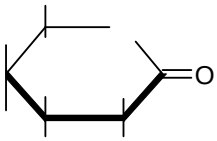
The Soap Kitchen
Unit 8 Caddsdown Industrial Park, Clovelly
Road, Bideford,
Devon EX39 3DX
Tel: 01237 420872 (+44 (0)1237 420872)
Email: info@thesoapkitchen.co.uk

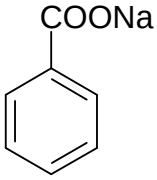
Product Information

Gluconolactone and Sodium Benzoate (GSB)

Multifunctional specialty additive for cosmetics and toiletries,
accepted under Natural and Organic cosmetics standards of Ecocert as well as Soil Association and NaTrue.



~75% D-Glucono-1,5-Lactone



~25% Sodium Benzoate

1.1 CAS No.:
D-Glucono-1,5-Lactone : CAS# 90-80-2
Sodium Benzoate: CAS# 532-32-1

1.2 EEC-No.:
D-Glucono-1,5-Lactone : 202-016-5
Sodium Benzoate: 208-534-8

1.3 UN No.: not applicable / non-hazardous goods

1.4 INCI-Name:
Actives: Gluconolactone (and) Sodium Benzoate
Additive (flow aid) : Calcium Gluconate

2. Specifications

2.1	Glucono Delta Lactone	70.0 % min.
2.2	Sodium Benzoate	22.0 % min.
2.3	Appearance	Pass (free flowing, white powder)

3. Properties

3.1	Activity	99%
3.2	Calcium Gluconate (flow aid)	1%
3.3	Odor	Mild
3.4	Bulk Density (20℃)	0.74 g/cc
3.5	Flash point	Not applicable
3.6	Solubility	Water soluble
2.7	Water content	1.0 % max.
2.8	Non-GMO verification	Pass

4. Registrations

North America

Gluconolactone and Sodium Benzoate is acceptable for both rinse-off and leave-on applications.

Asia/Japan

Gluconolactone and Sodium Benzoate ingredients are allowed in Japan according to the comprehensive licensing standards of cosmetics and the Ministry of Health & Welfare.

Europe

Gluconolactone is a proven moisturizer. Sodium Benzoate is a well-established, traditional preservative and is approved for leave-on and rinse-off products up to 0.5% (acid).

5. Efficacy

Moisturizing Cream

Raw Material	% W/W
Water, deionized	q.s
Glyceryl Tricaprate	2.00
Sorbitan Stearate	2.00
PEG Stearate	1.50
Glyceryl Stearate	2.00
Decaglyceryl Stearate	5.00
UV absorber	2.00
Thickener	2.00
Preservative	quantity varied
Total:	100.00

Bacterial Counts (CFU/gram)

