Technical Information

TEGO® Solve 55 / TEGO® Solve 90

PEG-free solubilizers for essential oils and perfume oils

Benefits at a glance

- Effective solubilization of essential and perfume oils in water based systems
- Fully based on renewable raw materials
- PEG-free
- Easy to handle, cold processable
- Very low impact on foaming
- Very mild cleansing properties and mitigating in surfactant solutions
- Excellent make-up removing properties
- Moisturizing benefits
- Suitable for AP/deo formulations with high content of aluminum chlorohydrate
- Very low influence on colour and odour of final formulation
- China IECIC listed INCI name for TEGO® Solve 90

INCI (PCPC name)

TEGO® Solve 55: Polyglyceryl-3 Caprylate/Caprate/Succinate (and) Propylene Glycol

TEGO® Solve 90: Polyglyceryl-6 Caprylate (and) Polyglyceryl-4 Caprate

Certificates

TEGO® Solve 90: Cosmos & Ecocert certification

Chemical and physical properties (not part of specifications)

Appearance	Clear to turbid, colourless to slightly yellow liquids
CMC	Approx. 0.1 – 0.5 g/l
Surface tension at RT (0.5% TEGO® Solve 90 or 1.0% TEGO® Solve 55 in H_2O)	~ 26 mN/m
HLB (experimental)	~ 15
Solvent in TEGO® Solve 55	~ 25% Propylene Glycol (100% natural based):
Solvent in TEGO® Solve 90	~ 10% water

Properties

TEGO® Solve 55 and TEGO® Solve 90 provide very good **solubilizing properties for essential oils** (e.g. Rosemary, Lavender or Lemongrass oil) as well as for perfume oils.

Figure 1 demonstrates their efficacy compared to PEG-40 Hydrogenated Castor Oil, a market standard solubilizer, and their superior efficacy compared to an existing PEG-free solubilizer (Polyglyceryl-4 Caprate).

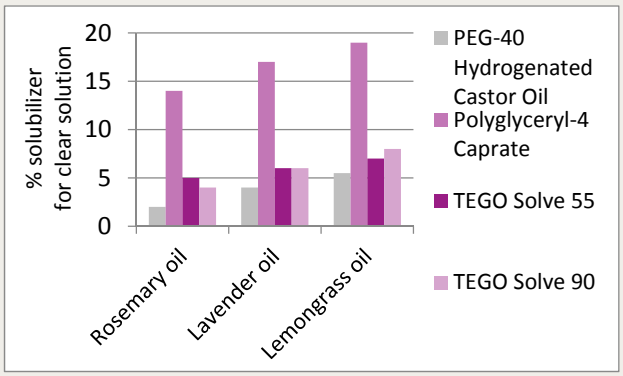

Figure 1: Solubilization of 1.0% essential oil in water

The solubilization performance of TEGO® Solve 55 and TEGO® Solve 90 are almost the same with just minor differences.

Figure 2 shows the **solubilizing efficacy** of TEGO® Solve 55 **for various perfume oils** in water. It is comparable with PEG-40 Hydrogenated Castor oil and outperforms the PEG-free benchmark. Very similar results are found for TEGO® Solve 90.

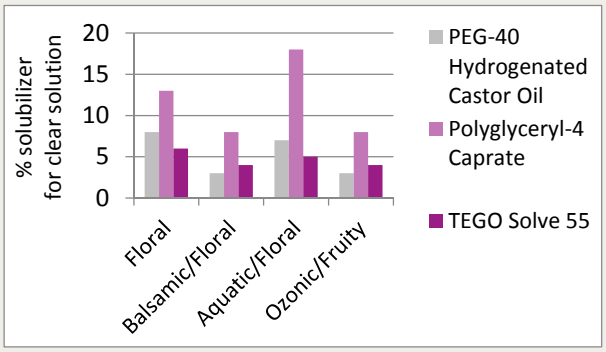

Figure 2: Solubilization of 1.0% perfume oil in water with TEGO® Solve 55

Floral:	Freesia – Lily Of The Valley – Rose, in DPG
Balsamic/Floral:	Fruity – Aldehyde – Musk, in DPG
Aquatic/Floral:	Balsamic – Powdery – Sandalwood, in DPG
Ozonic/Fruity:	Citrus – Melon – Musk, in DPG

