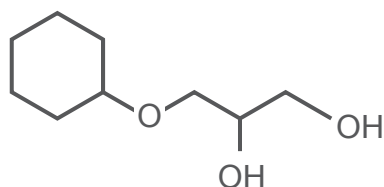


ADEKA NOL CHG

ADEKA NOL CHG is a highly water-soluble product that has a low level of skin irritation with bacteriostatic and moisturizing effects.



C₉H₁₈O₃: 174.23

CAS No.: 10305-41-6

INCI name: CYCLOHEXYL GLYCERIN

Product Properties

Purity	Appearance	Water solubility
99% or more	Light yellow liquid	Arbitrarily miscible

*Contains 0.1% tocopherol as a stabilizer.

Antibacterial Properties

○ The minimum inhibitory concentration (MIC) for each bacterial strain (µg/mL)

Test organism	ADEKA NOL CHG	Phenoxyethanol	1,2-hexanediol	Pentylene glycol
<i>E. coli</i>	10000	5000	10000	30000
<i>P. aeruginosa</i>	15000	5000	10000	20000
<i>S. aureus</i>	30000	10000	> 20000	50000
<i>B. subtilis</i>	20000	10000	20000	50000
<i>C. albicans</i>	10000	5000	15000	25000 ^(*1)
<i>Z. rouxii</i>	16000	4000	No data	No data
<i>A. brasiliensis</i>	10000	2500	10000	20000 ^(*1)

(*1) Fragrance Journal 2006-4 p.39-

Test organisms:

Bacteria

Escherichia coli ATCC 8739

Pseudomonas aeruginosa ATCC 9027

Staphylococcus aureus ATCC 6538

Bacillus subtilis IFO 3134

Fungi

Candida albicans ATCC 10231

Zygosaccharomyces rouxii IFO 1876

Aspergillus brasiliensis ATCC 16404

Data on Combined Antibacterial Properties

Synergistic effects can be expected when ADEKA NOL CHG is used in combination with caprylyl glycol and ethylhexylglycerin.

○ The MIC for each bacterial strain when combined with other ingredients

Test organism	MIC (µg/ml)				
	Caprylyl glycol	CHG: Caprylyl glycol (1:1)	ADEKA NOL CHG	CHG: Ethylhexyl-glycerin (2:1)	Ethylhexyl-glycerin
<i>E. coli</i>	1300	2500	10000	7500	2500
<i>P. aeruginosa</i>	3800	7500	15000	10000	10000 <
<i>S. aureus</i>	3800	5000	30000	3800	1900
<i>C. albicans</i>	2500	3800	10000	3800	1900
<i>A. brasiliensis</i>	< 900	1300	10000	< 1900	< 900

Preservative Effectiveness Test

Changes in the bacterial count were observed following the forced inoculation of strains in the formulations according to reference information on preservative effectiveness tests in the 16th edition of the Japanese Pharmacopoeia.

Formulation example: Formula for a lotion		Formulation example: Formula for a cream	
Ingredients	Compounding amount (%)	Ingredients	Compounding amount (%)
Polyoxyethylene sorbitol tetraoleate (30EO)	4.0	2-ethylhexanoic acid triglyceride	20.0
Glycerin	0.2	Polyoxyethylene sorbitol tetraoleate (30EO)	4.0
Acrylates/C10-30 alkyl acrylate crosspolymer - NA	0.1	Glycerin	0.2
Antibacterial ingredients	0~1.0	Cetostearyl alcohol	0.2
Water	Rest	Acrylates/C10-30 alkyl acrylate crosspolymer - NA	0.1
		Antibacterial ingredients	0~1.0
		Water	Rest

○ Evaluation Criteria

	Bacteria : <i>C.albicans</i>	<i>A.brasiliensis</i>
After 14 days	0.1% of the inoculum count or less	Less than the inoculum count and blank
After 28 days	Same or less than the inoculum count at 14 days	Same or less than the inoculum count at 14 days

