

TECHNICAL DATA SHEET

Product Name: Xylitol

INCI name: Xylitol

CAS: 87-99-0

Chemical classification: Polyol (sugar alcohol); pentahydroxy alcohol

Functional category: Humectant; sweetener; skin conditioning agent; moisture stabilizer

IUPAC name: (2R,3R,4S)-pentane-1,2,3,4,5-pentol

Description: Xylitol is a natural sugar alcohol (polyhydric alcohol) industrially produced by hydrogenation of xylose, most commonly derived from plant sources such as wood biomass or agricultural residues rich in hemicellulose. Chemically, it belongs to the group of pentitols and is characterized by high hydrophilicity, which determines its functional role in cosmetic formulations. In cosmetics, it is used as a humectant, a hydration-enhancing agent, and a component that contributes to the stability of the skin barrier function. Due to the presence of multiple hydroxyl groups in its molecule, xylitol effectively binds water and reduces transepidermal moisture loss. In addition to its moisturizing effect, xylitol exhibits mild antimicrobial activity, particularly in oral care cosmetics and products for oral hygiene, where it helps reduce the growth of bacteria responsible for biofilm formation. In dermocosmetic products, its role is not primarily preservative, but it may contribute to microbiological stability when combined with other ingredients. It does not exhibit comedogenic potential and does not clog pores. Owing to its good tolerability, it is used in creams, serums, lotions, gels, hair care products, and oral hygiene preparations. In dermatological practice, it is considered suitable for long-term use, including daily care products. In formulations intended for dry and dehydrated skin, it represents a functional component that supports hydration, barrier stabilization, and improved sensory properties.

Mechanism of action: The mechanism of action of xylitol is based on its pronounced hydrophilicity and its ability to influence hydration regulation and epidermal differentiation. As a small polyhydric alcohol, it disperses easily in the aqueous phase of formulations and, upon application, penetrates the superficial layers of the stratum corneum,

Disclaimer: The details provided here are specific to the identified material and may not remain accurate if that material is combined with other substances or used in different processes. The information presented is, to the best of the company's knowledge, considered precise and trustworthy as of the date mentioned. However, the company does not make any explicit or implied assurance, guarantee, or claim regarding the information's precision, trustworthiness, or comprehensiveness, and will not be held accountable for any losses, damages, or costs, whether direct or indirect, that arise from its use. Users are encouraged to independently verify the appropriateness and thoroughness of this information for their specific purposes.

TECHNICAL DATA SHEET

where it binds water via its hydroxyl groups. In this way, it increases both free and bound water content in the stratum corneum and reduces transepidermal moisture loss. Xylitol also acts at the cellular level. Studies indicate that it may stimulate the expression of proteins involved in the terminal differentiation of keratinocytes, including filaggrin, which is essential for the formation of the skin's natural moisturizing factor (NMF). Increased availability of NMF components contributes to improved corneocyte organization and a more stable lipid matrix, thereby enhancing the barrier function of the skin. Xylitol is also associated with the regulation of aquaporins, particularly AQP3, proteins responsible for the transport of water and glycerol across cell membranes. By promoting their activity, it supports more efficient intracellular moisture retention and improved skin elasticity.

Physicochemical properties: Xylitol is a white crystalline substance with a fine-grained or granular structure, without a pronounced odor and with a mildly refreshing sweet taste. Organoleptically, it is stable and does not tend to discolor under typical storage conditions. It is moderately hygroscopic and, at elevated humidity, may absorb moisture from the air and form compact masses. It belongs to the pentitol group and contains five hydroxyl groups, which explains its pronounced hydrophilicity and water-binding capacity. Its melting point ranges approximately from 92 to 96 °C. When heated above the melting point, it becomes a colorless viscous liquid without immediate decomposition, while at higher temperatures thermal degradation may occur. It is highly soluble in water, with solubility increasing as temperature rises. It dissolves rapidly in water, forming clear and stable solutions. It is poorly soluble in ethanol and practically insoluble in nonpolar organic solvents such as oils and hydrocarbons. It is stable over a wide pH range and does not undergo hydrolysis under typical cosmetic conditions. The density of the solid is approximately 1.52 g/cm³, while aqueous solutions show concentration-dependent density. Xylitol does not have a defined boiling point in the classical sense because it decomposes before boiling. It is nonvolatile and has negligible vapor pressure at room temperature. Chemically, it is stable, does not react with most common cosmetic ingredients, and does not exhibit oxidative instability under standard storage conditions. Storage in tightly closed containers, protected from moisture and direct light at room temperature, is recommended.

