Activeshine

Description

Molecular encapsulation of cyclodextrins and silicone derivatives.

INCI Name

Trimethylsiloxyamodimethicone (and) Isolaureth-6 (and) Cyclodextrin (and) Phenyl Trimethicone.

Introduction

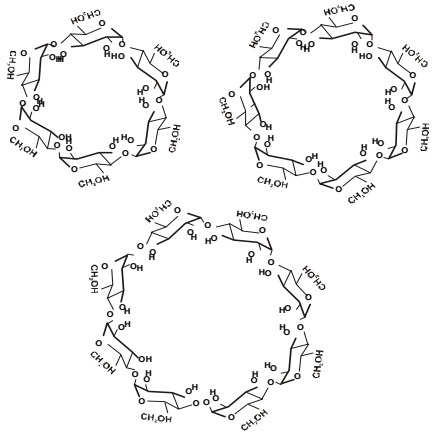
Cyclodextrins (CD): Sugar Molecules

Cyclodextrins are cyclical oligosaccharides obtained from a natural vegetal source, usually starch, through a conversion performed by the *CGTase*: *Glucosyl Transferase* enzyme.

Such structures are composed by 6, 7 or 8 units of *Glucopyranoses* linked by *α-1.4 Glycosides* bridges.

The three main molecules of Cyclodextrins are crystalline, homogeneous and non-hygroscopic substances. They have a torospheric cylindrical format, and its outer surface has a polar hydrophilic characteristic, and the inner cavity is relatively non-polar hydrophobic.

They are as follows:α, β and γ-CDs:



Molecular Encapsulation Principle

The encapsulation complexes formation follows the combination rule:

"Host"Molecule + "Guest" Molecule

The "Host" molecule, cyclodextrin, has a three-dimensional crystalline structure, having as a differential characteristic among the inclusion complexes the fact of always keeping the dimensions and cavity formats.

Their solubility is thermo dependent, and high temperatures make CD complex dissociation easier.

They are biocompatible, biodegradable and non-toxic.

The "Guest" molecules must be insoluble or minimally soluble in water, organic and no polars. They are encapsulated by the CDs and exchange their physical properties by the ones formed by the complex.

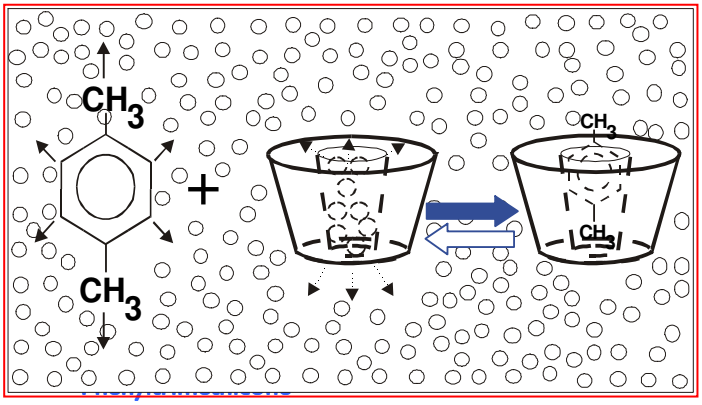
Mechanism of action

The most important property of the cyclodextrins is their ability to incorporate other molecules in their cavities - the "Guest" molecules, changing their original characteristics.

The inclusion mechanism of complexes in cyclodextrins follows the intermolecular interaction basis, where covalent links are not present between two molecules, ions or radicals.

When placed in an aqueous solution, the no polar cavity of the cyclodextrin is temporarily occupied by water molecules, which are energetically unfavorable due to the polar-no polar interaction.

The water is quickly replaced by "Guest" molecules, less polar or no polar. Then the "Guest" substance has its properties changed, as desired.



A figura mostra a formação de um complexo de CD onde p-Xileno é a molécula "Hóspede" e os pequenos círculos representam as moléculas de água.

It is a polyphenylmethylsiloxane fluid that improves the efficacy of several hair care products, like: shine, smoothness and greater flexibility when applied to hair products, besides being water-resistant and protecting the skin. Furthermore, it provides an easy emollient and non-oily dispersion, allowing skin to breathe naturally through the formation of a thin seamless pellicle.

Phenyltrimethicone is especially used in hair products due to its high refraction index, responsible for promoting intense shine and extreme luminosity.

Phenyltrimethicone has been evaluated according to a "shine box' visual analysis methodology, and validated when compared to the "take-home panels."(1)

For both evaluations it has been proved that phenyltrimethicone contributes significantly to visually improving hair shine, and also acts synergistically promoting other aesthetic benefits, such as smoothness and silkiness.

Benefits

- Phenyltrimethicone in CD is slowly and gradually released ("long lasting release") and a possible potentialization of its hair shine donor action occurs.
- Maximize emollient and shine hair effects, donating a silkiness touch.

The release of such silicone active molecule can be accelerated by heat, so its contents are quickly released. Thus, there are three action possibilities in case there is an interest to use the thermo activated appeal:

Activeshine: Intense shine active donor, released naturally to hair or potentialized by heat.