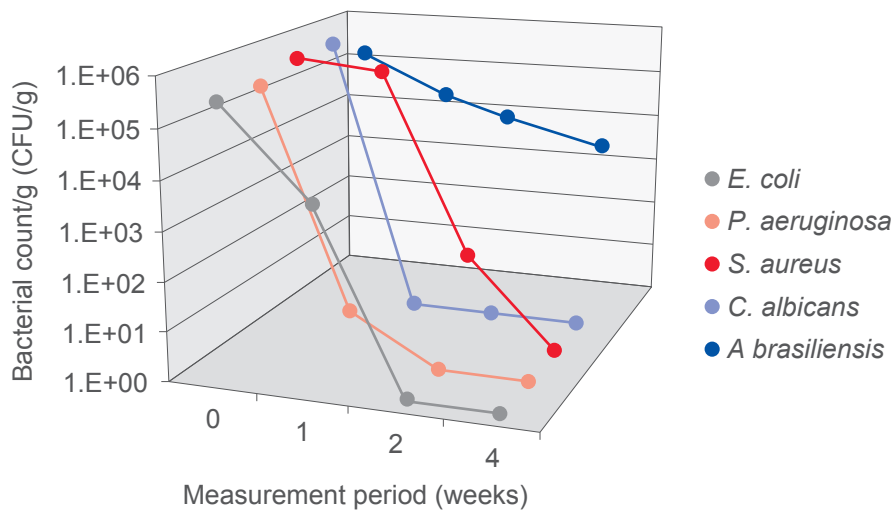
Formula for a Lotion

○ Effective concentrations [Lotion formula]

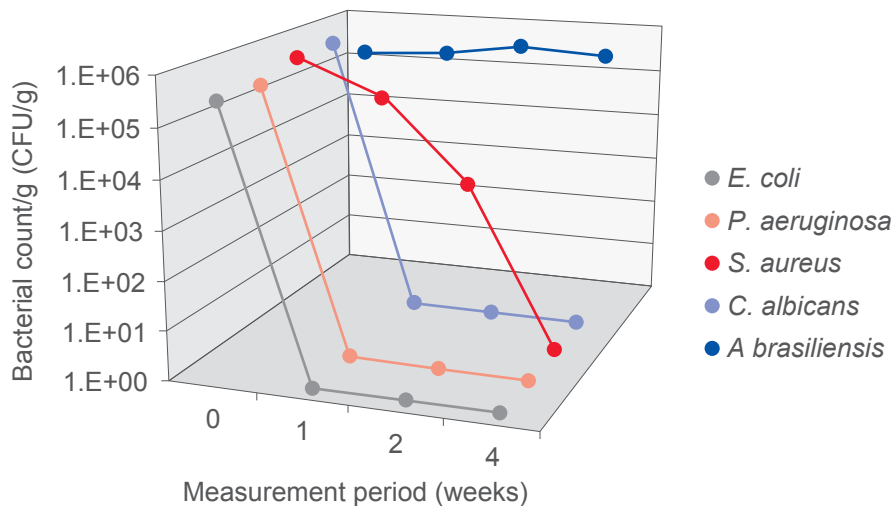
	ADEKA NOL CHG	Methylparaben	Phenoxyethanol
<i>E. coli</i>	2.0%	0.6%	1.0%
<i>P. aeruginosa</i>	1.0%	0.4%	1.0%
<i>S. aureus</i>	3.0%	0.6%	1.0%
<i>C. albicans</i>	2.0%	0.4%	1.0%
<i>A. brasiliensis</i>	3.0% <	0.4%	1.0%

Effects can be expected at about 2% for strains other than mold. Needs to be used in combination with other ingredients for mold.

