



AC-KAD

INCI Name: Kojic Dipalmitate

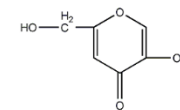
Whitening Agent



SOHO ANECO Chemicals Co., Limited

1 Background

- **Kojic Acid** (referred to as **KA**) — A metabolite of *Aspergillus oryzae*
- The earliest discovery was that the hands of the operators in the brewing industry were often whiter and tenderer than others. Later, Japanese scholars discovered a substance with a whitening effect, **KA**, in the soy sauce brewed by *Aspergillus oryzae*.
- The whitening mechanism of **KA** is to inhibit the activity of tyrosinase, and at the same time, it can inhibit the activity of N-hydroxyindole acid (DHICA) oxidase and block the polymerization of dihydroxyindole (DHI).
- **Kojic Dipalmitate** (referred to as **KAD**) protects the active hydroxyl groups in the molecular structure of kojic acid by forming esters, and the stability is greatly improved..

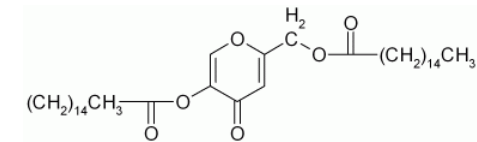


KA Chemical Structure

2 Introduction

- **KAD** — Kojic Dipalmitate (a diesterified derivative of kojic acid)
- **KAD** has an excellent property of inhibiting the activity of tyrosinase and delaying the melanogenesis so as to inhibit the melanin formation. It dissolves in hot alcohols, white oils and esters. it is compatible together with all kind of preservatives and sunscreen.

- Kojic Acid is not stable to light and heat, and tends to oxidize, which results in color change (often yellow or brown).
- Kojic Acid tends to chelate with metal ions (e.g. iron), which often results in color change.
- Unlike Kojic Acid, **KAD** is stable to pH, light, heat and oxidation, and does not complex with metal ions, which lead to color stability. So **KAD** does not turn brown or yellow over time.



KAD Chemical Structure

3 Whitening Mechanism

KAD is a **tyrosinase inhibitor**.

