

# Natural source, clear solutions

Overview of the Evonik natural-based solution portfolio



April 2020



# Key market trends

## NATURALITY & SUSTAINABILITY

- Natural and eco-friendly ingredients
- Essential oils indicate naturality to consumers
- Natural positioning in beauty helps brands build trust with consumers



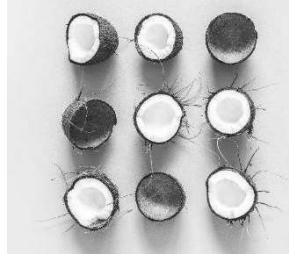
## MULTIFUNCTIONALITY

- Less is more
- Combining more than a single benefit in one product



## TRANSPARENCY

- Transparency of fragrance ingredients on labels
- Corporate Social Responsibility (CSR) matters to consumers



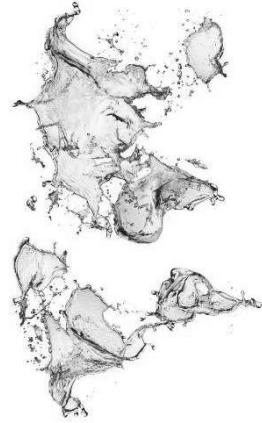
## WELL-BEING & STRESS RELIEF

Aromatherapeutic products support well-being e.g. by incorporating essential oils for relaxation



## WATERLESS

- Conserving water and being conscious how we use it is becoming more and more important



Source: Mintel



# Evonik portfolio of natural-based solubilizers

## At a glance

**essential oils, perfume oils and flavors**

**symbio<sup>®</sup>solv clear  
plus MB**  
highly efficient

**foaming**

**RHEANCE<sup>®</sup> One**  
next generation

**TEGO<sup>®</sup> Solve 90**  
**MB**  
certified

**low foaming**

**TEGO<sup>®</sup> Solve 55**  
**MB**  
cost-efficient

**light / polar  
emollients**

**TEGOSOFT<sup>®</sup> PC 41**  
**MB**

**TEGO<sup>®</sup>**

**N**



**increasing hydrophobicity**

# Evonik portfolio of natural-based solubilizers

## A closer look: essential oils, perfumes and flavors

					Certified / Registered
	Solvent	Viscosity influence	Foaming properties	HLB value	RSPO (MB <sup>1)</sup> COSMOS NATRUE Vegan
<b>symbio®solv clear plus MB</b> Caprylyl/Capryl Glucoside; Aqua; Sodium Cocoyl Glutamate; Glyceryl Caprylate; Citric Acid; Polyglyceryl-6 Oleate; Sodium Surfactin	~25% water  <b>Essential oils like:</b> Rosemary oil Orange oil Lemongrass oil Lemon oil Lavender oil Sage oil	no influence / slightly decreasing	•••	~16	✓ ✓  suitable
<b>TEGO® Solve 55 MB</b> Polyglyceryl-3 Caprate/ Caprylate/Succinate; Propylene Glycol	~25% Propylene Glycol	decreasing	•	~15	✓  ✓  suitable
<b>TEGO® Solve 90 MB</b> Polyglyceryl-6 Caprylate; Polyglyceryl-4 Caprate	~10% water  <b>Flavors</b>	decreasing	•	~15	✓  ✓  n. a. <sup>2)</sup>
<b>RHEANCE® One</b> Glycolipids	~50% water	increasing < pH 5.5; decreasing > pH 7	• pH < 5.5; ••• pH 7	pH depending: 4 (pH 4.5) – 13 (pH 6.1)	✓  ✓

1) MB = Mass balanced 2) n. a. = not applicable 3) vegan according to the definition of the European Vegetarian Union



# Evonik portfolio of natural-based solubilizers

## A closer look: light / polar emollients and fatty natural oils

		Solvent	Viscosity influence	Foaming properties	HLB value	RSPO (MB <sup>1)</sup>	COSMOS	NATRUE	Veg	Certified / Registered
<b>TEGO SOFT® PC 41 MB</b> Polyglyceryl-4 Caprate	<b>Light and/or relatively polar emollient esters like:</b> Isopropyl Myristate, Isopropyl Palmitate, Isomyl Cocoate, Diethylhexyl Carbonate, C12-15 Alkyl Benzoate <b>Short hydrocarbons like</b> Isohexadecane <b>Tocopherol</b>		slightly decreasing	••	~14	✓	✓	suitable		
<b>TEGO® Solve 61 MB</b>	<b>Fatty natural oils like:</b> Sunflower oil, Almond oil, Argan oil, Olive oil, Soy bean oil, Jojoba oil			• - ••	~11		✓	suitable		

1) MB = Mass balanced 2) n. a. = not applicable 3) vegan according to the definition of the European Vegetarian Union



# Evonik portfolio of natural-based solubilizers

## Benefits and properties

PROPERTIES	
BENEFITS	
	<ul style="list-style-type: none"><li>▪ Based 100% on raw materials</li><li>▪ PEG-free</li><li>▪ Low-viscous liquid</li><li>▪ Colorless to slight</li><li>▪ Effectively reduce surface tension of</li><li>▪ Recommended us 1–25%</li></ul>
Proven sustainability features combined with high performance – making them suitable even for natural concepts	<ul style="list-style-type: none"><li>▪ Easy to handle and cold processable</li><li>▪ Broad application profile supportive of current market trends</li><li>▪ Gentle cleansing and make-up removing properties</li><li>▪ Low impact on odor and color of formulations</li><li>▪ Low influence on viscosity of surfactant formulations compared to PEG-containing benchmarks - reduces thickener level</li></ul>