Tests

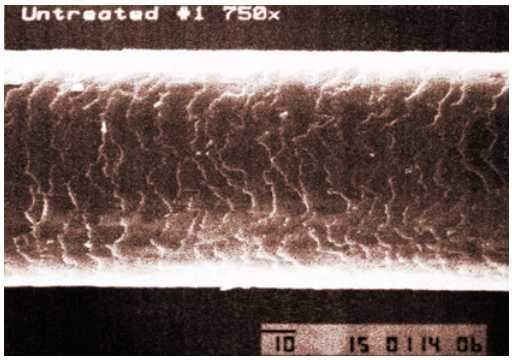
Efficacy Test

1. *In Vitro* Efficacy

1.1. Scanning Electron Microscopy

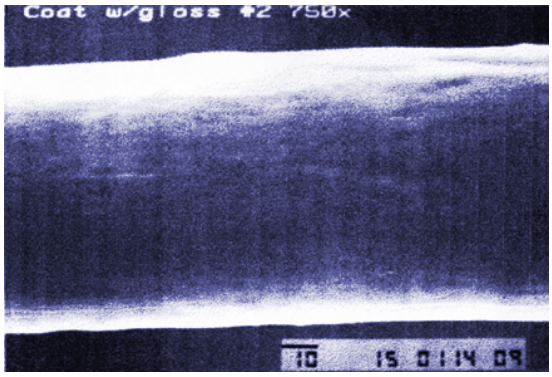
Analyses have been performed in order to demonstrate how silicones (a mix of phenyltrimethicone in synergy with other silicones), cover and recover cuticle, thus providing high shine when compared to an untreated hair.

Untreated hair:



Misshapen cuticle, overlaid and disarranged furfur

Hair treated with a synergic mix of silicones including Phenyltrimethicone:



Covered restored cuticle, as a consequence, VERY SHINY!

1.2. Sensorial evaluation comparing untreated hair to treated hair, with a mix of silicones containing only 2% phenyltrimethicone:

The results have been statistically evaluated according to ANOVA variability analysis test, and compared to the pattern, that is, natural hair not treated with silicone. There has been an exceptionally significant improvement in the following variants studied:

- Product spreadability to hair
- Greater combability
- Smoothness and silkiness
- Shine
- Split ends repair

1.3. Amodimethicone and Isolaureth-6

It is a cationic micro emulsion of an amodimethicone fluid, specially applied to hair products where there is a search for silky touch and greater substantiality, and it's specially indicated for hair that is hard to rinse. Because it has such a small particle size, it provides optimum interaction with hair cuticle. It also offers an optimum rinsing level.

1.4. Hair shine and ciclodextrins

From a consumer perception, shine is considered the most expected benefit when using any hair treatment product, including shampoos, conditioners, coloring products, holders or sprays.

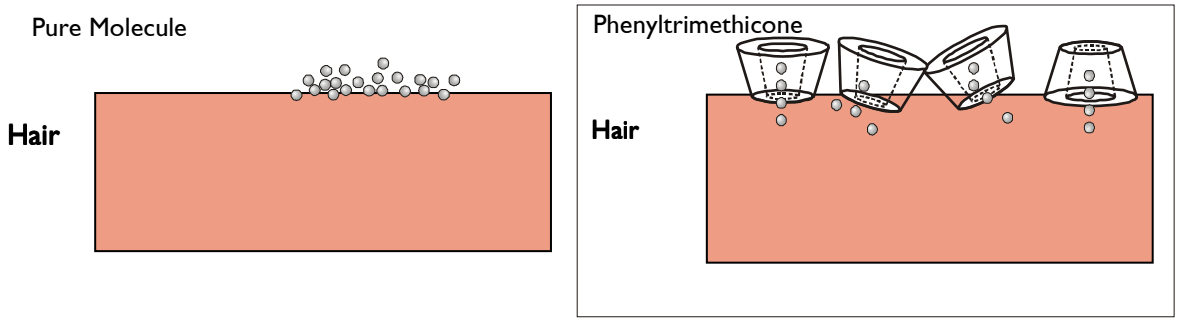
Shine is affected by a number of factors that vary from environment light to individual hair color.

Therefore shine is the result of light reflected from (on) hair surface.

There are many advantages arising from molecular encapsulation of silicone synergic mixes in cyclodextrins, but not all of them are present in other classical encapsulation processes.

- Complexes formed by active ingredients encapsulated in cyclodextrins present better activity than the active ingredient in its original format.
- Phenyltrimethicone homogenization coefficient, encapsulated in CYCLODEXTRIN, is higher than the one where phenyltrimethicone is placed separated ally over hair surface.

The inner cavity of the CD cylinder is slightly hydrophobic, and by affinity with the cuticle, extremely lipophilic, releasing the Guests molecules, therefore phenyltrimethicone complex substance homogenization is much faster and effective.



Application and Usage Indications

Rinsing conditioners or Leave-on products.

Physicochemical Aspects and Compatibility

Activeshine is indicated for application in shampoos (opaque), conditioners, masks and specially for finishing and styling products.

Activeshine might be applied in the final phase, below 50°C water dispersible.

Suggested Concentration

From 0.5 to 3.0%w/w.

Bibliographical References

1- Reich, C. and Robbins, C., "Light scattering and shine measurements of human hair: a sensitive probe of the hair surface," Journal of the Society of Cosmetic Chemists, 44: 221-234 (July/August 1993).

2- Halloran, Daniel J., "A silicone selection guide for developing conditioning shampoos, "Soap/Cosmetics/Chemical Specialties, vol. 68, nr 3,22-26 (March 1992)

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4- Maeda, T., Okada, M. and Hara, T., "Hair luster measured by color image analysis, "Cosmetic & Toiletries, 107: 53-59 (February 1993).
5- Robbins, C., The Physical Properties and Cosmetic Behavior of Hair, pp 269-275. New York: Van Nostrand Reinhold Company (1979).
6- 6.Cyclodextrin News – Database – Cyclolab.

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