Technical Information

TEGO® Solve 61

PEG-free solubilizer for natural oils and lipophilic emollients

Benefits at a glance

- Effective solubilization of natural and fatty oils
- Crystal clear formulations possible
- Low foaming during processing
- Easy to handle, cold processable
- 100% based on renewable raw materials

INCI name (CTFA name, proposed)

Polyglyceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate

Chemical and physical properties (not part of specifications)

Appearance (20 °C)	clear to slightly turbid, yellowish, viscous liquid
HLB	~11
Surface tension (0.5% in water, r.t.)	~30 mN/m

Properties

TEGO® Solve 61 shows very good solubilizing properties for natural and fatty oils, e.g. almond, avocado, olive, jojoba, sunflower and argan oil. Also hydrophobic emollients like Caprylic/Capric Triglyceride or hydrophobic perfume oils, actives or preservatives can effectively be solubilized in water or water-based formulations.
Figure 1 illustrates the solubilizing efficacy of TEGO® Solve 61 in water and surfactant systems, compared to two benchmarks. It is comparable with the market standard PEG-40 Hydrogenated Castor Oil and clearly outperforms the PEG-free standard.

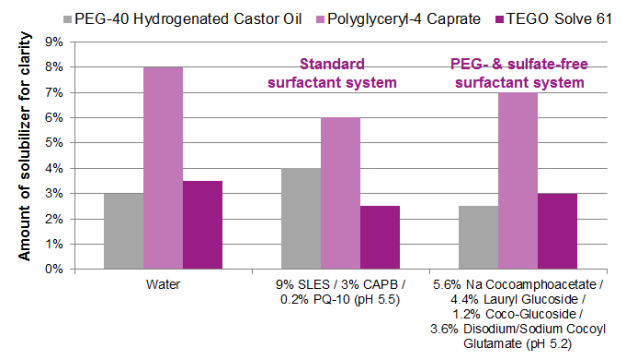

Figure 1: Solubilization of 0.5% Caprylic/Capric Triglyceride in water and surfactant systems
(0.5% oil; x% solubilizer; ad 100% water resp. surfactant solution).

Figure 2 shows the solubilizing benefits of TEGO® Solve 61 for different natural oils. TEGO® Solve 61 clearly outperforms the PEG-free benchmark and is even more effective than the market standard PEG-40 Hydrogenated Castor Oil.

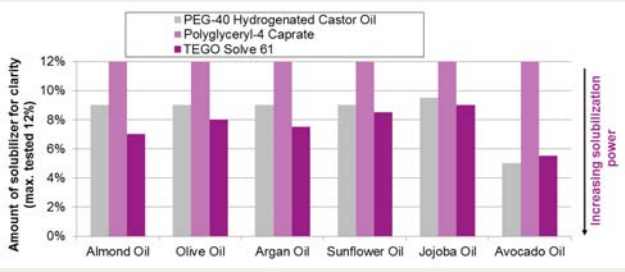

Figure 2: Solubilization of 0.5% oil in water
(0.5% oil + x% solubilizer + slowly add water ad 100%. x = necessary amount of solubilizer for crystal clear solution).

Crystal clear formulations are accessible.
Note: TEGO® Solve 61 itself is usually not clearly soluble in water, especially in concentrations of approx. 1–5%, only the addition of an oil will give clarity.

In addition to the solubilizing properties, TEGO® Solve 61 exhibits ultra-mild cleansing attributes as well as improved moisturizing and skin feel benefits. Results of *in vitro* red blood cell tests showed mitigating effects, which means the addition of TEGO® Solve 61 to a surfactant base can improve the mildness of the final formulation.

TEGO® Solve 61 is low foaming in water, so mixtures with oils and water can easily be prepared.
In surfactant mixtures, no negative effect on the foaming properties has been observed.

TEGO® Solve 61 shows almost no influence on odor or color of the final formulations.

TEGO® Solve 61 is 100% based on renewable raw materials. It is Ecocert approved.