# Natural-based solubilizers

## Proof of performance



### SOLUBILIZATION PERFORMANCE

- Perfume oils
- Essential oils
- Emollients
- Fatty natural oils

### ADDITIONAL BENEFITS

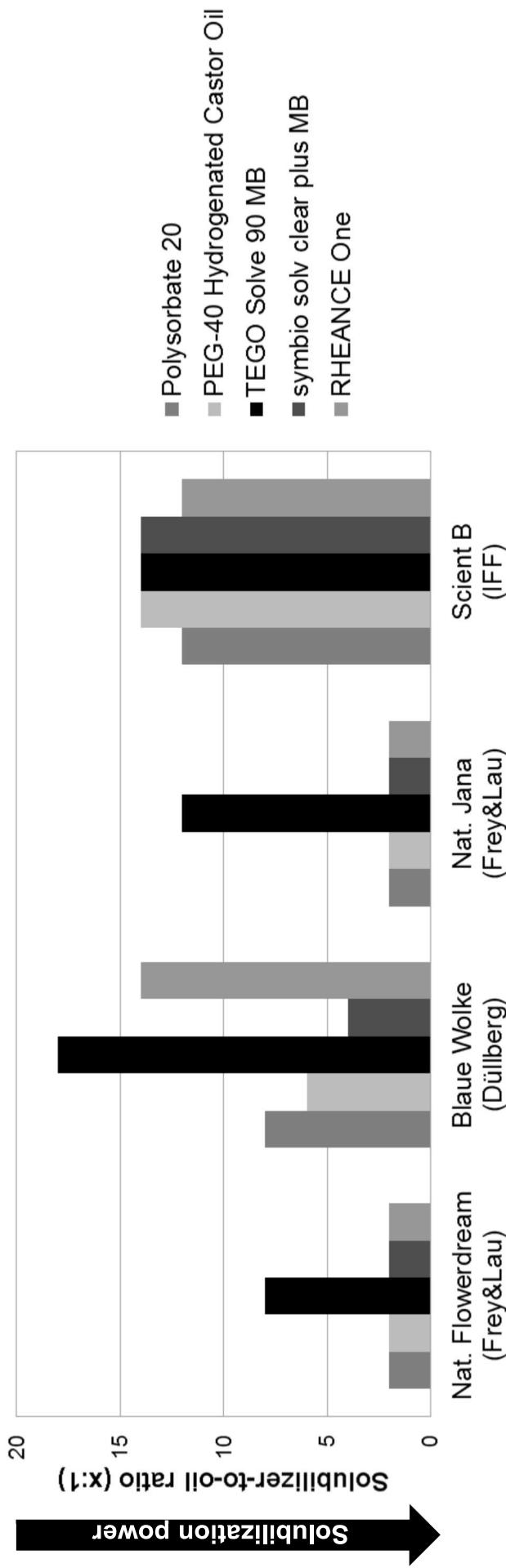
- Mildness
- Moisturization
- Make-up remover efficacy
- Foaming
- Processing
- Viscosity effects

### PROCESSING ATTRIBUT

# Natural-based solubilizers

## Solubilization performance – perfume oils

1 part perfume oil + x parts solubilizer (as is) + slowly add ad. 100% water; x = necessary amount of solubilizer for a crystal clear solution (after 30 min at



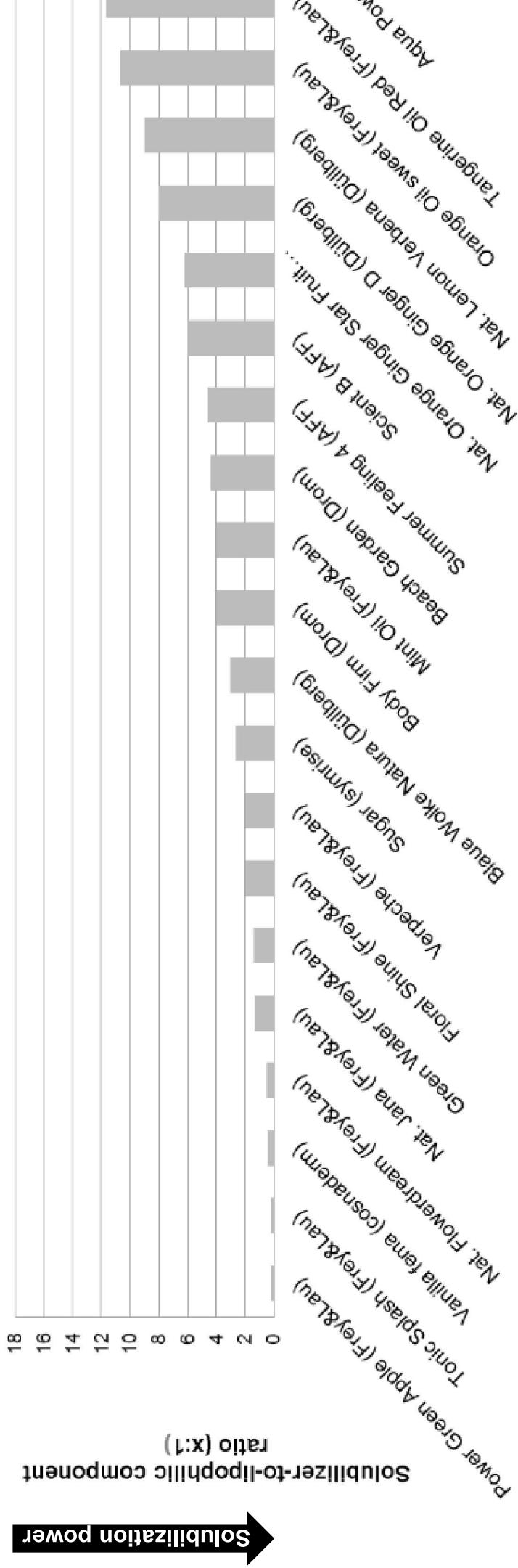
**RHEANCE® One, symbio®solv clear plus MB and TEGO® Solve 90 MB solubilize perfume oils efficiently.**

Source: SV 324

# Natural-based solubilizer

## Solubilization performance of symbio®solv clear plus MB for perfume oils

1 part perfume + x parts symbio®solv clear plus MB (as is) + slowly add ad. 100% water; x = necessary amount of solubilizer for a crystal clear solution



**symbio®solv clear plus MB** shows highest efficiency in solubilizing both conventional and natural perfume oils.

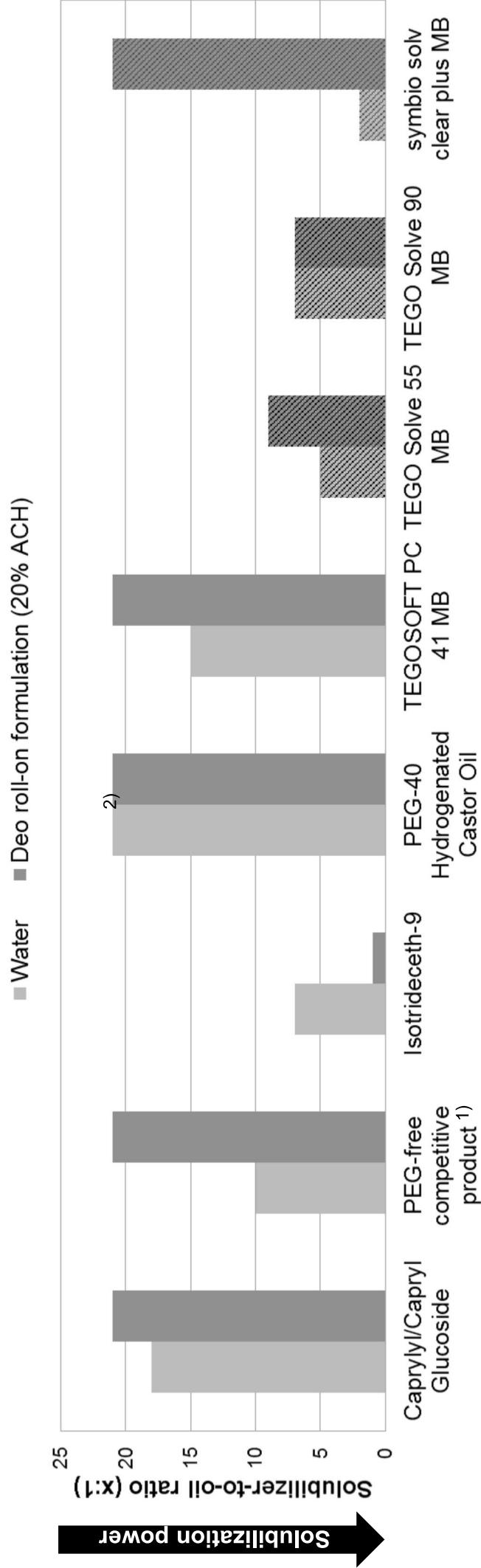
Source: EDrS



# Natural-based solubilizers

## Solubilization efficacy – perfume oil in water resp. a deo roll-on formula

1% perfume oil PINK GRAPEFRUIT (in DPG, IFF Fragrance GmbH)  
+ x% solubilizer (as is); x = necessary amount of solubilizer for a crystal clear solution (after ~30 min at RT)  
maximum of 21% solubilizer tested.

