Import and distribution for Serbia: Farmadria DOO
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TECHNICAL DATA SHEET

Product Name: Kojic Acid

INCI Name: Kojic Acid

CAS: 501-30-4

Functional Category: Antioxidant, Skin Whitening Agent

Chemical Classification: Phenol, Ketone, Heterocyclic Compound

IUPAC Name: 5-Hydroxy-2-(hydroxymethyl)-4-pyrone, 2-Hydroxymethyl-5-hydroxy-γ-pyrone

Description: Kojic acid, also known as kojic acid, is a by-product of rice fermentation, produced by the action of certain fungi, particularly those of the genera Aspergillus and Penicillium. These fungi are used in rice fermentation, which results in the production of traditional Asian alcoholic beverages such as sake, during which kojic acid is formed as a secondary metabolite. This ingredient is then extracted and used for various purposes, including in the cosmetic industry, due to its remarkable skin-lightening properties. Kojic acid is known for its ability to inhibit the enzyme tyrosinase. For this reason, it is widely applied in treatments against hyperpigmentation, dark spots, and melasma. Additionally, it has antioxidant properties that help protect the skin from damage caused by free radicals. When combined with ingredients such as vitamin C or hyaluronic acid, it can improve skin texture and tone, making it smooth and radiant. This acid is soluble in water, ethanol, and other polar solvents, and its solubility increases at lower pH values. This is important when formulating cosmetic products, as a lower pH can enhance its effectiveness and stability. The pKa value of kojic acid is around 8.7, indicating its degree of dissociation in aqueous solution and reflecting its chemical reactivity and bioavailability. Due to its sensitivity to light and tendency to oxidize, kojic acid may change color or lose effectiveness over time. It is recommended to store it in dark, opaque packaging and use antioxidants in formulations to extend its stability. It can also react with metals such as iron, which can cause discoloration, so it is important to choose packaging and ingredients carefully to avoid unwanted reactions. Kojic acid belongs to the group of alpha-hydroxy acids (AHAs) and has mild exfoliating properties, contributing to the removal of dead cells from the skin surface and improving its appearance. These characteristics make it a valuable ingredient in the formulation of

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skincare products aimed at skin lightening and quality improvement.

Mechanism of Action: The mechanism of action of kojic acid is based on the inhibition of the enzyme tyrosinase, which plays a key role in melanin biosynthesis. Melanin is the pigment responsible for the color of the skin, hair, and eyes, and its excessive production leads to hyperpigmentation, dark spots, and uneven skin tone. Tyrosinase catalyzes the conversion of the amino acid tyrosine into DOPA (dihydroxyphenylalanine) and further into DOPA-quinone, which then undergoes a series of reactions to form melanin. Kojic acid, acting as a competitive inhibitor of tyrosinase, binds to the enzyme's active site and prevents its interaction with the substrate. This process reduces melanin synthesis, resulting in lighter and more even skin. In addition to inhibiting tyrosinase, kojic acid also acts as an antioxidant. This property allows it to neutralize free radicals, unstable molecules that can damage skin cells, cause inflammation, and accelerate aging. The antioxidant action of kojic acid not only provides protection against damage caused by UV radiation and environmental pollution but also contributes to the regeneration and recovery of the skin, making it healthier and younger. Kojic acid also exhibits mild exfoliating properties. As an alpha-hydroxy acid (AHA), it helps remove dead cells from the skin surface, promoting cell renewal. This exfoliation process aids the penetration of other active ingredients from cosmetic formulations into the deeper layers of the skin, increasing their effectiveness. Exfoliation also contributes to a refreshed and smooth appearance of the skin, reducing the appearance of fine lines and wrinkles.

Benefits:

- ***Skin Lightening:*** Kojic acid reduces melanin production, thereby lightening dark spots and evening out skin tone.
- ***Whitening Effect:*** It reduces pigmentation, making the skin lighter and more uniform.
- ***Exfoliation:*** As an alpha-hydroxy acid (AHA), it can help remove dead cells from the skin surface, improving skin texture and making it smoother and shinier.
- ***Antioxidant Properties:*** It neutralizes free radicals and protects the skin from damage caused by external factors.

Usage: Kojic acid is used in various cosmetic formulations, including serums, creams, toners, lotions, and face masks. Each of these formulations requires careful determination of kojic acid concentration to achieve the desired effect without causing irritation.

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In skin-lightening serums and creams, kojic acid is most commonly used in concentrations between 1% and 2%. These concentrations are effective for treating hyperpigmentation, dark spots, and melasma. Toners and lotions, intended for daily use and gentler skin lightening, contain lower concentrations, usually from 0.5% to 1%. These milder formulations allow for continuous use without the risk of irritation while maintaining even skin tone. Face masks with kojic acid contain concentrations of 1% to 2%. They provide a more intensive lightening treatment and are used occasionally, usually once a week. Due to the higher concentration, these masks are applied to the skin for a shorter time to minimize the risk of irritation. The effectiveness of kojic acid depends on the pH value of the formulation, with optimal activity achieved at a pH range of 4 to 5. This pH allows for acid stability and maximum melanin inhibition. Due to its sensitivity to light and air, kojic acid is prone to oxidation, which can reduce its effectiveness. To improve stability, it is recommended to use antioxidants, such as vitamin E or ascorbic acid, and store the product in dark, opaque packaging in cool places, away from light sources. Kojic acid is often combined with other lightening ingredients, such as arbutin, niacinamide, vitamin C, and retinoids, to enhance the effect of hyperpigmentation treatments. However, these combinations must be carefully formulated to avoid excessive irritation, especially for sensitive skin. Using products with sun protection factor (SPF) during the day is recommended to further reduce the risk of photo-oxidation and protect the skin. In cosmetic products for chemical peels, kojic acid is often combined with alpha-hydroxy acids and/or beta-hydroxy acids (salicylic acid).

Note: Many cosmetic companies use kojic dipalmitate as an alternative to kojic acid because dipalmitate is more stable in formulations. However, no studies show that kojic dipalmitate is as effective as kojic acid.

Source Raw Materials: Sugars obtained from corn starch or rice

Method of Production: Kojic acid is produced by the fermentation of various sugars using fungi (mainly species of Aspergillus).

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

GMO: Non-GMO

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