

Geogard™ Ultra™ (patent pending)

Next-Generation Preservation



INCI Name: Gluconolactone & Sodium Benzoate

Key Product Benefits:

- Has a wide range of global regulatory acceptance
- Broad Spectrum Activity
- ECOCERT/COSMOS Accepted and Soil Association Approved
- Wide Applicability
- Bacterial/Fungal Control
- Widespread Usage

Recommended Use Level

0.75-2.0%

Description

Geogard™ Ultra™ is a synergistic, patent-pending blend comprised of gluconolactone and sodium benzoate. What makes this preservative unique is the synergy between the two ingredients, allowing for its broad spectrum efficacy. Typically, organic acids on their own are too weak and often require a co-preservative or booster in order to perform optimally. The gluconolactone in this blend works together with the sodium benzoate to act as an efficient preservative booster that is also non-GMO. Geogard™ Ultra™'s gluconolactone works by slowly releasing gluconic acid over time, which helps contribute to the preservation.

Chemical Compound Breakdown	Cas No.	EINECS No.
D-Glucono-1,5 Lactone	90-80-2	202-016-5
Sodium Benzoate	532-32-1	208-534-8
Calcium Gluconate	299-28-5	206-075-8

Chemical Compound Breakdown	Percentage
D-Glucono-1,5 Lactone	70-80%
Sodium Benzoate	22-28%
Calcium Gluconate	1%

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 Concentrations For Different Product Types

Product Type	Concentration Geogard™ Ultra™
Creams type "organic"	1.5 - 2.0 %
Foaming Bath	1.0 - 1.25 %
Shampoo	0.8 - 1.0 %
Hair Conditioner	0.6 - 0.8 %
Hand Soap	1.0 - 1.3 %
Face Mask	1.0 - 1.5%
Body Lotion	0.6 - 0.8 %

*Recommended use concentration based on the Lonza's laboratory challenge test results data collection

Geogard™ Ultra™ can be used at 1.0 to 2.0 % as a stand-alone preservative system, but can also be used successfully at lower levels (0.25% to 1.0%) when combined with other synthetic or natural preservatives, preferably good bactericides. Lonza can recommend combinations upon request.

Efficacy

Microbiological Challenge Studies

Studies were run using different concentrations of Geogard™ Ultra™ in various formulations to see efficacy against various bacteria, yeast and fungi. All samples were inoculated at the beginning of the study, sampled at 24 hours, 7, 14 and 28 days.

Moisturizing Cream

Ingredient	%W/W
Water, deionized	q.s
Caprylic Triglyceride	20.00%
Sorbitan Monostearate	2.00%
PEG Stearate	1.50%
Glyceryl Stearate	2.00%
Decaglyceryl Decaoleate	5.00%
UV absorber	optional
Thickener	optional
Preservative	quantity varied
Total:	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day0	Day7	Day14	Day28
1	Unpreserved Moisturizer	9.5x10 ⁶	4.2x10 ⁵	8.9x10 ⁴	<10
2	Moisturizer with 1.5% Geogard™ Ultra™	6.5x10 ⁶	<10	<10	<10

Initial Bacterial Inocula: 1.02 x 10⁹

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
3	Unpreserved Moisturizer	8.8x10 ⁵	1.7x10 ⁵	1.9x10 ⁵	2.8x10 ⁵
4	Moisturizer with 1.5% Geogard™ Ultra™	2.1x10 ⁵	<10	<10	<10

Initial Bacterial Inocula: 1.02 x 10⁹

Anionic Protein Shampoo

Ingredient	%W/W
Water, deionized	q.s
Sodium Lauryl Ether Sulfate	15.0%
Triethanolamine Lauryl Sulfate	10.0%
Cocamide DEA	3.0%
Anhydrous Protein	1.0%
50% Aqueous Citric acid	pH adjuster
Preservative	quantity varied
Total	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Shampoo	9.5x10 ⁶	4.76x10 ⁵	1.06x10 ⁹	2.0x10 ⁷
2	Shampoo with 1.5% Geogard™ Ultra™	5.2x10 ⁵	<10	<10	<10