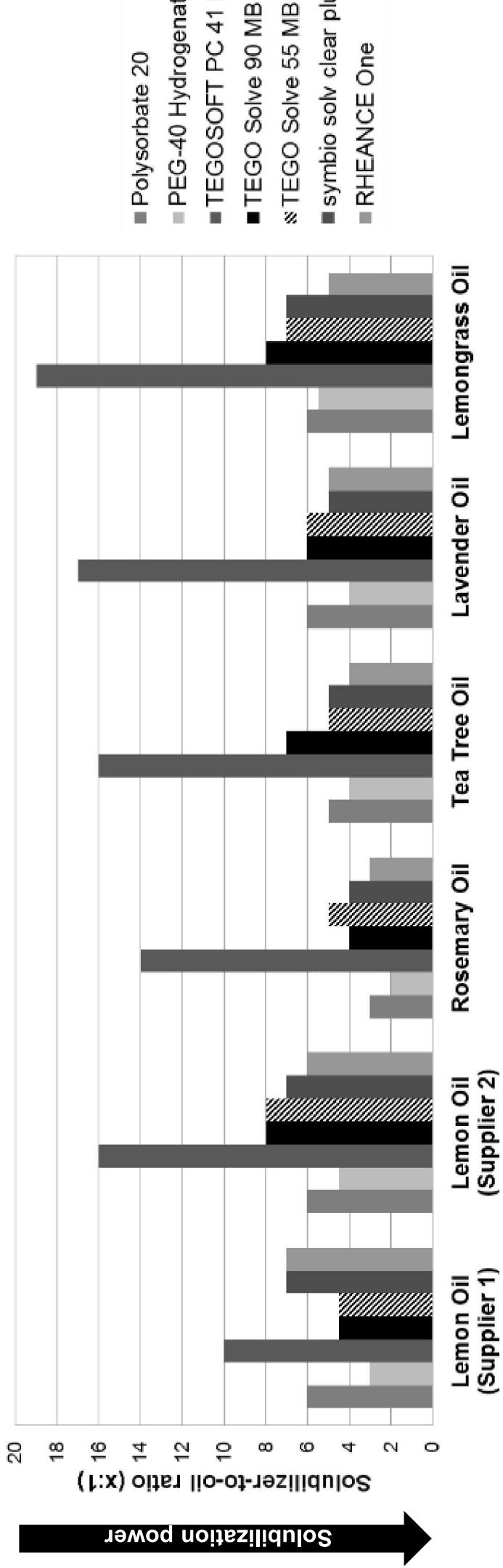


**TEGO® Solve 55 MB and TEGO® Solve 90 MB show excellent solubilizing properties and good electrolyte tolerance**

# Natural-based solubilizers

## Solubilization efficacy – essential oils

1.0% essential oil + x% solubilizer (as is) + slowly add ad. 100% water; x = necessary amount of solubilizer for a crystal clear solution (after ~30 min at R)



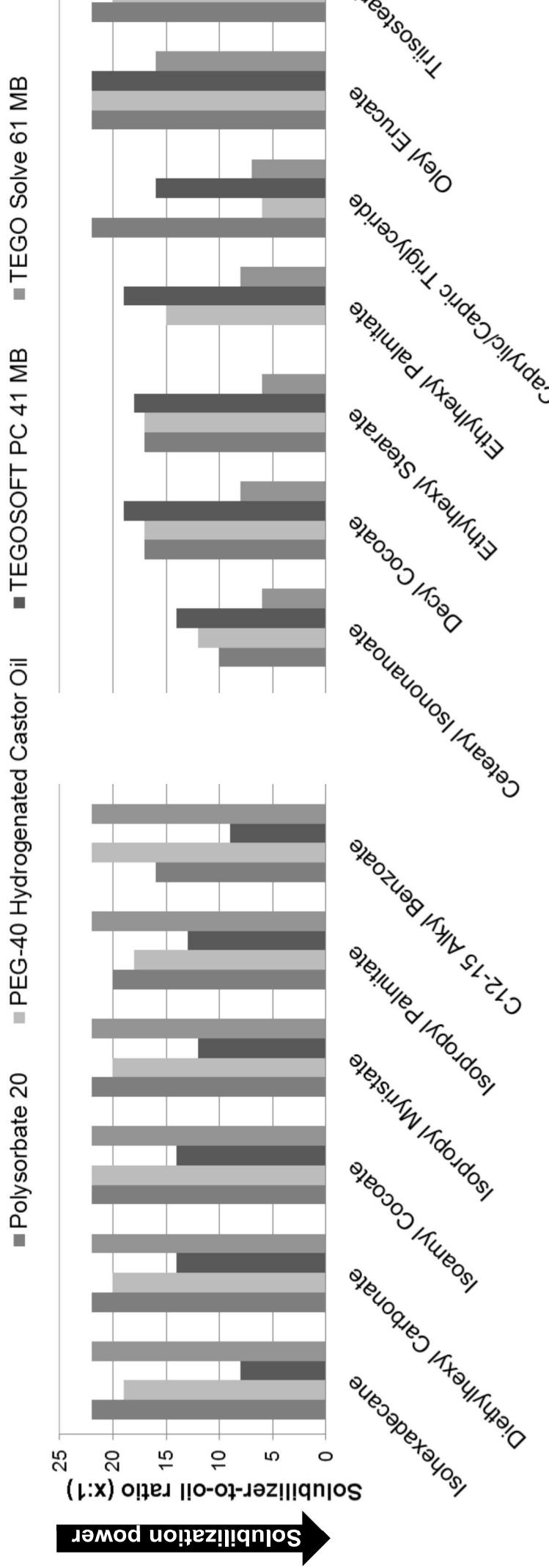
**TEGO® Solve 55 MB, TEGO® Solve 90 MB, symbio®solv clear plus MB and RHEANCE® One** show high solubilization power for the incorporation of many essential oils into water.