TECHNICAL DATA SHEET

Benefits:

- Intensively hydrates the skin by binding water in the superficial layers of the epidermis.
- Reduces transepidermal moisture loss and helps maintain optimal hydration.
- Supports strengthening of the skin barrier through keratinocyte differentiation.
- Promotes formation of the skin's natural moisturizing factor.
- Improves skin elasticity and softness.
- Suitable for sensitive areas, such as the area around the eyes, due to good tolerability.
- Does not clog pores and has no comedogenic potential.
- Contributes to microbiological balance in oral care products.
- Improves the sensory profile of formulations by providing a pleasant skin feel.
- Compatible with most cosmetic raw materials and stable over a wide pH range.

Directions for use: Xylitol is used in formulations as a component of the aqueous phase and is dissolved directly in demineralized water with gentle stirring, without the need for heating, as it dissolves easily and completely at room temperature. It may also be added during the cold-process phase, provided that the system has already been homogenized and sufficient free water is available for dissolution. It has no application in anhydrous systems because it is insoluble in oils. In moisturizing creams, emulsions, and lotions, it is most commonly used at concentrations of 2–5%, where it contributes to increased hydration and stabilization of the skin barrier. In serums and light gel formulations, concentrations typically range from 3–7%, depending on the desired hydration intensity and combination with other humectants such as glycerin or hyaluronate. In products intended for dry and dehydrated skin, including reparative creams, concentrations may reach up to 10%, with attention to overall system osmolarity and skin tolerability. In formulations for sensitive areas, such as the area around the eyes, a range of 1–3% is recommended to achieve a mild yet effective moisturizing effect without a tightening sensation. In hair care products, it is used at 1–5%, contributing to hair fiber hydration and reduced scalp dryness. In oral care products such as toothpastes and mouthwashes, typical concentrations range from 5–20%, depending on functional purpose and formulation requirements. During formulation, it should be considered that higher concentrations may increase stickiness or alter the rheological properties of the aqueous phase, so optimization in combination with other humec-

Disclaimer: The details provided here are specific to the identified material and may not remain accurate if that material is combined with other substances or used in different processes. The information presented is, to the best of the company's knowledge, considered precise and trustworthy as of the date mentioned. However, the company does not make any explicit or implied assurance, guarantee, or claim regarding the information's precision, trustworthiness, or comprehensiveness, and will not be held accountable for any losses, damages, or costs, whether direct or indirect, that arise from its use. Users are encouraged to independently verify the appropriateness and thoroughness of this information for their specific purposes.

TECHNICAL DATA SHEET

tants and appropriate thickeners is recommended.

Animal testing: In accordance with current European regulations (Regulation (EC) No. 1223/2009 on cosmetic products), the substance has not been tested on animals. Safety assessment is based on available toxicological data, scientific literature, and validated alternative testing methods (in vitro and in silico). The term in silico refers to testing and assessment methods conducted using computer models and simulations rather than on living organisms (in vivo) or cell cultures (in vitro). This note confirms compliance with the ban on animal testing and is provided for informational purposes regarding further use of the raw material in cosmetic formulations.

GMO: Not GMO

Vegan: Contains no components of animal origin

Disclaimer: The details provided here are specific to the identified material and may not remain accurate if that material is combined with other substances or used in different processes. The information presented is, to the best of the company's knowledge, considered precise and trustworthy as of the date mentioned. However, the company does not make any explicit or implied assurance, guarantee, or claim regarding the information's precision, trustworthiness, or comprehensiveness, and will not be held accountable for any losses, damages, or costs, whether direct or indirect, that arise from its use. Users are encouraged to independently verify the appropriateness and thoroughness of this information for their specific purposes.