

Technical Information

ABIL® Care XL 80 MB

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%); 0.3 to 0.5 % if used as sensory additive in cream gels
- 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
HL value	Approx. 11

ABIL® Care XL 80 MB is a liquid emulsifier with a translucent, opaque appearance at room temperature. If ABIL® Care XL 80 MB 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 MB 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 MB 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 MB leads to optimal emulsion stability while enabling to provide a specific smooth and velvety skin feel to cosmetic emulsions.
- ABIL® Care XL 80 MB 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 MB 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 MB 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 MB 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 Acrylates/C10-30 Alkyl Acrylate Crosspolymer (Carbomer Copolymer C)/Carbomer (Carbomer Homopolymer A) 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 (Cetareth-25) at 0.3 – 0.5% can be used. As consistency-enhancer a combination of TEGIN® M Pellets MB (Glyceryl Stearate) and Stearyl Alcohol is suggested.
- Formulations based on ABIL® Care XL 80 MB 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 MB 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 MB is 2.0 to 2.5%. A co-emulsifier is not required.

Production

The components of the oil phase including ABIL® Care XL 80 MB and the components of the water phase are mixed separately. Thickener combinations such as Acrylates/C10-30 Alkyl Acrylate Cross-polymer (Carbomer Copolymer C)/Carbomer (Carbomer Homopolymer A) or Carbomer (Carbomer Homopolymer C)/Carbomer (Carbomer Homopolymer A)/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 MB with 2.0 – 4.0% of consistency enhancers such as TEGIN® M Pellets MB (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% Carbomer (Carbomer Homopolymer A) has to be added at 40 °C.

Production

The oil phase including ABIL® Care XL 80 MB 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 Carbomer (Carbomer Homopolymer A) 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 MB at 2.0% and TEGINACID® C Pellets (Cetareth-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 MB (Glyceryl Stearate) and Stearyl Alcohol. Carbomer (Carbomer Homopolymer C) or Acrylates/C10-30 Alkyl Acrylate Crosspolymer (Carbomer Copolymer C) may be added for viscosity adjustment and improvement of freeze stability.

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 Carbomer (Carbomer Homopolymer C) – 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 Carbomer (Carbomer Homopolymer C). 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. Carbomer can be neutralized with e. g. Sodium Hydroxide between 60 and 35 °C.

Comparing Performances

The performance benefits of ABIL® Care XL 80 MB compared to other silicone-based O/W emulsifiers can be demonstrated in a wide set of formulations. In general, ABIL® Care XL 80 MB 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 MB 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 MB 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%
Carbomer	0.16%
Xanthan Gum	0.16%

Phase B

Water	77.35%
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Phase C

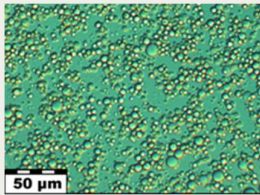
Sodium Hydroxide (10% in water)	1.25%
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Phase Z

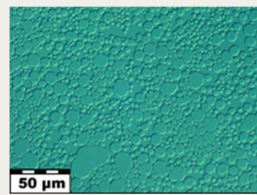
Phenoxyethanol, Methylparaben; Butylparaben; Ethylparaben; Propylparaben; Isobutylparaben	0.70%
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Preparation

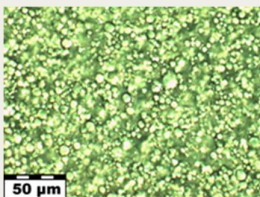
1. Combine phases A and B without stirring.
2. Homogenize.
3. Add phases C and Z and homogenize.



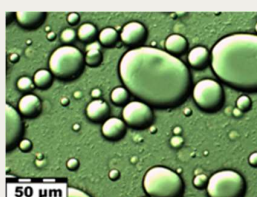
ABIL® Care XL 80 MB:
4 days room temperature



ABIL® Care XL 80 MB:
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 MB and PEG-12 Dimethicone in a test formulation based on Mineral Oil and Ethylhexyl Stearate.