Initial Bacterial Inocula: 1.02 x 10⁹

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
3	Unpreserved Shampoo	6.6x10 ⁵	2.0x10 ⁵	3.0x10 ⁵	1.7x10 ⁷
4	Shampoo with 1.5% Geogard™ Ultra™	4.4x10 ⁵	<10	<10	<10

Initial Bacterial Inocula: 1.02 x 10⁹

Moisturizing Cream

Ingredient	% W/W
Water, deionized	q.s
Glyceryl Tricaprate	2.00%
Glycomul™ S	2.00%
Pegosperse™	1.50%
Aldo™ MS	2.00%
Polyaldo™ 10-1-S Pastillated	5.00%
UV absorber	2.00%
Thickener	2.00%
Preservative	quantity varied
Total:	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Shampoo	9.5x10 ⁶	4.76x10 ⁵	1.06x10 ⁹	2.0x10 ⁷
2	Shampoo with 1.5% Geogard™ Ultra™	5.2x10 ⁵	<10	<10	<10

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
3	Unpreserved Moisturizer	2.2 x 10 ⁵	2.8 x 10 ⁴	2.5 x 10 ⁵	2.3 x 10 ⁵
4	Moisturizer w/ 1.0% Geogard™ Ultra™	1.3 x 10 ⁵	8 x 10 ¹	<10	<10

Protein Shampoo

Ingredient	%W/W
Water, deionized	q.s
Sodium Lauryl Ether Sulfate	15.0%
Triethanolamine Lauryl Sulfate	10.0%
Cocomide DEA	3.0%
Anhydrous Protein	1.0%
50% Aqueous Citric acid	pH adjuster
Preservative	quantity varied
Total	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Shampoo	7.2 x 10 ⁶	4.0 x 10 ⁸	3.3 x 10 ⁸	1.2 x 10 ⁸
2	Shampoo w/ 1.5% Geogard™ Ultra™	6.6 x 10 ⁶	< 10	< 10	< 10

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
3	Unpreserved Shampoo	1.2 x 10 ⁶	4.9 x 10 ⁶	7.1 x 10 ⁴	2.1 x 10 ⁵
4	Shampoo w/ 1.5% Geogard™ Ultra™	1.6 x 10 ⁵	<10	<10	<10

Hair Conditioner

Ingredient	% W/W
Water, deionized	q.s
Glycosperse 0-20 – Polysorbate 80	0.5%
Lecithin - Alcolec F100	1.0%
Distearyldimonium Chloride (Varisoft TA100)	2.0%
Cetyl Alcohol - C0-1695	2.1%
Cetearyl Alcohol -TA-1618	1.5%
Ethospense LA-4 - POE 4 Lauryl Alcohol	3.1%
10% Aqueous Sodium Hydroxide	pH adjuster
Preservative	quantity varied
Total:	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Conditioner	8.3 x 10 ⁶	4.8 x 10 ⁷	2.4 x 10 ⁶	9.0 x 10 ⁶
2	Conditioner w/ 1.0% Geogard™ Ultra™	6.6 x 10 ⁶	< 10	< 10	< 10

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
3	Unpreserved Conditioner	4.2×10^6	1.8×10^7	8.3×10^5	3.7×10^5
4	Conditioner w/ 1.0% Geogard™ Ultra	4.1×10^4	2.0×10^2	<10	<10

There is also a moisturization benefit on the skin with the Geogard™ Ultra™. In the same moisturizing cream formulation used to demonstrate preservative efficacy, Geogard™ Ultra™ produced a quantitative moisturization benefit to the skin. Over a period of time, Geogard™ Ultra™ produced a moisturizing effect that was comparable to the use of 2 percent glycerin.

