schülke

euxyl® K 903

Preservative for cosmetics & toiletries

the plus of pure performance

euxyl® K 903

Product description

euxyl® K 903 is a liquid cosmetic preservative which can be used in leave-on and rinse-off products, as well as for wet wipes. euxyl® K 903 was developed for use in cosmetic formulations with a skin-friendly pH value up to 6. euxyl® K 903 is particularly effective in nonionic systems. It has a broad, balanced spectrum of effect against bacteria, yeast and mold.

EU INCI declaration
Benzyl Alcohol
Benzoic Acid
Dehydroacetic Acid
Tocopherol

US INCI declaration
Benzyl Alcohol (and)
Benzoic Acid (and)
Dehydroacetic Acid (and)
Tocopherol

Microbiological effectiveness

euxyl® K 903 is equally effective against bacteria, yeast and mold. It is a typically biostatic product with the biocidal properties necessary for practical use.
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 5.5:

Species	ATCC-No.	MIC value [%]
Gram-negative:		
Enterobacter gergoviae	33028	0.75
Escherichia coli	11229	0.75
Klebsiella pneumoniae	4352	0.75
Pseudomonas aeruginosa	9027	0.75
Pseudomonas fluorescens	17397	0.75
Pseudomonas putida	12633	0.75
Gram-positive:		
Staphylococcus aureus	6538	0.75
Staphylococcus epidermidis	12228	> 1.0
Mold:		
Aspergillus brasiliensis	16404	0.5
Penicillium pinophilum	36839	0.50
Yeast:		
Candida albicans	10231	0.75

Germ count reduction test
Dilutions of euxyl® K 903 were prepared with sterile tap water. 25 ml portions of the end solutions were inoculated with 0.1 ml microorganism suspension (initial microorganism count approx. 10^8 cfu/ml) and stirred.

Test organisms	ATCC-/DSM-No.
Pseudomonas aeruginosa	9027
Escherichia coli	11229
Staphylococcus aureus	6538
Candida albicans	10231
Aspergillus brasiliensis	16404

The solutions were 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 were incubated for 48 hours at 37°C, except for *Aspergillus brasiliensis*, which was incubated for 72 hours at 25 – 27°C.
The evaluation was made on the basis of semi-quantitative assessment of the microbial growth of the streaks.

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In the table below, the microorganism reduction achieved by euxyl® K 903 at pH 5.5 as a function of the contact time and use-concentration is presented for the various test organisms:

Test organism	Preservative	Contact time [h]					
		3	6	24	48	72	168
Pseudomonas aeruginosa	blank sterile tap water	C	C	C	C	C	C
	+ 0.50% euxyl K 903	++++	+++	–	–	–	–
	+ 0.75% euxyl K 903	+++	+	–	–	–	–
	+ 1.00% euxyl K 903	–	–	–	–	–	–
Escherichia coli	blank sterile tap water	C	C	C	C	C	C
	+ 0.50% euxyl K 903	C	C	C	++++	+	–
	+ 0.75% euxyl K 903	C	C	+	–	–	–
	+ 1.00% euxyl K 903	C	++++	–	–	–	–
Staphylococcus aureus	blank sterile tap water	C	C	C	C	C	C
	+ 0.50% euxyl K 903	C	++++	–	–	–	–
	+ 0.75% euxyl K 903	C	++++	–	–	–	–
	+ 1.00% euxyl K 903	++++	+++	–	–	–	–
Candida albicans	blank sterile tap water	C	C	C	C	++++	++++
	+ 0.50% euxyl K 903	C	C	C	C	++++	++++
	+ 0.75% euxyl K 903	C	C	++++	++++	++++	–
	+ 1.00% euxyl K 903	C	C	++++	++++	++	–
Aspergillus brasiliensis	blank sterile tap water	C	C	C	C	C	C
	+ 0.50% euxyl K 903	C	C	C	C	++++	++++
	+ 0.75% euxyl K 903	C	C	C	C	+++	–
	+ 1.00% euxyl K 903	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 903 proved to be well preserved even after three months storage at +40°C.

Use-concentrations

	acc. schülke recommendation	acc. EU and ASEAN Cosmetics Legislation	acc. CIR (USA)
Leave-on (i.e. creams, lotions, etc.)	0.4 – 1.2%	max. 1.23%	max. 10%
Rinse-off (i.e. shampoos, bath preparations, etc.)	0.4 – 1.2%	max. 1.23%	max. 10%

Recommended use-concentrations 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 finished 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 903, prolonged heating periods (max. 4 hours) >80°C should be avoided. It is advantageous to add euxyl® K 903 in the cooling phase, e.g. with the fragrance (t <40°C). As a result of the low surface tension of euxyl® K 903 solutions, good dispersion can be expected in most formulations, even at low temperatures.

pH stability
euxyl® K 903 is adapted for use in products with a skin-friendly pH value of up to 6. The efficacy of euxyl® K 903 depends on the pH value. The efficacy is increased by reducing the pH value. pH values exceeding 6 can occur in the production process without affecting the integrity of euxyl® K 903. However, the pH value of the finished product must be checked at the end of the production process and, if necessary, adjusted to max. 6 to activate the preservative efficacy of euxyl® K 903. The pH measurement of a W/O emulsion is problematic. In this case, the measurement must be performed in the water phase, prior to emulsification.