Phenoxyethanol [1.0% added]



ADEKA NOL CHG [2.0% added]



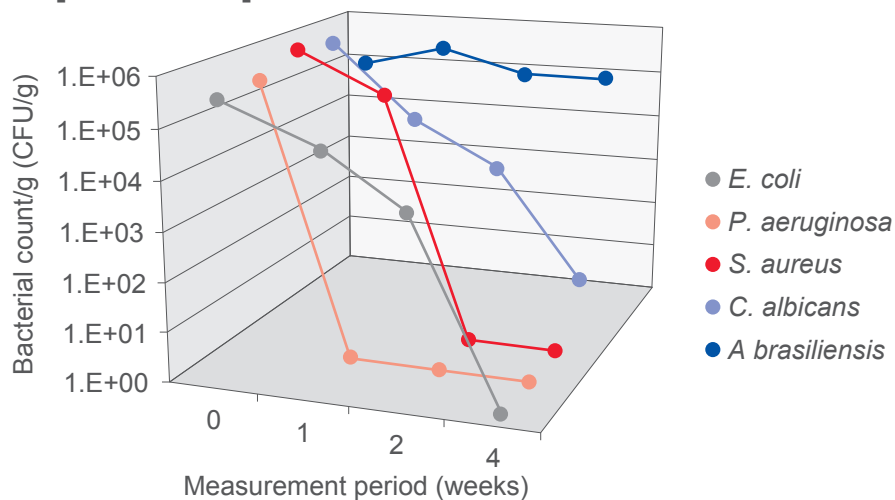
Formula for a Cream

○ Effective concentrations [Cream formula]

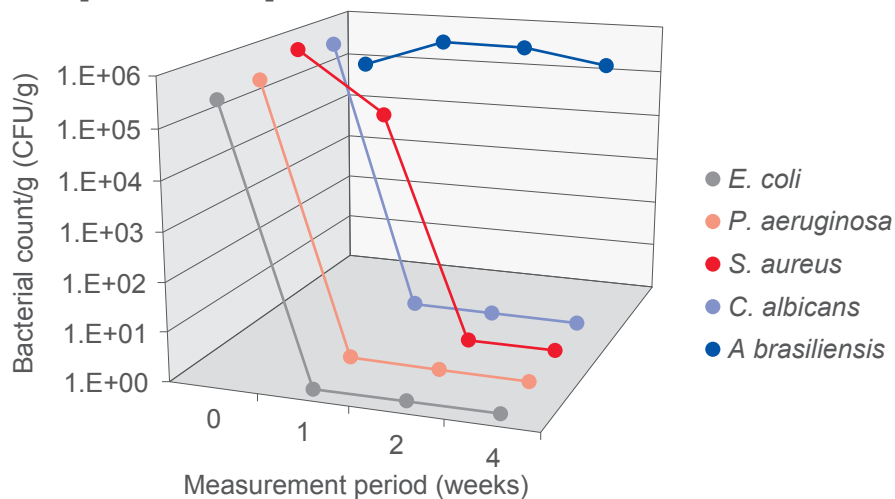
	ADEKA NOL CHG	Methylparaben	Phenoxyethanol
<i>E. coli</i>	1.0%	0.8% <	1.5%
<i>P. aeruginosa</i>	1.0%	0.6%	1.0%
<i>S. aureus</i>	2.0%	0.6%	1.0%
<i>C. albicans</i>	2.0%	0.8%	1.5%
<i>A. brasiliensis</i>	3.0%	0.6%	2.0% <

ADEKA NOL CHG is highly water-soluble and therefore exhibits an antibacterial effect without being influenced by oily ingredients even in an emulsified formulation. It is an ingredient that is less influenced by oily ingredients in the formulation, compared to methylparaben and phenoxyethanol.

Phenoxyethanol [1.0% added]

