

schülke -+

euxyl® K 703

Preservative for cosmetics & toiletries



the plus of pure
performance

Product description

euxyl® K 703 is a liquid cosmetic preservative, which can be used in leave-on and rinse-off products as well as for wet wipes.

euxyl® K 703 was developed for use in cosmetic formulations with a skin-friendly pH value of up to 6. euxyl® K 703 is particularly effective in non-ionic systems. It has a broad, balanced spectrum of effect against bacteria, yeasts and mould fungi as well as a good vapour phase effectiveness.

EU INCI declaration

Phenoxyethanol
Benzoic Acid
Dehydroacetic Acid

US INCI declaration

Phenoxyethanol (and)
Benzoic Acid (and)
Dehydroacetic Acid (and)

Microbiological effectiveness

euxyl® K 703 is equally effective against bacteria, yeasts and mould fungi. It is a typically biostatic product with the biocidal properties necessary for practical use.

For euxyl® K 703 to perform effectively in destroying organisms in products already contaminated, a minimum contact time of 48 hours is necessary. Since the effect of euxyl® K 703 takes place through chemical reactions with the microorganisms when it is used in heavily contaminated products loss of active ingredient must be taken into account.

Good production hygiene, as well as the use of raw materials with low microorganism levels as a result of correct raw material control, are of course vital prerequisites for the production of microbiologically faultless finished products.

MIC values

Determination of the minimum inhibitory concentration in serial dilution tests produced the following values at pH 5.0:

Species	ATCC-No.	MIC value [%]
Gram-negative:		
<i>Enterobacter gergoviae</i>	33028	0.75
<i>Escherichia coli</i>	11229	0.75
<i>Klebsiella pneumoniae</i>	4352	0.75
<i>Pseudomonas aeruginosa</i>	9027	0.75
<i>Pseudomonas fluorescens</i>	17397	0.75
<i>Pseudomonas putida</i>	12633	0.75
Gram-positive:		
<i>Staphylococcus aureus</i>	6538	1.0
<i>Staphylococcus epidermidis</i>	12228	< 1.0
Mould fungi:		
<i>Aspergillus niger</i>	16404	0.75
<i>Penicillium funiculosum</i>	36839	0.50
Yeasts:		
<i>Candida albicans</i>	10231	0.75

Germ count reduction test

Dilutions of euxyl® K 703 are prepared with sterile tap water. 50 ml portions of the end solutions are inoculated with 0.5 ml microorganism suspension (initial microorganism count approx. 10⁸ cfu/ml) and stirred.

Test organisms	ATCC-No.
<i>Pseudomonas aeruginosa</i>	9027
<i>Escherichia coli</i>	11229
<i>Candida albicans</i>	10231
<i>Aspergillus niger</i>	16404

The solutions are streaked out onto tryptone soya agar or Sabouraud-dextrose 4% agar after 3, 6, 24, 48, 72 and 168 hours, depending on the test organism. The cultures are incubated for 48 hours at 37 °C, except for *Aspergillus niger*, which is incubated for 72 hours at 25 – 27 °C.

The evaluation is made on the basis of semi-quantitative assessment of the microbial growth of the streaks.

In the table below, the microorganism reduction achieved by euxyl® K 703 at pH 5.0 as a function of the contact time and use-concentration is presented for the various test organisms:

Test organism	Use-concentration [%]	Contact time [h]				
		1	3	6	24	168
<i>Pseudomonas aeruginosa</i>	0.0 (blank value)	C	C	C	C	C
	0.25	C	C	C	+++	-
	0.5	C	C	+++	-	-
	0.75	C	+++	-	-	-
	1.0	++	-	-	-	-
<i>Escherichia coli</i>	0.0 (blank value)	C	C	C	C	C
	0.25	C	C	++++	+++	-
	0.5	C	C	++++	+	-
	0.75	C	C	++	-	-
	1.0	++++	-	-	-	-
<i>Candida albicans</i>	0.0 (blank value)	++++	++++	++++	++++	++++
	0.25	++++	++++	+++	+++	-
	0.5	++++	++++	+++	++	-
	0.75	++++	++++	+++	++	-
	1.0	++++	++++	++	+	-
<i>Aspergillus niger</i>	0.0 (blank value)	C	C	C	C	C
	0.25	C	C	C	C	C
	0.5	C	C	C	C	+++
	0.75	C	C	C	+++	-
	1.0	C	C	C	++	-

