TEGO® Care LTP

Cold processable PEG-free O/W Emulsifier

- Mild, EO- and preservative-free O/W emulsifier based on vegetable raw materials
- Cost effective liquid emulsifier, easy- to-use for cold processing of lotions and sprays and for hot processing of creams
- No co-emulsifiers needed
- Able to stabilize O/W lotions prepared in a cold process without a real homogenization step
- Usage concentration of 1.5 - 2.5 %

Personal Care

INCI name (CTFA name)

Sorbitan Laurate; Polyglyceryl-4 Laurate; Dilauryl Citrate

Chemical and physical properties (not part of specifications)

Form	liquid (η (25°C) < 3,000 mPas)
Appearance	Clear, yellow liquid (at 20°C)
HLB value	approx. 11

Properties

- TEGO® Care LTP is a versatile, liquid PEG-free emulsifier based on vegetable raw materials.
- TEGO® Care LTP is suitable for the formulation of O/W lotions, sprays and creams.
- No co-emulsifiers are needed in addition to TEGO® Care LTP.
- TEGO® Care LTP is free of preservatives.
- TEGO® Care LTP is a clear, yellow liquid at temperatures above 18°C. At temperatures below 18°C it starts to be turbid. When the product is brought back to room temperature it is again a clear, yellow liquid.
  The turbidity of TEGO® Care LTP at lower temperatures has no impact on the emulsifying performance.
  At temperatures below 15°C TEGO® Care LTP can become pasty. The pasty consistency is overcome by bringing the emulsifier to temperatures above 15°C.
  For better handling and dosage of the emulsifier, processing temperatures above 16°C are recommended.
- TEGO® Care LTP is especially of interest for the cold processing of lotions and sprays at room temperature and for the hot processing of creams.
- TEGO® Care LTP can be used for all standard production processes of O/W emulsions using a homogenizer.
- In cases where no homogenizer is available in production,
  TEGO® Care LTP can also be used for the preparation of O/W lotions using intense stirring instead of a homogenization step. (see formulation example F 8/08-3).
- It is recommended to add
  TEGO® Care LTP to the oil phase of emulsions.
- The recommended usage concentration of TEGO® Care LTP is 1.5 - 2.0 % for lotions and 1.5 - 2.5 % for sprays and creams.
- TEGO® Care LTP forms stable emulsions with all commonly used oils for skin care products, e. g. mineral oils, vegetable oils and synthetic esters.
- The formulations have a wide heat and cold stability range, typically they are stable from -15°C up to +45°C.
- TEGO® Care LTP has a good compatibility with UV filters and active ingredients.
- In cold processed formulations
  TEGO® Care LTP should be combined with polymeric stabilizers/thickeners in order to adjust the viscosity and the stability profile of the emulsions. For body lotions combinations of 0.1 - 0.3 % TEGO® Carbomer 141 or
  TEGO® Carbomer 140 with Xanthan Gum proved to be most effective. For the preparation of sprayable emulsions a combination of TEGO® Carbomer 141 and TEGO® Carbomer 341 ER (Acrylates/C10-30 Alkyl Acrylates Crosspolymer) proved to be most effective.
- In hot processed creams TEGO®
  Care LTP is preferably combined with consistency enhancers such as
  TEGIN® M Pellets (Glyceryl Stearate) and TEGO® Alkanol 18 (Stearyl Alcohol). Addition of small amounts of TEGO® Carbomer 134 (0.1 - 0.2 %) results in an improved freeze stability and in improved maintenance of the cream-like consistency at temperatures above 40°C.
- The pH value of emulsions based on TEGO® Care LTP can be preferably adjusted in a range from 5.0 - 9.0. Formulations based on TEGO® Care LTP with lower pH values in combination with electrolytes e.g. Aluminiumchlorohydrate or Dihydroxyacetone tend to show instabilities.
- EUXYL® K 300 and EUXYL® PE 9010 (Schülke&Mayr GmbH) as well as Microcare MEM (Thor GmbH) proved to be suitable as preservative systems.

Application

TEGO® Care LTP is especially suitable for O/W lotions, sprays and creams for:

- Facial and Body Care
- Baby Care
- Sunscreens
- After Sun Care

Preparation

Cold processing (using a homogenizer)
The components of the oil phase and the components of the water phase are mixed separately.
It is recommended to add TEGO® Care LTP to the oil phase. It was found that it is beneficial to include a mixture of Carbomer/Xanthan Gum directly in the oil phase.
Preferably oil- and water phase are combined without stirring. A homogenization step follows (the homogenizer has to be placed in the water phase).
After homogenization the pH can be adjusted by addition of an aqueous solution of Sodium Hydroxide (in order to neutralize the Carbomers).