Mix Bacteria : Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus

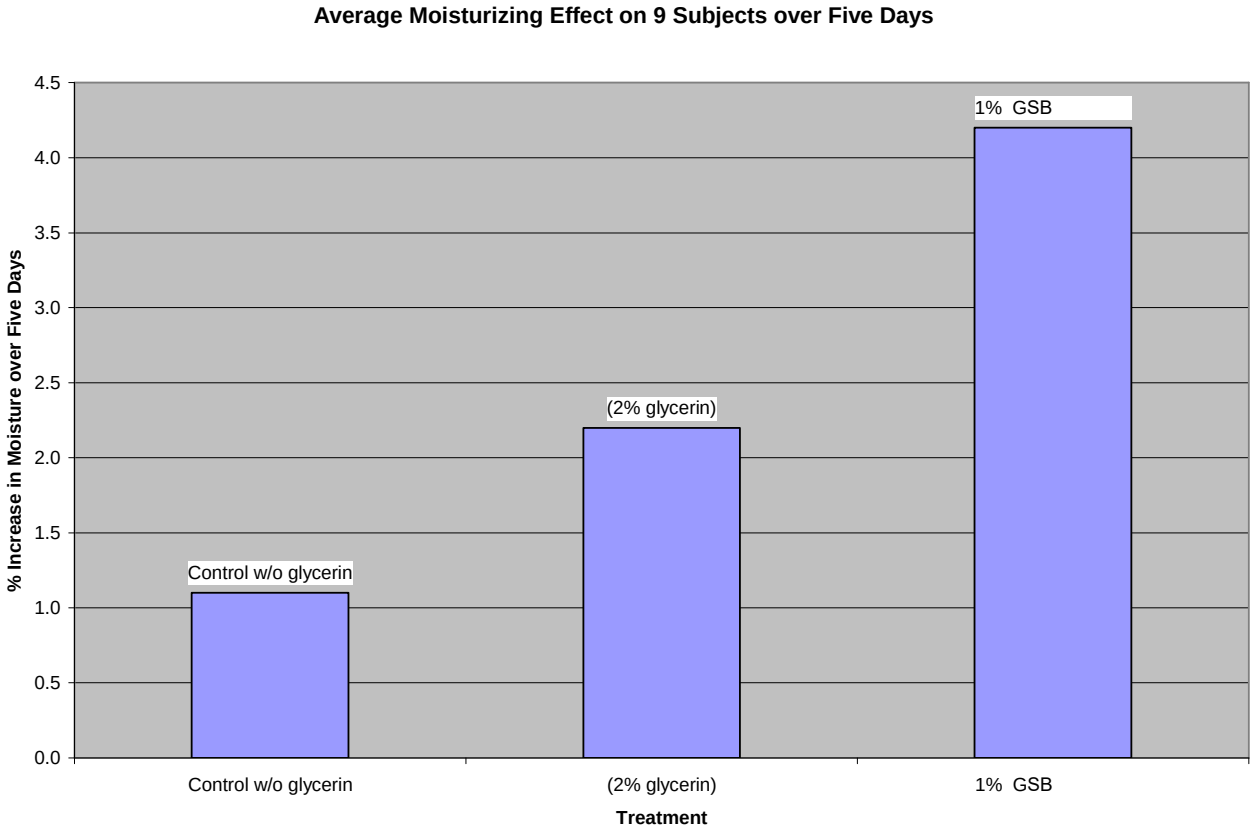
Sample #	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Moisturizer	2×10^6	$>3 \times 10^6$	$>3.3 \times 10^6$	$>3 \times 10^6$
2	Moisturizer w/ 1.0% GSB	2×10^6	< 10	< 10	< 10

Fungal Counts (CFU/gram

Mix Fungi : Aspergillus niger, Candida albicans

3	Unpreserved Moisturizer	2.2×10^5	2.8×10^4	2.5×10^5	2.3×10^5
4	Moisturizer w/ 1.0% GSB	$1\text{-}3 \times 10^5$	8×10^1	<10	<10

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



Protein Shampoo

Raw Material	*%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	7.2×10^6	4.0×10^8	3.3×10^8	1.2×10^7
2	Shampoo w/ 1.5% GSB	6.6×10^6	< 10	< 10	< 10

Fungal Counts (CFU/gram

3	Unpreserved Shampoo	1.2×10^6	4.9×10^6	7.1×10^4	2.1×10^5
4	Shampoo w/ 1.5% GSB	1.6×10^5	<10	<10	<10

Hair Conditioner

Raw Material	*% W/W*
Water, deionized	q.s
Glycosperse 0-20 – Polysorbate 20	0.5
Lecithin - Alcolec F100	1.0
Distearyldimonium Chloride (Varisoft TA 100)	2.0
Cetyl Alcohol - CO-1695	2.1
Ceatryl Alchol -TA-1618	1.5
Ethosperse LA-4 - POE 4 Laurly Alcohol	3.1
10% Aqueous Sodium Hydroxide	pH adjuster
Preservative	quantity varied
Total:	100.00

Bacterial Counts (CFU/gram)