(All perfumes from IFF Fragrance GmbH)

TEGO® Solve 55 and TEGO® Solve 90 are also **suitable for AP/Deo applications** with Aluminum Chlorohydrate (ACH). Figure 3 shows the solubilizing efficacy of TEGO® Solve 55 for different perfume oils in an AP/Deo roll-on formulation including 20% ACH. Depending on the perfume, TEGO® Solve 55 is able to outperform the standard PEG-40 Hydrogenated Castor Oil. Compared to the PEG-free benchmark, the efficacy is significant better.

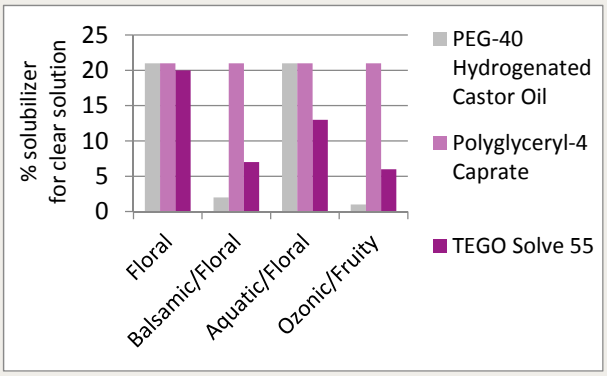

Figure 3: Solubilization of 1.0% perfume oil in deo roll-on including 20% ACH

TEGO® Solve 55 and TEGO® Solve 90 are able to **efficiently remove make-up**. This was tested in comparison to common solubilizers, which are already used for this application.

Figure 4 indicates the make-up removal efficacy, tested with an internal standard method. A long lasting make-up was applied with a defined thickness on frosted Polymethylmethacrylate (PMMA) plates.

After a defined time of drying, the make-up was removed in a standardized way by using cotton pads soaked with defined amounts of the test product.

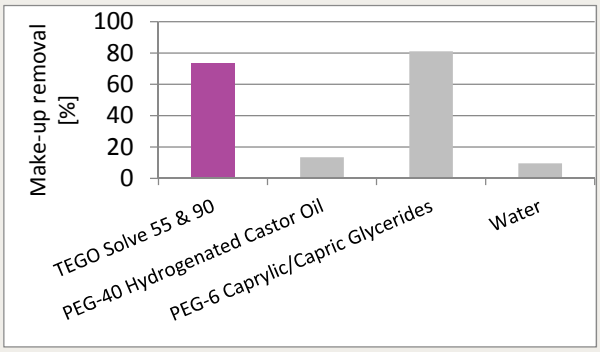

Figure 4: Make-up removal test results –3% in water

TEGO® Solve 55 and TEGO® Solve 90 are **ultra-mild surfactants** according to RBC tests and show mildness improvement in surfactant solutions. They can give good skin feel properties and act as humectants to provide **moisturizing benefits** (Corneometer studies).

TEGO® Solve 55 and TEGO® Solve 90 are **low foaming in water**, so pre-mixes with perfume or essential oils and water can easily be prepared. In surfactant mixtures no effect on the foaming properties has been observed.

Furthermore, TEGO® Solve 55 and TEGO® Solve 90 show almost no influence on the odor or color of the final formulations and just have a **low influence on the viscosity of surfactant formulas**.

TEGO® Solve 55 and TEGO® Solve 90 are completely based on renewable raw materials.

Application

TEGO® Solve 55 and TEGO® Solve 90 can be used in e.g.:

- Oil baths
- Make-up remover, “micellar water”
- Facial cleansers
- Perfumes and tonics
- AP/Deo formulations
- Wet wipes
- Hair and body shampoos

Suggested usage concentration

1.0 – 25.0% TEGO® Solve 55/TEGO® Solve 90

Processing

The necessary amount of any solubilizer is highly dependent on oil quality, solubilizer quality, water hardness, pH, temperature, formulation composition and processing method (e.g. speed of water phase addition).

