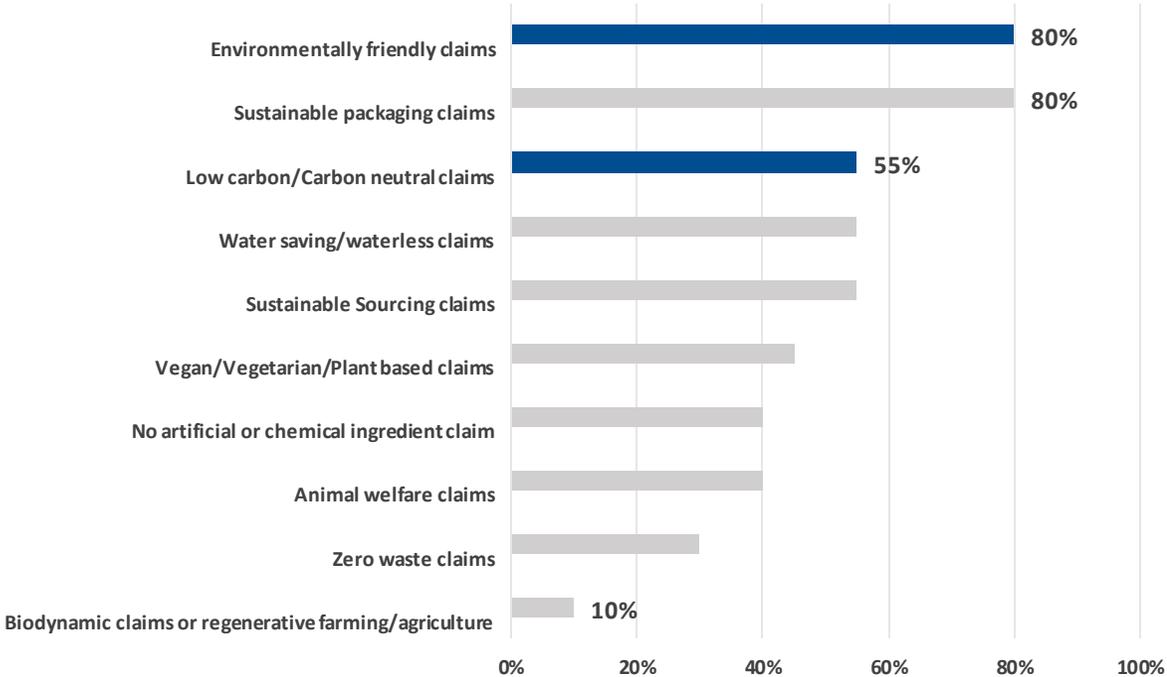
Of **US consumers** believes that efficacy in cold water is an important factor when purchasing laundry products.



**DOW**<sup>®</sup>

# Environmentally friendly & Low Carbon/Carbon Neutral Claims are One of the Top Sustainable Claims in Home Care

Home care Brand owners are responding to consumer demand for sustainability by investing in the development and launch of sustainable products and services.



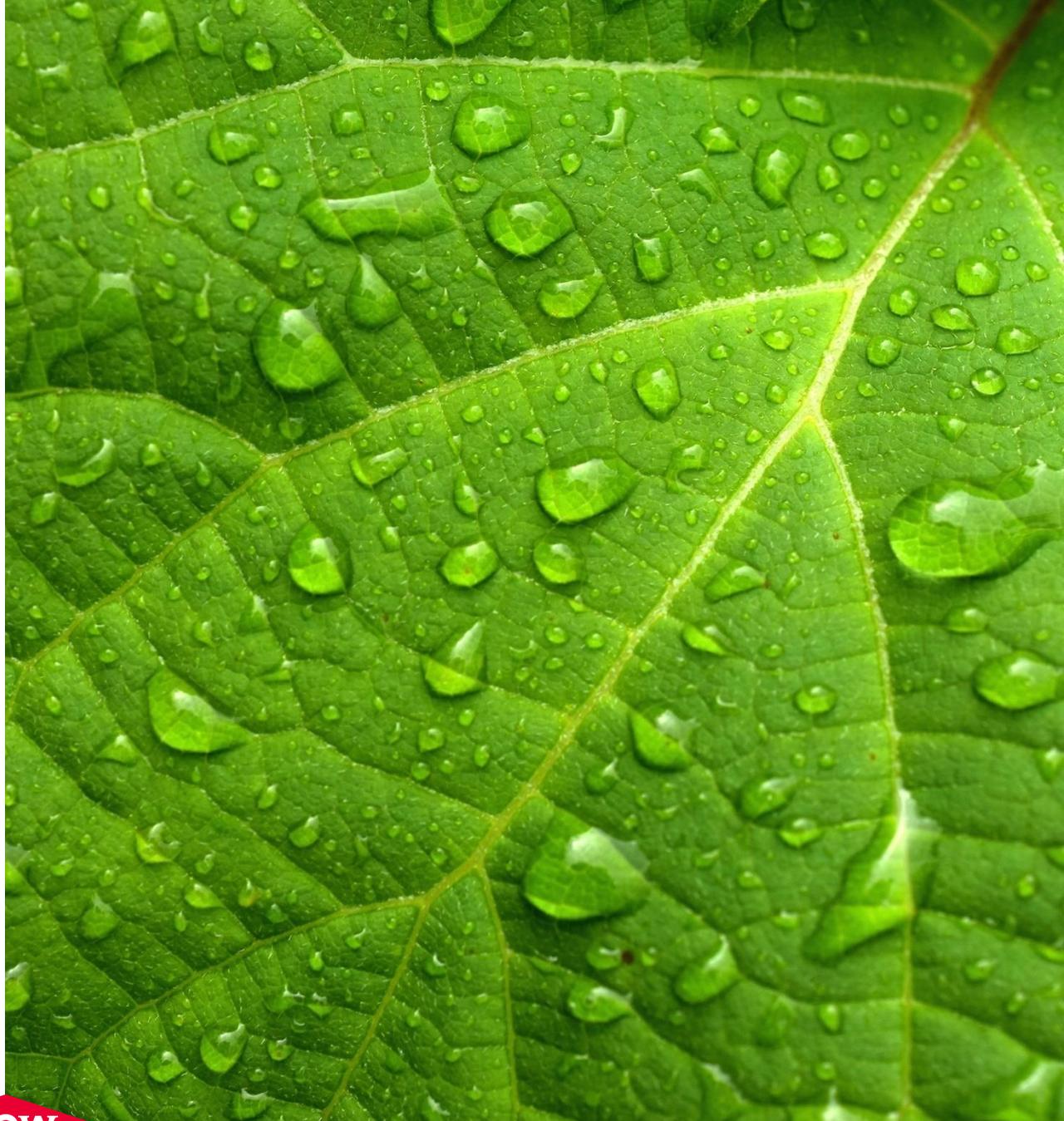
Source: Euromonitor International Voice of Industry: Sustainable Survey, 2022

Note: Fielded in February 2022;n=516

Mintel GNPD



# EcoSense™ 2470 Surfactant



# EcoSense™ 2470 Surfactant



Winner



Finalist

Ethanol from LanzaTech's fermentation of captured carbon emissions



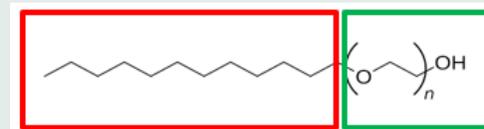
**Upcycling carbon** into the cleaning solution

**LanzaTech's carbon recycling technology** converts industrial carbon emissions to ethanol



Ethoxylates made using recycled carbon based Ethanol

RSPO



Uses alcohol of natural origin & RSPO certified



EcoSense™ 2470 Surfactant



**Readily Bio-degradable** surfactant with **lower carbon footprint.**



# EcoSense™ 2470 Surfactant – Enables Significant Carbon Reduction

Technology ready –early access to technology of the future

**EcoSense™ 2470 Surfactant** offers detergent manufacturers the opportunity to be part of tomorrow's sustainability ecosystem, **led by DOW and powered by LanzaTech**



Recycled carbon materials combine high performance with cutting edge climate tech to deliver quality and **environmental benefits** today to laundry detergents and hard surface cleaners. This sustainable solution does not negatively impact land use, preserves biodiversity and supports non-deforestation efforts



Early adopters will benefit from a **drop-in solution** that doesn't compromise on the performance of traditional fossil-based surfactants, enabling a new circular carbon economy. Home Care products can now leverage a **novel carbon capture**-based approach for surfactant production.



