

TECHNICAL DATA SHEET

Product Name: Fermented Radish Root Filtrate

INCI Name: Leuconostoc/Radish Root Ferment Filtrate

CAS: 84775-94-0

Chemical Class: Biotechnological product

Functional Category: Antimicrobial agent, Antifungal agent, Anti-dandruff agent, Hair conditioning agent, Skin conditioning agent – other.

Description: Leuconostoc/Radish Root Ferment Filtrate is a natural cosmetic ingredient obtained via a biotechnological process through the fermentation of radish root (*Raphanus sativus*) using *Leuconostoc kimchii* bacteria, traditionally employed in food fermentation such as kimchi. During fermentation, natural antimicrobial peptides, bacteriocins, are produced, exhibiting a broad spectrum of activity against Gram-positive and Gram-negative bacteria, as well as certain fungi. For this reason, this ingredient is used as a natural alternative to synthetic preservatives in cosmetic formulations. Fermented radish root filtrate contributes to maintaining the microbiological stability of products without the irritation often associated with parabens, phenoxyethanol, and similar preservatives. The ingredient is compatible with a wide pH range (from 4 to 8), making it suitable for formulations such as creams, lotions, serums, shampoos, and conditioners. An additional benefit is its hydrating and mild conditioning effect on the skin and hair, as peptides formed during fermentation improve skin surface smoothness and reduce transepidermal water loss. Due to its natural origin and biocompatibility, *Leuconostoc/Radish Root Ferment Filtrate* is frequently used in formulations labeled as “natural” and “preservative-free,” where it functions as a multifunctional ingredient, acting simultaneously as a mild preservative, a microflora regulator, and a skin-conditioning agent. When used alone at concentrations below 3%, it is generally not considered reliable for ensuring long-term microbiological stability of products. Even at concentrations of 3–4%, protection is predominantly directed toward Gram-positive bacteria, while efficacy against Gram-negative bacteria and fungi remains limited. Therefore, this approach is mainly acceptable for products with a short shelf life, small packaging, airless packaging, or formulations produced in small batches.

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Mechanism of Action: The mechanism of action of Leuconostoc/Radish Root Ferment Filtrate is based on biotechnologically derived antimicrobial peptides produced by Leuconostoc kimchii during the fermentation of radish root (Raphanus sativus). During fermentation, the bacteria generate natural bacteriocins low-molecular-weight protein compounds that act as selective antibiotics against microorganisms present in cosmetic products. These bacteriocins disrupt microbial cell membranes, increase membrane permeability, and lead to leakage of intracellular components, resulting in growth inhibition or complete destruction of bacterial cells. The activity is particularly pronounced against Gram-positive bacteria such as Staphylococcus aureus and Listeria monocytogenes, while also showing some effect against Gram-negative bacteria and fungi, depending on concentration and formulation pH. In addition to antimicrobial effects, fermented radish root filtrate contains peptide derivatives and polysaccharides that can enhance skin hydration and contribute to skin smoothness. These bioactive fragments can bind to the skin surface, forming a mild protective film that reduces transepidermal water loss. Through this mechanism, Leuconostoc/Radish Root Ferment Filtrate acts as a natural multifunctional preservative: it prevents microbiological contamination, extends product shelf life, and simultaneously supports microbiological balance and physiological skin tolerance.

Physicochemical Properties: Leuconostoc/Radish Root Ferment Filtrate is a clear to slightly cloudy liquid, light yellow to light amber in color, with a characteristic mild odor typical of fermented plant materials. At room temperature, the filtrate remains liquid, without a tendency toward sedimentation or phase separation, allowing easy dosing and straightforward incorporation into aqueous and emulsion-based cosmetic systems. The raw material is water-soluble and disperses evenly without the need for additional solubilizers. Its pH is mildly acidic, typically ranging from approximately 4.0 to 6.0, making it compatible with most skin and hair care formulations, including products intended for sensitive skin. The specific gravity at 25 °C is slightly higher than that of water, which is characteristic of fermented filtrates containing dissolved solids. Total solids content is moderate and derives from bioactive peptides, polysaccharides, and other fermentation derivatives that contribute to functionality without negatively affecting formulation texture or stability. Leuconostoc/Radish Root Ferment Filtrate shows good stability when properly stored in tightly closed packaging, in a cool and dry place, protected from direct light.

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Benefits:

- Acts antimicrobially and inhibits the growth of bacteria, yeasts, and molds in cosmetic formulations.
- Extends product stability and shelf life without the use of synthetic preservatives.
- Provides mild skin hydration and improves smoothness due to fermentation-derived peptides.
- Helps maintain the natural skin microflora and reduces the risk of irritation.
- Acts synergistically with other natural preservatives, enhancing their effectiveness.
- Belongs to the category of natural, biotechnologically derived ingredients suitable for “clean beauty” formulations.

