

Geogard® 111A & 111S

ECOCERT and COSMOS Accepted Preservation



INCI Name: Sodium Dehydroacetate (Geogard® 111S)

INCI Name: Dehydroacetic acid (Geogard® 111A)

Key Product Benefits:

- Organic acid / salt
- Good fungicide, mild bactericide
- Salt form is water-soluble
- Meet ECOCERT and COSMOS requirements
- Soil Association approved
- Has a wide range of global regulatory approval
- Easy-to-use and compatible with most types of cosmetic formulations
- Wide effective pH range
- Compatible with key raw materials
- Chemically and physically stable
- Not tested on animals

Recommended Use Level

0.1–0.6%

Description

Geogard® 111A is based on dehydroacetic acid (DHA). Geogard® 111S is sodium dehydroacetate (water soluble salt form of DHA). These products offer higher fungal efficacy than many traditional chemistries and lower “in-use” cost. They are globally approved for virtually every personal care and cosmetic application. In addition, they conform with ECOCERT and COSMOS standards, as a synthetic preservative in ecological and organic certified cosmetics.

Product	Chemical Compound Breakdown	CAS No.	EINECS No.
Geogard® 111S	Sodium Dehydroacetate	4418-26-2	224-580-1
Geogard® 111A	Dehydroacetic Acid	520-45-6	208-293-9

Compositional Breakdown

Geogard® 111A	Geogard® 111S
100% Dehydroacetic Acid (DHA)	100% Sodium Dehydroacetate (NaDHA)

Applications

- Baby care
- Baby wipes
- Body butter
- Body wash
- Conditioner
- Cream
- Deo/ Anti-perspirant
- Eye creams/gels
- Eye shadow
- Face lotion
- Face wipes
- Facial cream
- Foundation
- Hair gel
- Hand soap
- Lipstick
- Lotion
- Make up remover
- Mascara
- Oil in Water
- Oral care
- Powder
- Shampoo
- Suncare
- Toner
- Water in Oil

Efficacy

Microbiological Challenge Studies

Geogard® 111 MICs versus widely used parabens

Minimum Inhibitory Concentrations (MIC) for Geogard® 111A Compared to Parabens

Organism	Geogard® 111 A	Typical Parabens
<i>Aspergillus niger</i>	200 ppm	600–200ppm
<i>Candida albicans</i>	200 ppm	1000–250 ppm
<i>Penicillium notatum</i>	200 ppm	500–125 ppm
<i>Staphylococcus aureus</i>	10,000 ppm	800–150 ppm
<i>Escherichia coli</i>	10,000 ppm	800–300 ppm
<i>Pseudomonas aeruginosa</i>	20,000 ppm	1,000–400 ppm

Studies were run using different concentrations of Geogard® 111 in an anionic shampoo to see efficacy against various bacteria, yeast and fungi. All samples were inoculated at the beginning of the study, sampled at 24 hours, 3, 7, 14 and 28 days.

Ingredient	% wt/wt
Sterile DI Water	75%
Myristyl propionate	8%
Glyceryl stearate	6%
Glycerin	5%
PEG-20 glyceryl stearate	4%
Cetearyl alcohol	1.5%
Sodium hydroxide	<1%
Total	100%

Challenge Testing of Geogard® 111S Compared to Parabens in Anionic Shampoo Against Mixed Bacteria

Preservatives	% Use Level	Day 0 cfu/g.	Day 7 cfu/g.	Day 14 cfu/g.	Day 28 cfu/g.
Geogard® 111S	0.35%	2×10^5	<10	<10	<10
Methyl Paraben	0.60%	2×10^5	7.1×10^5	2.8×10^7	2.1×10^7
Methyl: Propyl Paraben 2:1 ratio	0.60%	2×10^5	1.3×10^6	1.2×10^7	2.2×10^7

Challenge Testing of Geogard® 111S Compared to Parabens in Anionic Shampoo Against Mixed Fungi

