Import and distribution for Serbia: Farmadria DOO
info@avenalab.com
+381 (0) 69 / 55 65 029
www.avenalab.com

TECHNICAL DATA SHEET

Product Name: Acetyl Glucosamine

INCI Name: N-acetyl-α-D-glucosamine (NAG)

CAS: 10036-64-3

Chemical Classification: Carbohydrate, Amide, Polyol

Functional Category: Skin Care Conditioner ~ Miscellaneous

IUPAC Name: 2-(Acetylamino)-2-deoxy-D-glucose

Description: The pure form of acetyl glucosamine is very unstable under normal conditions. Its synthetic or bio-fermented derivative known as N-acetyl glucosamine (NAG) is much more stable and effective. N-acetyl glucosamine is a compound modified by adding an acetyl group (-COCH3) to the nitrogen (N) atom of the amino group present in glucosamine. This acetyl group is key for achieving stability and resistance to external conditions. Thanks to its improved stability, NAG can act more effectively on the skin, and the risk of undesirable reactions or product degradation that can cause skin irritation or other problems is significantly reduced. N-acetyl glucosamine is a white, crystalline powder. It is soluble in water, making it suitable for aqueous formulations in skin care. Its solubility decreases in less polar solvents. NAG is generally non-reactive under normal conditions but can participate in biochemical reactions within the skin, contributing to the synthesis of hyaluronic acid and other glycosaminoglycans. As a precursor to hyaluronic acid, N-acetyl glucosamine plays a key role in hydration and the establishment of skin elasticity. The stability of N-acetyl glucosamine can depend on the pH of the solution. It is generally stable across a wide range of pH values, making it versatile for different types of skin care products. It is compatible with most other ingredients, making it a flexible addition to formulations aimed at improving hydration, elasticity, and overall skin health. N-acetyl glucosamine works particularly well in combination with niacinamide (vitamin B3) to achieve a reduction in visible discolorations and even out skin tone.

Benefits:

- ***Hydration:*** N-acetyl glucosamine (NAG) helps strengthen the skin's barrier

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function by preventing excessive water loss from the epidermis (surface layer of the skin). NAG stimulates the production of natural moisturizing factors, such as amino acids, that help maintain moisture within the skin. One of the key functions of NAG is its ability to stimulate the production of hyaluronic acid in the skin. Hyaluronic acid is a natural polysaccharide that has an exceptional ability to retain water. This allows the skin to retain large amounts of water, resulting in improved hydration and volume. In addition to direct hydration, NAG supports the natural skin renewal process, indirectly contributing to better skin hydration.

• ***Skin Lightening:*** The skin lightening mechanism enabled by N-acetyl-α-D-glucosamine (NAG) is based on its ability to affect the process of melanin synthesis. Melanin is the pigment that gives color to the skin, hair, and eyes. Melanin production occurs in melanocytes, cells located in the basal layer of the epidermis of the skin, and involves several steps where enzymes play key roles. One of the key enzymes in melanin synthesis is tyrosinase. Tyrosinase catalyzes the first steps in converting the amino acid tyrosine into melanin. NAG acts as a tyrosinase inhibitor. By reducing the activity of this enzyme, it slows down melanin production. Additionally, NAG can also reduce the transfer of melanin from melanocytes to keratinocytes, contributing to skin lightening.

• ***Anti-aging:*** NAG can stimulate the production of hyaluronic acid in the skin, improving elasticity and reducing the visibility of fine lines and wrinkles. It supports the natural ability of the skin to produce collagen, which is key to maintaining youthful texture and firmness of the skin.

• ***Anti-inflammatory Properties:*** NAG can inhibit the activity of NF-kB (nuclear factor kappa B), a protein that plays a key role in regulating the inflammatory response and the expression of inflammatory cytokines. Cytokines are signaling proteins that play an important role in cell communication during inflammatory processes. NAG reduces the production of pro-inflammatory cytokines, such as interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor alpha (TNF-α), thereby reducing inflammation, redness, and skin irritation. NAG can affect the function of immune cells, including macrophages and T cells. Modulating their response reduces excessive activation leading to inflammation. It reduces oxidative stress, which can contribute to the development and worsening of inflammatory skin conditions.

• ***Acne and Skin Regeneration:*** NAG can affect healing and skin regeneration, which is particularly important in treating acne to reduce existing lesions and prevent scar formation. Although primarily not known for its antimicrobial properties, its role in improving skin health can indirectly contribute to reducing the growth of bacteria associated with acne, such as Propionibacterium acnes (now reclassified as

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Cutibacterium acnes).

• ***Exfoliation:*** Although N-acetyl-α-D-glucosamine (NAG) itself is not an exfoliating agent in the traditional sense, it can have a synergistic effect when used in combination with other exfoliating ingredients. NAG combines well with exfoliating ingredients such as alpha-hydroxy acids (AHA) and beta-hydroxy acids (BHA). NAG can help improve the effects of chemical peels by contributing to hydration and reducing inflammation. Also, NAG can support the natural exfoliation process of the skin by stimulating cell renewal and the production of hyaluronic acid, indirectly contributing to smoother and healthier skin.

• ***Compatibility:*** NAG is generally well tolerated. Due to its mild and non-irritating properties, it can be used in formulations intended for people with sensitive skin. Stability in Formulations: NAG is stable across a wide range of pH values, making it suitable for use in various types of cosmetic formulations, from serums and creams to lotions and masks. The stability of NAG in formulations means it can effectively deliver its benefits to the skin without rapid degradation or loss of efficacy.

Usage: In cosmetic formulations, it is typically used at concentrations between 1% and 4%. These concentrations are sufficient to achieve benefits such as hydration, improved skin texture, reduction of fine lines and wrinkles, as well as reduction of hyperpigmentation and dark spots. The use of NAG at these concentrations is considered effective and safe for most skin types. When used together with niacinamide, there may be a need to adjust the concentration of one or both ingredients, as they can mutually affect solubility and efficacy. Despite this, the combination of NAG and niacinamide can provide synergistic effects, especially in improving the skin barrier function, reducing hyperpigmentation, and supporting the fight against signs of aging. Although the solubility of NAG is poor at concentrations above 10%, even the use of these higher concentrations does not lead to skin irritation, indicating its general safety. However, for optimal results and to avoid potential formulation issues, it is recommended to stay within the stated range of concentrations.

Animal Testing: The substance is not tested on animals

GMO: Non-GMO

Vegan: Does not contain animal-derived components