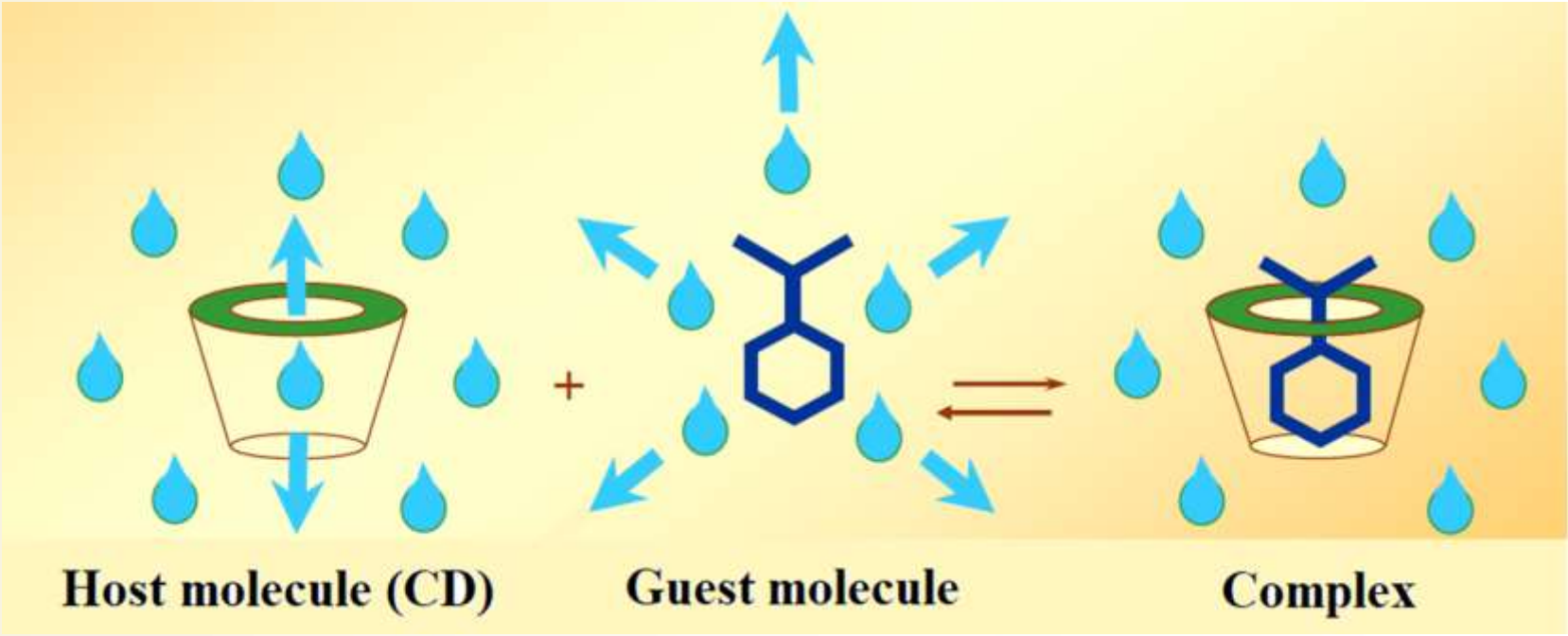
CYCLOLAB

The Cyclodextrin Company

# Application of Cyclodextrins in Cosmetics

# What are cyclodextrins (CDs)?

- Composed of sugar units
- Cyclic molecules
- Naturally occurring compounds
- Used in food, pharmaceuticals, chemical industries, agriculture, etc.




**Reversible inclusion complex**

# Why use cyclodextrins in cosmetics?

- **CDs as solubilizing agents**

Stable aqueous solutions of insoluble compounds can be prepared without the use of organic co-solvents or surfactants and the rate of dissolution can be enhanced.

- **Flavor and odor coverage by encapsulation**

CDs may be useful in covering the unfavorable organoleptic characteristics of some cosmetic products due to the presence of a particular active.

- **Liquid or oily materials can be transformed into powder forms**

Some active ingredients in cosmetic preparations, such as α-tocopherol and vitamin A, occur in oily form and thus are difficult to handle. This problem can be easily solved by preparing a CD inclusion complex in solid state.

# Why use cyclodextrins in cosmetics?

- **Controlled/extended release of fragrances**

CDs can be used to complex different fragrances, included in personal care products such as shampoos, deodorants, detergents and absorbent powders such as bath- and baby-powder products.