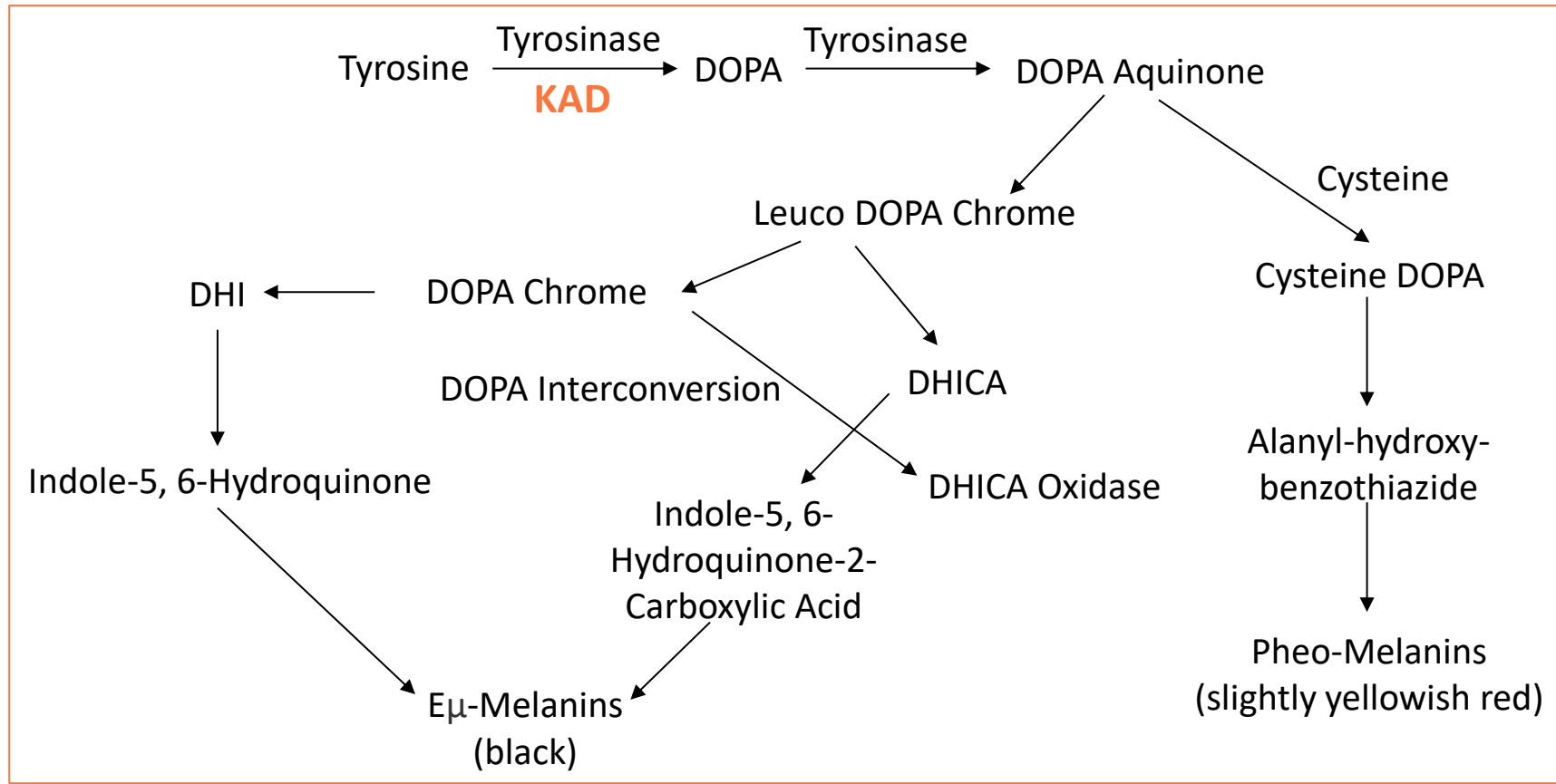


Fig. 1 Melanin biosynthesis pathway

4 Inhibition of tyrosinase activity by KAD

Accurately pipette 1mL of tyrosine solution (0.3mg/mL), 1mL of McIlvaine (pH 6.8) buffer solution, 0.9mL of KAD into the test tube. In a water bath at 37°C for 10min and add 0.1mL tyrosinase solution (1mg/mL), mix well, and measure the absorbance at 475 nm.

For KAD at different mass concentrations, the inhibition rate was determined to obtain the mass concentration-inhibition rate relationship curve (see Fig. 2).

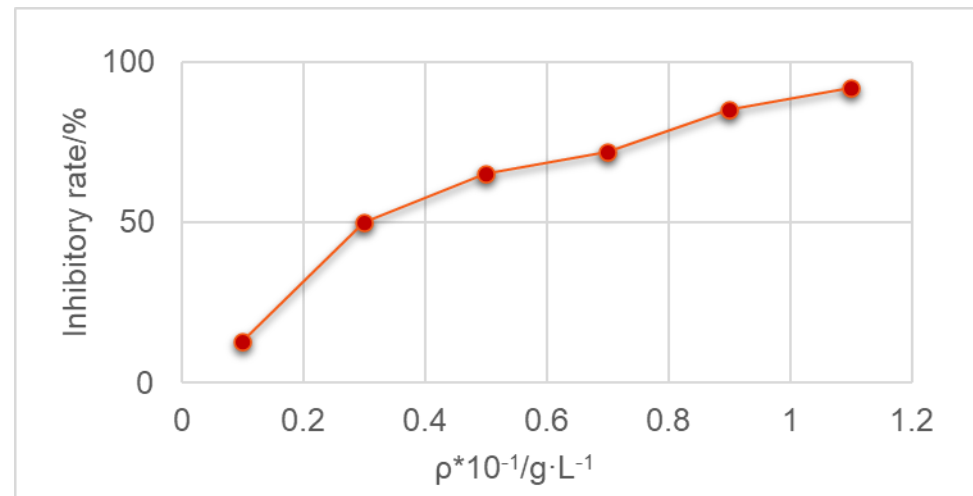


Fig. 2 Curve of relationship between density and inhibitory rate

5 Comparison of skin lightening agents

Ingredient	Mechanism of action	Ease of formula	Stability	Effectiveness	Safety
Hydroquinone	Tyrosinase inhibitor	+	++	++++	+
Arbutin	Tyrosinase inhibitor	+++	+++	++++	++++
Kojic acid	Tyrosinase inhibitor	++	+++	++++	++++
KAD	Tyrosinase inhibitor	+++++	+++++	+++++	+++++
MAP	Tyrosinase inhibitor	+++++	+++++	++++	+++++

Notes:

- + + + + + means the highest value
- MAP: Magnesium Ascorbyl Phosphate

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Summary of the efficacy of KAD

- **Lightening/whitening:**

Inhibit tyrosinase and melanin formation

Ameliorate dermal pigmentation

Excellent effects in even toning skin, fighting age spots, pregnancy marks, freckles as well as general pigmentation disorders

Effects boosted when used in combination with glucosamine derivatives like N-Acetyl Glucosamine (NAG)

- **Anti-aging**

- **Skin conditioning - emollient**

- **Toning/Invigorating**



7 ANECO laboratory



8 Product information

Product Name	AC-KAD
INCI Name	Kojic Dipalmitate
Chemical Name	2-palmitoyloxymethyl-5-palmitoyloxy- γ - pyrone
CAS No.	79725-98-7
Chemical Formula	$C_{38}H_{66}O_6$
Molecular Weight	618.9
Appearance	White or almost white powder
Assay	$\geq 98\%$



Formulation Guideline

- Oil-soluble and can be easily melted into oil-phase at 75-85°C;
- Compatible with almost all ingredients and especially suitable for use in combination with sunscreens;
- Stable at pH: 5.0-8.0;
- Adding oil soluble antioxidant is helpful.

Dosage: 1-5%

9 KAD applications



Eye Cream



Lip Cream



Beauty Cream



Night Cream



Gel



Serum



Mud Mask



Facial Cleanser



Facial Scrub



Antiperspirant



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