Technical Information

ABIL® Care XL 80

Emulsifier with a unique combination of stability, flexibility and sensory properties

INTENDED USE

O/W emulsifier

BENEFITS AT A GLANCE

- Silicone O/W emulsifier providing an outstanding combination of stabilization, flexibility and sensory benefits
- Formulations with a smooth and velvety-silky skin feel
- High formulation flexibility for all types of cosmetic formulations
- Suitable for cold and hot processed emulsions
- Low usage concentration (2.0 - 3.0%)
- Easy to process (liquid)

INCI (PCPC NAME)

Bis-PEG/PPG-20/5 PEG/PPG-20/5 Dimethicone; Methoxy PEG/PPG-25/4 Dimethicone; Caprylic/Capric Triglyceride

CHEMICAL AND PHYSICAL PROPERTIES (NOT PART OF SPECIFICATIONS)

Form	liquid
HLB value	Approx. 11

ABIL® Care XL 80 is a liquid emulsifier with a translucent, opaque appearance at room temperature. If ABIL® Care XL 80 is stored at temperatures below 20 °C, the product can become slightly turbid. This turbidity, however, is no indication for a phase separation and has no impact on product stability and emulsification performance. The turbidity is fully reversible if the product is taken back to room temperature again.

PROPERTIES

- ABIL® Care XL 80 is a silicone based non-ionic emulsifier for oil-in-water emulsions. Its composition has been optimized in order to achieve excellent emulsion stabilizing properties, formulation flexibility and sensory benefits.
- ABIL® Care XL 80 contains about 82% of silicone polyether based emulsifiers and about 18% of Caprylic/Capric Triglyceride in order to obtain a liquid product that can be pumped at room temperature.
- The specific composition of ABIL® Care XL 80 leads to optimal emulsion stability while enabling to provide a specific smooth and velvety skin feel to cosmetic emulsions.
- ABIL® Care XL 80 can help counteract the negative sensory effects of other ingredients, for example the tackiness of glycerine or carbomers or the dry feel of waxy stabilizers.
- ABIL® Care XL 80 is a purely non-ionic emulsifier and shows an excellent compatibility with non-ionic, cationic and anionic ingredients such as emulsifiers, texturizing agents, thickeners, UV filters or active ingredients. It is typically suitable for formulations with a pH from 4 to 8.
- ABIL® Care XL 80 is suitable for cold processing of lotions, sprays and cream gels and for hot processing of lotions and creams.
- The usage concentration of ABIL® Care XL 80 is 2.0 - 3.0% depending on the specific formulation needs.
- For cold processed formulations a viscosity enhancing and stabilizing system is necessary. A combination of TEGO® Carbomer and Xanthan Gum is recommended

- For hot processed creams with waxy consistency-enhancers in most cases small amounts of a non-silicone based co-emulsifier are required for better formation of liquid-crystalline structures in the external water phase. For example TEGINACID® C Pellets (Ceteareth-25) at 0.3 – 0.5% can be used. As consistency-enhancer a combination of TEGIN® M Pellets (Glyceryl Stearate) and Stearyl Alcohol is suggested.
- Formulations based on ABIL® Care XL 80 typically have a wide heat and cold stability range (e. g. from -15 °C up to +45 °C).
- Typical applications of ABIL® Care XL 80 can be facial care, body care, sun care, baby care, decorative cosmetics and AP/DEO formulations.

PREPARATION AND FORMULATION HINTS

Cold processed sprays and lotions

For this type of formulations thickeners can be present in the oil phase before the homogenisation step. The addition after the homogenisation step is possible, too. Suitable polymeric thickeners are combinations of Carbomer/Xanthan Gum, Acrylates/C10-30 Alkyl Acrylates Crosspolymer or Polyacrylamide, C13-14 Isoparaffin, Laureth-7 (Sepigel 305).
The usage level of ABIL® Care XL 80 is 2.0 – 2.5%.
A co-emulsifier is not required.