# Go greener | Development journey of surfactants from recycled carbon

## Traditional Surfactant

- Gleditsia Sinensis
- Sheep oil
- Plant ash
- Turkish red oil

## Petro-Chemical based Surfactant

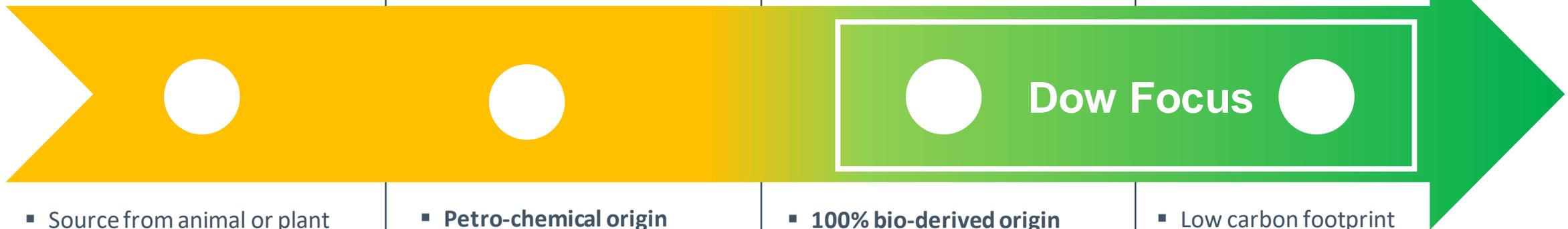
- SLS
- SLES
- LAS

## Bio-based and Biosurfactants

- APG/APP
- Amino acid surfactant
- Sophorolipids

## Surfactants from recycled Carbon

- Non-ionic surfactants made from recycled carbon



**Dow Focus**

- Source from animal or plant
- No mass volumes

- **Petro-chemical origin**
- **Synthetic process**
- High irritation

- **100% bio-derived origin**
- **Synthetic or bio (fermentation) process**
- Improved mildness

- Low carbon footprint
- **Hydrophobe of bio-origin**
- **Green (fermentation) process**

**EcoSense™ 2470**  
**Surfactant powered**  
**by LanzaTech**



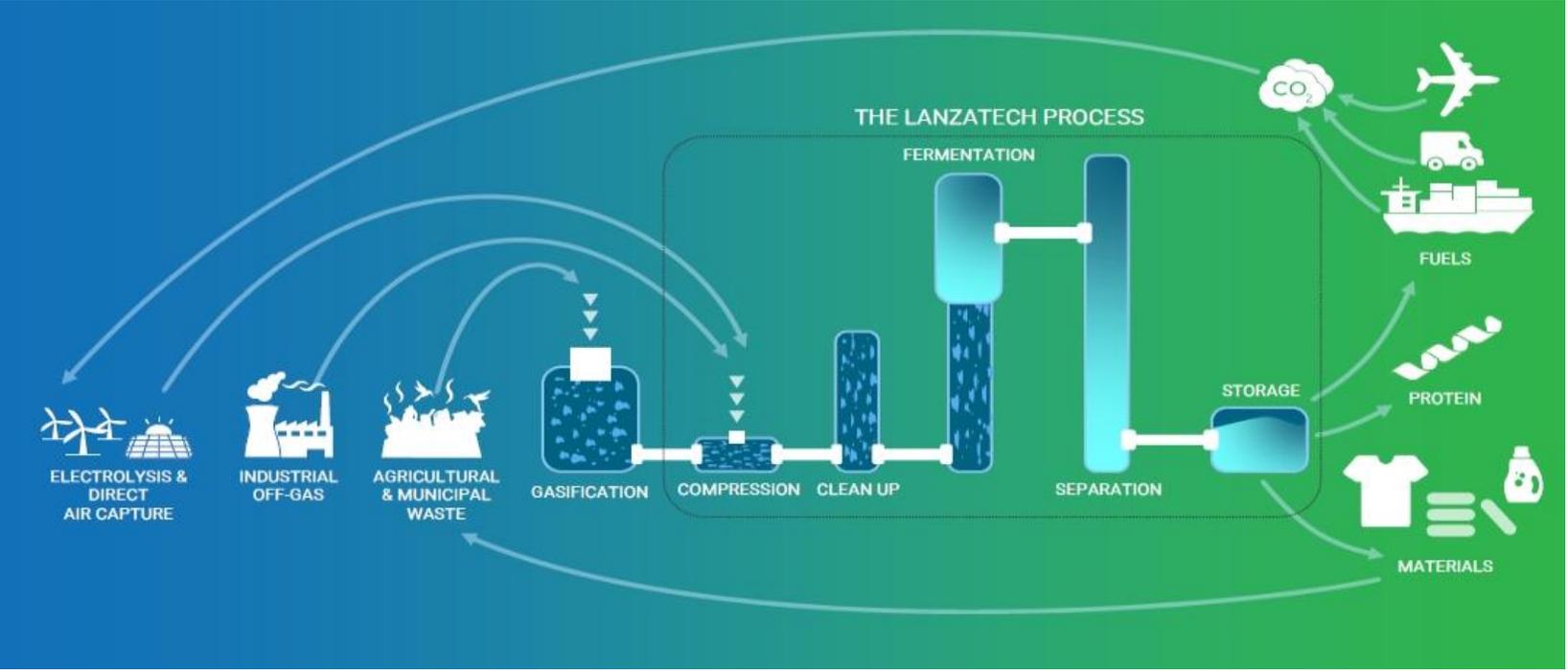
# EcoSense™ 2470 Surfactant powered by LanzaTech



Product	Solid %	Form	Surface tension (mN/m) at 25°C	CMC at 25°C
ECOSENSE™ 2470	99.9	Liquid	28	8mg/l

Features/Benefits	Main applications
<ul style="list-style-type: none"> <li>• Low carbon footprint</li> <li>• Readily bio-degradable</li> <li>• Uses hydrophobe from natural origin (RSPO certified)</li> <li>• Vegan/Non-GMO</li> <li>• Excellent wetting</li> <li>• Excellent detergency</li> <li>• Low temperature cleaning</li> <li>• Low streaking and filming</li> <li>• Good emulsification properties</li> <li>• Stable at highly alkaline conditions</li> <li>• Easy to handle, cold processable</li> </ul>	<ul style="list-style-type: none"> <li>• Liquid laundry</li> <li>• Unit dose</li> <li>• Hard surface cleaners</li> <li>• Gentle laundry detergents</li> <li>• Powder laundry</li> <li>• Bars</li> <li>• Hand dishwashing liquids</li> <li>• Automatic dishwashing detergents</li> </ul>

# Capturing carbon-technical summary of EcoSense™ 2470 Surfactant



- Carbon Capture
- Recycled Carbon-based Ethanol
- Recycled Carbon Ethylene
- Recycled Carbon Ethylene oxide
- Recycled Carbon ethylene oxide + ROH = Recycled Carbon Ethoxylates

Courtesy: LanzaTech



# EcoSense™ 2470 Surfactant | ID card



Typical properties	EcoSense™ 2470 Surfactant
Appearance	Clear to translucent
Colour (Apha)	less than 50
Cloud point °C at 1% aqueous solution	52-59
pH 10% Aqueous solution	5.0-8.0
Moisture %	0.3 max

These are typical properties, not to be construed as specifications.



**EcoSense™ 2470**  
**Surfactants**  
**powered by**  
**LanzaTech**  
**performance**  
**evaluation**



# HDL formulation DOE and test conditions

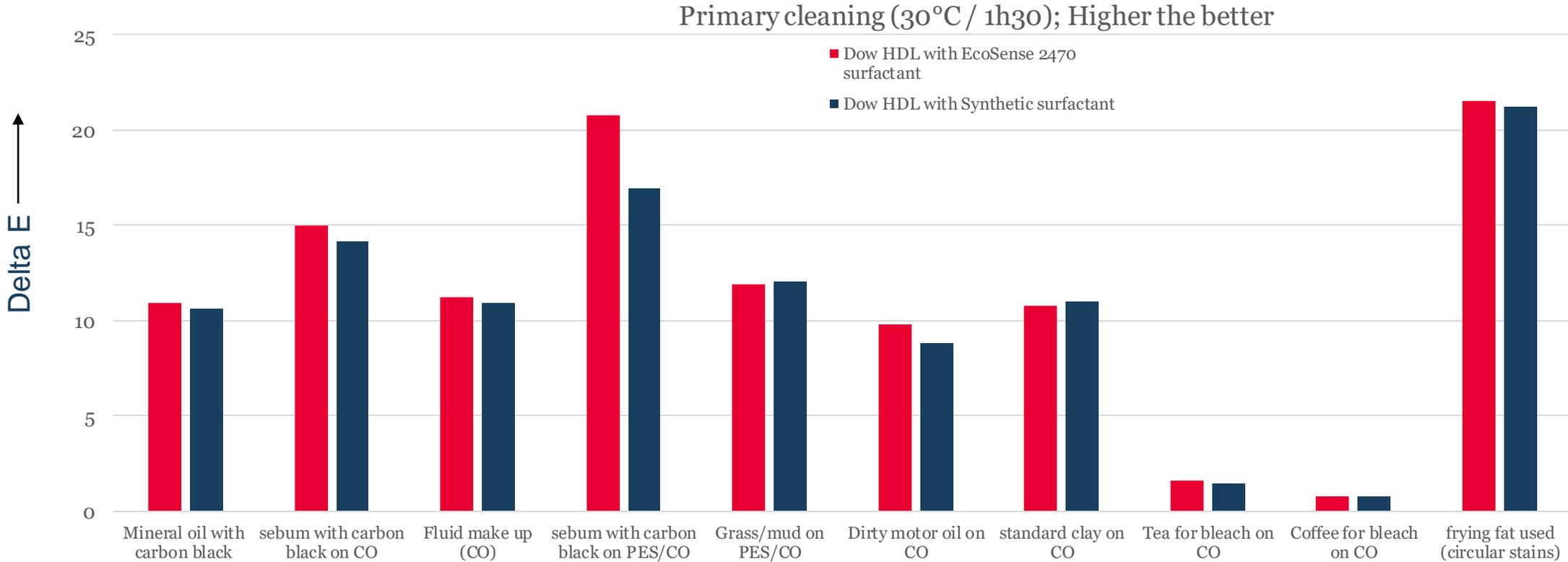
Ingredients	% weight					
DI water	34.54	41.54	41.35	41.3	43.67	43.03
Stepanol WA Extra E	25	25	25	25	25	25
Texapon N70	12	12	12	12	12	12
Eltesol SC40	10	3	3	3	10	10
Synthetic Non-ionic surfactant	0	15	0	0	0	0
EcoSense™ 2470 Surfactant	15	0	0	0	0	0
APG 1	0	0	15	0	0	0
APG 2	0	0	0	15	0	0
Bio-surfactant 1	0	0	0	0	5	0
Bio-surfactant 2	0	0	0	0	0	5
Propylene glycol	1.6	1.6	1.6	1.6	1.6	1.6
Citric acid 50% solution	0	0	0.25	0.3	0	0
NaOH 10% solution	0.06	0.06	0	0	0.93	1.57
D-Sorbitol	0.5	0.5	0.5	0.5	0.5	0.5
Medley 100L	1.3	1.3	1.3	1.3	1.3	1.3
	7.5	7	7.2	7.8	7.1	7.1
	Stable / Transparent	Stable / Transparent	Stable / Transparent	Stable / Transparent	Stable / Yellow / Transparent	Stable / Yellow / Transparent