Alternatively, the Carbomer/Xanthan Gum mixture can be added after the homogenization step. In this case a dispersion of Carbomer/Xanthan Gum in oil (20 % in e. g. Mineral Oil or TEGOSOFT® OP (Ethylhexyl Palmitate); not in triglycerides) is added and the emulsion is homogenized again for a short time, before the Carbomer is neutralized with e. g. Sodium Hydroxide.

Cold processing (intensive stirring)
The components of the oil phase and the components of the water phase are mixed separately.
It is recommended to add TEGO® Care LTP to the oil phase. It was found that it is beneficial to include a mixture of Carbomers/Xanthan Gum directly in the oil phase.
Preferably oil- and water phase are combined without stirring.
Oil- and water phase are then stirred intensively for approx. 5 minutes (depending on the size of production vessel and the intensity of the stirrer).
Then the pH of the emulsion is adjusted by the addition of an aqueous solution of Sodium Hydroxide.
Finally the emulsion is again stirred intensively for 5 minutes (depending on the size of the production vessel and the intensity of the stirrer) until the target viscosity is obtained.
(Longer and more intensive stirring leads to a finer droplet size but to a lower viscosity (due to thinning of the Carbomer network in the aqueous phase).

Hot processing (using a homogenizer)
For the hot processing of O/W creams it is recommended to combine 1.5 - 2.5% of TEGO® Care LTP with 4.0 - 8.0% of consistency enhancers such as TEGIN® M Pellets (Glyceryl Stearate),
TEGO® Alkanol 18 (Stearyl Alcohol).
TEGO® Carbomer 134 is added for cold stability and for improved maintenance of cream-like consistency upon storage at temperatures above 40°C.
TEGO® Care LTP is added together with the consistency enhancers to the oil phase.

Oil and water phases are heated separately to approx. 80°C. The hot oil phase is added to the hot water phase with stirring. This pre-emulsion is then homogenized.

If the oil phase has to be charged into the vessel first due to the production facility, the water phase should be added without stirring to the oil phase. A homogenization step follows (make sure that the homogenizer is placed in the water phase).
After homogenization an oily dispersion of TEGO® Carbomer is added at 60°C and the emulsion is homogenized again for a short time.
During cooling under continuous moderate stirring the viscosity of the initially low viscous emulsion increases to a cream viscosity due to the solidification of the hydrated consistency-enhancers.

Fragrance, heat sensitive or electrolyte containing active ingredients are added between 40 and 35 °C.

The Carbomer can be neutralized with e. g. Sodium Hydroxide between 60 and 35°C.

Suggested usage concentration

1.5 - 2.5 % TEGO® Care LTP

Packaging

200 kg drums

Storage

At temperatures below 18°C TEGO® Care LTP starts to become turbid. When the product is brought back to room temperature it is again a clear, yellow liquid. The emulsifying ability is not affected by a possible turbidity of the product.

A possible turbidity of TEGO® Care LTP at lower temperatures has no impact on the emulsifying properties of the product.
As TEGO® Care LTP is getting pasty at temperatures below 15°C, it is recommended to use processing temperatures above 16°C for better handling and dosage of the emulsifier.

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 sheets.

Guide Line Formulations

O/W Body Spray (Cold Processing) F 27/06-6	
Phase A	
TEGO® Care LTP	2.00 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	6.50 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	7.30 %
TEGO® Carbomer 141 (Carbomer)	0.10 %
TEGO® Carbomer 341 ER (Acrylates/C10-30 Alkyl Acrylates Crosspolymer)	0.10 %
Phase B	
Glycerin	3.00 %
Water	81.00 %
Phase C	
Sodium Hydroxide (10 % in water)	q.s.
Phase Z	
Parfum, Preservative	q.s.

Preparation:

1. Prepare phase A and B separately at room temperature.
2. Combine phase A and B without stirring.
3. Homogenize.
4. Add phase C and Z.

Viscosity = 2.6 Pas
(Brookfield RVT Spindle 5 / 10 rpm (25°C))

Cold Processed PEG-free O/W Lotion (without homogenization step) F 8/08-3	
Phase A	
TEGO® Care LTP	2.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	10.20 %
Mineral Oil (30 mPas)	9.00 %
TEGO® Carbomer 140 (Carbomer)	0.10 %
TEGO® Carbomer 141 (Carbomer)	0.10 %
Xanthan Gum	0.10 %
Phase B	
Glycerin	3.00 %
Water	75.50 %
Phase C	
Sodium Hydroxide (10 % in water)	q.s.
Phase Z	
Parfum, Preservative	q.s.

