

Geogard™ 111A & 111S

ECOCERT and COSMOS Compliant Preservation



INCI Name: Sodium Dehydroacetate (Geogard™ 111S)

Product	Chemical Compound Breakdown	CAS No.	EINECS No.
Geogard™ 111S	Sodium Dehydroacetate	4418-26-2	224-580-1

INCI Name: Dehydroacetic acid (Geogard™ 111A)

Product	Chemical Compound Breakdown	CAS No.	EINECS No.
Geogard™ 111A	Dehydroacetic Acid	520-45-6	208-293-9

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.

Compositional Breakdown

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

Key Product Benefits:

- Organic acid / salt
- Good fungicide, mild bactericide
- Salt form is water-soluble
- Suitable for ECOCERT and COSMOS compliant formulations, Geogard™ 111A is Soil Association approved
- Global acceptance (including Japan and EU) for most applications
- 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

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
- Liptick/gloss
- Lotion
- Make up remover
- Mascara
- Oil in Water
- Oral care
- Powder
- Shampoo
- Suncare
- Toner
- Water in Oil

Recommended Use Level

0.1-0.6%

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	1.3×10^5	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
- Can get better efficacy at higher pHs but will need more product and it is not as cost effective
- 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	33%	48%	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

General

- Cannot be used in oral care or lip products

Typical Properties

Appearance	Crystalline powder
Color	White
Odor	Characteristic

USA

Lonza Personal Care
70 Tyler Place
South Plainfield, NJ 07080
Tel +1-908-412-6461
lonzapc.arch@lonza.com

Switzerland

Lonza Ltd
Muenchensteinerstrasse 38
4002 Basel
Tel +41 61 316 81 11
contact@lonza.com

This document is an overview for professionals of certain scientific information on the subject ingredient and certain scientific information on clinical and other trials with such ingredient. No claims are made herein for any particular consumer product, and any use of these statements is the sole responsibility of the user based on its independent evaluation. The republication of the statements made herein is prohibited. The recommended use for our product is as a cosmetic ingredient. It is always important to ensure that final communications to the consumer on cosmetic products containing our ingredient products comply with the applicable claims regulations in the regions/countries where the cosmetic products are marketed. Statements made in this document may indicate mechanisms of the subject ingredient generally, and such claims may not be suitable for a finished cosmetic product. Users of our product should make an independent determination as to the appropriate use of such product in a given finished cosmetic formulation, as well as the suitability of, and support for, any claims made in labeling or advertising for such finished cosmetic formulation. The information contained herein is believed to be correct and corresponds to the latest state of scientific and technical knowledge. However, no warranty, either express or implied, is made regarding its accuracy or the results to be obtained from the use of such information. The user assumes all risks of use and/or handling of our products. No statement herein is intended or should be construed as a recommendation to infringe any existing patent. NO WARRANTIES ARE GIVEN HEREIN AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.