Symbol	Finding	Germ count/ml
-	no growth	< 100
+	slight growth	approx. 10 ²
++	moderate growth	approx. 10 ³
+++	heavy growth	approx. 10 ⁴
++++	massive growth	approx. 10 ⁵
C	surface covered	approx. 10 ⁶

Repeated challenge test (schülke Koko test)

This method is used to determine the preservative effect of chemical preservatives in cosmetic formulations, e.g. creams, lotions and shampoos. For this, in various test series, the preservative to be tested is added in different concentrations to unpreserved samples. A constant microorganism load is achieved by means of periodic inoculation (inoculation cycles) of the test preparations. Immediately before inoculation, samples of the individual preparations are streaked out onto nutrient media. The preservative effect is evaluated on the basis of the microorganism growth on the nutrient media. The longer the time to occurrence of the first microbial growth the more effective is the preservative. Experience has shown that a well preserved product should remain growth-free for six inoculation cycles in order to ensure the shelf-life in the original packaging required in practice (30 months).

Oil/water and water/oil systems, as well as shampoos and bath additives preserved with use-concentrations of between 0.4 and 1.2% euxyl® K 703 proved to be well preserved even after three months storage at + 40 °C.

Use-concentrations

	acc. schülke-recommendation	acc. EU and ASEAN Cosmetics Directive	acc. CIR (USA)
Leave-on (i.e. creams, lotions etc.)	0.4 – 1.2%	max. 1.23%	max. 6.17%
Rinse-off (i.e. shampoos, Bath preparations etc.)	0.4 – 1.2%	max. 1.23%	max. 6.17%

Recommended use-concentration are based on average active content. Please pay attention to the corresponding certificate.

The schülke recommended percentages relate to the complete formulation in each case. The values given are recommended guides. The individual use-concentration is dependent on the sensitivity of the product to microbial contamination, the choice of raw materials and production hygiene.

The efficacy and optimum use-concentration should always be determined in the end product with the aid of a preservation load test (i.e. Schülke & Mayr GmbH Technical Service Department and Microbiology).

All responsibility for determining the most effective percentage for a given use remains with the final product manufacturer since the optimal use-concentration level will vary due to product-specific variables such as choice of raw materials, production hygiene etc.

Indications for use

General

Temperature stability

When using euxyl® K 703 prolonged heating periods (max. 4 hours) > 80 °C should be avoided.

It is advantageous to add euxyl® K 703 in the cooling phase e.g. with the fragrance (t < 40 °C). As a result of the low surface tension of euxyl® K 703 solutions good dispersion in the various systems even at low temperatures is guaranteed.

pH stability

euxyl® K 703 is adapted for use in products with a skin-friendly pH value of up to 6. The efficacy of euxyl® K 703 depends on the pH-value. The efficacy is increased by reducing the pH value. If pH values exceeding 6 occur in the production process after the addition of euxyl® K 703, euxyl® K 703 is stable but ineffective. In all cases the pH value of the finished product must be checked at the end of the production process and if necessary adjusted to max. 6. The measurement of a w/o emulsion is problematic, in this case the measurement must be performed in the water phase.

Emulsions

Emulsions may be preserved with 0.4 – 1.2% euxyl® K 703.

Solutions

For shampoos, bath preparations and hand cleansing preparations good preservation results are achieved with 0.4– 1.2% euxyl® K 703.

Wet wipes

For wet wipes good preservation results are achieved with 0.4 – 1.2% euxyl® K 703.

Aerosols

Due to the restriction of Dehydroacetic Acid in aerosol dispensers the use of euxyl® K 703 is prohibited according to EU-Cosmetics Directive. In other spray applications where a droplet size comparable to aerosol dispensers is reached the use of euxyl® K 703 is not recommended.

For other uses please contact us.

Chemical compatibility

In general it is possible for interactions to occur between various active ingredients and auxiliary substances in cosmetic formulations.

Thus, certain incompatibilities of euxyl® K 703 with other ingredients have been established and are listed below.

General

euxyl® K 703 is fully effective in anionic as well as cationic and non-ionic systems.

Compatibility with surfactants

euxyl® K 703 proved to have good compatibility with anionic surfactants such as sulphates, ether sulphates and sulphosuccinates as well as with non-ionogenic surfactants.

Compatibility with sulphite ions

euxyl® K 703 shows no interactions with sulphite ions.

Compatibility with iron ions

In formulations as a result of the presence of iron ions, e.g. from mineral thickeners, yellow discolourations were observed.