Preservatives	% Use Level	Day 0 cfu/g.	Day 7 cfu/g.	Day 14 cfu/g.	Day 28 cfu/g.
Geogard® 111S	0.35%	1.3×10^5	<10	<10	<10
Methyl Paraben	0.60%	2×10^5	1.1×10^4	5.0×10^3	2.1×10^3
Methyl: Propyl Paraben 2:1 ratio	0.60%	2×10^5	7.1×10^3	4.2×10^3	2.2×10^3

Formulation Recommendations

- Salt variant (111S) is water soluble
- Maximum Dehydroacetic acid solubility is 0.1% in water
- Maximum Sodium Dehydroacetate solubility is 33% in water
- Use between pH 2–6.5
- Added at both room and elevated temperatures
- Added any time during manufacturing process
- May require a bactericide booster
- A slight yellowing effect can sometimes be seen by the addition of dehydroacetic acid or its salts
- Can be limited by the addition of reducing agents / antioxidants, in particular, BHT or sodium metabisulfite or tocopherol (not tocopheryl acetate)
- Anionics (carbomers and certain surfactants) and high temps cause discoloration
- Only the acid form has preservative efficacy; the salt is inactive
- Add the sodium dehydroacetate and reduce the pH to liberate acid
- Compatible in all types of formulations: anionics, nonionics and cationics

Compatibility and Solubility of Geogard® 111 vs. Parabens

Preservative	Solubility		Compatibility			Typical % Use Level
	Water	Propylene	Anionics	Nonionics	Cationics	
Geogard® 111A	0.10%	1.7%	Yes	Yes	Yes	0.35%
Geogard® 111S	20%	12%	Yes	Yes	Yes	0.35%
Parabens	<0.25%	22%	Some	No	Yes	>0.60%

Additional Information

Since Geogard® 111 preservatives are based on dehydroacetic acid with a pKa of 5.27, there is more activity across a wider pH range compared to other acids like sorbic acid at 4.76.

Preservatives	pK Value	pH Range									
		3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	
Dehydroacetic Acid	5.27	100%	98	95	86	65	37	15.9	5.6	1.9	
Sorbic Acid	4.76	98	95	85	65	37	15	5.5	1.8	0.6	
Formic Acid	3.75	85	64	36	15	5	1.8	0.6	0.2	0.06	

The efficacy of Geogard® 111 preservatives is pH dependent, offering greater efficacy at lower pH.

Global Regulatory

Europe

- Max use level for DHA is 0.6% DHA – rinse-off & leave-on

Japan

- Max use level for DHA is 0.5% DHA – rinse-off & leave-on

US

- Max use level for DHA is 0.6% DHA – rinse-off & leave-on

Typical Properties	
Appearance	Crystalline powder
Color	Geogard® 111A : Off-white to yellow Geogard® 111S : White
Odor	Characteristic

USA

Lonza Consumer Care
70 Tyler Place
South Plainfield, NJ 07080
Tel +1 908 561 5200

Switzerland

Lonza Ltd
Muenchensteinerstrasse 38
4002 Basel
Tel +41 61 316 81 11

Review and follow all product safety instructions. All product information corresponds to Lonza's knowledge on the subject at the date of publication, but Lonza makes no warranty as to its accuracy or completeness and Lonza assumes no obligation to update it. Product information is intended for use by recipients experienced and knowledgeable in the field, who are capable of and responsible for independently determining the suitability of ingredients for intended uses and to ensure their compliance with applicable law. Proper use of this information is the sole responsibility of the recipient. This information relates solely to the product as an ingredient. It may not be applicable, complete or suitable for the recipient's finished product or application; therefore republication of such information or related statements is prohibited. Information provided by Lonza is not intended and should not be construed as a license to operate under or a recommendation to infringe any patent or other intellectual property right. No claims are made herein for any specific intermediate or end-use application.