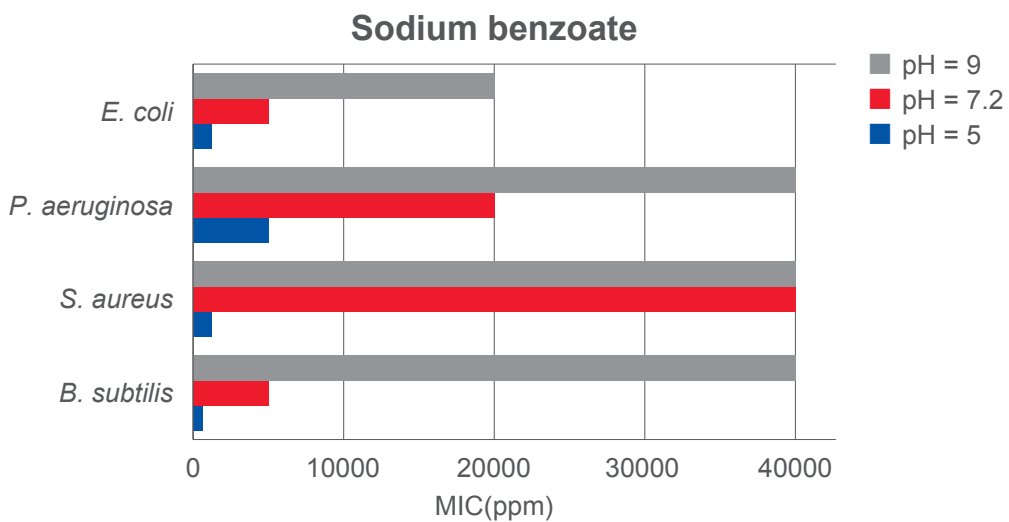
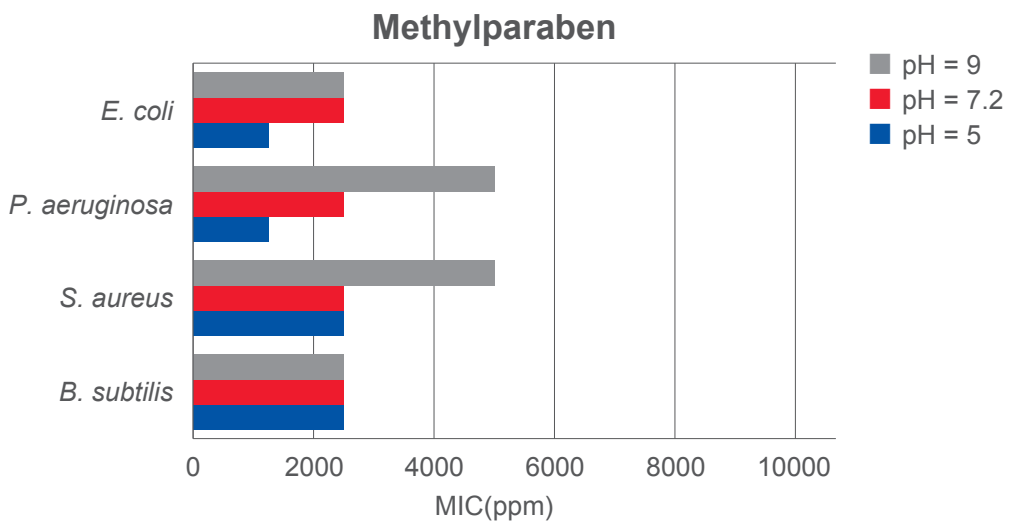
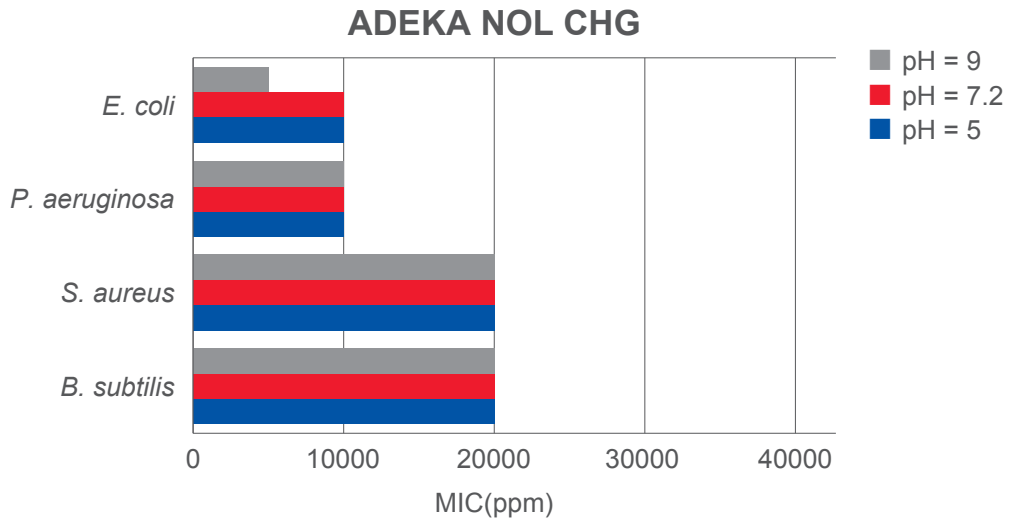


