

Caproicine

Caproicine is a **mild** and **multi-functional ingredient** for the **cleansing** of skin and scalp:

- **Caproicine** is an **anti-acne ingredient** that reduces sebum production and inhibits the growth of *Propionibacterium acnes*. It inhibits the 5 α -reductase, a key enzyme in the regulation of sebum production.
- **Caproicine reduces dandruff formation** thanks to its anti-microbial activity against the yeast *Malassezia furfur* (*Pityrosporum ovale*), and it simultaneously reduces fatty scalp.
- **Caproicine** can act as **deodorant agent**, as it inhibits the growth of bacteria which are involved in the formation of body odour. Targeted germs are e.g. *Staphylococcus epidermidis*, *Bacillus subtilis*, *Micrococcus luteus*, as well as different Corynebacteria.
- **Caproicine** can help to **protect cosmetic formulations**. It can be combined with preservative boosters to enhance their performance or even substitute traditional preservatives.

ONE FOR EVERYONE

The multitude of potential applications of Caproicine are highlighted by a range of example formulations, designed to care for the whole family:

ONE FOR EVERYONE anti-acne face cleanser, ONE FOR EVERYONE anti-dandruff shampoo, ONE FOR EVERYONE deodorant and ONE FOR EVERYONE moisturizing face lotion.

Functions

- Anti-acne and anti-seborrhoea
- Anti-dandruff
- Purifying and deodorizing
- Microbial protection of formulations

Applications

- Skin care
- Hair care
- Toiletries



Specifications and characteristics

INCI name	Capryloyl Glycine
CAS reg. N°	[14246-53-8]
Recommended pH of use	4.0 – 7.0
Recommended use level	0.5 to 2.0 %
Appearance	White or almost white crystalline powder
Melting point	106 – 111 °C
Purity (HPLC)	Min. 99.0 area-%
Content (HPLC)	98.0 – 102.0 wt.-%
Loss on drying	Max. 0.5 wt.-%
Sulphated ash	Max. 0.5 wt.-%
Acid value	265 – 300 mg KOH/g
Regulatory status	Globally approved; safety and regulatory data are available upon request
Origin, ISO 16128-2	Naturality index: 0.687 "derived-natural", 80 % renewable carbon (of total carbon)
Chemical structure	

Caproic acid

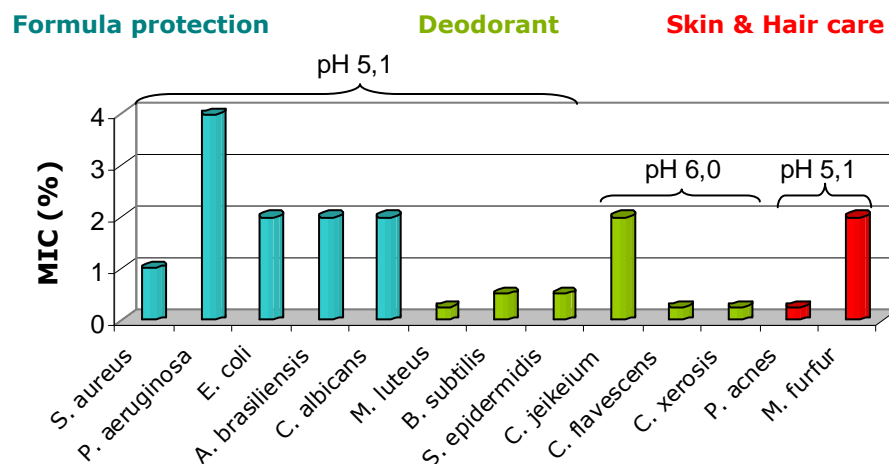
Performances

Antimicrobial effects

Caproic acid inhibits the growth of a multitude of micro-organisms. The corresponding minimum inhibitory concentrations (MIC) were determined in suspension at pH 5.1. The tests on *Corynebacteria* were carried out at pH 6, because these microbes do not grow at pH < 6 (see graph below).