Production

The components of the oil phase including ABIL® Care XL 80 and the components of the water phase are mixed separately. Thickener combinations such as TEGO® Carbomer 141/341 ER or TEGO® Carbomer 140/141/Xanthan Gum can be already included into the oil phase.
The oil phase is added to the water phase with stirring. Then the coarsely dispersed pre-emulsion is homogenised.
If the oil phase has to be charged into the vessel first due to production facility related conditions, the water phase has to be added **without stirring** to the oil phase before the homogenisation step (to avoid the formation of a water-in-oil emulsion).
After homogenisation the dispersion of Carbomer/Xanthan Gum or Carbomer in oil -at 20% in Mineral Oil or TEGOSOFT® OS (Ethylhexyl Stearate) - is added (if not incorporated before) and the emulsion is homogenised again for a short time.
Avoid the use of triglyceride based esters for dispersion of the Carbomer/ Xanthan Gum.
The Carbomer is then neutralized with e. g. Sodium Hydroxide.

Hot processed lotions

For the hot processing of O/W lotions it is recommended to combine 2.0 – 2.5% of ABIL® Care XL 80 with 2.0 – 4.0% of consistency enhancers such as TEGIN® M Pellets (Glyceryl Stearate) and TEGO® Alkanol 1618 (Cetearyl Alcohol). A co-emulsifier is not required.

Polymeric thickeners are added for cold stability.
The polymeric thickener such as 0.2 – 0.3% TEGO® Carbomer 141 has to be added at 40 °C.

Production

The oil phase including ABIL® Care XL 80 and the water phase are heated separately to approx. 80 °C. The oil phase is added to the water phase with stirring. Then the coarsely dispersed pre-emulsion is homogenised.
If the oil phase has to be charged into the vessel first due to production facility related conditions, the water phase has to be added **without stirring** to the oil phase before the homogenisation step (to avoid the formation of a water-in-oil emulsion).
The emulsion is cooled down with gentle stirring.
At 40 °C the dispersion of TEGO® Carbomer 141 in oil is added and the emulsion is homogenised again for a short time.
Fragrance, heat sensitive or electrolyte containing active ingredients are added between 40 and 35 °C.
The Carbomer is then neutralized with e. g. Sodium Hydroxide.

Hot Processed Creams

Creams require a co-emulsifier.
The combination of ABIL® Care XL 80 at 2.0% and TEGINACID® C Pellets (Ceteareth-25) at 0.5% is suggested.
Depending on the formula 6.0% of a consistency-enhancer is required for the formation of viscosity increasing structures in the external water phase. Especially effective is a combination of TEGIN® M Pellets (Glyceryl Stearate) and Stearyl Alcohol. TEGO® Carbomer 134 may be added for viscosity adjustment and improvement of freeze stability.

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PRODUCTION

Oil and water phases are heated to 70 – 80 °C. The hot oil phase is added to the hot water phase with stirring. Then it is homogenised (the homogeniser should be placed in the water phase).

If the oil phase has to be charged into the vessel first due to the production facility, the water phase has to be added without stirring to the oil phase, then homogenised (to avoid the formation of a water-in-oil emulsion).

If necessary after homogenisation a dispersion of TEGO® Carbomer 134 – at 20% in Mineral Oil or TEGOSOFT® OS (Ethylhexyl Stearate) – is added at 60 °C and the emulsion is homogenised again for a short time.

Avoid the use of triglyceride based esters for dispersion of the TEGO® Carbomer 134.
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.

COMPARING PERFORMANCES

The performance benefits of ABIL® Care XL 80 compared to other silicone based O/W emulsifiers can be demonstrated in a wide set of formulations. In general ABIL® Care XL 80 shows superior emulsion stability and improved formulation flexibility. In most cases co-emulsifiers are not needed to obtain stable formulations.

Only in the case of hot processed O/W emulsions a small amount of non-silicone based co-emulsifier is recommended in order to build up a strong liquid-crystalline network with consistency enhancers in the water phase. However, also in this case ABIL® Care XL 80 requires lower amount of co-emulsifiers compared to other available silicone based O/W emulsifiers.