Preparation:

1. Prepare phase A and B separately at room temperature
2. Combine phase A and B without stirring.
3. Stir for 5 minutes (MIG stirrer 900 rpm).
4. Add phase C and Z.
5. Stir again for 5 minutes (MIG stirrer 900 rpm).

Light O/W Anti-Aging Lotion (Cold Processing) F 9/06-2	
Phase A	
TEGO® Care LTP	1.50 %
TEGOSOFT® CI (Cetearyl Isononanoate)	10.00 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	3.50 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	1.10 %
TEGO® Carbomer 140 (Carbomer)	0.15 %
TEGO® Carbomer 141 (Carbomer)	0.15 %
Xanthan Gum	0.10 %
Phase B	
TEGO® Cosmo C 100 (Creatine)	0.50 %
Glycerin	3.00 %
Water	80.70 %
Phase C	
Sodium Hydroxide (10 % in water)	q.s.
Phase Z	
Parfum, Preservative	q.s.

Preparation:

1. Prepare phase A and B separately at room temperature.
2. Combine phase A and B without stirring.
3. Homogenize.
4. Add phase C and Z.

O/W Sun Protection Spray (Cold Processing) H 10/06-10	
Phase A	
TEGO® Care LTP	2.00 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	4.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	4.80 %
TEGO® Carbomer 141 (Carbomer)	0.10 %
TEGO® Carbomer 341 ER (Acrylates/C10-30 Alkyl Acrylates Crosspolymer)	0.10 %
Octocrylene	3.00 %
Ethylhexyl Methoxycinnamate	5.00 %
Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (Tinosorb S, BASF)	2.00 %
Phase B	
Glycerin	3.00 %
Water	76.00 %
Phase C	
Sodium Hydroxide (10 % in water)	q.s.
Phase Z	
Parfum, Preservative	q.s.

Preparation:

1. Mix ingredients of phase A at room temperature and homogenize until UV filters are solubilized.
2. Prepare phase B separately at room temperature.
3. Combine phase A and B without stirring.
4. Homogenize.
5. Add phases C and Z with stirring.

SPF 14 (in vitro)
(Sunscreen Tester: 1 mg/cm^3; on PMMA slides)

Viscosity = 1.8 Pas
(Brookfield RVT Spindle 4 / 5 rpm) (25°C)

High Sun Protection O/W Lotion (Cold Processing) SPF 50 Ma 38/07-2	
Phase A	
TEGO® Care LTP	3.00 %
Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine	4.00 %
Butyl Methoxydibenzoylmethane	3.00 %
Ethylhexyl Methoxycinnamate	3.00 %
Ethylhexyl Salicylate	5.00 %
Ethylhexyl Triazone	1.50 %
Octocrylene	8.00 %
Phase B	
TEGO® Sun TDEC 45 (Titanium Dioxide; Diethylhexyl Carbonate; Polyglyeryl-6 Polyhydroxystearate)	6.70 %
TEGO® Carbomer 341 ER (Acrylates / C10-30 Alkyl Acrylates Crosspolymer)	0.20 %
Xanthan Gum	0.20 %
Phase C	
Glycerin	2.00 %
Water	62.40 %
Phase D	
Phenonip XB (Phenoxyethanol, Methylparaben, Propylparaben, Ethylparaben)	1.00 %
Phase E	
Sodium Hydroxide (10 % in water)	q.s.

Preparation:

1. Homogenize phase A until sun filters are dissolved.
2. Add phase B to phase A and homogenize.
3. Add phase A/B to phase C with stirring.
4. Homogenize.
5. Add phase D and E in the given order and stir well.

Calculated values: SPF 50 (BASF Sunscreen Simulator)
UVF-PF (PPD): 15.2 Critical Wavelength: 375
UVA/B ratio: 0.62 UVA-Balance: 32

O/W Cream for Daily Wear F 17/06-9	
Phase A	
TEGO® Care LTP	2.00 %
TEGIN® M Pellets (Glyceryl Stearate)	3.50 %
TEGO® Alkanol 18 (Stearyl Alcohol)	3.50 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	8.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	8.00 %
Phase B	
Glycerin	3.00 %
Water	71.50 %
Phase C	
TEGO® Carbomer 134 (Carbomer)	0.10 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	0.40 %
Phase D	
Sodium Hydroxide (10 % in water)	q.s.
Phase Z	
Parfum, Preservative	q.s.

Preparation:

1. Heat phase A and B separately to approx. 80°C.
2. Add phase A to phase B with stirring.[1)]
3. Homogenize.
4. Cool with gentle stirring to approx. 60°C and add phase C.
5. Homogenize for a short time.
6. Cool with gentle stirring and add phase D and Z below 40°C.

Important: If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

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