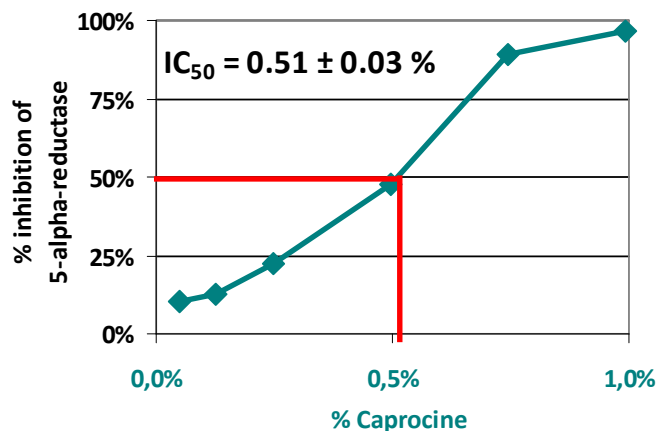
Caproic acid inhibits the growth of microbes that play a role in the formation of body odour. It can therefore be regarded as an interesting additive for deodorant formulations. Thanks to its inhibiting effects on the growth of *Malassezia Furfur* and *Propionibacterium acnes*, **Caproic acid can further support the treatment of acne and dandruff** via this second mechanism.

Caproic acid also prevents the growth of all common test organisms used in microbial challenge tests. It can therefore be considered as a **co-protecting agent for cosmetic formulations**. **Caproic acid** can be beneficially combined with preservative boosters for enhanced activity, such as e.g. the eco-sourced alkanediol **A-Leen 5**.



Inhibition of 5- α -reductase

Caproic acid inhibits the 5 α -reductase, a key enzyme in the **regulation of sebum production**. The IC₅₀-value of Caproic acid was determined in an in-vitro assay on the isolated enzyme:



Caproic acid can therefore reduce the formation of sebum in sebaceous glands. Skin and scalp become less greasy, and those microbes that are consuming sebum grow less. This concerns e.g. the dandruff forming yeast *Malassezia Furfur*, and the acne-forming bacterium *Propionibacterium acnes*.

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Co-preservation effect

The efficacy of **Caproicine** as co-preservative was confirmed in a challenge test according to ISO 11930. The amount of test germs present in the formulation was checked after 7, 14 and 28 days. The variations in the numbers of colony forming units (cfu) are presented below in a logarithmic form. The following O/W-emulsion (pH 5.5) was tested:

Phase	Ingredient	INCI name	%
A	Water	Aqua	ad 100
	Xanthan Gum ⁽¹⁾	Xanthan Gum	0.5
	Caproicine ⁽²⁾	Capryloyl Glycine	0.0 or 2.0
	A-leen 5 ⁽²⁾	Pentylene Glycol	2.0
B	Emulgade PL 68/50 ⁽³⁾	Cetearyl Glucoside (and) Cetearyl Alcohol	5.0
	Lipex Sheasoft ⁽⁴⁾	Butyrospermum Parkii (Shea) Butter	3.0
	Lipovol J ⁽⁴⁾	Simmondsia Chinensis (Jojoba) Oil	3.0
	Lipovol HNO ⁽⁴⁾	Corylus Americana (Hazel) Seed Oil	3.0
C	Bioxan T70 ⁽⁵⁾	Tocopherol	0.1
D	10 % aq. Citric acid	Citric Acid (and) Aqua	ad pH 5.5

Raw material suppliers

⁽¹⁾ Jungbunzlauer

⁽²⁾ **Minasolve**

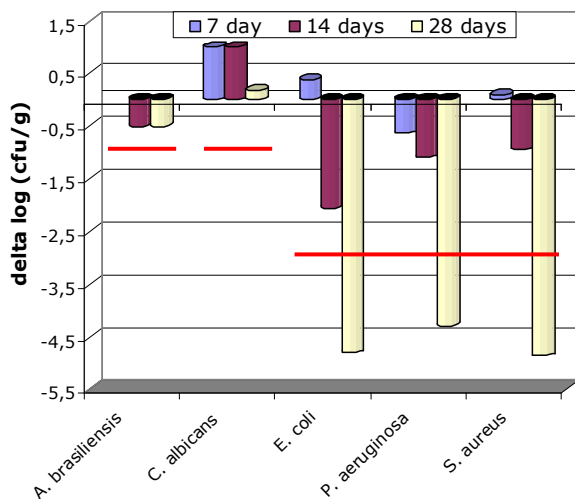
⁽³⁾ BASF

⁽⁴⁾ Aarhus Karlshamn (AAK)