Source: BK577

# Natural-based solubilizers

## Solubilization efficacy – emollients

0.5% emollient+ x% solubilizer (as is) + slowly add ad. 100% water; x = necessary amount of solubilizer for a crystal clear solution;  
max. amount of solubilizer tested: 11%



**TEGOSOFT® PC 41 MB** is the best choice for light and polar emollients.

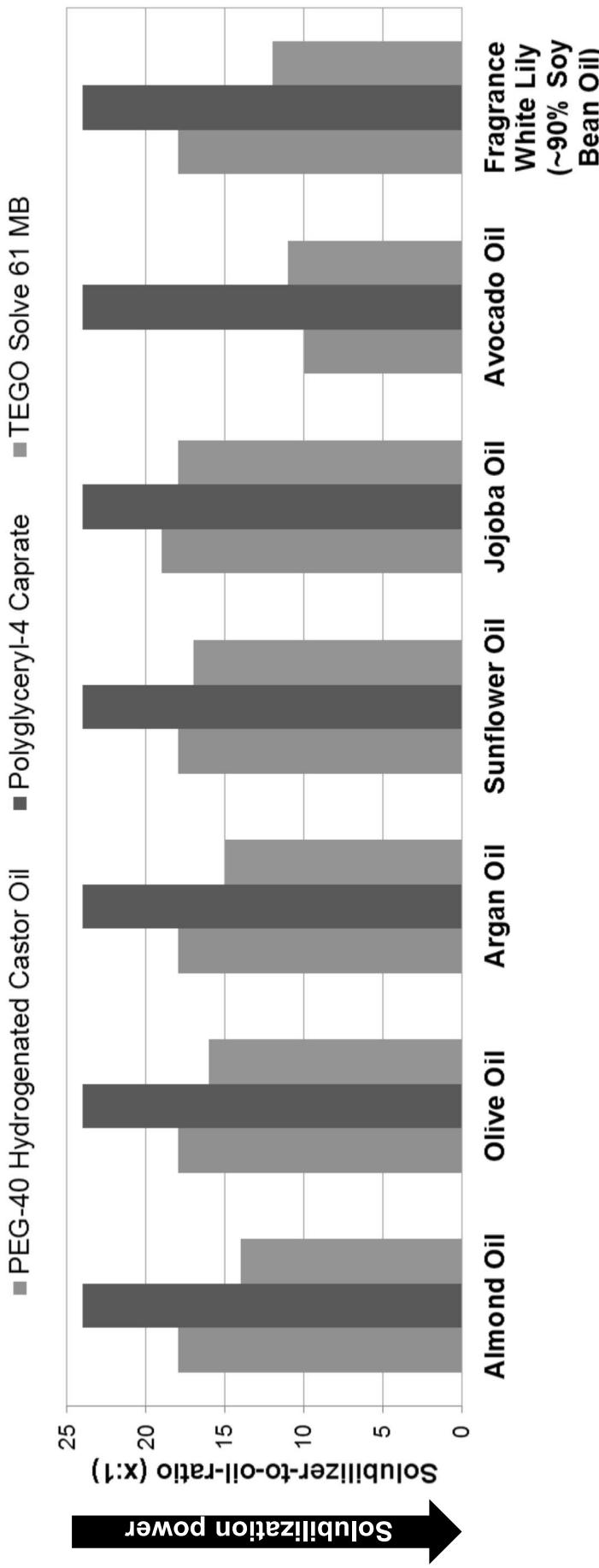
**TEGO® Solve 61 MB** is the best choice for high lipophilic emollients.



# Natural-based solubilizers

## Solubilization efficacy – fatty natural oils

0.5% fatty oil + x% solubilizer (as is) + slowly add ad. 100% water; x = necessary amount of solubilizer for a crystal clear solution  
max. amount of solubilizer tested: 11%



TEGO® Solve 61 MB is ~15 – 20% more efficient than the PEG-based market standard PEG-40 Hydrogenated Oil.

# Natural-based solubilizers

## Proof of performance



### SOLUBILIZATION PERFORMANCE

- Perfume oils
- Essential oils
- Emollients
- Fatty natural oils

### ADDITIONAL BENEFITS

- Mildness
- Moisturization
- Make-up remover efficacy
- Foaming
- Processing
- Viscosity effects

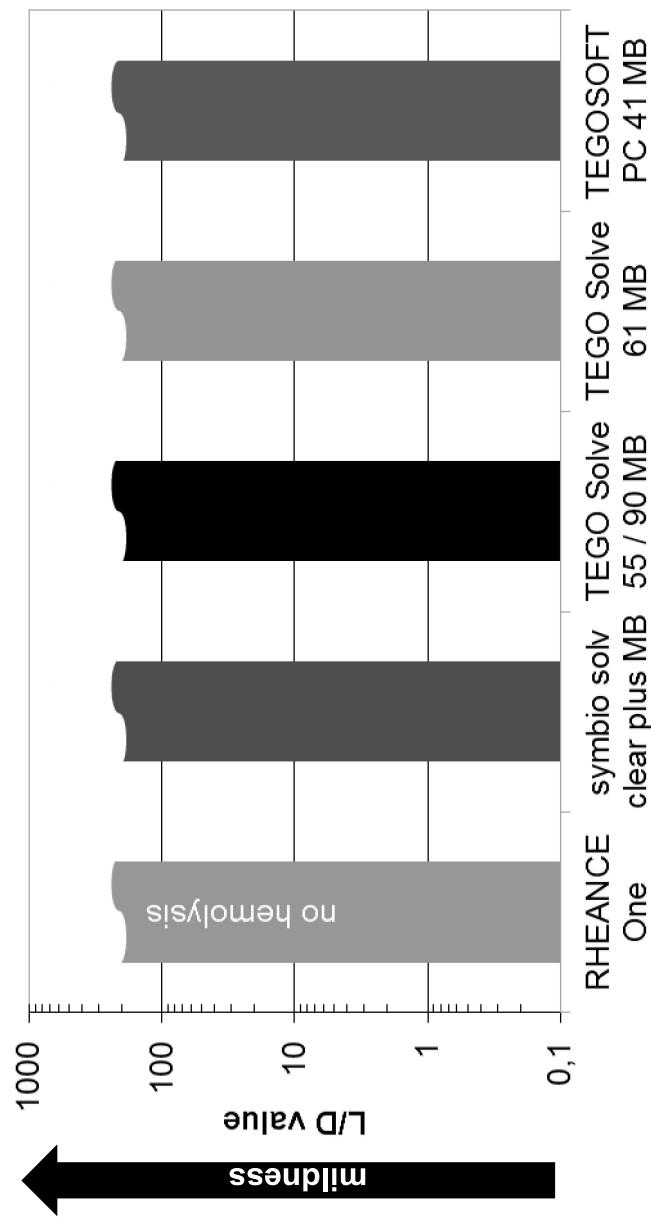
### PROCESSING ATTRIBUT

# Natural-based solubilizers

## Mildness

### RED BLOOD CELL (RBC) TEST RESULTS

Lysis-to-denaturatation ratio (L/D)



