

Geogard Ultra®

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 , NATRUE-approved and Soil Association-approved
- Wide applicability
- Added moisturization benefit

Recommended Use Level

0.75–2.0%

Description

Geogard Ultra® is a synergistic 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
- Lipstick/gloss
- Lotion
- Make up remover
- Oil in Water
- Oral care
- Powder
- Shampoo
- Suncare
- Toner
- Water in Oil

Efficacy

Microbiological Challenge Studies

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

In these challenge studies, the bacterial pool consisted of *S.aureus*, *P.aeruginosa* and *E.coli*, and the fungal pool of *C.albicans* and *A.brasiliensis*.

Moisturizing Cream

(pH = 5.28)

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	1.5% Geogard Ultra®
Total:	100.00%

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 28
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

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

Anionic Protein Shampoo

(pH = 5.42)

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	1.5% Geogard Ultra®
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 ⁷	1.06x10 ⁸	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 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

Hair Conditioner

(pH = 4.89)

Ingredient	% W/W
Water, deionized	q.s
Polysorbate 80 (Glycosperse® 0-20)	0.5%
Lecithin	1.0%
Distearyldimonium Chloride (Varisoft TA100)	2.0%
Cetyl alcohol	2.1%
Cetearyl alcohol	1.5%
POE 4 Lauryl Alcohol (Ethospense® LA-4)	3.1%
10% Aqueous Sodium Hydroxide	pH adjuster
Preservative	1.0% Geogard Ultra®
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®	3.5 x 10 ⁵	< 10	< 10	< 10

Fungal Counts (CFU/gram)

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

Wet Wipe Liquor

{pH = 5.54}

Ingredient	%W/W
Water	q.s to 100
Decyl glucoside (Plantaren® 2000)	0.25%
Polysorbate 20 (Glycosperse® L-20)	0.30%
Disodium EDTA	0.20%
Sodium citrate	3.00%
Geogard Ultra®	2.00%
Total	100.00%

{pH adjustments for in-situ buffer}

Bacterial Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 21	Day 28
1	SPC nonwoven (unpreserved)	1.6×10^6	3.1×10^5	$>3.9 \times 10^6$	$>3.9 \times 10^6$	$>3.9 \times 10^6$
2	SPC nonwoven with 2% Geogard Ultra®	2.1×10^6	<100	<100	<100	<100
3	Spunlace nonwoven (unpreserved)	2.6×10^6	3.0×10^6	$>3.9 \times 10^6$	$>3.9 \times 10^6$	$>3.9 \times 10^6$
4	Spunlace nonwoven with 2% Geogard Ultra®	1.9×10^6	<100	<100	<100	<100

Fungal Counts (CFU/gram)

Sample#	Test Samples	Day 0	Day 7	Day 14	Day 21	Day 28
5	SPC nonwoven (unpreserved)	7.7×10^4	2.4×10^6	6.4×10^6	4.1×10^5	1.2×10^6
6	SPC nonwoven with 2% Geogard Ultra®	7.8×10^4	1.0×10^2	<100	<100	<100
7	Spunlace nonwoven (unpreserved)	1.2×10^5	5.5×10^5	8.8×10^5	1.1×10^6	1.2×10^6
8	Spunlace nonwoven with 2% Geogard Ultra®	9.5×10^4	<100	<100	<100	<100

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 superior to the use of 2 % glycerin.

Average Moisturizing Effect on 9 Subjects Over Five Days

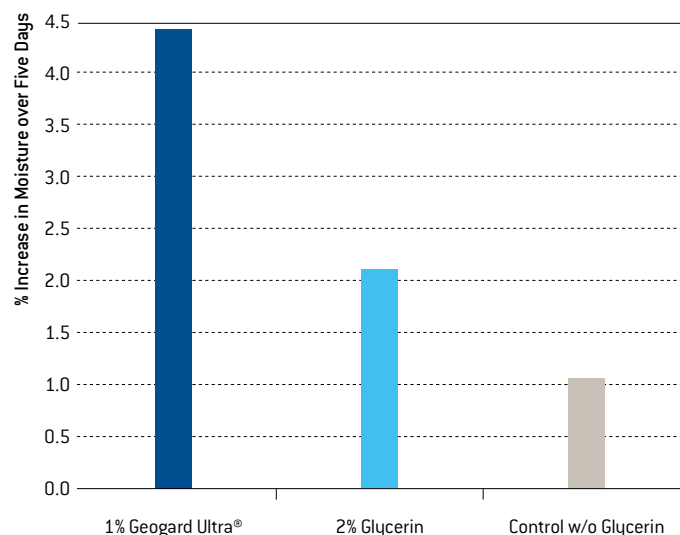


Fig. 1

Global Regulatory

Europe

- Max concentration of sodium benzoate 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 sodium benzoate

US

- 5.0% total max level of sodium benzoate

General

- Compliance with ECOCERT/COSMOS and Soil Association

Formulation Recommendations

- Water soluble
- 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
- Soluble up to 4% in ambient water; it can be easily dispersed in glycols and alkyl sulfates
- To maximise the pH stability of the final formulation, it may be necessary to employ use of a sodium citrate buffer and pH adjustment as described below...
 1. Dose the final product with the required level of Geogard Ultra® along with a 1.5x amount of sodium citrate. So, a 2% dose of Geogard Ultra® should be accompanied by 3% sodium citrate
 2. Mix thoroughly to ensure all solids have dissolved and adjust the pH of the formulation to 7.00 - 7.25 with 30% sodium hydroxide
 3. Finally, adjust the pH to desired final product pH (pH 5.4 – 5.5 is ideal) with dilute sodium hydroxide or citric acid solution

Solubility Data

Solvent	Soluble/Insoluble
Water	Soluble
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%

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