

TECHNICAL DATA SHEET

Product Name: Pullulan

INCI Name: Pullulan

CAS: 9057-02-7

Chemical Classification: Carbohydrate

Functional Category: Binder, Film-forming agent (for forming a film on the skin surface), Skin and hair conditioner.

IUPAC Name: α -1,4- ; α -1,6-glucan

Description: Pullulan is a natural polysaccharide obtained through the fermentation of the fungus *Aureobasidium pullulans*, known for its unique properties that make it indispensable in the cosmetics industry. Its chemical structure allows the formation of smooth, elastic, and breathable layers on the skin's surface. As a film-forming agent, pullulan provides a feeling of tightening and instantly improves the skin's appearance, making it smooth, radiant, and protected from external factors like pollution and moisture loss, without clogging pores. Pullulan also acts as a strong moisturizing agent, improving the texture of cosmetic products and making them easier to apply. Due to its viscous and adhesive properties, it is used as a substitute for hyaluronic acid in formulations. In decorative cosmetics, it contributes to the longevity of makeup, while in hair care products, it ensures smoothness and shine. Its role as a "carrier" of active ingredients enables efficient delivery of these components into deeper layers of the skin. Research confirms that pullulan strengthens the skin microbiome, provides temporary mechanical support to the skin's structures, and delivers a subtle tightening effect due to its non-irritating properties. These characteristics make it useful in products like dissolvable microneedle patches, where it enhances the transdermal delivery of active ingredients, and in hydrogel films that have therapeutic benefits for various skin issues. Pullulan is characterized by good water solubility, low viscosity compared to other polysaccharides, and high thermal stability. Its natural base, biodegradability, and Generally Recognized as Safe (GRAS) status by the U.S. FDA make it ideal for eco-friendly and safe formulations. Due to its versatility and compatibility with different cosmetic raw materials, pullulan is a key ingredient in modern skin and hair care products. It is water-soluble, biodegradable, and the pH value of a 10% aqueous solution ranges

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between 4.5 and 6.5.

Benefits:

- Forms a thin, elastic layer on the skin, providing a feeling of tightness and improving its appearance.
- Pullulan's moisturizing properties help maintain skin moisture and prevent dryness.
- Its film-forming properties protect the skin from external influences like pollution and moisture loss.
- Acts as a carrier for active ingredients, enabling their efficient delivery to deeper layers of the skin.
- Strengthens the skin microbiome, improving its resilience and health.
- Provides temporary support to the skin structures and delivers a subtle tightening effect.
- Enhances the texture of products, making them easier to apply and more pleasant to use.
- In decorative cosmetics, increases makeup longevity and contributes to hair smoothness and shine.
- Has antioxidant properties, protecting the skin from harmful free radicals.
- Biodegradable and safe for use, making it ideal for eco-friendly formulations.

Usage: Pullulan is used in a wide range of cosmetic products, with recommended concentrations depending on the type of formulation and desired effects. In moisturizers and serums, it is typically used at concentrations of 0.5% to 2% to improve hydration and provide a skin-tightening effect. In decorative cosmetics such as powders or mascaras, it is used in lower concentrations, ranging from 0.1% to 0.5%, to improve product longevity and texture. For hair care products, pullulan is added at concentrations of 0.5% to 1% to increase shine and smoothness. In dissolvable microneedle patches or hydrogel formulations, it is used at concentrations up to 10% to provide optimal structure and enable the effective delivery of active ingredients. Pullulan is often incorporated into the aqueous phase of formulations as it is fully soluble in water and, due to its good thermal stability, can also be added to products requiring heating during manufacturing.

Alternatives for Pullulan: Pullulan forms a thin, non-sticky film on the skin, delivering a

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mild tightening and smoothing effect. In cosmetic formulations, it is also used to improve product texture. When pullulan is unavailable, alternatives such as sodium hyaluronate and xanthan gum are often used. Sodium hyaluronate, a salt of hyaluronic acid, is known for its ability to intensely hydrate the skin by binding water in the epidermis. While it doesn't provide the same tightening effect as pullulan, it contributes to the feeling of hydration and can be used in combination with other ingredients to achieve similar performance. Xanthan gum, a natural thickener, can partially replace pullulan due to its ability to form a mild protective film on the skin. It also stabilizes formulations and gives the desired texture, but is less effective in providing a lifting effect. To achieve effects similar to pullulan, these two ingredients are often combined—sodium hyaluronate for hydration and xanthan gum for texture and film-forming properties.

Animal Testing: The substance has not been tested on animals.

GMO: Not GMO.

Vegan: Does not contain animal-derived components.

Raw Material Origin: China.

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