Method of Use: In cosmetic formulations, Leuconostoc/Radish Root Ferment Filtrate is used as an ingredient that contributes to microbiological stability while also providing mild conditioning effects. It is incorporated into the aqueous phase, most commonly during the final stage of formulation or during cooling, at temperatures below 40 °C, in order to preserve the stability of fermentation-derived bioactive peptides. It blends easily with other hydrophilic components and does not require special technological conditions or additional solubilizers. In skin care products such as creams, lotions, and emulsion serums, it is typically used at concentrations of 1–4%. Within this range, it supports microbiological stability and improves skin sensory feel without affecting texture or spreadability. For formulations intended for sensitive skin or minimalist “clean” products, concentrations are usually kept closer to the lower end of this range. In aqueous gels, toners, and high-water-content serums, typical concentrations range from 2–4%, where the ingredient functions as part of a mild preservative system and helps control microbial growth. In such systems, it is often combined with auxiliary preservatives or pH regulators, depending on formulation complexity. In hair care products such as shampoos, conditioners, and masks, Leuconostoc/Radish Root Ferment Filtrate is used at concentrations of 1–3%. Within this range, it contributes to product stability and provides a mild conditioning effect on hair and scalp, without weighing down the formula or negatively affecting foaming and rinse-off properties. In specialized formulations with reduced or alternative preservative systems, concentrations may reach up to 4%, although in such cases additional microbiological stability testing of the finished product is recommended. Leuconostoc/Radish Root Ferment

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Filtrate is not considered a full-spectrum preservative but is most commonly used as part of a carefully balanced preservative system adapted to the formulation type and its pH range.

Combinations with Other Preservatives: When combined with organic acids and their salts, such as sodium levulinate and sodium anisate, Leuconostoc/Radish Root Ferment Filtrate is used at concentrations of 2–4%, while sodium levulinate is typically dosed at 0.3–0.6% and sodium anisate at 0.2–0.5%. These combinations are stable in a mildly acidic pH range and are commonly applied in formulations intended for sensitive skin, as well as in products positioned as “clean” or “natural.” A very common and technologically reliable combination is with glyceryl caprylate or glyceryl caprate, where Leuconostoc/Radish Root Ferment Filtrate is used at 2–3%, and glyceryl caprylate or glyceryl caprate at 0.3–1.0%, depending on formulation structure. In such systems, the fermented filtrate provides primary antibacterial activity, while glycerol esters significantly enhance antifungal protection and further contribute to product stability. In formulations requiring stronger microbiological protection, Leuconostoc/Radish Root Ferment Filtrate is often combined with phenoxyethanol at reduced concentrations. In these cases, the fermented filtrate is applied at 2–4%, while phenoxyethanol is dosed at 0.3–0.6% instead of higher conventional levels. This approach enables a favorable balance between preservation efficacy and improved dermatological tolerance. In systems based on benzyl alcohol-based preservatives, Leuconostoc/Radish Root Ferment Filtrate is used at 2–4%, while benzyl alcohol is typically applied at 0.6–1.0%, often in combination with organic acids that stabilize pH and broaden antimicrobial spectrum. These combinations are suitable for emulsions, lotions, and products with a higher content of botanical extracts. In formulations with a high content of hydrolates, fermented raw materials, or mineral-rich waters, Leuconostoc/Radish Root Ferment Filtrate is frequently combined with chelating agents. In such systems, the fermented filtrate is used at 2–4%, while sodium phytate is typically dosed at 0.05–0.2% and disodium EDTA at 0.05–0.1%. Chelators do not act as primary preservatives but significantly enhance the overall preservative system by binding metal ions that promote microbial growth. Regardless of the selected combination, it is recommended that the finished formulation always undergo additional microbiological stability testing, as Leuconostoc/Radish Root Ferment Filtrate functions as a preservative booster and multifunctional antimicrobial ingredient rather than the sole source of product protection.

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Natural or Synthetic Ingredient: In regulatory and formulation contexts, Leuconostoc/Radish Root Ferment Filtrate is classified as a biotechnological ingredient of natural origin rather than a synthetic ingredient. Although the process involves controlled industrial conditions, the final product does not contain synthetically produced active molecules but rather a complex of natural fermentation products. As such, it is accepted in formulations with “natural” and “clean” positioning, in accordance with current cosmetic guidelines.

Animal Testing: In accordance with current European regulation (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 performed using computer models and simulations, rather than laboratory testing on living organisms (in vivo) or cell cultures (in vitro). This statement confirms compliance with the animal testing ban and is provided solely for informational purposes regarding further use of the raw material in cosmetic formulations.

GMO: Not GMO

Vegan: Does not contain components of animal origin