

NAT DEFENCE - PRESERVATIVE

(Previously Geogard Ultra)

INCI name: Gluconolactone (and) Sodium Benzoate
Ingredient type: Preservative
Appearance: Granular Powder
Colour: White
Solubility: Water Soluble
Odour: Characteristically mild odour
Usage Rate: 0.75 – 2%
No Animal testing, Non GMO, Ecocert Approved

Nat Defence is a natural preservative comprised of a combination of a naturally occurring food additive, glucono delta lactone, derived from corn, and a food grade preservative sodium benzoate, the sodium salt of benzoic acid, along with a trace amount of calcium gluconate as a processing agent. This is the solution for those challenging formulas in which you wish to change the preservation system to an efficacious natural preservative.

Nat Defence is an effective broad spectrum preservative (biocide) which can be included in Organic Products and is effective within a pH range of 3.0 - 6.5. There are also a few additional benefits – you can add it to the water phase whilst it is still quite hot (giving better control of the emulsion), and also test the pH at the same time, it is GRAS (generally regarded as safe) and is a proven moisturiser – another bonus!

With its multi-functionality, Nat Defence can be used in a wide range of cosmetic products including Shampoo and Hair Care Products, Lotions and Creams and Bath and Body Cleansing Gels. In most formulations, testing showed an effective dosage rate of 1.0 – 1.5% of batch weight was suitable.

Nat Defence helps prevent product spoilage by using less aggressive: "Hurdle Technology." This preservative works by creating a hostile environment (to Fungi and Bacteria) within the formulation, rather than by aggressively attacking Fungi and Bacteria themselves. Potentiators within the preservation system create these hurdles and thus the self preserving environment of the formulation is increased.

Nat Defence is compatible with a wide variety of formulation ingredients as well as most types of cationic, non-ionic, and anionic systems. It has an exceptional toxicity profile, a long history of use, is non-sensitizing and non-irritating.

Usage Information:

- Always add powder to warm water (40°C), prior to adding to formulation. Mix well immediately with overhead mixing blade or a magnetic stirrer. This elevated temperature should help dissolution. If the formula also contains a surfactant, this can also be added to the warm water phase. If the formula contains glycerin, this can also be added to the warm water phase. **If you delay mixing the powder into the water, the mixture will become cloudy and slightly "gelled" which prevents the powder fully dissolving and being solubilised into the water which may result in inferior performance in your formula
- Nat Defence is expected to be stable up to 80°C, however if such high temperatures are necessary, it is recommended that this preservative be added at the point where the batch will start to cool down - to minimize the time of exposure to such a high temperature. Typically, preservatives are added at 50°C or lower in personal care formulations. We strongly suggest that you conduct suitable Preservative Efficacy Testing on the final product prepared under normal processing conditions to check the effect of their processing temperature.
- Broad spectrum protection across pH range of 3.0 - 6.5, if pH depression occurs, the formulation can be adjusted with citrate (Citric Acid) or phosphate buffering systems. If using Citric Acid, make a solution and adjust the pH, testing after each addition until you have reached the desired pH.
- Soluble up to 4% in ambient water and can be dispersed in glycols and alkyl sulphates.
- Insoluble in Oil – therefore not suitable for anhydrous products

Incompatibilities:

- not for use in products which contain ascorbic acid (due to undesirable chemical reaction as a result of the destabilization and oxidation of the ascorbic acid which may convert the sodium benzoate to its acidic state (benzoic acid))
- not for use in products which contain food colours (due to undesirable chemical reaction which may convert the sodium benzoate to its acidic state (benzoic acid))

Buffering to stabilise pH Shift in personal care products (From the Manufacturer)

Nat Defence: Gluconolactone (~70%) - Sodium Benzoate (~22%) - Calcium Gluconate (~1%)

(To be utilized at pH < 7)

Formulating recommendations

Nat Defence is fully compatible with a wide variety of formulation ingredients as well as most types of cationic, non-ionic and anionic systems. Nat Defence can be used effectively over a wide pH range of 3 to 6.5 and can be added at both room and elevated temperatures, preferably in the aqueous phase of the formulation. The addition of Nat Defence may lead to a decrease of pH due to the hydrolysis of Gluconolactone. We recommend a recheck of pH stability, and if necessary, incorporate a buffering system. In addition to the two buffering systems listed below, Sorensen's phosphate buffer (0.2M NaH₂PO₄ / 0.2M Na₂HPO₄) also showed adequate buffering capacity.

Buffering systems, examples

Buffer A:

Na₂HPO₄ x 2H₂O 0.35%
Citric acid 0.15%
Water add 100%
pH value 5.3

Buffer B:

Na₂HPO₄ x 2H₂O 0.05%
Na₂HPO₄ 0.45%
Water add 100%
pH value 5.3

Nat Defence'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.

**As is usual, it is necessary to test ingredients in your own applications and formulations to ensure it is the right product for you.

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