- **Protecting agents against light, heat, and oxidation**

CDs can increase the physical and chemical stability of guest molecules by protecting them against oxidation, decomposition, hydrolysis or loss by evaporation.

- **Preventing skin irritation**

The CDs alleviate local irritation and reduce side effects. CDs have advantages over other conventional penetration enhancers, such as fatty acids and surfactants.

- **Stabilization of emulsions and suspensions**

Incompatible compounds can be mixed and used together in complexed form.

# Who we are and what can we offer?

**CycloLab is the world's only all-around Cyclodextrin Service Provider**

**Our services include:**

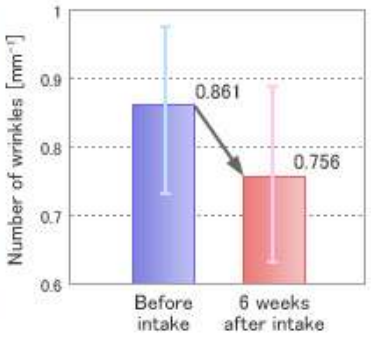
- **Supplying cyclodextrins for commercial products and product development**
- **Screening cyclodextrin derivatives to find the right candidate for the request of customers**
- **Providing formulation development services, composition optimization, stability assessment**
- **Offering analytical services to characterize complexes and products**

**For more information please click here**

# CDs in cosmetics

## Skin anti-aging products: CoQ10-gammaCD in eye wrinkle creams


Wrinkle
Male, 33 years old ／ Outer corner of the left eye

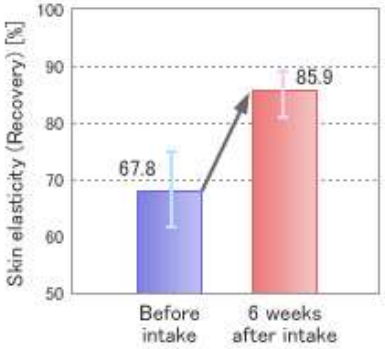



| Special characteristics | |
|---|---|
| Chemical Name | CoQ10 γ-CD inclusion complex |
| CAS-No. | γ-cyclodextrin: 17465-86-0<br>Coenzyme Q10: 303-98-0 |
| Appearance | Free-flowing slightly yellow/orange colored powder |
| Bulk density | 0.1-0.3 g/cm³ |
| Particle size | 100 micron max |
| Dispersibility | Disperses easily in water (Picture→) |

Water dispersibility

CoQ10 CoQ10-γCD complex

Skin texture (digital microscope)
Female, 32 years old ／ Cheek near the right eye




Number of wrinkles decreaes
Skin elasticity increases

Effect of CoQ10-γCD complex supplemented eye wrikle cream on human skin
(Terao, et al. 2006 CycloChem Bio)

# CDs in cosmetics


Water / Aqua, Butylene Glycol, Biosaccharide Gum-1, **Cyclodextrin**, Salicylic Acid, Panicum Miliaceum Glycoprotein Extract, Aloe Barbadensis (Aloe Vera) Extract, Arginine, PEG-10 Soya Sterol, Ceteth-20, Dimethicone, Ceteth-2, Dimethicone Copolyol, Hexadecanol, Methylparaben, Green 5 / CI 61570, Yellow 10 / CI 47005

Olive Fruit Oil, Vaseline, Mineral Oil, Diisostearyl Malic Acid, Ceresin, Hydrogenated Kokoguriseriru, Hexa-hydroxy Stearic Acid Dipentaerythrityl, Tri(Caprylic/Capric Acid) Glyceryl, Ethylhexyl Methoxycinnamate, **Cyclodextrin**, Polyethylene, Dimethicone, Squalane, Tocopherol Acetate, Isotridecyl Isononanoate, Microcrystalline Wax, Fragrance, Silica, t-Butylmethoxydibenzoylmethane, BHT, (+/-) 4 Yellow, Blue 1, Red 201

# CDs in cosmetics


Peg-115M, PVP, Peg-100, **Cyclodextrin**, Tocopherol, Aloe Barbadensis (Aloe Vera), Maltodextrin


Alcohol Denat., Water / Aqua, Parfum / Fragrance, **Methyl Cyclodextrin**, BHT, Butylphenyl Methylpropional, Citral, Citronellol, Diethylamino Hydroxybenzoyl Hexyl Benzoate, Ethylhexyl Methoxycinnamate, Eugenol, Geraniol, Limonene, Linalool

# CDs in cosmetics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**(54) Title:** USE OF CYCLODEXTRINE AS A PEARLY-LUSTRING AGENT AND PEARLY LUSTRED COMPOSITIONS