Processing

- In general, the necessary amount of solubilizers is highly dependent on the oil quality, solubilizer quality, water hardness, pH-value; the formulation in total, temperature and especially the processing method (e.g. speed of water phase addition).
- Recommended process: blend the oil with TEGO® Solve 61, heat to ~50 °C, and add water or a surfactant mixture very slowly, especially at the beginning. Later on it can be added faster.
- Processing at room temperature is easily possible with TEGO® Solve 61. No gel phase is formed (in marked contrast to PEG-40 Hydrogenated Castor Oil).
- Combination of two solubilizers (e.g. with TEGOSOFT® PC 41) recommended for the effective solubilization of lipophilic natural oils and essential/perfume oils together (mix the oils separately with the respective suitable solubilizer first)
- Recommended pH range for use of TEGO® Solve 61: approx. pH 4–8

Application

TEGO® Solve 61 can be used in:

- shampoos
- body/hand/facial washes & gels
- make-up remover
- wet wipes
- emulsions

Suggested usage concentration

0.5 – 10.0 % TEGO® Solve 61

Packaging

200 kg drum

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in accidents and fires
- toxicity and ecological effects

is given in our material safety data sheet.

Guideline formulation

Clear conditioning shampoo with Argan Oil BK 357/4	
TEGO® Solve 61	8.0%
Argan Oil	0.5%
Water	ad 100.0%
Polyquaternium-10	0.2%
Sodium Laureth Sulfate, 28%	32.0%
TEGO® Betain F 50 (Cocamidopropyl Betaine)	8.0%
ANTIL® 120 Plus (PEG-120 Methyl Glucose Dioleate)	1.0%
NaCl	0.7%
Preservative, Perfume	q.s.

Preparation:

Blend TEGO® Solve 61 with Argan Oil and heat to ~45 °C.

Dissolve PQ-10 in water and allow to swell. Add surfactants.

Slowly add the water phase to the oil phase.

Add ANTIL® 120 plus. Adjust final viscosity with NaCl.

Remarks:

pH=5.5; viscosity (Brookfield, 25 °C): 5000 mPas.

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Product specification

Material TEGO SOLVE 61
Spec.Code K00 STANDARD

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Inspection Characteristics	Method	Limits	Units	Z
Colour to Gardner	GM_0140_01	<=4.0	Gardner	X
Acid Value	GM_0010_01	<=5.0	mg KOH/g	X
Saponification Value	GM_0030_01	68.0 - 80.0	mg KOH/g	X
Water Content	GM_0080_01	11.0 - 13.0	%	X
Appearance 25°C	GM_0170_00	OK		X

Appearance 25°C	OK

Report on inspection certificate: X = specific/actual value, C = unspecific value/conformity, T = not reported

Appearance 25°C: clear to slightly turbid liquid

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The Standard Test Methods can be obtained from specialized publishers. Evonik's test methods are available on request.

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TEGO® Solve 61

Product data record

1. General information

1.1 Manufacturer / Supplier

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1.2 Product Description

1.2.1 Raw material category Solubilizer

1.2.2 Ingredients according to INCI

Polyglyceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate

1.2.3 Composition

Components	Source	Ratio
Polyglyceryl-6 Caprylate	vegetable	17 - 27 %
Polyglyceryl-3 Cocoate	vegetable	17 - 27 %
Polyglyceryl-4 Caprate	vegetable	17 - 27 %
Polyglyceryl-6 Ricinoleate	vegetable	17 - 27 %
Water		11 - 13 %

This composition information serves for information of our customers only.
It is neither relevant for the composition listing according to Regulation (EC) No 1223/2009, nor does it reflect the chemical composition according to the different chemical regulations in the world which is disclosed in the table "information on ingredients/hazardous components" in the relevant parts of the respective (Material) Safety Data Sheets.

1.2.4 Solvents, preservatives and other additives

	CAS No.	EINECS / EC No.	content	Function
Water	7732-18-5	231-791-2	11 - 13 %	solvent

No components which are listed in Annex II of the Regulation (EC) No 1223/2009 and its modifications and updates are added to and are not to be expected in the above mentioned product due to the raw materials used and the production process.

2. Information on production process

General description of production process:
Esterification of fatty acids with polyglycerin.

The product is not irradiated.

TEGO® Solve 61 is produced in the strictest absence of any animal derived material of any type.

Origin of vegetable starting material: rapeseed oil, palm kernel oil

GMO-Status:
The item does not contain ingredients that might have been derived from GM sources. However max 0.9 % cross-contamination is possible. Any protein or DNA is not present. Consequently the product will be PCR negative when tested.

2.1 By products

		method
1,4-Dioxane	not applicable	
Residual solvents	not applicable	
Dichloroacetic acid	not applicable	Chromatography
Monochloroacetic acid	not applicable	Chromatography
Free amines	not applicable	Chromatography
Pesticides	meets the valid regulatory requirements for limits on agricultural pesticides	
Nitrosamines	not applicable	
Total heavy metals	max. 20 ppm	AAS-ICP
As, Cd, Co, Cr, Hg, Ni, Pb, Sb	Each < 1 ppm	AAS-ICP
Latex	not to be expected in the product due to the raw materials used and the production process	
VOC	< 3 % according to SR (Swiss Right) 814.018	

2.2 CMR (Carcinogenic, Mutagenic or Reprotoxic)

The use in cosmetic products of substances classified as CMR substances, of category 1A or 1B or 2 under Part 3 of Annex VI to Regulation (EC) No 1272/2008 shall be prohibited.