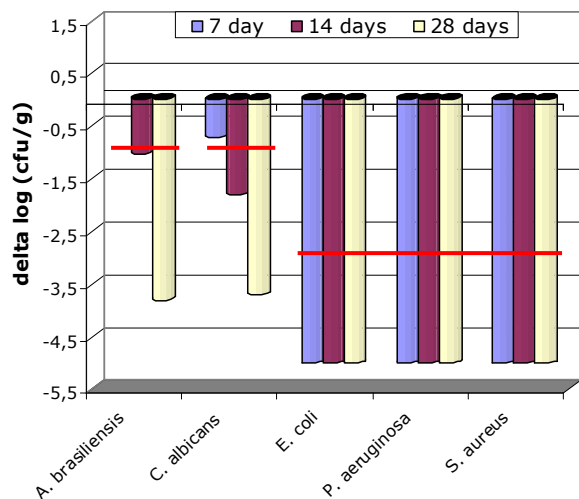
⁽⁵⁾ BTSA

Results of the microbial challenge tests*:

0 % Caproicine



2 % Caproicine



— ISO 11930 requirements for log cfu reduction after 28 days (criteria A)

*Results within experimental error of 0.5 delta log (cfu/g)

Caproicine protects the tested O/W-emulsion. Hence it acts synergistically with the bio-based boosting agent **A-Leen 5**. The tested formulation fulfils criteria A of the norm ISO 11930.

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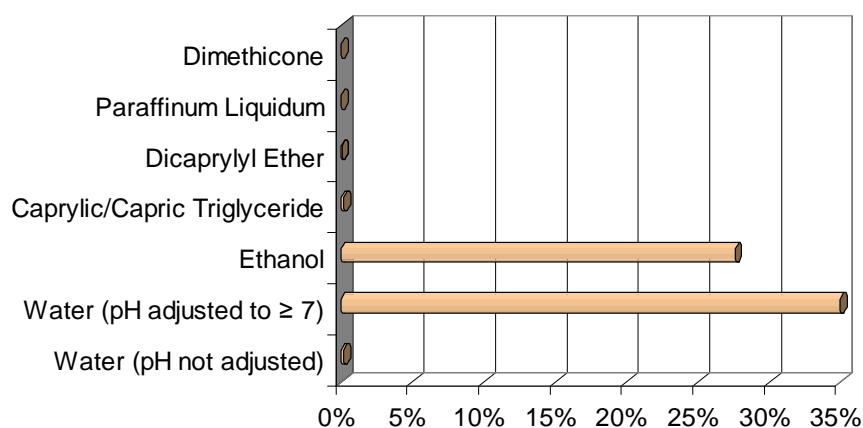
Formulation guidelines

Caproicine is a slightly water-soluble powder. The ingredient is preferably dissolved in the aqueous phase of formulations under its carboxylate form. This can be achieved by adjusting the pH with a base to > 7 . Heating may speed up complete dissolution, but is not necessary, if the pH is kept at a sufficiently high value. Alternatively, Caproicine can be dissolved in hot water.

Caproicine at a use level of about 2 % increases significantly the viscosity of a Xanthan gum gel, allowing for using less of the gum in the formulation. To achieve a uniform product, an aqueous solution premix of **Caproicine** is preferably added after the thickening agent has been fully hydrated.

Caproicine is most effective at pH 4-7. The pH of the final formulations should therefore be adjusted within this range for optimum efficacy. **Caproicine** is active only in its neutral acidic form. Higher pH-levels will therefore necessitate higher concentrations of **Caproicine** for achieving similar effects compared to lower pH.

Solubility in cosmetic solvents



Bibliography

- Thiboutot D et al. *Activity of the Type 1 5- α -Reductase Exhibits Regional Differences in Isolated Sebaceous Glands and Whole Skin*, Journal of Investigative Dermatology **1995**, vol. 105, 209–214.
- Boon N et al. *Characterization of Staphylococcus and Corynebacterium Clusters in the Human Axillary Region*, PLOS One **2013**, vol. 8 (8), e70538.
- James AG et al. *Microbiological and biochemical origins of human foot malodour*, Flavour and Fragrance Journal **2013**, vol. 28, 231–237.