As an example for performance testing a comparison to the silicone O/W emulsifier PEG-12 Dimethicone is given. The two emulsifiers have been compared in two critical test formulations containing only 1.5% of emulsifier and various types of oils ((1) Ethylhexyl Stearate / Mineral Oil and (2) Diethylhexyl Carbonate / Cyclopentasiloxane).

The clearly better stability of the emulsions based on ABIL® Care XL 80 is reflected in micrographs comparing the size and stability of particles shortly after production (four days at room temperature) and after one month at 45 °C.

Test Formulation 1 Cold Processed Lotion

Phase A	
Silicone based O/W emulsifier	**1.50%**
TEGOSOFT® OS (Ethylhexyl Stearate)	9.88%
Mineral Oil (30mPas)	9.00%
TEGO® Carbomer 134 (Carbomer)	0.16%
Xanthan Gum	0.16%
Phase B	
Water	77.35%
Phase C	
Sodium Hydroxide (10% in water)	1.25%
Phase Z	
Phenoxyethanol, Methylparaben; Butylparaben; Ethylparaben; Propylparaben; Isobutylparaben (Euxyl® K 300 (Schülke & Mayr GmbH)	0.70%

Preparation:

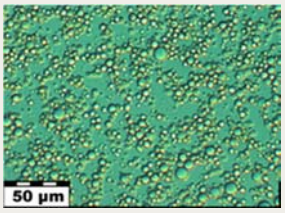
1. Combine phase A and B without stirring.
2. Homogenize.
3. Add phase C and Z and homogenize again.

Test Formulation 2 Cold Processed Lotion

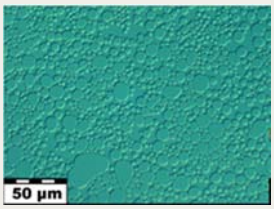
Phase A	
Silicone based O/W emulsifier	1.50%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	9.88%
Cyclopentasiloxane	9.00%
TEGO® Carbomer 134 (Carbomer)	0.16%
Xanthan Gum	0.16%
Phase B	
Water	77.35%
Phase C	
Sodium Hydroxide (10% in water)	1.25%
Phase D	
Phenoxyethanol, Methylparaben; Butylparaben; Ethylparaben; Propylparaben; Isobutylparaben (Euxyl® K 300, Schülke & Mayr GmbH)	0.70%

Preparation:

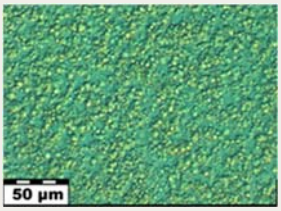
1. Combine phase A and B without stirring.
2. Homogenize.
3. Add phase C and Z and homogenize again.



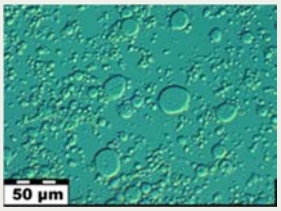
ABIL® Care XL 80:
4 days room temperature



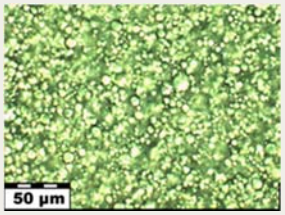
ABIL® Care XL 80:
1 month 45 °C



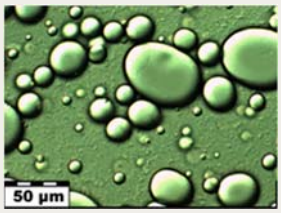
ABIL® Care XL 80:
4 days room temperature



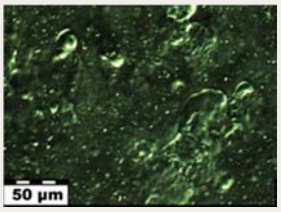
ABIL® Care XL 80:
1 month 45 °C



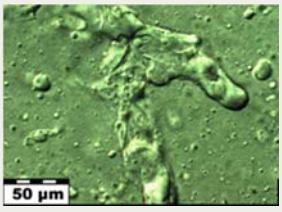
PEG-12 Dimethicone:
4 days room temperature



