

# Stabilizing Vitamin C and L-Ascorbic Acid vs Lipophilic & Ethyl Esters — Engineering Review 2014

Por Cristiano Ricardo · Publicado em 09/05/2014

Technical dermocosmetic engineering lecture by Prof. Cristiano Ricardo on stabilizing vitamin c: l-ascorbic acid vs lipophilic & ethyl esters (Antioxidant Chemistry & Dermocosmetic Formulation), featuring colorful schematic diagrams and clinical data.

Versão online e eventuais atualizações:

<https://cristianorichardo.com/post/stabilizing-vitamin-c-l-ascorbic-acid-vs-lipophilic-ethyl-esters-2014-05-09>

---

Antioxidant Chemistry & Dermocosmetic Formulation · Cosmetic Engineering & Science

Formulating unoxidized, bioavailable L-Ascorbic Acid requires strict pH regulation and stabilization co-antioxidants.

## Engineering Mechanism & Kinetic Flowchart

L-Ascorbic Acid (Pure)

? pH < 3.5 mandatory (Duke Eq)

? Rapidly oxidizes to Dehydroascorbic

Requires Ferulic + Vitamin E

Tetrahexyldecyl (THD)

? Lipid-Soluble (Oil Phase)

? Stable at Neutral pH (~ 6.0)

Deep Cellular Membrane Affinity

## The Duke Formulation Parameters

Unmodified L-Ascorbic Acid (pKa 4.2) requires an aqueous formulation pH < 3.5 to keep the molecule unionized for passive stratum corneum absorption. Adding 0.5% Ferulic Acid and 1.0% Alpha-Tocopherol increases photoprotective efficacy eight-fold via synergistic free-radical scavenging.

## Lipophilic Tetrahexyldecyl Ascorbate (THD)

THD is a tetra-esterified, oil-soluble precursor that seamlessly crosses lipid membranes, undergoing intracellular enzymatic cleavage into ascorbic acid without the erythema associated with low-pH water serums.

## Tyrosinase Inhibition & Melanogenesis Regulation

Ascorbate inhibits cutaneous hyperpigmentation by chelating copper ions at the catalytic site of tyrosinase, while simultaneously reducing dopaquinone back into L-DOPA.

Prof. Cristiano Ricardo

Pharmacist-Biochemist · Specialist in Cosmetic Engineering & Dermato-Pharmacology ·  
Published on May 09, 2014 at 18:32