**(54) Titre :** UTILISATION D'UNE CYCLODEXTRINE EN TANT AGENT NACRANT ET COMPOSITIONS NACREES

**(57) Abstract:** The invention relates to the use of at least one cyclodextrine as a pearly-lustring agent in a cosmetic composition in an aqueous physiologically acceptable medium. The invention also relates to pearly-lustred compositions comprising at least one cyclodextrine and at least one surfactant in an aqueous physiologically acceptable medium. The invention further relates to pearly-lustred compositions comprising at least one cyclodextrine, at least one surfactant and at least one conditioning agent in an aqueous physiologically acceptable medium. The invention also relates to the use of said cyclodextrine as a suspension agent for insoluble conditioning agents. The inventive compositions are used in particular as rinsed products for washing and/or conditioning keratin materials.

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# CDs in household toiletries



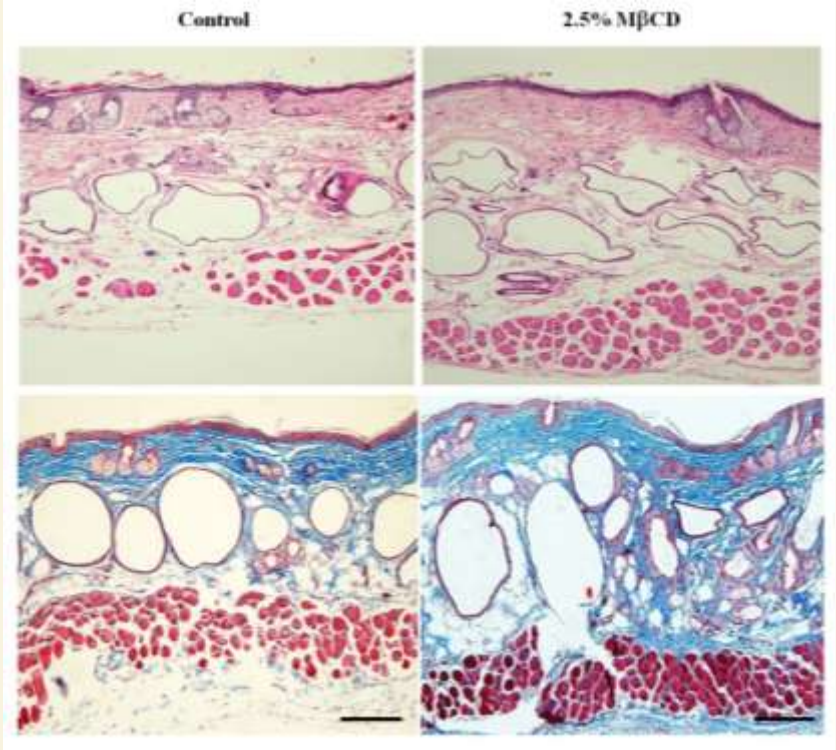

Simply spray Febreze Fabric Refresher evenly onto the fabric until it becomes slightly damp.

Febreze molecules penetrate into the fabric to clean away odors.

As Febreze dries, the odor is cleaned away and a fresh scent is left in its place.

**P&G has been awarded over 200 patents on the application of CDs in fabric, homecare and health, beauty care.**

# Future prospects




H & E (upper panel) and Masson's trichrome (lower panel) stains for skin samples were performed from 2.5% Methyl-βCD-injected and control groups (n=3 for both groups). Bar = 20 μm.

- Caveolin-1 (Cav-1) is one of the key molecules to modulate collagen metabolism in the skin with a negative correlation between Cav-1 and collagen I (COL I).

- Methyl-βCD is a known chemical Cav-1 inhibitor.

- Methyl-βCD injection via the intra-dermal route revealed that 2.5% Methyl-βCD administered twice per week for two months showed a potent COL I-up-regulating activity, leading to the increase of skin thickness ($P < 0.05$) without adverse reactions such as skin fibrosis.

- Collectively, Methyl-βCD has a COL I-enhancing activity in chronologically-aged skin, where Cav-1 acts as a brake in COL I expression, suggesting its potential role for an anti-aging agent.

Lee, J-A.; Choi, D-I.; Choi, J-Y.; Kim, S-O.; Cho, K-A.; Lee, J-B.; Yun, S-J.; Lee, S-C. (2015) Methyl-β-cyclodextrin up-regulates collagen I expression in chronologically-aged skin via its anti-caveolin-1 activity. Oncotarget., 6(4), 1942-1953.

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