PEG-12 Dimethicone:
1 month 45 °C



PEG-12 Dimethicone:
4 days room temperature



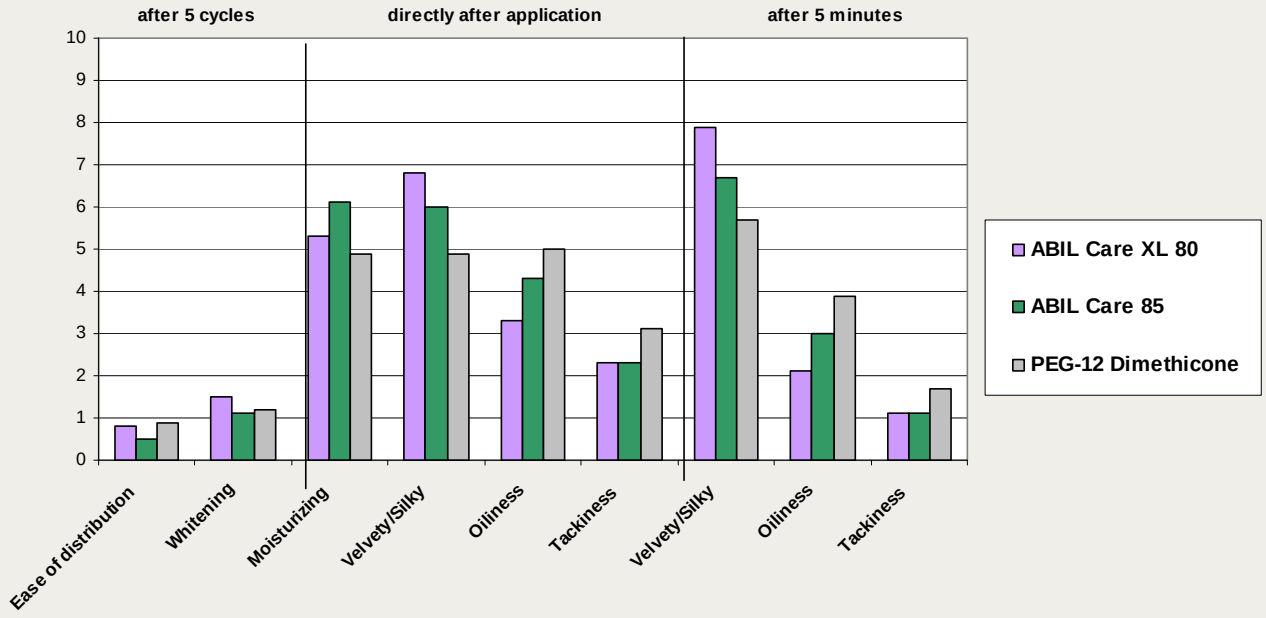
PEG-12 Dimethicone:
1 month 45 °C

Fig. 1: Micrographs comparing the performance of ABIL® Care XL 80 and PEG-12 Dimethicone in a test formulation based on Mineral Oil and Ethylhexyl Stearate.

Fig. 2: Micrographs comparing the performance of ABIL® Care XL 80 and PEG-12 Dimethicone in a test formulation based on Diethylhexyl Carbonate and Cyclopentasiloxane.

Moreover, the sensory properties of emulsions based on ABIL® Care XL 80 were rated in all conducted tests as comparable or better compared to other silicone based emulsifiers

As an example the results of a sensory panel comparing ABIL® Care XL 80, ABIL® Care 85 and PEG-12 Dimethicone in cold processed body lotion based on Mineral Oil and Ethylhexyl Stearate are shown in Fig.3 (formulations corresponds to test formulation 1 containing 2.0% of the test emulsifiers).