- Washing machine Miele W1614
- **Program Cold (30°C), 1000 rpm and short**
- **Time : 1h 30 minutes**
- Hardness water : 14 °dH
- Ballast load : terry towels/ bed sheet/ huckaback towels
- Soil : 4 \* SBL-2004
- 1 Stains monitor with different types of stains



# Comparison of EcoSense™ 2470 Surfactant with synthetic non-ionic surfactant in HDL

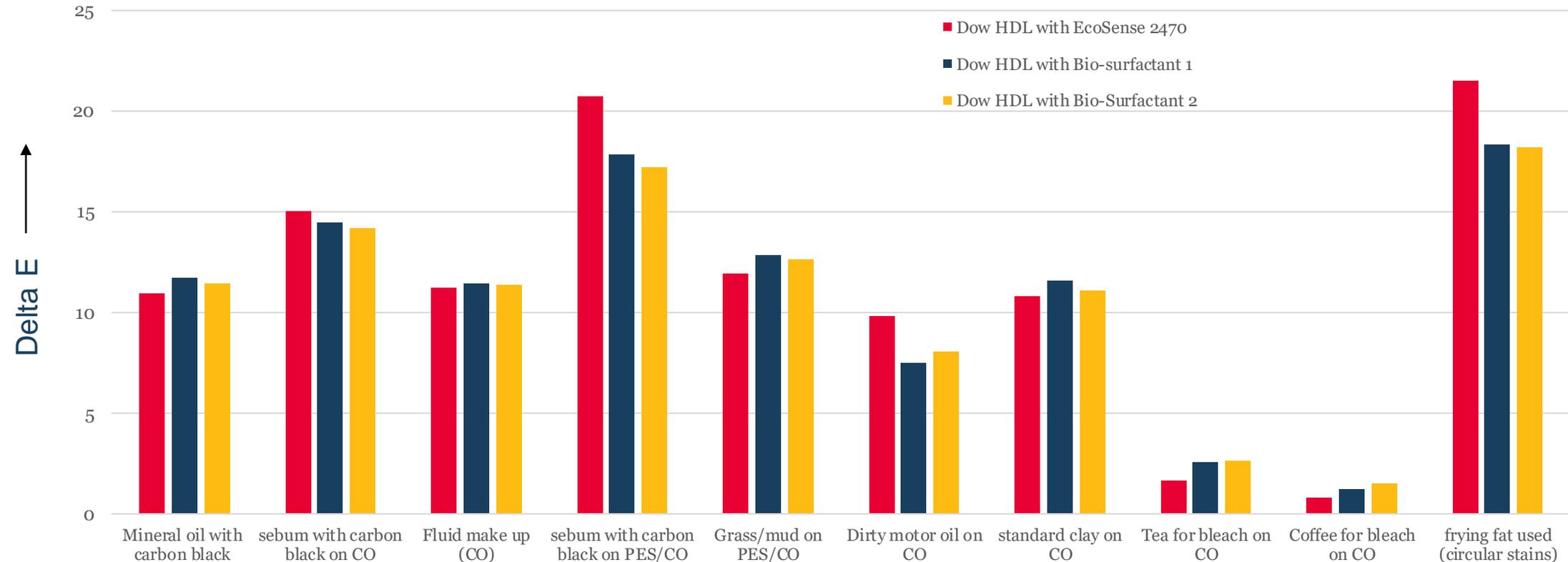
EcoSense™ 2470 Surfactant shows parity v/s industrial benchmark



# Comparison of EcoSense™ 2470 Surfactant with bio-surfactant in HDL

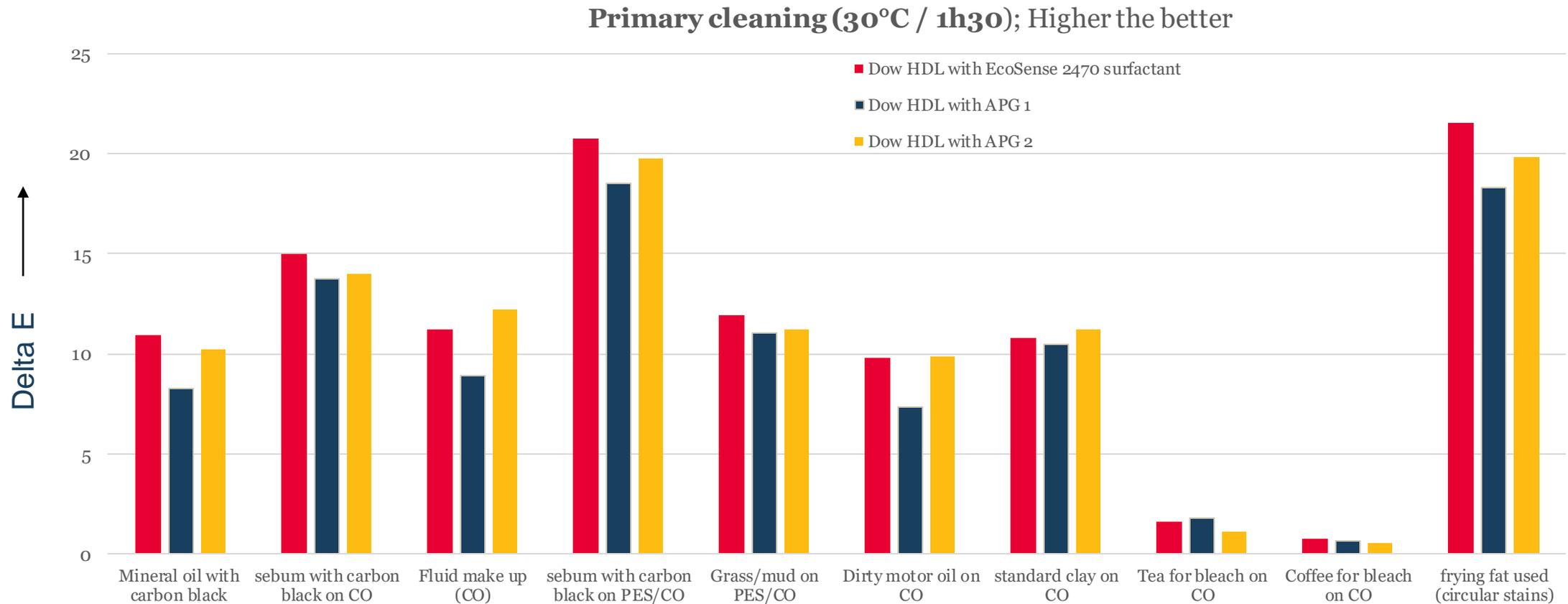
EcoSense™ 2470 Surfactant demonstrated superior performance v/s bio-surfactants