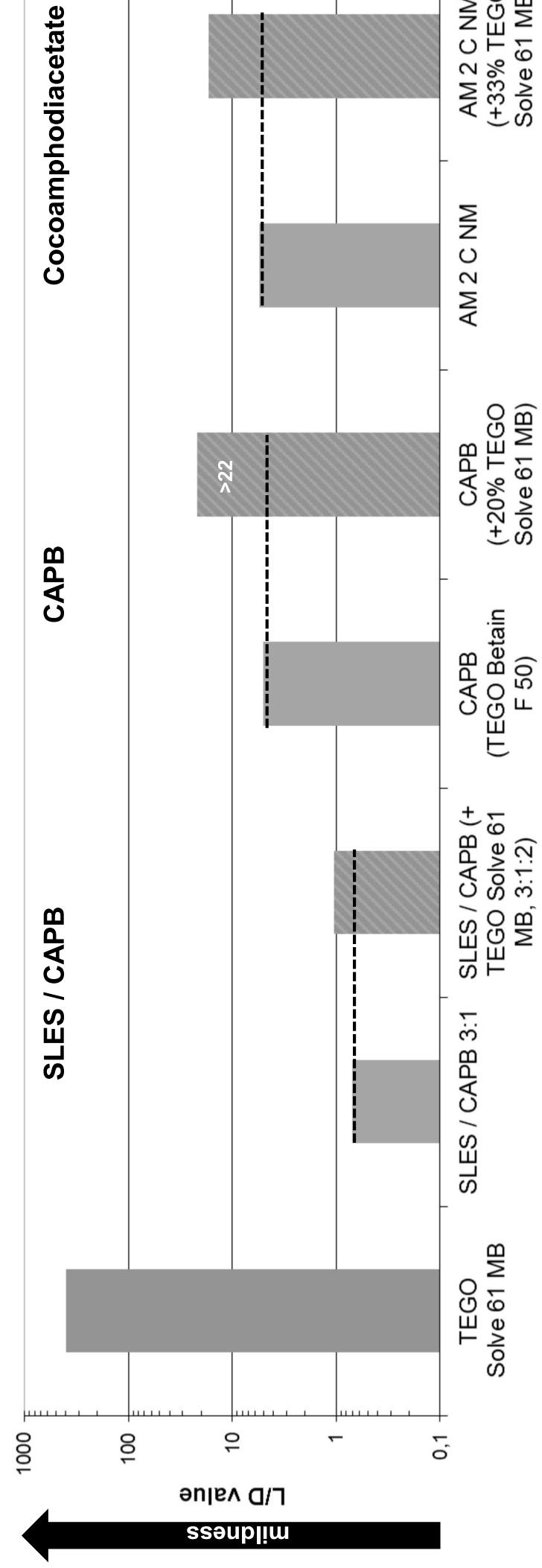
All our natural-based solubilizers are basically non irritant to the skin and mucous membranes

# Natural-based solubilizers

## Mitigating irritation potential

### RED BLOOD CELL (RBC) TEST RESULTS

Lysis-to-denaturation ratio (L/D); TEGO® Solve 61 MB is added on top (as an additive) and not calculated into the surfactant active matter



TEGO® Solve 61 MB improves the mildness of surfactant systems.

# Natural-based solubilizers

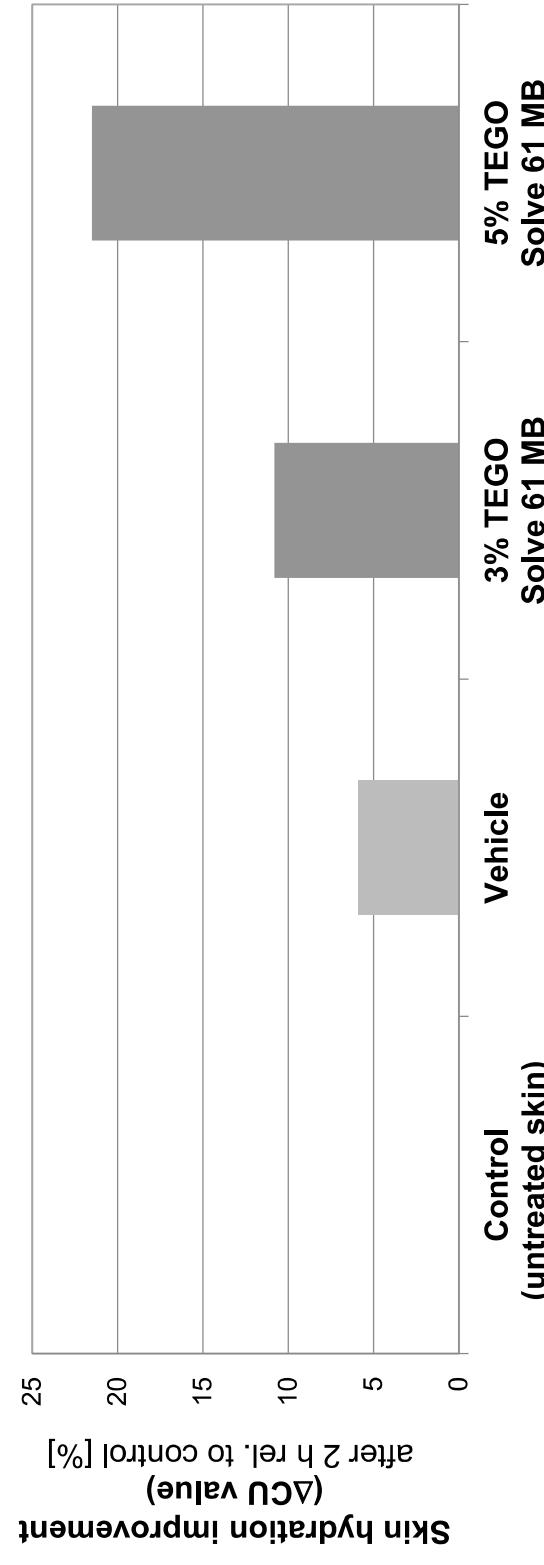
## Moisturizing properties

### CORNEOMETER TEST RESULTS

*In vivo* short-term moisturization test with a leave-on O/W treatment

Test area: 5 cm<sup>2</sup> (inner forearm); 20 µg test formulation;

Time points: Start & 2 h after application;  
14 test persons (Nov. 2013), 22-23 measurements / formula