Test Formulation 2: Cold Processed Lotion

Phase A

Silicone based O/W emulsifier	1.50%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	9.88%
Cyclopentasiloxane	9.00%
Carbomer	0.16%
Xanthan Gum	0.16%

Phase B

Water	77.35%
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Phase C

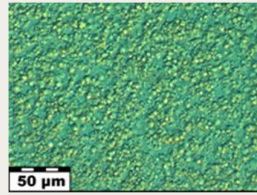
Sodium Hydroxide (10% in water)	1.25%
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Phase Z

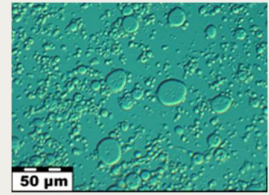
Phenoxyethanol, Methylparaben; Butylparaben; Ethylparaben; Propylparaben; Isobutylparaben	0.70%
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Preparation

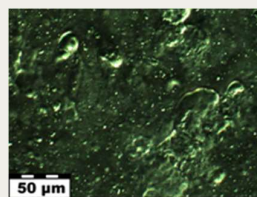
1. Combine phases A and B without stirring.
2. Homogenize.
3. Add phases C and Z and homogenize again.



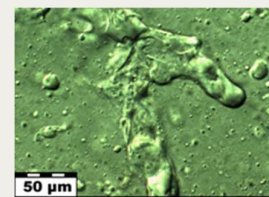
ABIL® Care XL 80 MB:
4 days room temperature



ABIL® Care XL 80 MB:
1 month 45 °C



PEG-12 Dimethicone:
4 days room temperature

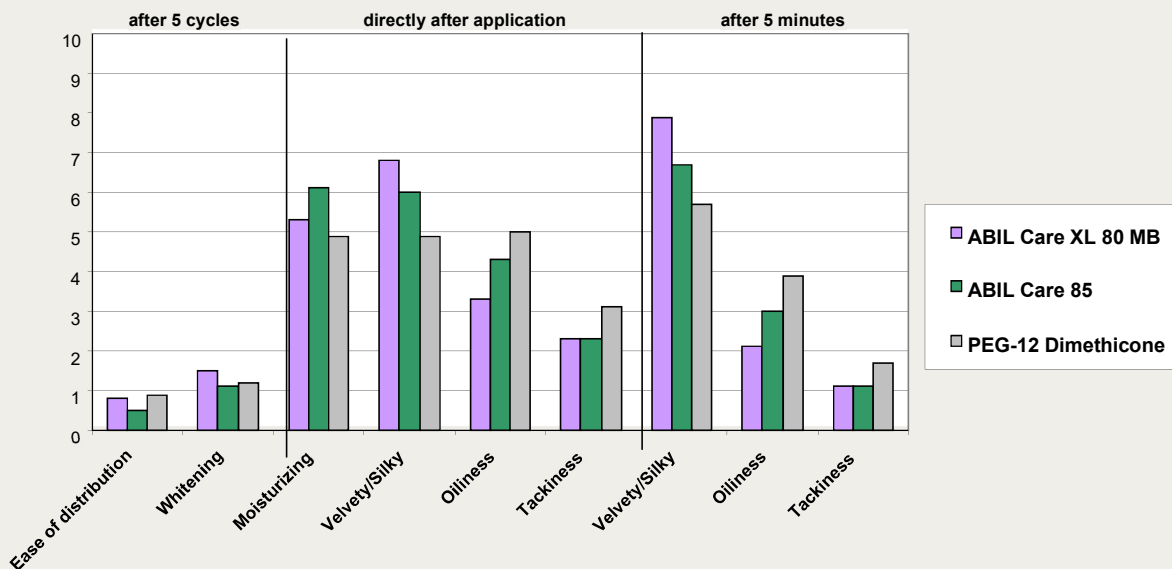


PEG-12 Dimethicone:
1 month 45 °C

Fig. 2: Micrographs comparing the performance of ABIL® Care XL 80 MB 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 MB 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 MB, 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 MB

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

If you are interested in guideline formulations please visit our homepage <https://personal-care.evonik.com>.

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