Primary cleaning (30°C ), One Wash; Higher the better



# Comparison of EcoSense™ 2470 Surfactant with APG's in HDL

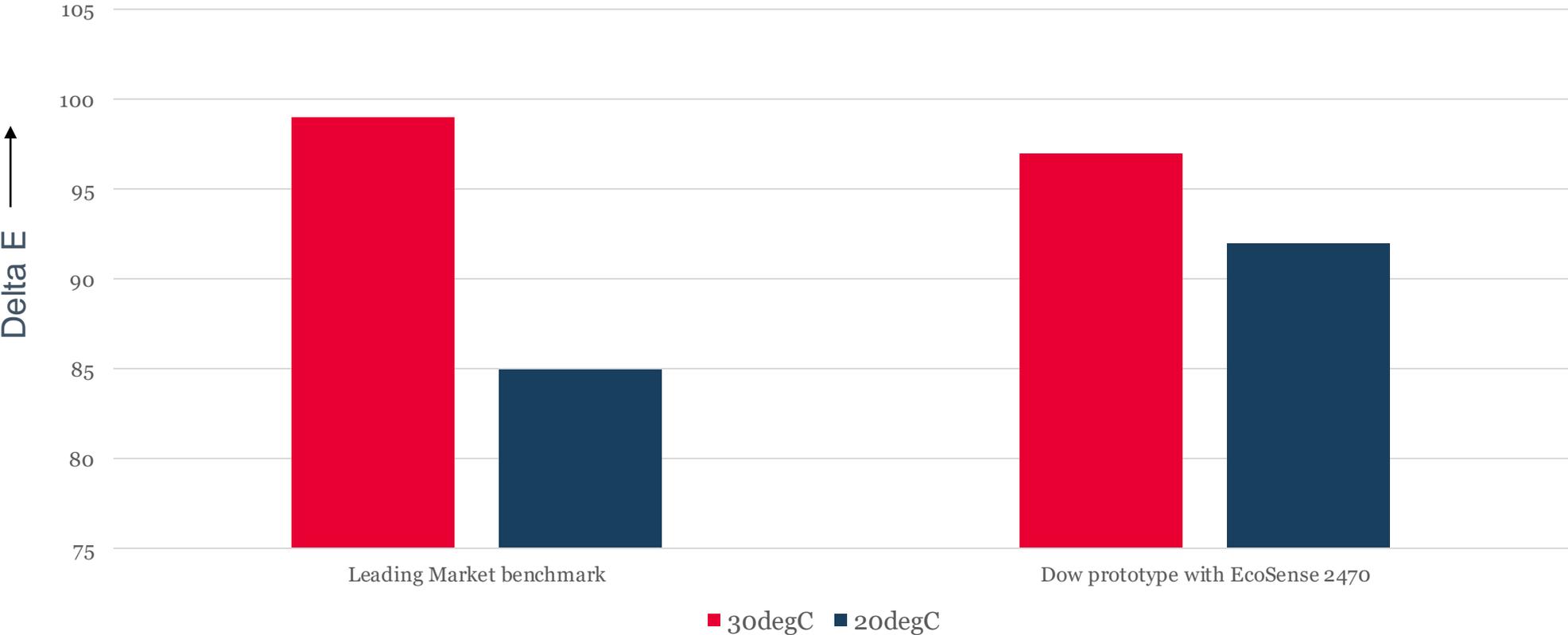
EcoSense™ 2470 Surfactant demonstrates superior performance v/s APG's



# Low temperature primary cleaning in HDL with EcoSense™ 2470 Surfactant

Excellent cleaning by EcoSense™ 2470 Surfactant at low temperature vs Market benchmark

Primary cleaning, One wash-Impact of washing temperature



# Liquid laundry monodose formulations and test conditions

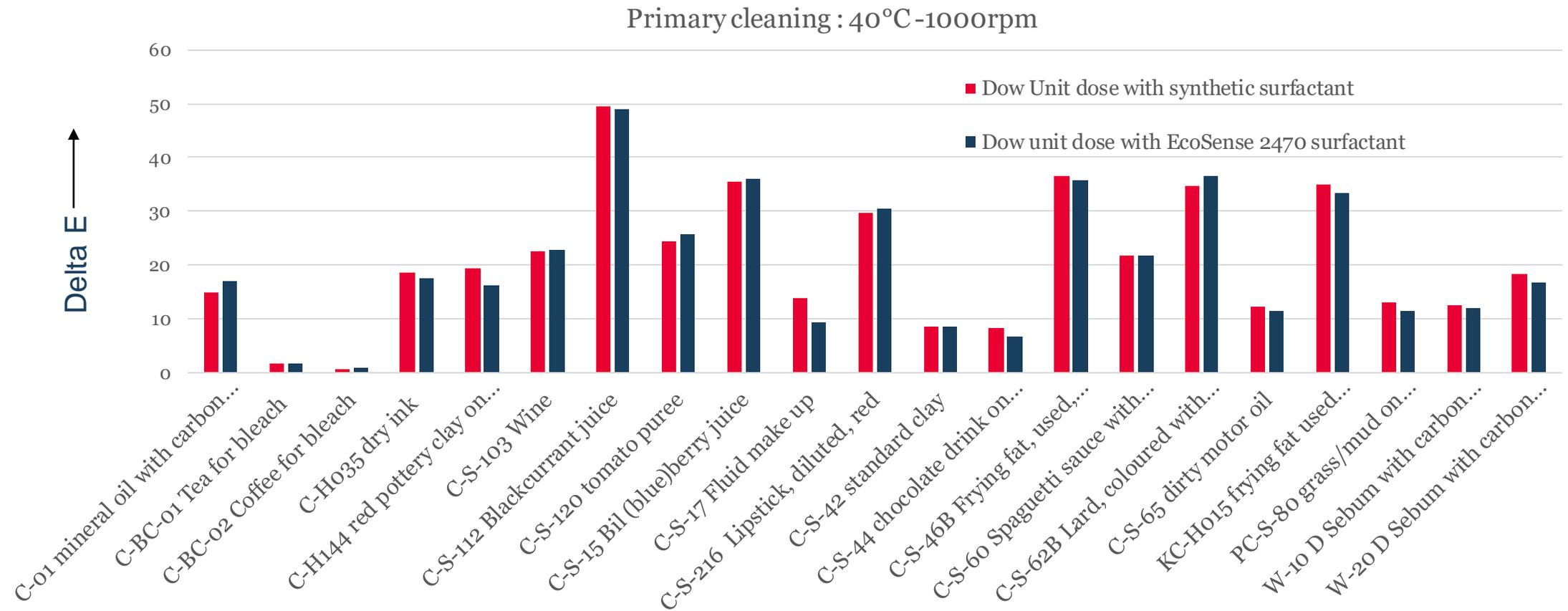
	Dow Unit Dose with synthetic surfactant	Dow Unit dose with EcoSense™ 2470
Ingredients	% by wt.	% by wt.
Propylene glycol	15.64	15.64
LAS (95% active)	52.67	52.67
Tinopal CBSX	0.11	0.11
Synthetic Non-ionic surfactant	12.98	0
<b>EcoSense™ 2470 Surfactant</b>	0	12.98
MEA	11.04	11.04
Hexyl Cellosolve	3.62	3.62
Dowsil AF-8017	0.34	0.34
Glycerin	0.28	0.28
Preferenz P300	1.33	1.33
PreferenzS210	0.26	0.26
Preferenz M100	0.26	0.26
Revitalenz 200	0.06	0.06
Powder dose 84	1.4	1.4
Total	99.99	99.99
Final pH of the prototypes:	8.5	8.3

- Washing machine Miele W1614
- Program Cotton (40°C), 1000rpm
- Hardness water : 14 °dH
- Ballast load : terry towels/ bed sheet/ huckaback towels
- Soil : 4 \* SBL-2004
- 1 Stains monitor with different types of stains



# Performance of EcoSense™ 2470 Surfactant in monodose

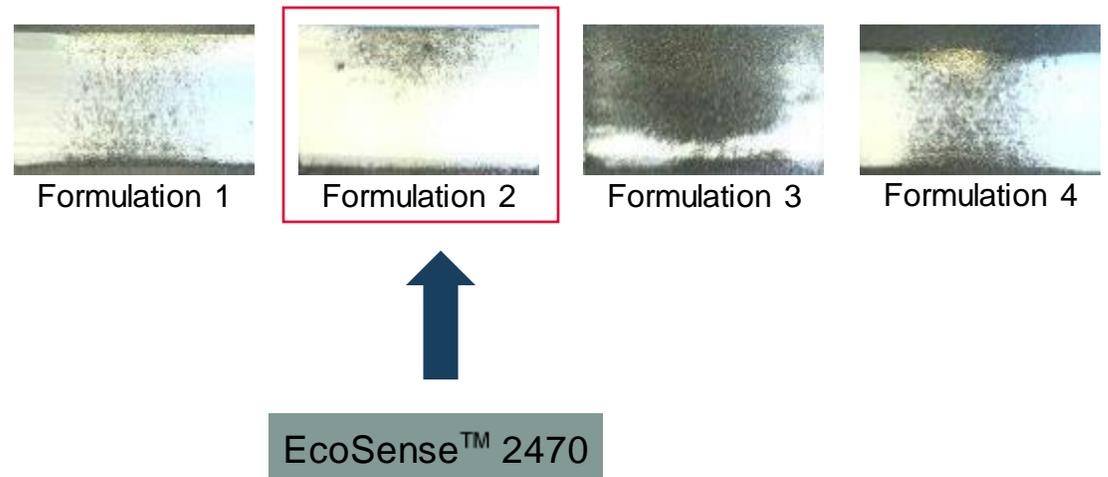
Cleaning performance is demonstrated with EcoSense™ 2470 Surfactant



# Hard Surface cleaning

Formulation with EcoSense™ 2470 Surfactant demonstrates superior cleaning performance v/s bio-surfactants

Ingredients	Formulation 1	Formulation 2	Formulation 3	Formulation 4
	% by wt	% by wt	% by wt	% by wt
Non-ionic surfactant (Synthetic)	1,75	0	0	0
<b>EcoSense™ 2470 Surfactant</b>	0	1,75	0	0
Bio-surfactants 1	0	0	0,6	0
Bio-surfactants 2	0	0	0	0,6
Hexyl Cellosolve	1,35	1,35	1,35	1,35
TIPA LFG85	1,325	1,325	1,325	1,325
DOWANOL™ EPH	0,25	0,25	0,25	0,25
Kool & Fresh perfume	0,15	0,15	0,15	0,15
DI water	95,175	95,175	96,325	96,325
<b>pH</b>	<b>9,30</b>	<b>9,30</b>	<b>9,50</b>	<b>9,40</b>
<b>Appearance</b>	<b>Clear</b>	<b>Clear</b>	<b>Not stable</b>	<b>Not stable</b>