ADEKA NOL CHG [2.0% added]



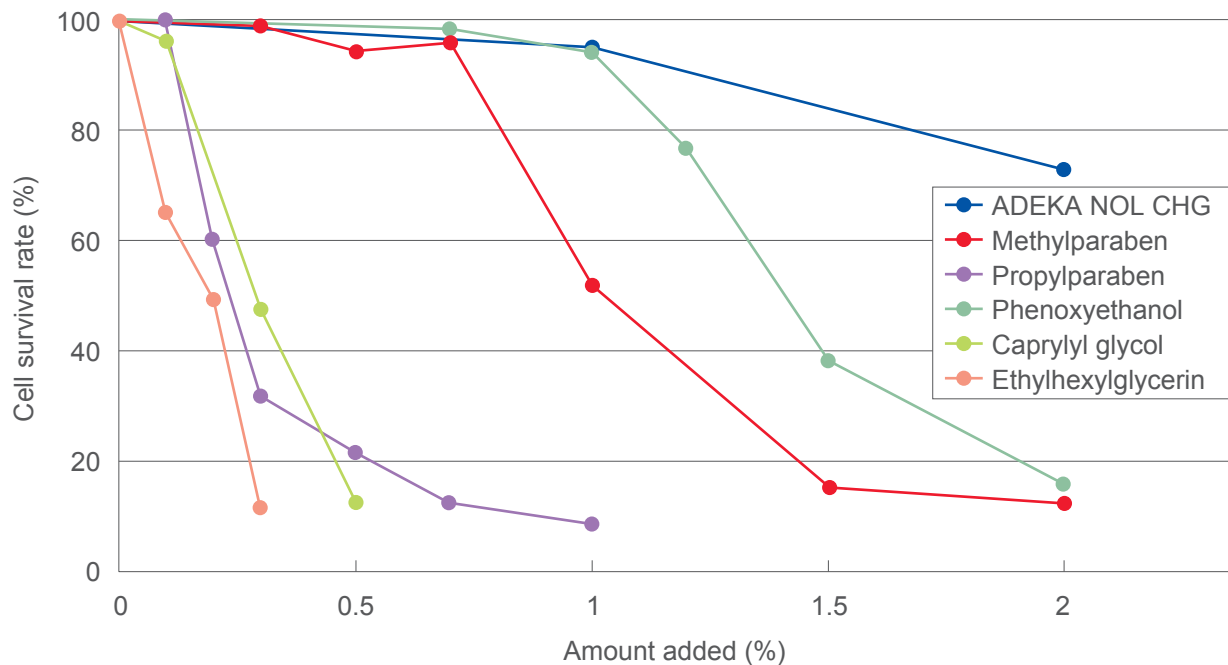
pH Dependence

Bacteriostatic effects of ADEKA NOL CHG is not influenced by pH.



Irritation

○ Irritation test using a three-dimensional human epidermis culture model



Method of preparation:

ADEKA NOL CHG, methylparaben and propylparaben were dissolved in a 50% aqueous solution of 1,3-butanediol for measurement. Caprylyl glycol and ethylhexylglycerin were dissolved in distilled water for measurement.