**TEGO® Solve 61 MB** acts as a humectant and provides moisturization benefits.

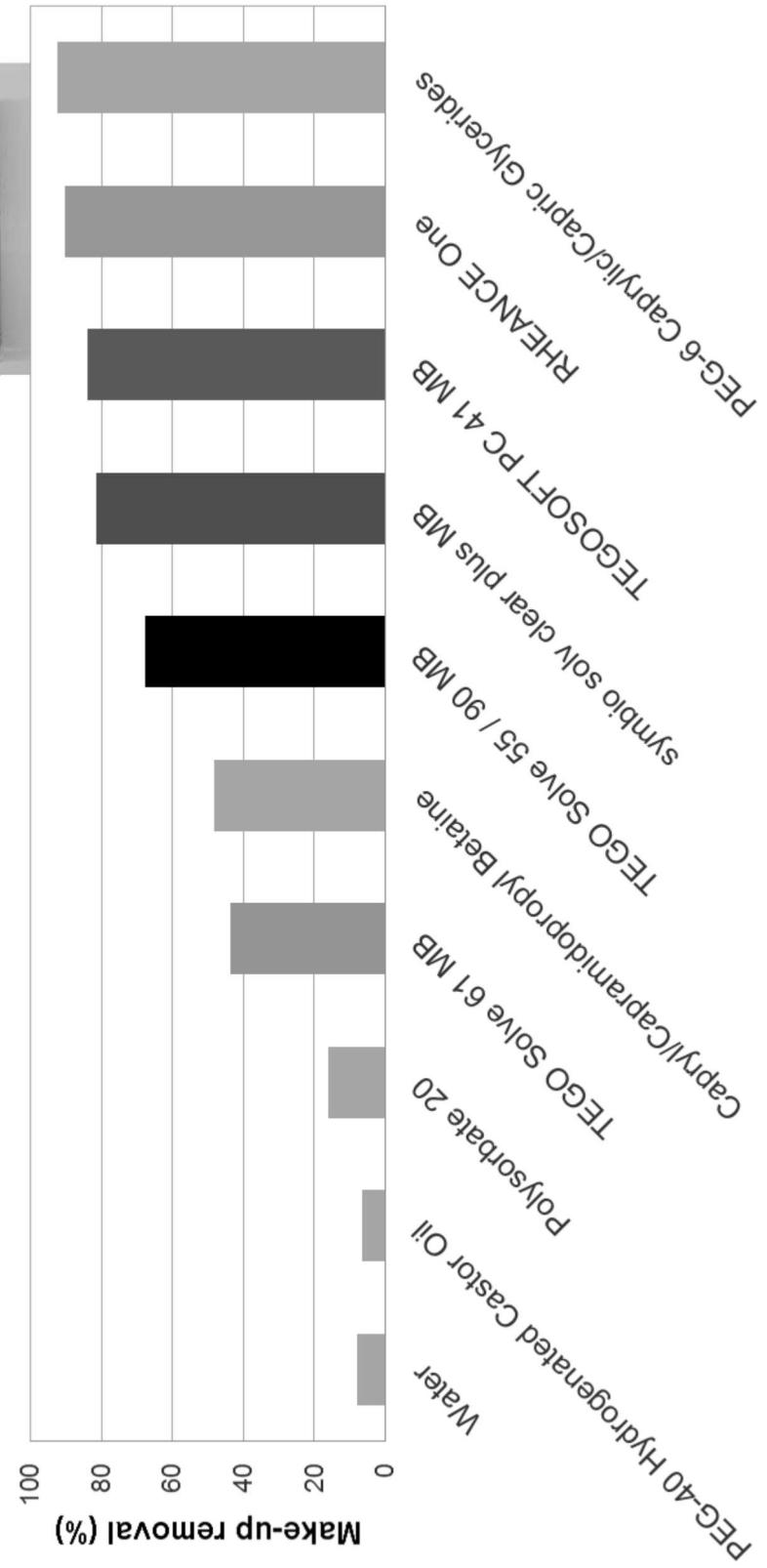


# Natural-based solubilizers

## Cleansing properties

### MAKE-UP REMOVING PROPERTIES

Method: ARTM 11-05, 3% aqueous solution, pH 6.0



The PEG-free natural-b  
solubilizers remove mak  
effectively and in a very  
way.

# Natural-based solubilizers

## Micellar water for facial cleansing, PEG-free (UL 5803/9.1)

INGREDIENTS	% w/w
TEGOSOFT® PC 41 MB (Polyglyceryl-4 Caprate )	1.00
TEGO® Betain 810 (Capryl/Capramidopropyl Betaine)	1.30
TEGO® Solve 61 MB (Polyglyceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate)	1.00
Perfume	0.05
Water	ad 100.0
TEGO® Natural Betaine (Betaine )	2.00
Hexylene Glycol	1.40
Glycerin	1.00
Z Preservative	q.s.

Mild, non-irritant surfactants

Increases skin's moisture retention

Clear, water-thin solution.  
3-in-1: cleanses, removes make-up (even water)  
soothes.  
in vitro mildness data (RBC): basically non irrita  
>482).  
Usage with a cotton-pad.  
No rinsing required.