## Testing conditions

IKW test method

0.20g Fat Dust Soil / tile (white / ceramic / 245\*100 mm)

TQC-Sheen



# Conclusion – EcoSense™ 2470 Surfactant

- New and Innovative Surfactant made using the unique technology of recycled carbon
- Drop-in solution for synthetic non-ionic surfactants, **increases bio-based content and reduces carbon footprint**
- **At par to better performance with significant benefit in low temperature cleaning in laundry, dish and hard surface care**



**Sustainability  
Ecosystem**



**Recycled waste  
feedstock**



**\*Low Carbon  
Footprint**



**No Food  
Competition**



**Reduced  
land use**



**Readily  
biodegradable**

\*VS synthetic equivalent surfactant



# **ECOSENSE™ HC Sophorolipids for Home Care**



# Dow Sophorolipids for Home Care – EcoSense™ HC Surfactants

*Naturally Sourced Bio-Surfactant*

Natural Inputs



Transformation / Fermentation



EcoSense™ HC Sophorolipids



**Bio-derived origin**, enabling brand owners to **reduce carbon footprint** and **increase naturality** of their products



Available in blendable grades, offering a **wide range of acid/lactone ratio** to optimize formulation performance



**Low use levels** give improved or similar performance in dishwashing compared to higher use levels of traditional surfactants

# Modular fermentation process

Modular fermentation allows for **rapid scaling** and forward deployment

Use natural, renewable, non-palm derived raw materials: vegetable oil and sugar

Proprietary / patented non-GMO, high yield fermentation technology

Purification and downstream processes fully commercial – no organic solvent

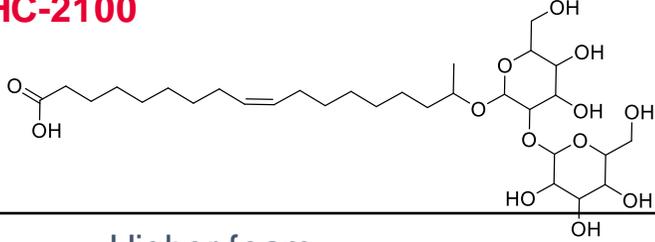
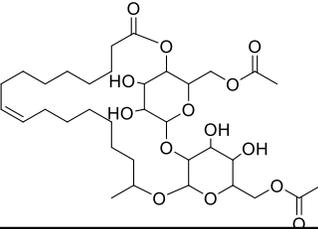
Broad range of products

LARGE  
VOLUME  
PRODUCTION



# Sophorolipids for Home Care

Where sustainability meets performance

<p><b>ECOSENSE™ HC-2100</b></p> <p><b>Acid form</b></p> 	<p><b>ECOSENSE™ HC-2200</b></p> <p><b>Lactone form</b></p> 
Higher foam	Lower foam
Highly water soluble	Limited water soluble
High HLB	Low HLB

## Naturality and safety

- Made by fermentation
- Low aquatic toxicity
- >99% Bio-based (USDA certified)
- Non-GMO, suitable for vegan
- No intentionally added EO, 1,4-DO, sulfate
- Readily biodegradable



## Benefits/Features

- Milder vs. traditional surfactants
- Enabling concentrated formulas
- Bendable to tune desired performance
- Ability to emulsify oils
- Fragrance solubilization
- Easy to handle, cold processable
- Foam Stabilization



# Dow Sophorolipids for Home Care – EcoSense™ HC Surfactants

*Blending flexibility for fine-tuned properties*

## EcoSense™ HC-2100

- High acid
- Oil/water emulsifier
- Detergency and foam

## EcoSense™ HC-2200

- High lactone
- Water/oil emulsifier
- Low foam
- Foam stabilization as a co-surfactant

Hydrophilic

Water dispersible blends

Hydrophobic

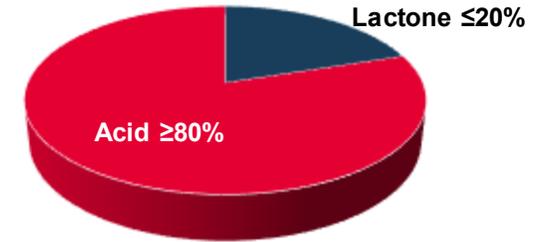
- High foaming agents
- Solubilizing agents

- Detergents
- Emulsion agents (oil/water)
- Wetting and spreading agents

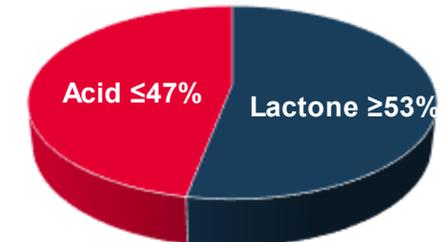
- Emulsion agents (water/oil)
- Grease cutting agents
- Antifoaming

## Highest Acid/Lactone Ratio Range In the Market

**EcoSense™ HC 2100**  
~50% Active High Acid Sophorolipid



**EcoSense™ HC 2200**  
~50% Active High Lactone Sophorolipid



# Product Properties

- ID Card
- Properties
- Mildness Test
- Cloud Point
- Essential Oil Solubilization



# EcoSense™ HC Sophorolipid Surfactants | ID card

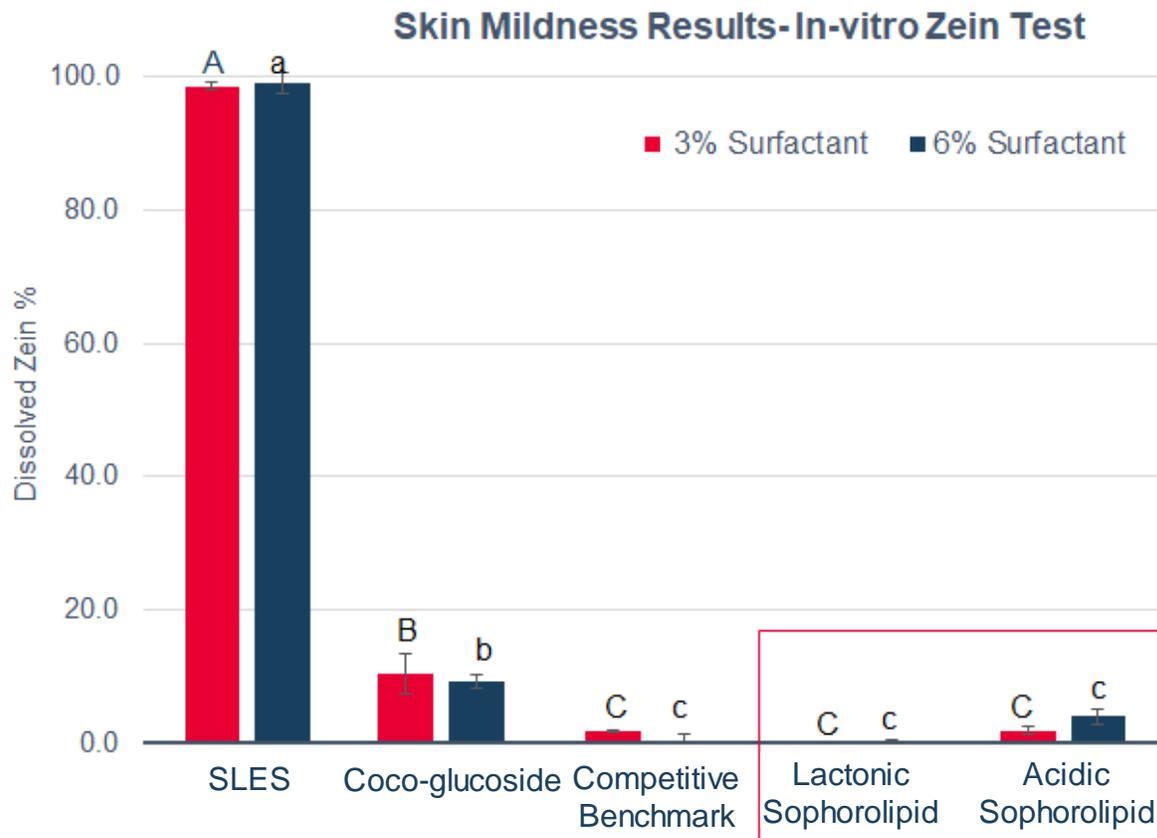
Typical properties	EcoSense™ HC 2100 Surfactant	EcoSense™ HC 2200 Surfactant
Appearance	Translucent to clear, amber liquid	
Sophorolipids content	~50%	
Lactone %	≤ 20%	≥ 53%
Acid %	≥ 80%	≤ 47%
pH at 0.1%	4.5 - 5.5	4 - 5
HLB	Medium-high	Low
Shelf life	12 months	
Degradability	Readily bio-degradable	
Cloud Point	> 90 °C	48 °C
CMC, ppm	123	27
Eq Surface Tension, mN/m	38	37
R-M Foam Height, initial, mm	78	34
Contact Angle (Parafilm)	68°	57°

These are typical properties, not to be construed as specifications.