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Emulsions
Emulsions may be preserved with 0.4 – 1.2% euxyl® K 903.

Solutions
For shampoos, bath preparations and hand cleansing preparations, good preservation results are achieved with 0.4– 1.2% euxyl® K 903.

Wet wipes
For wet wipes, good preservation results are achieved with 0.4 – 1.2% euxyl® K 903.

Aerosols
Due to the restriction of dehydroacetic acid in aerosol dispensers according to EU-Cosmetics Regulation, the use of euxyl® K 903 is prohibited for this use in Europe. In other spray applications where a droplet size comparable to aerosol dispensers is reached, the use of euxyl® K 903 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 903 with other ingredients have been established and are listed below.

General
euxyl® K 903 is fully effective in anionic, cationic and nonionic systems.

Compatibility with surfactants
euxyl® K 903 was proven to have good compatibility with anionic surfactants such as sulfates, ether sulfates, sulfosuccinates and nonionic surfactants.

Compatibility with sulfite ions
euxyl® K 903 shows no interactions with sulfite ions.

Compatibility with iron ions
In the presence of iron ions, e.g. from mineral thickeners, yellow discolorations were observed.

Product-specific properties

Material compatibility
Concentrate
In material compatibility tests with the concentrate of euxyl® K 903, stainless steel, aluminum, polyethylene (PE) and polyoxymethylene proved to be suitable materials for handling the undiluted product. Non-metallic materials must be tested for their suitability. Hard polyvinyl chloride (hard PVC), polycarbonate (PC), polymethylmethacrylate (PMMA) and acrylonitrilebutadiene-styrene copolymer (ABS) should not be used. Fluorinated rubber (FKM) and polymethylsiloxane (SI) are preferred as sealing material when handling undiluted euxyl® K 903. Other sealing materials could lead to severe swelling or to pronounced discoloration of euxyl® K 903.

Dilutions
euxyl® K 903 in 1.0% aqueous solution showed that stainless steel, aluminum, polyethylene (PE), polystyrene (PS), polyoxymethylene (POM), hard polyvinyl chloride (hard PVC), polymethylmethacrylate (PMMA), polycarbonate (PC), polyethylenterephthalate (PET) and polysulfone (PSU) proved to be suitable materials for handling the diluted product.
Fluorinated rubber (FKM), ethylene-propylene-terpolymer (EPDM), polymethylsiloxane (SI), soft polyvinyl chloride (PVC soft), natural rubber/styrene-butadienrubber (NR/SBR), isobutene-isoprene rubber (IIR), chloroprene rubber/styrene-butadien rubber (CR/SBR) and nitrile rubber (NBR) are preferred as sealing material when handling diluted euxyl® K 903.

Please check the compatibility in individual cases.

Foaming behavior
In a foaming test in accordance with DIN 53 902, a 0.8% solution of euxyl® K 903 in demineralized water proved to be non-foaming.

Solubility
euxyl® K 903 has limited solubility in water.
100 g of water at 20°C dissolve 1.2 g of euxyl® K 903.
In polar solvents, such as 1,2-propylene glycol, propanol or acetone, euxyl® K 903 is readily soluble.
In polyalcohols, such as glycerol and sorbitol, euxyl® K 903 is moderately soluble.
In aliphates with hydrophilic groups, such as 2-octyldecanol and isopropyl myristate, euxyl® K 903 has limited solubility.
It is slightly soluble in pure aliphatic solvents.

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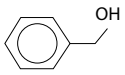
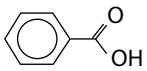
General information

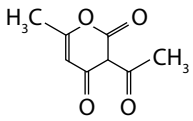
Descriptions of individual substances



	C_7H_8O
	108.13 g/mol
CAS no.:	100-51-6
INCI name:	Benzyl Alcohol
Name according to EC 1223/2009:	Benzyl Alcohol
No. according to EC 1223/2009:	34
EINECS name:	Benzyl Alcohol
EINECS no.:	202-859-9



	$C_7H_6O_2$
	122.12 g/mol
CAS no.:	65-85-0
INCI name:	Benzoic Acid
Name according to EC 1223/2009:	Benzoic Acid
No. according to EC 1223/2009:	1
EINECS name:	Benzoic Acid
EINECS no.:	200-618-2



	$C_6H_8O_4$
	168.14 g/mol
CAS no.:	520-45-6
INCI-name:	Dehydroacetic Acid
Name according to EC 1223/2009:	Dehydroacetic Acid
No. according to EC 1223/2009:	13
EINECS name:	3-Acetyl-6-methyl-2H-pyrane-2.4(3H)-dione
EINECS no.:	208-293-9

Physical-chemical data

Appearance:	clear yellow - dark yellow liquid
Odor:	characteristic
Refractive index n_D^{20}:	1.536 – 1.549
Density (20°C):	1.067 – 1.079 g/ml
Vapor 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. 12 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 labels are made of PE. Our packaging materials contain no PVC and are recyclable.

Expert opinions

The toxicology and tolerance of the preservative euxyl® K 903, Dr. Susanne Hendrich, Schülke & Mayr GmbH

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