Further Information:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:342:0059:0209:en:PDF

Some of the CMR substances mentioned below and listed in Annex VI to Regulation (EC) No 1272/2008 are used as starting materials or solvents for the production of our cosmetic raw materials and may require reporting under California Proposition 65 or the Safe Cosmetics Act, SB 484.

The presence of these prohibited substances has to be seen as non-intended. It is stemming from impurities of the starting materials or the manufacturing process which is technically unavoidable in good manufacturing practice.

CMR substance	Starting material	max. concentration	method
Ethylene Oxide	no		
Propylene Oxide	no		
Octamethylcyclotetrasiloxane (D4)	no		
2-Ethylhexanoic Acid	no		
n-Hexane	no		
Methyl Chloride	no		
Dimethyl Sulphate	no		

2.3 "Allergens" according to the Regulation (EC) No 1223/2009

The presence of substances, the mentioning of which is required under the column 'Other' in Annex III, shall be indicated in the list of ingredients in addition to the terms parfum or aroma.

The cosmetic raw materials and the cosmetic actives supplied by Evonik Personal Care are manufactured without the use of perfumes and fragrances. An analytical proof for the absence in traces of the substances to be mentioned in addition to the terms parfum or aroma is not performed in cosmetic raw materials, which are chemically produced.

None of these substances have been intentionally added to our cosmetic raw materials or are formed during the manufacturing process according to our knowledge of the chemistry.

2.4 Food Ingredients listed in Annex IIIa of Commission Directive 2007/68/EC.

None of these substances have been intentionally added to our cosmetic raw materials or are formed during the manufacturing process according to our knowledge of the chemistry.

3. Microbiological status

Total Viable Count	max. 100 cfu/g
Pathogens*	absent/g

*Pathogens are: Enterobacteria, Pseudomonas, Enterococci, Candida albicans, Staphylococci

4. Shelf life / storage conditions

24 months after production (unopened original packaging)

5. Regulatory Status

5.1 Customs tariff number 38249092

5.2 Regulatory status (chemical regulations)

Europe

Components	REACH status	CAS No.	EINECS / EC No.
Polyglyceryl-6 Caprylate	Polymer	108777-93-1	Polymer
Polyglyceryl-3 Cocoate	Polymer	1096160-92-7	Polymer
Polyglyceryl-4 Caprate	Polymer	74504-65-7	Polymer
Polyglyceryl-6 Ricinoleate	Polymer	68936-89-0	Polymer

Other countries

Country		yes / no	Remark
Polyglyceryl-6 Caprylate			
Australia	AICS:	no	registration maybe initiated on request
China	IECSC:	yes	
Taiwan	TCSI:	yes	
Polyglyceryl-3 Cocoate			
Australia	AICS:	no	registration maybe initiated on request
China	IECSC:	yes	up to 10 t/year
Taiwan	TCSI:	no	registration maybe initiated on request
Polyglyceryl-4 Caprate			
Australia	AICS:	yes	
China	IECSC:	yes	
Taiwan	TCSI:	yes	

Country		yes / no	Remark
Polyglyceryl-6 Ricinoleate			
Australia	AICS:	yes	
China	IECSC:	yes	
Taiwan	TCSI:	yes	
For the whole reaction mass under CAS No. 1588911-75-4			
Canada	DSL NDSL	no	but notified by Evonik Canada Inc. for up to 10 t/year

In the following countries the relevant authorities currently do not require pre-market approval for cosmetic raw materials:

Brazil, Japan, South Korea, Philippines, USA

5.2.1 Regulatory status (cosmetic regulation)

Country		yes / no	Remark
Polyglyceryl-6 Caprylate			
China	CFDA:	yes	
Japan	JSQI:	no	
Polyglyceryl-3 Cocoate			
China	CFDA:	yes	
Japan	JSQI:	no	
Polyglyceryl-4 Caprate			
China	CFDA:	yes	
Japan	JSQI:	no	
Polyglyceryl-6 Ricinoleate			
China	CFDA:	yes	
Japan	JSQI:	no	

6. Toxicology and Ecotoxicology

Refer to summary of ecotoxicological and toxicological data