# EcoSense™ HC Sophorolipid Surfactants - Skin mildness via Zein test

Acidic and lactonic sophorolipids are milder to skin vs. SLES or APG



- Zein – a yellow corn protein that closely resembles the keratin present in skin/hair
- Protein is water insoluble – surfactant will damage Zein protein to make it water soluble.
- Dissolved Zein = initial Zein weight - insoluble Zein after filtration/drying
- **Low dissolved zein % = low skin irritation**

**Test condition:**

Pre-weigh Zein

Make a Zein water solution

Add **3% / 6% active Sophorolipids** to Zein solution

Filter and dry the un-dissolved Zein

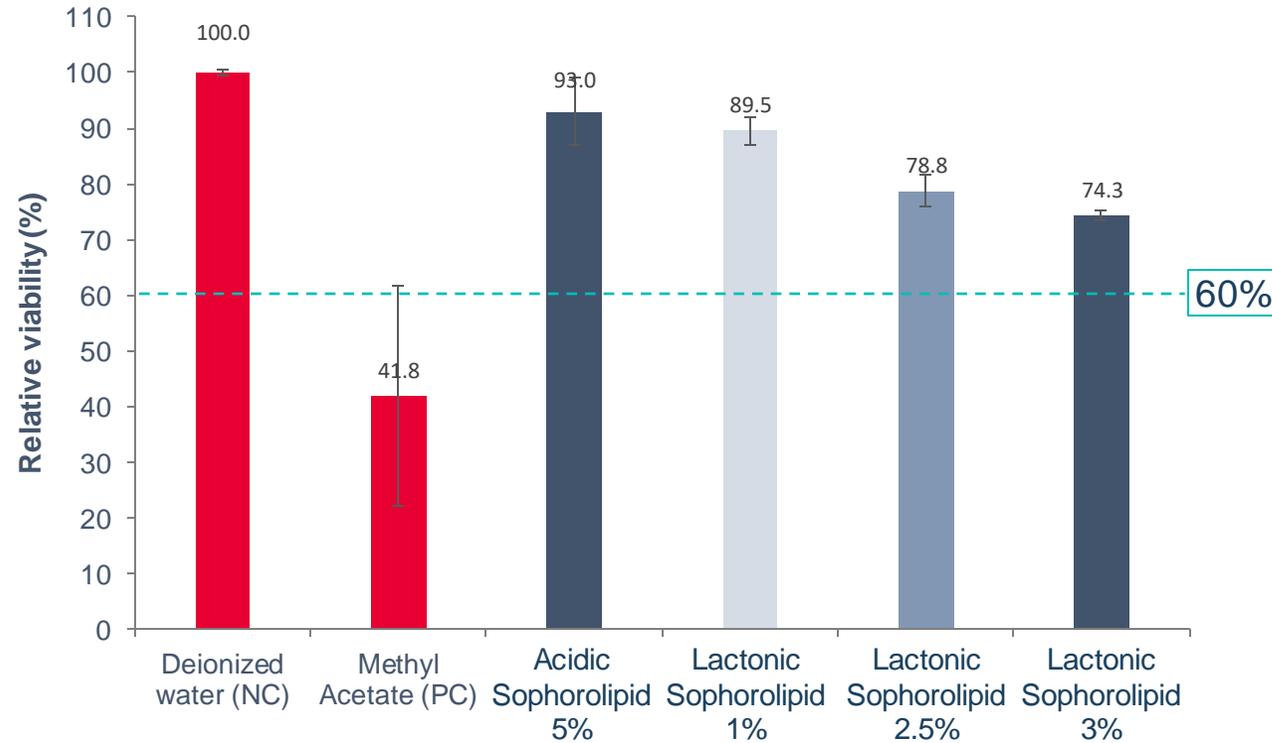
Calculate dissolved Zein %

Statistics: Different letters show a statistical difference at 95% confidence



# ECOSENSE™ HC Sophorolipid Surfactants – Eye irritation

Acidic and lactonic sophorolipids did not induce eye irritation for concentrations up to 5% active (acidic) and 3% active (lactonic), respectively.



% values are given in % active

## EpiOcular eye irritation test:

- EpiOcular tissues (n=2 per test material)
- Test materials diluted in water
- pH adjusted at pH 6.0
- NC: deionized water; PC: Methyl acetate
- Applied volume: 50 µL
- Incubation time: 30 minutes (SCC)
- Extensive washing (PBS)
- Post-treatment 12 min-immersion + 2h-incubation
- Endpoints: Tissue viability (MTT assay)

The EpiOcular Eye Irritation Test predicts the acute eye irritation potential of a topically applied chemical by measurement of its cytotoxic effect on the EpiOcular cornea epithelial model.

### In vitro result

Viability (% of NC) > 60%

Viability (% of NC) ≤ 60%

### In vivo prediction

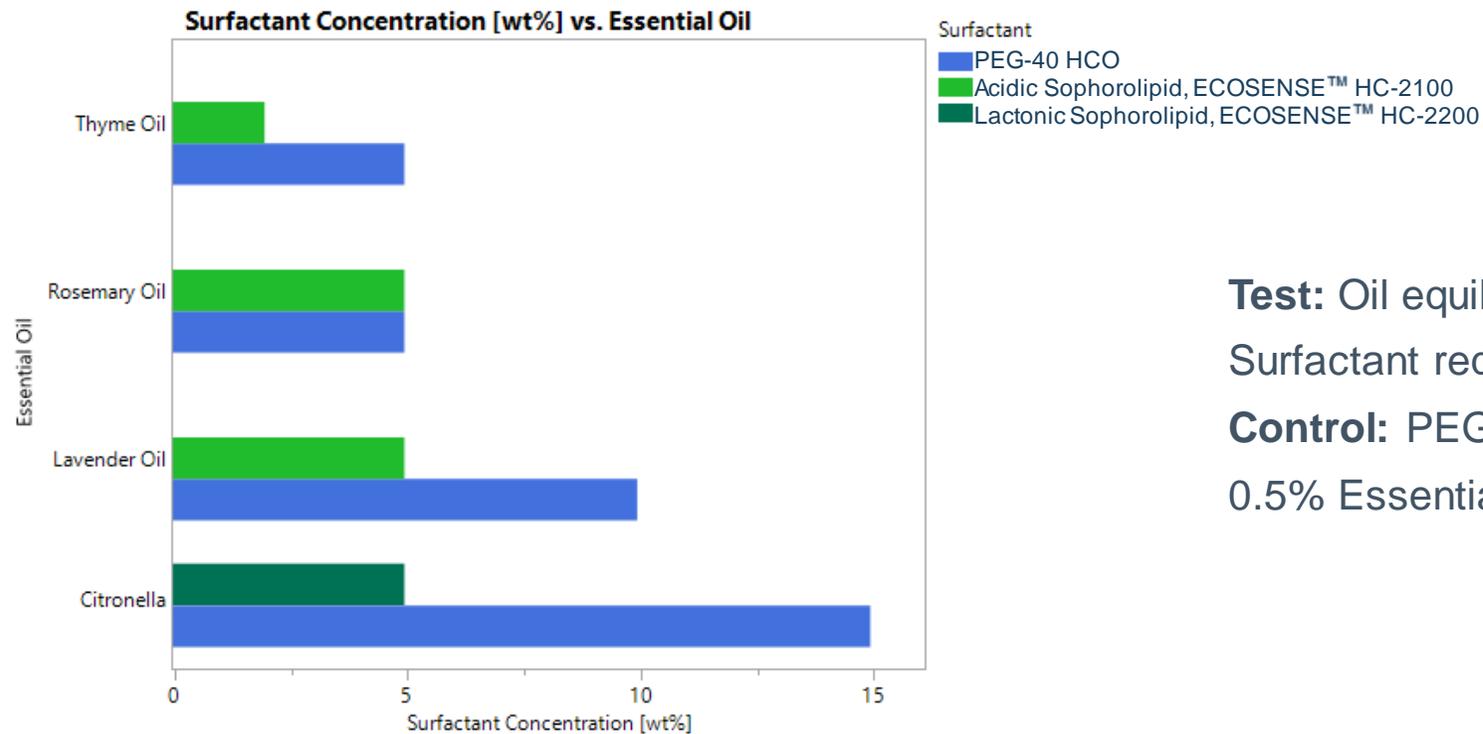
Non-irritant

Irritant

Reference: [https://www.mattek.com/wp-content/uploads/OCL-200-EIT-Eye-Irritation-Test-Protocol-MK-24-007-0055\\_02\\_02\\_2021.pdf](https://www.mattek.com/wp-content/uploads/OCL-200-EIT-Eye-Irritation-Test-Protocol-MK-24-007-0055_02_02_2021.pdf)

# ESSENTIAL OIL SOLUBILIZATION

Sophorolipids solubilize essential oils at lower use levels compared to PEG-40 hydrogenated castor oil (HCO).