Processing at room temperature is easily possible with TEGO® Solve 55 and TEGO® Solve 90.

Best results for solubilization:

- Blend the oil with TEGO® Solve 55 or TEGO® Solve 90
- Add water or surfactant mixture very slowly initially (later on it can be added faster)

Combination with TEGO® Solve 61 is recommended for perfumes based on or solubilized with fatty oils (e.g. soy bean oil). This can lead to a higher efficacy: therefore mix the suitable solubilizer with the respective oils and water beforehand and then mix.

Recommended pH range: approx. 4 – 7.

Storage

Under storage the products tend to get turbid. This is a typical behavior and indicates no loss in application behavior or performance. In case of some small precipitate, the products should be homogenized at ~30 °C.

TEGO® Solve 90 should be stored at temperatures below 30 °C.

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport of chemicals
- protective measures for storage and handling
- measures in case of accidents and fire
- toxicological and ecotoxicological effects

is given in our safety data sheets.

Guideline formulations

Micellar water, PEG-free
UL 5803/15

TEGO® Solve 55	2.00%
Perfume	0.05%
Water	Ad 100.00%
TEGO® Betain 810 (Capryl/Capramidopropyl Betaine)	1.30%
TEGO® Natural Betaine (Betaine)	2.00%
Hexylene Glycol	1.40%
Glycerine	1.00%
Preservative	q. s.

Preparation

Mix the ingredients in the given order.

Remarks

Clear, water-thin solution. pH = 5.0.
3-in-1: cleanses, removes make-up, soothes.
Removes even waterproof eye make-up.
Application with a cotton pad. No rinsing required.

Micellar water for gentle and efficient make-up removal, PEG-free
BK 484/2

TEGO® Solve 90	1.00%
Perfume Pink Grapefruit (IFF Fragrance GmbH)	0.05%
TEGO® Betain 810 (Capryl/Capramidopropyl Betaine)	1.30%
TEGO® Solve 61 (Polygylceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate)	1.00%
Water	Ad 100.00%
TEGO® Natural Betaine (Betaine)	2.00%
Glycerine	1.00%
Preservative	q. s.

Preparation

Mix the ingredients in the given order.

Remarks

Clear, water-thin solution. pH = 5.0.
3-in-1: cleanses, removes make-up, soothes.
Removes even waterproof eye make-up.
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Clear Deo roll-on, PEG- & Ethanol-free
WP 513/4

Phase A	
TEGO® Solve 55	2.00%
Perfume Spicy Herbs (IFF Fragrance GmbH)	0.20%
Phase B	
Water	Ad 100.00%
Hydroxyethyl Cellulose	1.00%
Phase C	
Aluminum Chlorohydrate (50% solution)	40.00%
Preservative	q. s.

Preparation

Prepare phase B with warm water (~45 °C) and stir well before adding phase C to it.

Prepare phase A and slowly add the premixed phases B – C. Mix well.

Remarks

pH = 4.0. Viscosity (Brookfield, 25 °C):
~3750 mPas. Under prolonged storage at 40 °C the formulation could get turbid at 40 °C, but gets clear again at RT.

Moisturizing, clear wet-wipe liquid, PEG-free
UW 1263/2

Phase A	
TEGO® Solve 61 (Polygylceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate)	1.50%
Caprylic/Capric Triglyceride	0.20%
Phase B	
TEGO® Solve 55	0.40%
Perfume Sky (IFF Fragrance GmbH)	0.10%
Phase C	
Water	Ad 100.00%
Propylene Glycol	3.00%
ABIL® ME 45 (Silicone Quaternium-22; Polyglyceryl-3 Caprate; Dipropylene Glycol; Cocamidopropyl Betaine)	0.50%
Phase Z	
Preservative, Citric Acid	q. s.

Preparation

Premix phases A and B separately. Add B to A and mix.

Slowly add the premixed phase C and stir for approx. 30 min. Add preservative and adjust the pH with Citric Acid.

Remarks

pH = 5.5.

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