Testing method:

The test substance was added to a three-dimensional human epidermis culture model (Japan Tissue Engineering Co., Ltd.) and grown in an assay medium for 24 hours (5% CO₂, 37°C). It was then transferred to an MTT assay medium and grown for another 24 hours (5% CO₂, 37°C). Lastly, the colored three-dimensional human epidermis culture model was extracted using isopropanol to calculate the cell survival rate from the absorbance.

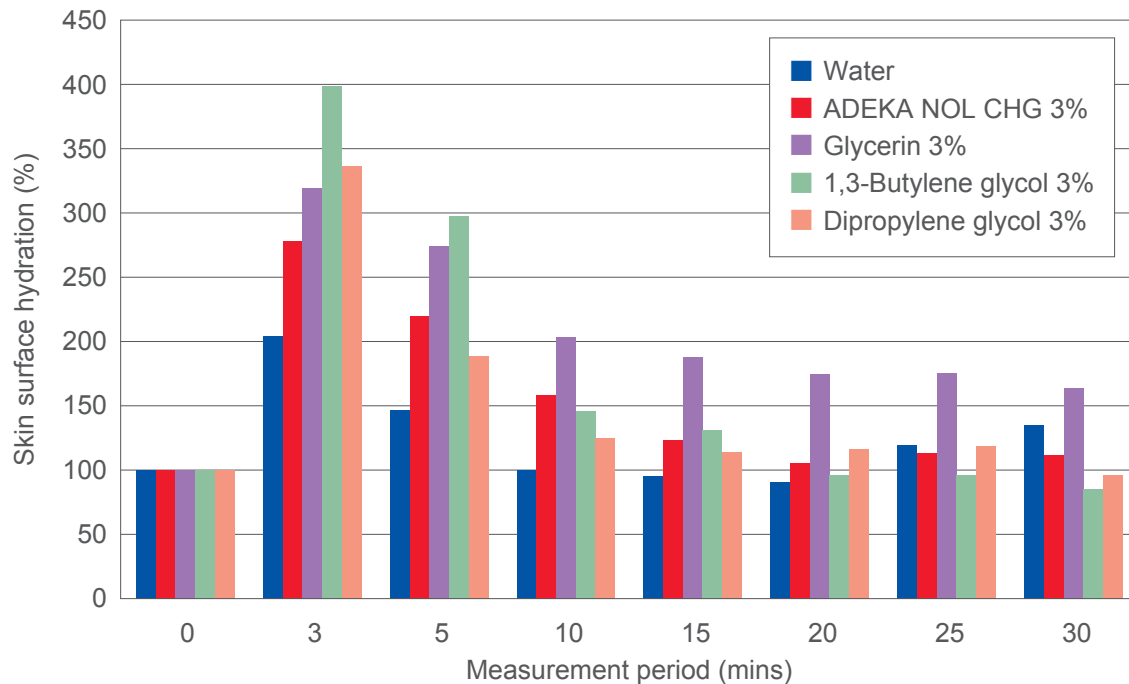
Calculation formula:

$$\text{Cell survival rate (\%)} = \frac{(\text{Absorbance of test substance} - \text{Absorbance of blank})}{(\text{Absorbance of negative control} - \text{Absorbance of blank})} \times 100$$

A higher cell survival rate indicates a lower level of irritation. ADEKA NOL CHG is a product with a lower level of irritation compared to other antibacterial constituents. A high cell survival rate is maintained even at the MIC (approx. 2%).

Moisture Retention

ADEKA NOL CHG has moisture retaining properties as is the case with polyalcohol, such as glycerin and 1,3-butylene glycol.



Measurement conditions:

Moisture retention was measured with a skin surface hydrometer (SKICON-200) in a constant temperature and humidity room at 22°C and at 50% humidity.

Measurement method:

Before starting the measurement, the skin surface hydration of the inner arm was measured with the SKICON-200. (Consider this measurement value to be 100.) 0.1 mL of test solution was impregnated onto a filter paper cut into a 1.5 cm square, which was then attached to the skin where the initial value had been measured. The skin surface hydration was measured 3, 5, 10, 15, 20, 25 and 30 minutes after removing the filter paper.

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