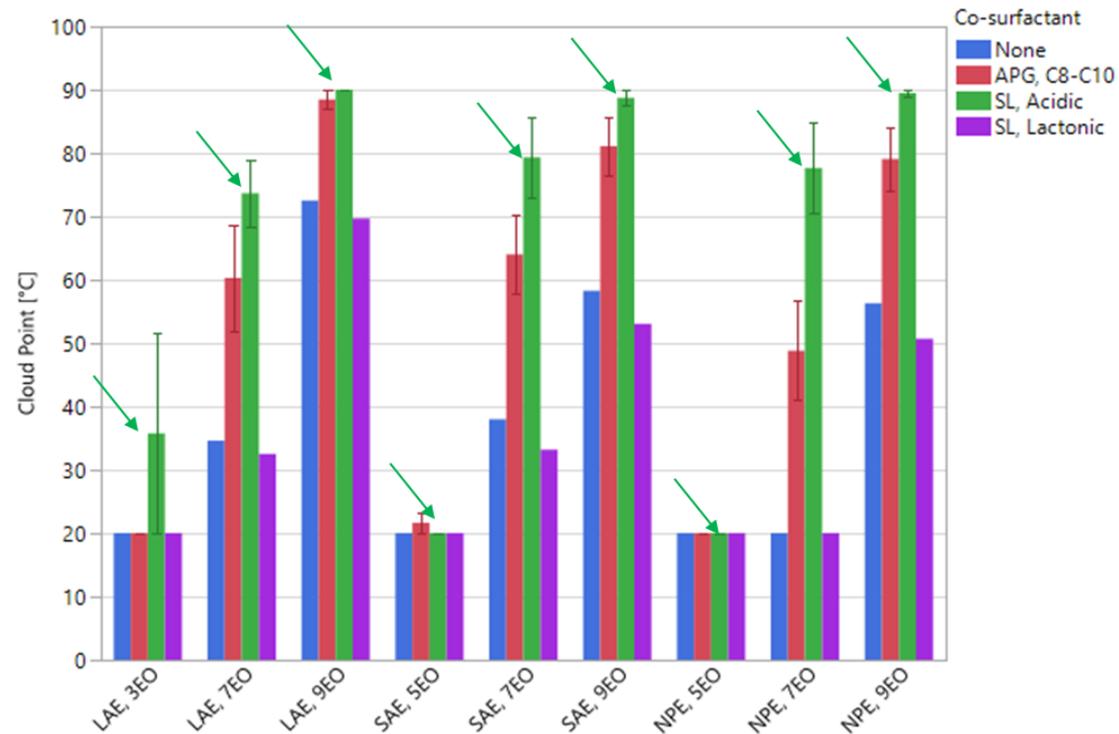
**Test:** Oil equilibrated in surfactant solutions for >24 h  
Surfactant required for water clear solution specified

**Control:** PEG 40 Hydrogenated castor oil  
0.5% Essential oil + x%Surfactant

# ECOSENSE™ HC SOPHOROLIPID SURFACTANTS | CLOUD POINT

*Blending with EcoSense™ HC Acidic Sophorolipids delivers highest increase in cloud point*

EcoSense™ HC-2100 is a very efficient hydrotope.



SL, Acidic = EcoSense™ HC-2100  
APG, C8-C10 = ECOSENSE™ 1000 HCG

LAE: Linear alcohol ethoxylate  
SAE: Secondary alcohol ethoxylate  
NPE: Nonylphenol ethoxylate



- Samples: 1 wt% active Nonionic / 0.25 wt% active Co-surfactant
- Method: Crystal 16 heat ramp from 20 – 90 °C at rate of 0.1 °C/min

# DOW SOPHOROLIPIDS FOR HOME CARE – ECOSENSE™ HC SURFACTANTS

*Versatile surfactants for dishwash, cleaning, and laundry*



## Market Applications

### Dish Wash

- Automatic Dish Wash
- Hand Wash

### Hard Surface\*

- Kitchen Cleaner
- Bathroom Cleaner
- All-Purpose Cleaner

### Laundry

- Monodose
- Heavy Duty Liquid

\*Non-microbial applications

# High Throughput Hand Dish Study

*EcoSense™ HC Sophorolipids are strong performers at low dosages*

Small amount of EcoSense™ HC Sophorolipids can replace large amount of SLS/LAO with similar performance

Material	Active wt. %			
	0	0.5	1	1.5
<b>EcoSense™ HC Sophorolipids*</b>	<b>0</b>	<b>0.5</b>	<b>1</b>	<b>1.5</b>
Sodium lauryl sulfate, SLS	<b>18</b>	<b>14</b>	<b>9</b>	<b>4</b>
Lauramine oxide, LAO	<b>9</b>	<b>7</b>	<b>4.5</b>	<b>2</b>
Ethanol	2.5	2.5	2.5	2.5
Glycerin	2.5	2.5	2.5	2.5
Tetrasodium glutamate diacetate	2	2	2	2
Citric acid or NaOH (pH)	q.s.	q.s.	q.s.	q.s.
Water	65	71	78	85
<b>% Surfactant</b>	<b>27</b>	<b>21.5</b>	<b>13.5</b>	<b>7.5</b>

\*EcoSense™ HC-2100, EcoSense™ HC-2200 and their 1:1 blend were tested

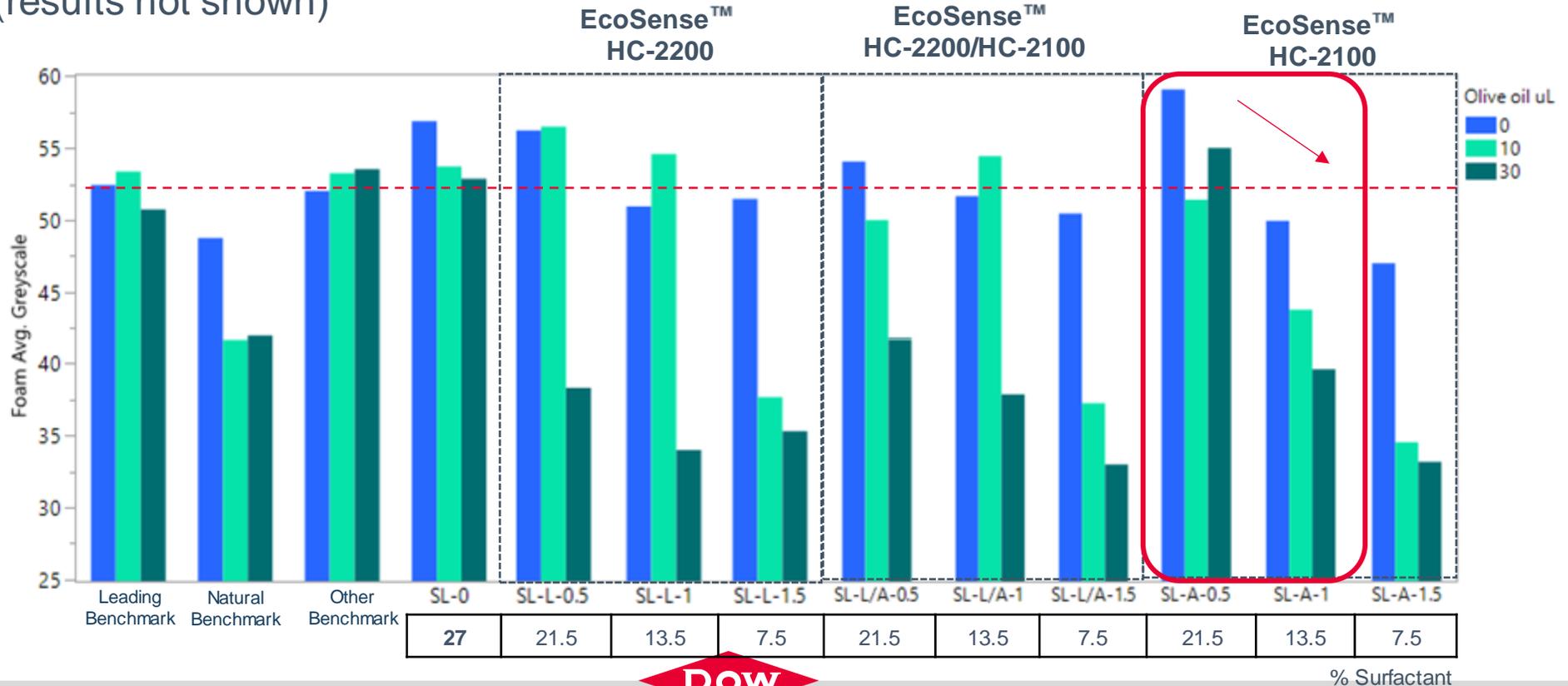


- SLS/LAO ratio fixed at 2:1; base formulation (solvent, chelant, pH) kept constant between formulations
- Sophorolipid level varied 0 – 1.5 wt%, total actives reduced



# High Throughput Hand Dish Study – Suds Mileage 1% Dilution

- **Better suds mileage** achieved vs. natural benchmark using EcoSense™ HC-2100 at only 0.5 wt% and similar performance compared to leading benchmark
- **Same suds mileage at reduced % actives** and **increased naturality** compared to LAO/SLS formulation
- Up to 1% replacement of any Sophorolipid gave the similar grease removal performance vs. natural benchmark (results not shown)



# Automatic Dishwash (ADW) Testing – US Conditions

## *Anti-redeposition of food soil on select clean substrates*

Ingredients	wt. %
Na-sulfate	21
Na-carbonate	25
Na-citrate	20
Carboxylate Based Dispersant Polymer	5
<b>Test surfactant</b>	<b>varied</b>
Na-percarbonate	15
Tetraacetylenediamine, TAED	4
Na-silicate	2
Enzymes	3

Surfactants evaluated:

- Commercial ADW surfactant\* (5%)
- Commercial ADW surfactant\* (1%)
- EcoSense™ HC-2200, lactonic sophorolipid (1%)
- Alkyl polyglucoside (APG) – short hydrocarbon chain (HC) (3%)
- Alkyl polyglucoside (APG) – long hydrocarbon chain (HC) (3%)

\* Commercial ADW surfactant: Blend of branched alcohol alkoxyate (BAA) and secondary alcohol ethoxyate (SAE)



Whirlpool dishwasher model #WDF330PAHW, 15 gr detergent, , 130F (54.4°C) wash, 5 cycles, 300ppm water (2:1 Ca:Mg) with 100ppm Na-bicarbonate, 40 gr ASTM food soil with and without 2 gr egg yolk

# ADW Testing – US Conditions – Results

## Anti-redeposition of food soil on select clean substrates

Food soil	Milk / margarine				Milk / margarine + egg yolk			
<b>Surfactant:</b>	BAA + SAE	EcoSense™ HC-2200	APG – short HC	APG – long HC	BAA + SAE	EcoSense™ HC-2200	APG – short HC	APG – long HC
<b>Concentration</b>	5.00%	1.00%	3.00%	3.00%	5.00%	1.00%	3.00%	3.00%

Libbey Collins  
Glasses



Plastic tumblers

EcoSense™ HC-2200, lactonic sophorolipid, gives superior spotting and filming performance compared to larger weight % of other surfactants.