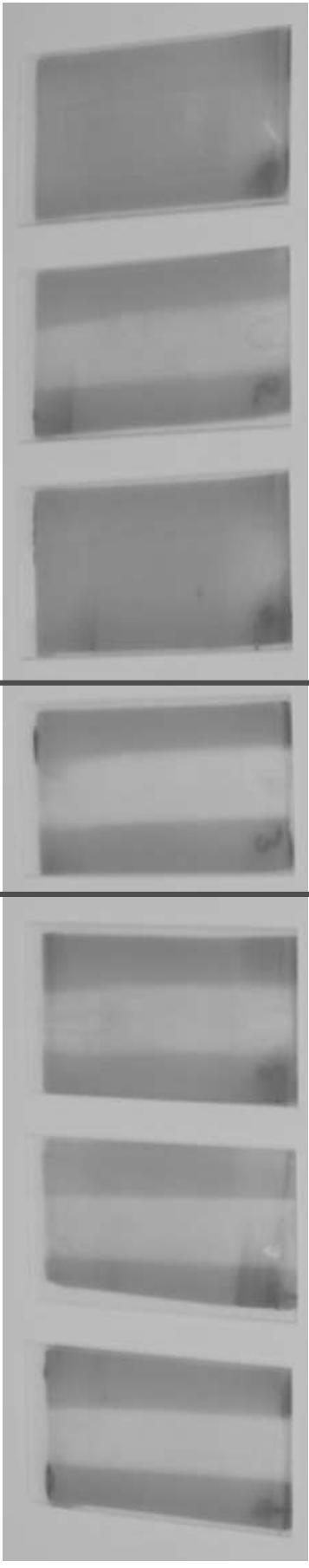


# Natural-based solubilizers

## Micellar water for facial cleansing, PEG-free (UL 5803/9.1)

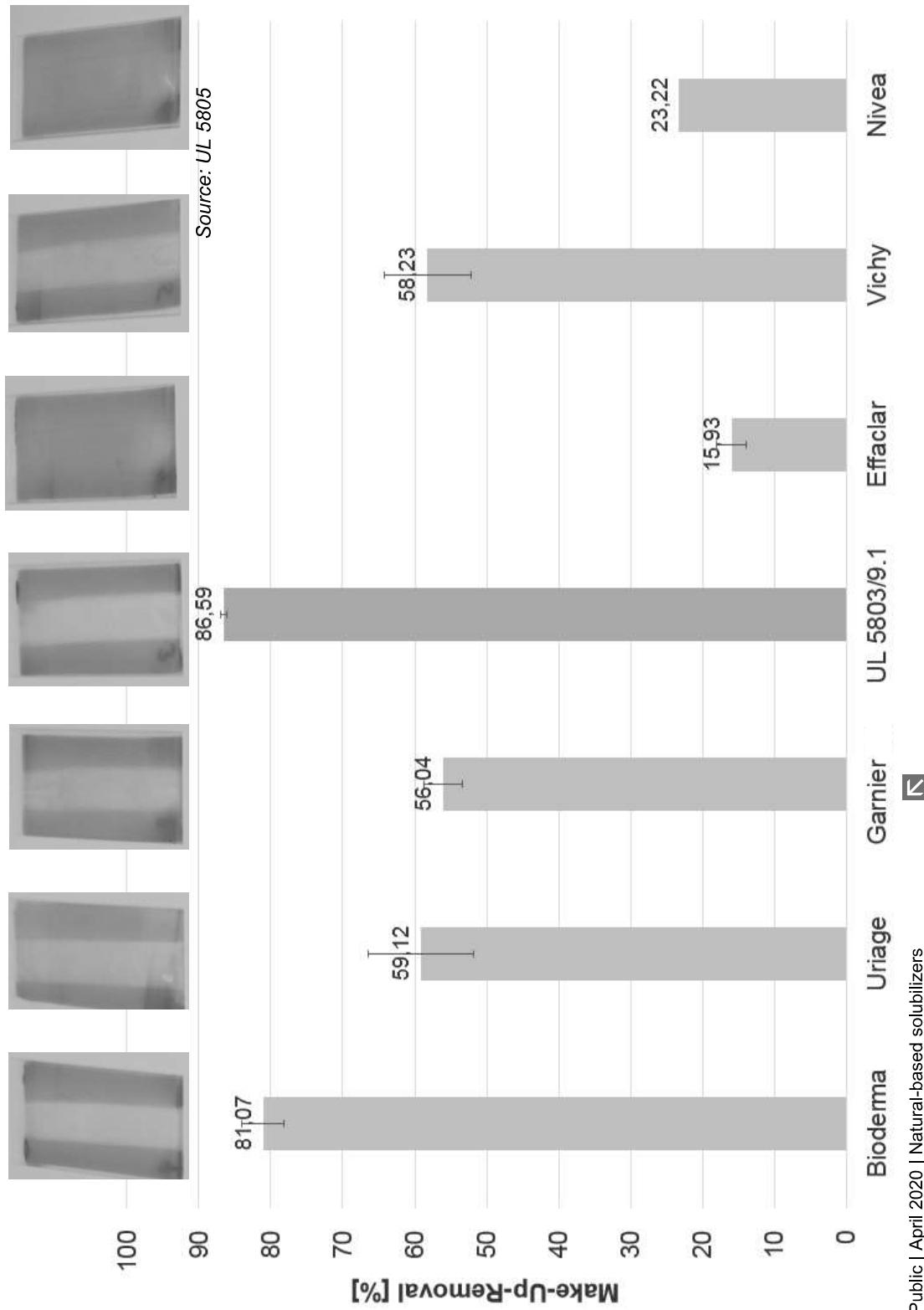
### MAKE-UP REMOVING PROPERTIES

Method: ARTM 11-05, 3% aqueous solution, pH 6.0

Bioderma		<b>UL 5803/9.1</b>	
Garnier		<b>UL 5803/9.1</b>	
Uriage		<b>UL 5803/9.1</b>	
Effaclar		<b>UL 5803/9.1</b>	
Vichy		<b>UL 5803/9.1</b>	
Nivea		<b>UL 5803/9.1</b>	

# Natural-based solubilizers

## Micellar water for facial cleansing, PEG-free (UL 5803/9.1)



# Natural-based solubilizers

## Proof of performance

### SOLUBILIZATION PERFORMANCE

- Perfume oils
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### ADDITIONAL BENEFITS

- Mildness
- Moisturization
- Make-up remover efficacy

### PROCESSING ATTRIBUT

- Foaming
- Processing
- Viscosity effects

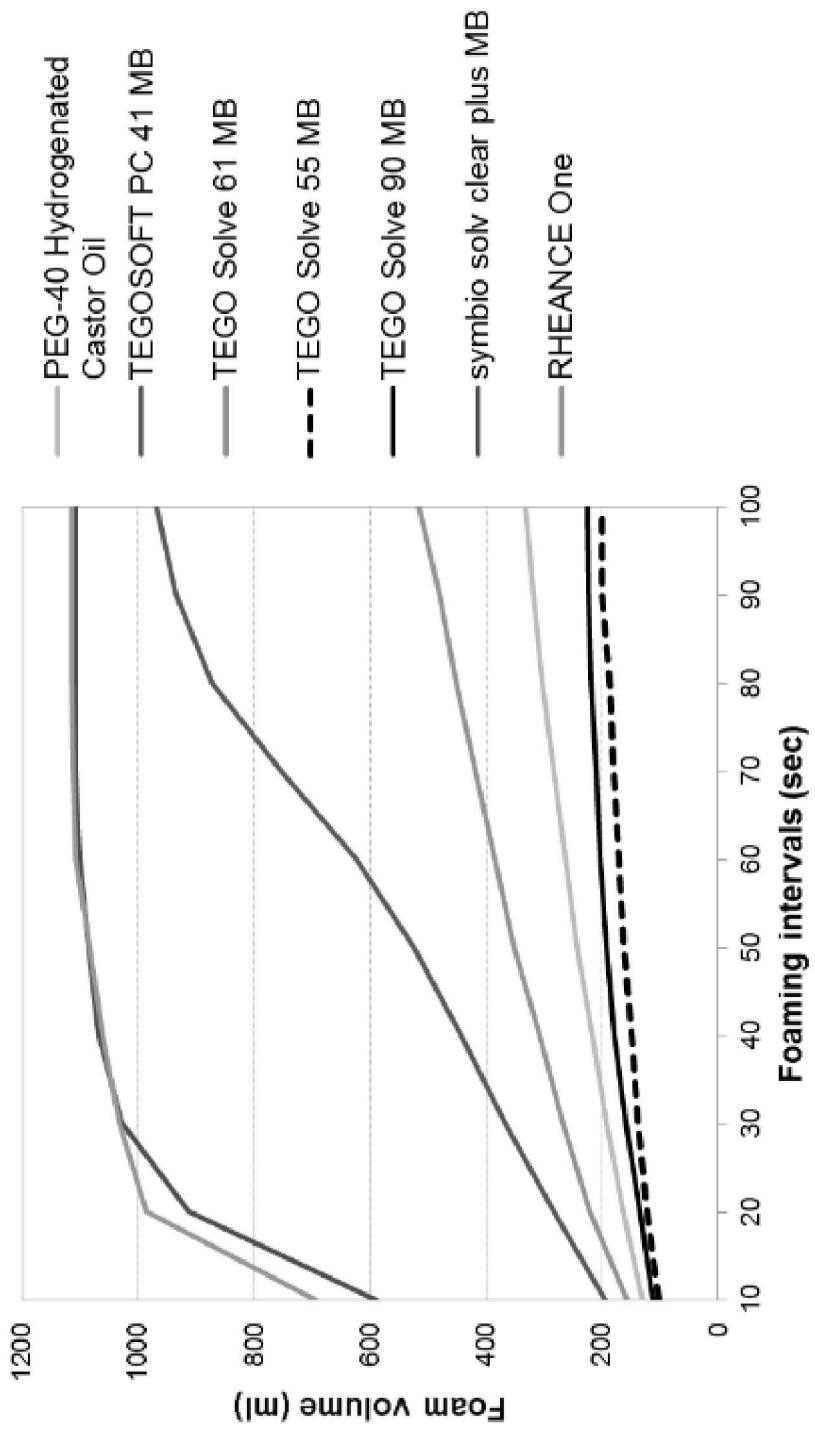


# Natural-based solubilizer

## Foam kinetics

### FLASH FOAMING and FOAM KINETICS

Method: SITA; 0.5% in water (~10 °dH), T= 30 °C, pH ~6, 1500 rpm



**TEGO® Solve 55 MB, TEGO® MB and TEGO® Solve 90 MB foaming in water, thus enabling processing.**

**symbio®solv clear plus MB a RHEANCE® One contribute to overall foaming performance of surfactants based product. Hence total surfactants amount may be reduced which has a positive influence the mildness of the formula.**