Average Moisturizing Effect on 9 Subjects Over Five Days

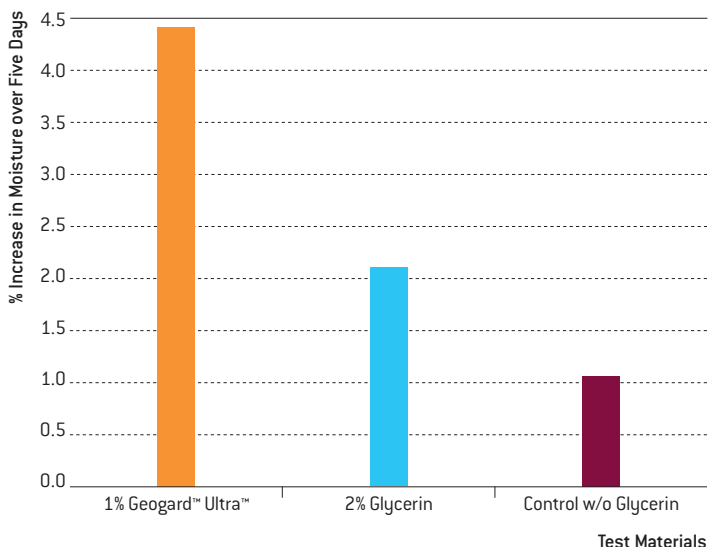


Fig. 1

Additional Information

Geogard™ Ultra™ Synergy Study

While both the Gluconolactone and the Sodium Benzoate are effective individually, the graph below demonstrates higher efficacy due to the synergy between Gluconolactone and the Sodium Benzoate contained in the Geogard™ Ultra™

Geogard™ Ultra™ Synergy Study - Bacterial Counts

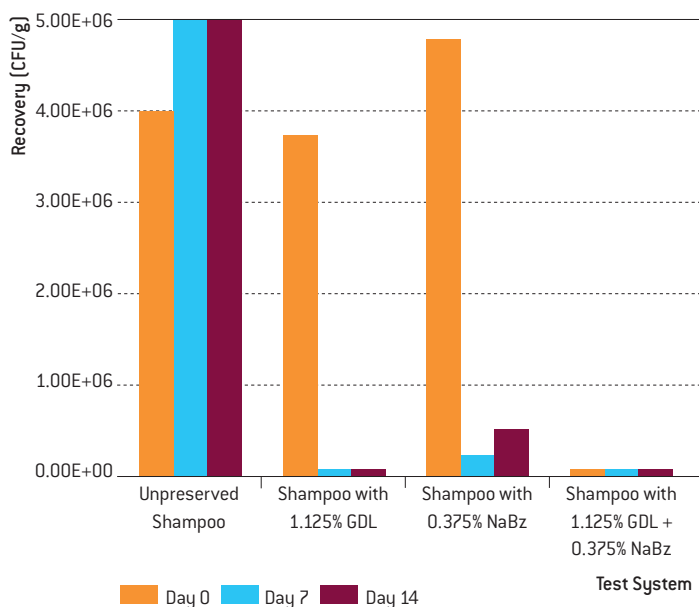


Fig. 2

Global Regulatory

Europe

- Max concentration of NaBenzoate is based on benzoic acid content
- Max concentration of benzoic acid is 2.5% for rinse-off
- Max concentration of benzoic acid is 0.5% for leave-on

Japan

- 1.0% total max. level of NaBenzoate

US

- 5.0% total max. level of NaBenzoate

General

- ECOCERT compliance, Soil Association approved

Formulation Recommendations

- Compatible with a wide variety of formulation ingredients as well as most types of cationic, nonionic and anionic systems
- Can be used effectively over a pH range of 3 to 6 and can be added at both room and elevated temperatures
- It is recommended that it's dissolved in the water phase or a portion of water and/ or glycerin pre-mix prior to addition to the batch
- Soluble up to 4% in ambient water; it can be easily dispersed in glycols and alkyl sulfates
- Water soluble

Solubility Data

Solvent	Soluble/Insoluble
Water	Dispersible
Propylene Glycol	Dispersible
Glycerin	Soluble
Ethanol	Insoluble
Mineral Oil	Dispersible
Vegetable Oil	Insoluble
Silicone (Dimethicone)	Insoluble
Alkyl Sulfates	Dispersible

Typical Properties	
Gluconolactone,%	70% Minimum
Sodium Benzoate,%	22% Minimum
Appearance	Free flowing, white powder
Activity	99%

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

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