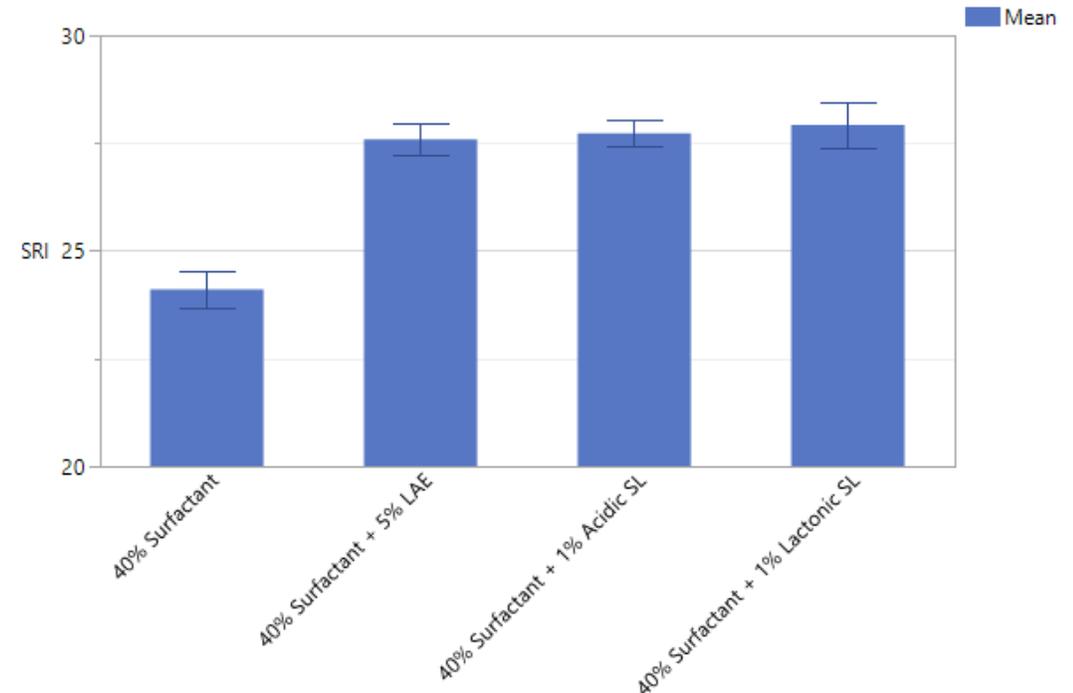
# Laundry, unit dose: Primary cleaning of sebum stain from fabrics

Adding 1% of acidic or lactonic sophorolipid gives the same improvement in primary cleaning of sebum soil as 5% linear alcohol ethoxylate

Ingredient	Active wt.%
<b>4-Dodecylbenzenesulfonic acid, DBSA</b>	<b>30</b>
Water	fill
Oleic acid	3
Propylene glycol	17
Monoethanolamine	~8 (to pH 8.5)
<b>Sodium lauryl ether sulfate, SLES</b>	<b>10</b>
<b>Test Surfactant</b>	<b>Varied</b>
Glycerin	16.5

Surfactants evaluated:

- No nonionic surfactant
- Linear alcohol ethoxylate (LAE, 7EO) (5%)
- EcoSense™ HC-2100, acidic sophorolipid (1%)
- EcoSense™ HC-2200, lactonic sophorolipid (1%)

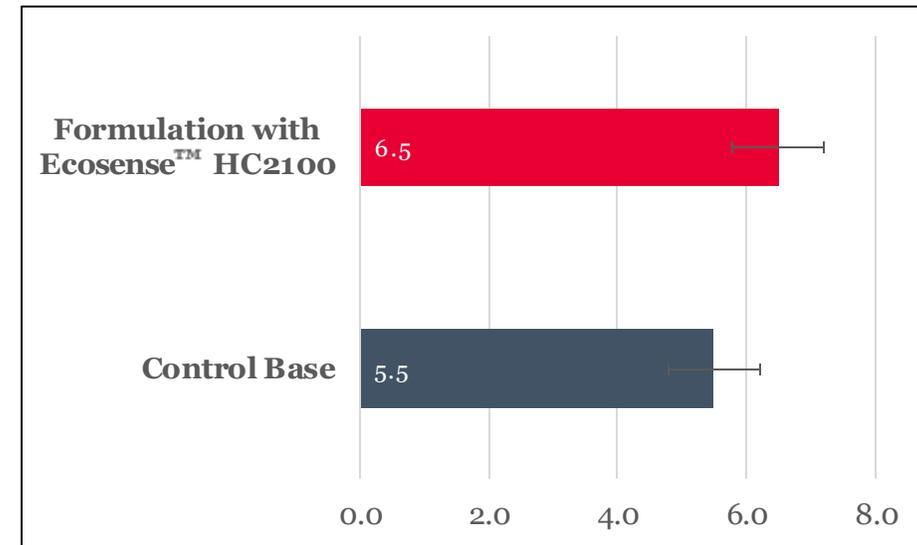


Tergitometer, 21g/L detergent, 30°C wash, 120ppm water (2:1 Ca:Mg), CFT PCS-92 dust sebum on polycotton fabric, 30 min wash, 3 min rinse

# Hard Surface Cleaning – Multi-Purpose Cleaner

Formulation with sustainable nonionic surfactant and acidic Sophorolipid **cleans better** or equal to formulation with traditional nonionic surfactant.

Ingredient	Control	Test formulation with EcoSense™ 2100
	Wt. %	Wt. %
Nonionic surfactant	1.75	0
Sustainable nonionic surfactant	0	1.575
<b>Ecosense™ HC-2100, acidic SL</b>	<b>0</b>	<b>0.48</b>
Hexyl CELLOSOLVE™	1.35	1.35
TIPALFG85	1.325	1.325
NaOH 40%	0	0.4
DOWANOL™ EPH	0.25	0.25
Benzylammonium chloride	0.125	0.125
Kool & Fresh perfume	0.15	0.15
DI water	QS 100%	QS 100%



- IKW test method Scrub machine
- Paired comparison
- 5 strokes, 1ml product/sponge
- Soft side of sponge



# Formulation Guidelines

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- Aqueous solution of ~50% sophorolipids
- Cold processable and can be directly incorporated into formulations by simple blending
- Optimal pH range
  - ECOSENSE™ HC-2100, acidic Sophorolipid: 4.0~10.0
  - ECOSENSE™ HC-2200, lactonic Sophorolipid: 4.0~7.0
- Recommended use level
  - ECOSENSE™ HC-2100, acidic Sophorolipid: 0.2 – 7.5 % as is
  - ECOSENSE™ HC-2200, lactonic Sophorolipid: 0.2 – 10 % as is

Preferred order of addition for aqueous formulations:

1. Mix water with the other surfactants.
2. Check pH to make sure it is within 4.0-8.0.
3. Add Sophorolipid Surfactant to the solution.
4. Add other ingredients and do final pH adjustment.

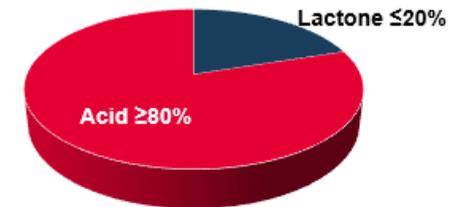


# Conclusion - EcoSense™ HC sophorolipids

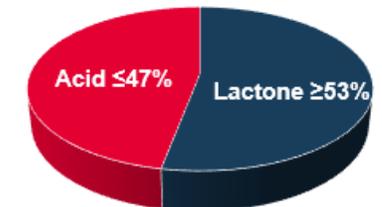
- Dow has a broad offering of biodegradable, bio-based and bio-surfactants
- Using EcoSense™ HC sophorolipids at low levels **reduce total surfactant concentration, increase naturality, and reduce carbon footprint** vs. higher levels of traditional surfactants while:
  - Maintaining or improving filming, spotting and primary cleaning in ADW
  - Maintaining the same suds mileage and grease removal performance in HDW
  - Maintaining sebum soil removal performance in Laundry
- Enabling **blendability** with offering **widest range of acid/lactone ratio**
- **Efficient hydrotrope** increasing the **cloud point** of nonionic surfactants when used as a co-surfactant.
- **Good solubilizer** for essential oils



**EcoSense™ HC 2100**  
~50% Active High Acid Sophorolipid



**EcoSense™ HC 2200**  
~50% Active High Lactone Sophorolipid





Seek

Together™

# QUESTIONS?

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