# Natural-based solubilizer Processing versus PEG-40 Hydrogenated Castor Oil

## PROCESSING OF ALMOND OIL IN WATER

0.5% almond oil + 9.0% solubilizer at room temperature; slowly add water ad 100%



**TEGO® Solve 61  
MB**



**PEG-40  
Hydrogenated  
Castor Oil**



**TEGO® Solve 61 MB, TEGOSOFT® PC 41 MB, TEGO® Solve 55 MB, TEGO® Solve 90 MB and RHEANCE® Q**  
not form a gel phase in contrast to some PEG-containing solubilizers in high concentrations.<sup>1)</sup>

1) TEGO® Solve 61 MB results selected as an example.

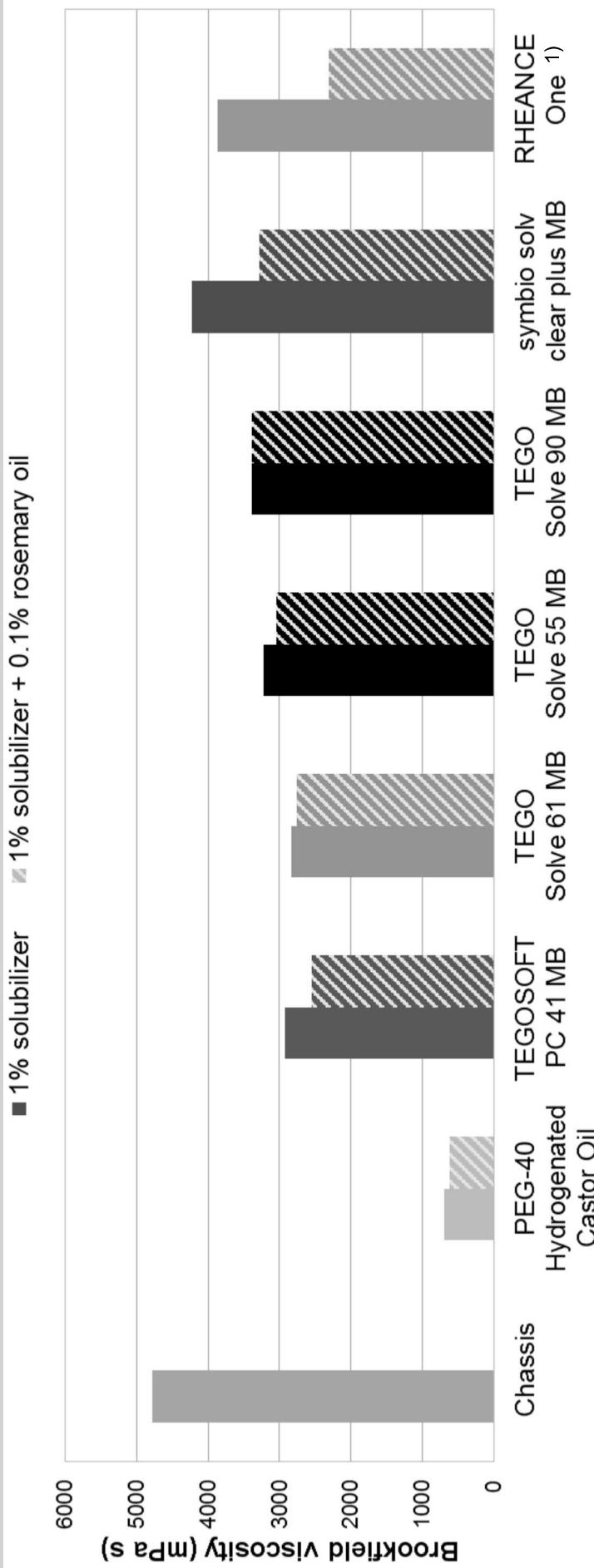


# Natural-based solubilizers

## Viscosity effects in surfactant systems

### INFLUENCE OF SOLUBILIZERS ON THE VISCOSITY

9.25% Lauryl Glucoside, 6% Sodium Lauryl Sulfate, 1.25% Disodium Cocoyl Glutamate, 4% Glycerin, 1% Sorbitan Sesquicaprylate; pH 5.2



PEG-40 Hydrogenated Castor Oil reduces viscosity significantly. Our natural-based solubilizers show significant viscosity loss compared to PEG-40 Hydrogenated Castor Oil or Polysorbate 20.

Source: SV322

1) Viscosity is pH-dependent

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# Evonik portfolio of natural-based solubilizers

## At a glance

**essential oils, perfume oils and flavors**

**symbio<sup>®</sup>solv clear  
plus MB**  
highly efficient

**foaming**

**RHEANCE<sup>®</sup> One**  
next generation

**TEGO<sup>®</sup> Solve 90**  
**MB**  
certified

**low foaming**

**TEGO<sup>®</sup> Solve 55**  
**MB**  
cost-efficient

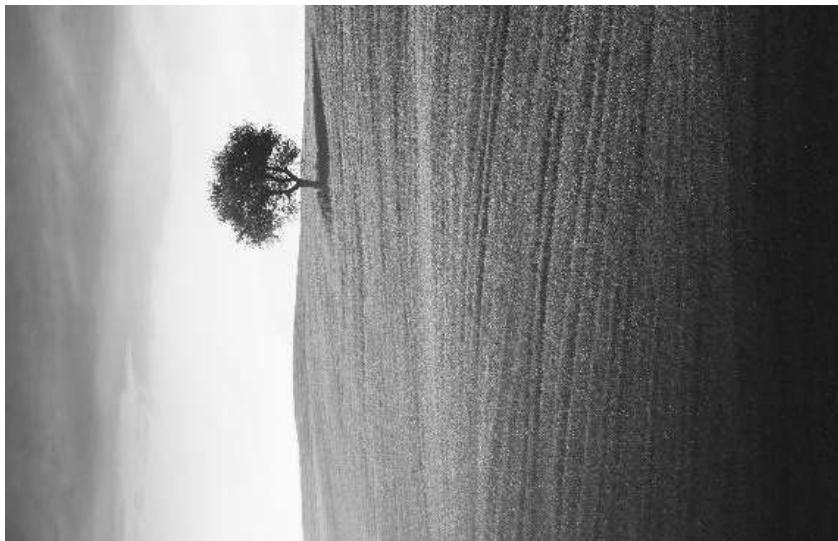
**light / polar  
emollients**

**TEGOSOFT<sup>®</sup> PC 41**  
**MB**

**TEGO<sup>®</sup>**

**N**

increasing hydrophobicity



**EVDOK**  
Leading Beyond Chemistry