Product-specific properties

Material compatibility

Concentrate

In the material compatibility tests with the concentrate of euxyl® K 703 stainless steel, polyethylene (PE) and hard polyvinyl chloride (hard PVC) proved to be suitable materials for handling the undiluted product.

Non-metallic materials must be tested for their suitability, especially polycarbonate (PC), polymethylmethacrylate (PMMA) and acrylonitrilebutadiene-styrene copolymer (ABS) should not be used. As sealing material when handling undiluted euxyl® K 703 fluorinated rubber (FKM), ethylene-propylene-terpolymer (EPDM) and polytetrafluoro-ethylene (PTFE) should be preferred. Other sealing materials could lead to severe swelling or to pronounced discolouration of euxyl® K 703.

Dilutions

euxyl® K 703 in 0.3% aqueous solution showed material compatibility behaviour which was not significantly different from that of the water used for dilution. No incompatibilities with plastics have been observed with products preserved with euxyl® K 703.

Please check the compatibility in individual cases.

Foaming behaviour

In the foaming test in accordance with DIN 53 902 a 0.8% solution of euxyl® K 703 in demineralised water proved to be non-foaming.

Solubility

euxyl® K 703 is only limitedly soluble in water.

100 g of water at 20 °C dissolve 2 g of euxyl® K 703.

In polar solvents such as 1,2-propylene glycol, propanol or acetone, euxyl® K 703 is readily soluble.

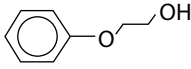
In polyalcohols such as glycerol and sorbitol euxyl® K 703 is moderately soluble.

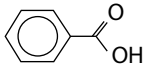
In aliphates with hydrophilic groups such as 2-octyldecanol and isopropyl myristate, euxyl® K 703 is limitedly soluble.

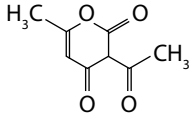
In pure aliphatic solvents it is slightly soluble.

General information

Descriptions of individual substances

	$C_8H_{10}O_2$ 138.16 g/mol
CAS no.:	122-99-6
INCI name:	Phenoxyethanol
Name according to 76/768/EEC:	2-Phenoxyethanol
No. according to 76/768/EEC:	29
EINECS name:	2-Phenoxyethanol
EINECS no.:	204-589-7

	$C_7H_6O_2$ 122.12 g/mol
CAS no.:	65-85-0
INCI name:	Benzoic Acid
Name according to 76/768/EEC:	Benzoic Acid
No. according to 76/768/EEC:	1
EINECS name:	Benzoic Acid
EINECS no.:	200-618-2

	$C_6H_6O_4$ 168.14 g/mol
CAS no.:	520-45-6
INCI-name:	Dehydroacetic Acid
Name according to 76/768/EEC:	Dehydroacetic Acid
No. according to 76/768/EEC:	13
EINECS name:	3-Acetyl-6-methyl-2H-pyran-2.4(3H)-dione
EINECS no.:	208-293-9

Physical-chemical data

Appearance:	clear yellow - dark yellow liquid
Odour:	characteristic
Refractive index n_D^{20} :	1.536 – 1.545
Density (20 °C):	1.119 – 1.131 g/ml
Vapour pressure (20 °C):	< 1 hPa
Flash point (ISO 2719):	> 100 °C
Flow time (DIN 53 211/20 °C):	< 15 s
Water solubility (20 °C):	ca. 20 g/l

Storage

We recommend storing in the original container at room temperature.

Environmental information

Schülke & Mayr GmbH has DIN EN ISO 9001 and DIN EN 14001 certification and a validated environmental management system in accordance with the Eco Audit Regulation. The canisters and drums used by schülke are made of polyethylene (HDPE) and are labelled accordingly. The 1000 kg containers are affiliated to a recycling system that guarantees free pick-up and sensible utilisation of used containers throughout Europe. The labels are made of PE. Our packaging materials contain no PVC and are recyclable.

Expert opinions

The toxicology and tolerance of the cosmetic preservative euxyl® K 703, Dr. Susanne Hendrich, Schülke & Mayr GmbH, September 2009



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Our recommendations regarding our products are based on in-depth scientific testing in our Research Department; they are given in good faith, but no liability can be derived from them. It is the responsibility of the final product manufacturer to assure that claims made for the final product are in conformance with all applicable local laws. In other respect our Conditions of Sale and Supply apply.

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