SUGGESTED USAGE CONCENTRATION

2.0 – 3.0% ABIL® Care XL 80

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 case of accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

GUIDELINE FORMULATIONS

Silky O/W Cream Gel JS 6/15-2

Phase A	
ABIL® Care XL 80	3.00%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.00%
Dimethicone (5 mPas)	9.00%
ABIL® 350 (Dimethicone)	1.00%
TEGOSOFT® CR (Cetyl Ricinoleate)	3.00%
TEGO® Carbomer 341 ER (Acrylates/C10-30 Alkyl Acrylate Crosspolymer)	0.40%
Xanthan Gum	0.20%
Phase B	
Water	73.20%
TEGO® Cosmo C 100 (Creatine)	0.50%
Phase C	
Alcohol	5.00%
Sodium Hydroxide (10% in water)	q.s.
Phenoxyethanol; Ethylhexylglycerin (Euxyl PE 9010, Schülke&Mayr GmbH)	0.70%
Phase Z	
Perfume	q.s.

Preparation:

1. Heat phase A to approx. 30 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Add phase C and homogenize for a short time.

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

Emulsion viscosity: 20 Pas (Brookfield RV DV-I, sp. C, 10 rpm)

Light O/W Lotion with silky skin feel (Hot processed) FU 16/16-4

Phase A	
ABIL® Care XL 80	2.00%
TEGO® Alkanol 1618 (Cetearyl Alcohol)	1.25%
TEGIN® M Pellets (Glyceryl Stearate)	1.25%
TEGOSOFT® OS (Ethylhexyl Stearate)	4.50%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.50%
Triisostearin	1.50%
Phase B	
Glycerin	3.00%
Water	80.30%
Phase C	
TEGO® Carbomer 141 (Carbomer)	0.20%
TEGOSOFT® OS (Ethylhexyl Stearate)	0.80%
Phase D	
Sodium Hydroxide (10% in water)	q.s.
Phase E	
Benzyl Alcohol, Ethylhexylglycerin, Tocopherol (Euxyl K 900, Schülke&Mayr GmbH)	q.s.
Phase Z	
Perfume	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 below 40°C.
7. Cool with gentle stirring and add phase E below 30°C and stir.

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

Emulsion viscosity: 25 Pas (Brookfield RVT-I, sp. 4, 5 rpm)

Anti-Pollution & Intensive Hydration Sleep Mask CHN BR 25-2-47

Phase A	
ABIL® Care XL 80	0.50%
ABIL® 350 (Dimethicone)	1.50%
TEGOSOFT® OS (Ethylhexyl Stearate)	4.00%
Phytosphingosine SLC (Salicyloyl Phytosphingosine)	0.05%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.00%
Phase B	
TEGO® Carbomer 341 ER (2% in water) (Acrylates/C10-30 Alkyl Acrylate Crosspolymer)	30.00%
Glycerin	5.00 %
TEGO® Cosmos C 100 (Creatine)	0.50%
TEGO® Natural Betaine (Betaine)	2.00%
HyaCare® (1% in water) (Sodium Hyaluronate)	3.00%
HyaCare® 50 (1% in water) (Hydrolyzed Hyaluronic Acid)	3.00%
Phase C	
Water	43.10%
Triethanolamine (78 %)	0.60%
SK-INFLUX® V (Ceramide NP; Ceramide AP; Ceramide EOP; Phytosphingosine; Cholesterol; Sodium Lauroyl Lactylate; Carbomer; Xanthan Gum)	1.50%
Phase D	
Phenoxyethanol; Ethylhexylglycerin (Euxyl PE 9010)	1.00%
Perfume "Azura 231517" *	0.25%

Preparation:

1. Add Phytosphingosine SLC in TEGOSOFT® CT and heat to 85 °C.
2. Add other ingredients of phase A and mix well.
3. Add phase B in phase A.
4. Homogenize.
5. Add phases C and D while stirring.

Emulsion viscosity: 20 Pas (Brookfield RV DV-I, sp: 5, 10 rpm).

* Fragrance Resources GmbH

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