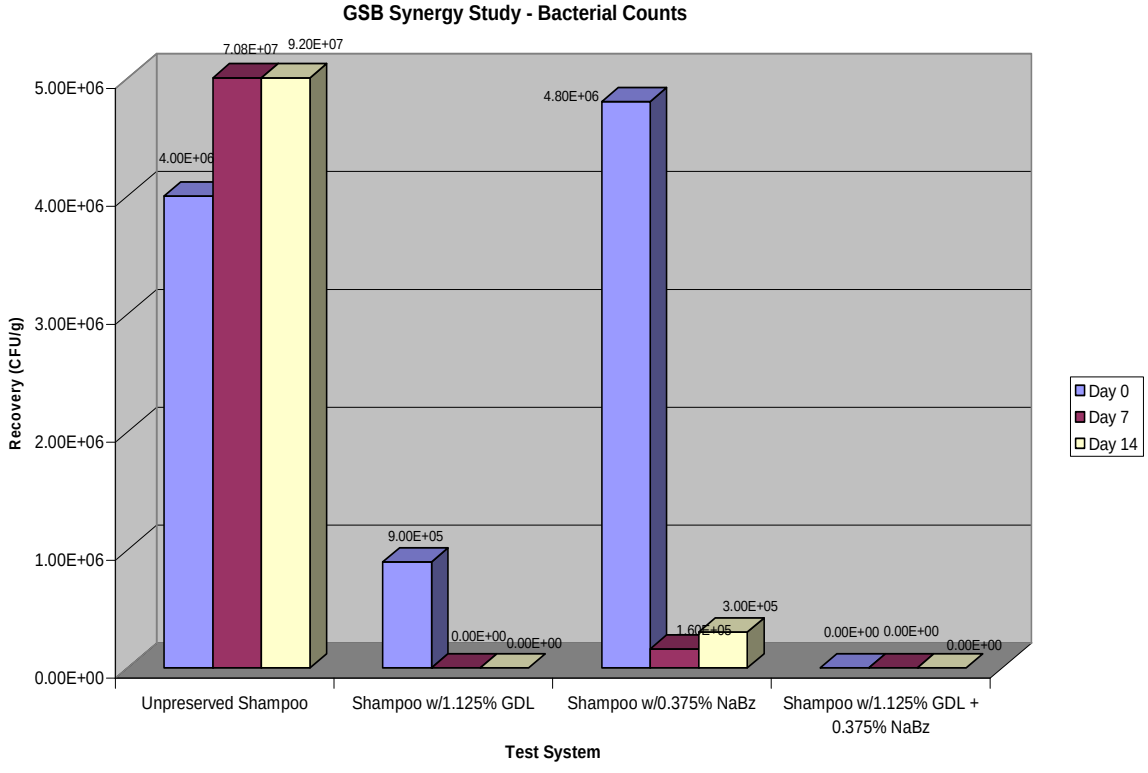
Sample #	Test Samples	Day 0	Day 7	Day 14	Day 28
1	Unpreserved Conditioner	8.3×10^6	4.8×10^7	2.4×10^6	9.0×10^6
2	Conditioner w/ 1.0% GSB	3.5×10^5	< 10	< 10	< 10

Fungal Counts (CFU/gram

3	Unpreserved Shampoo	4.2×10^6	1.8×10^7	8.3×10^5	3.7×10^5
4	Conditioner w/ 1.0% GSB	4.1×10^4	2.0×10^2	<10	<10

GSB 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 GSB.



Other investigations
Recommended use concentrations for different product types:

Product type	**Concentration GSB**
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

6. Heavy metal content

Sample N°	Batch Nr. K8438052
µg/g Co	< 0,5 ppm
µg/g Cr	< 0,5 ppm
µg/g Ni	< 0,5 ppm
µg/g As	< 0,5 ppm

Cr results confirmed via ICP/OES

7. Use areas

GSB is compatible in a diverse range of natural based product formulations, for example
Hair Care: Shampoos, Conditioners, Rinses
Skin Care: Liquid Soaps, Shower Gels, Sensitive Skin Lotions, Moisturizers, Cold Creams
Sun Products: Sunscreen Lotions and Creams
Raw Materials: Surfactants, Shampoo Blends, Conditioner Blends
GSB 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

8. Expertise at Derma Consult GmbH

GSB has been expertized with occlusive patch tests each with 50 volunteers by Derma Consult GmbH. The examination of Geogard™ Ultra has been done with three different GMS Cream formulations. (1.5% pH independent 4 to 5.5) None of the subjects showed any reaction to the test formulation.

9. Formulating Recommendations

GSB is fully compatible with a wide variety of formulation ingredients as well as most types of cationic, nonionic and anionic systems. GSB can be used effectively over a wide pH range of 3 to 6 and can be added at both room and elevated temperatures, preferably in the aqueous phase of the formulation.
The addition of GSB may lead to a decrease of pH and we recommend a recheck of pH stability, and if necessary, addition of pH buffers. In that respect, Sorensen's phosphate buffer (0.2M NaH_2PO_4 / 0.2M Na_2HPO_4) was found to give the best results. GSB's efficacy is pH-dependent and, whether the final cosmetic formulation is buffered or not, a challenge test should always be performed to ensure efficacy of the preservative system.

Solubility:

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

Stability:
GSB is a uniform, white powder which is very stable over time.

10. Packaging / Storage

GSB is supplied in plastic pails holding 15.88 kg net and fiber drums holding 45.36 kg net. GSB can be stored two years in the sealed original packaging under normal temperature conditions.

11. Regulatory information

refer to MSDS

12. Toxicological information, Ecological and Ecotoxicological Information

refer to MSDS