



## CAVAMAX® and ITS APPLICATIONS

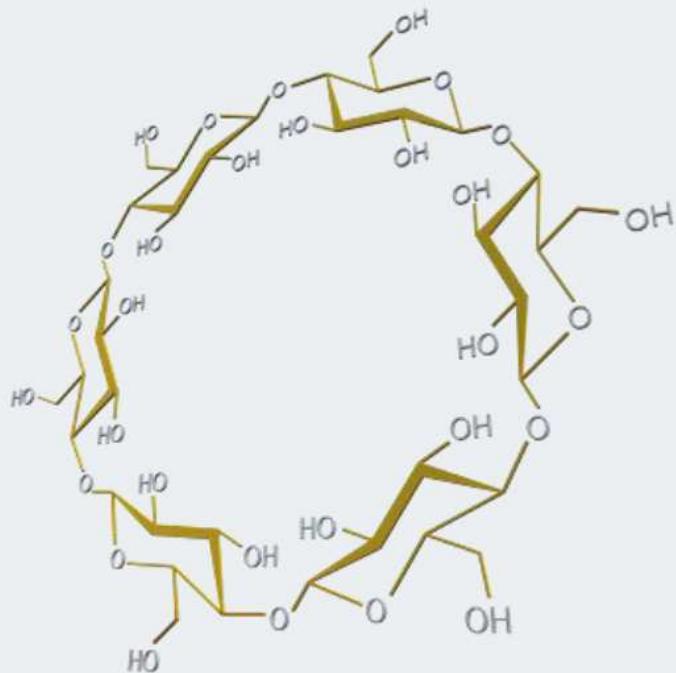
# Agenda

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## 1. What is CAVAMAX®?

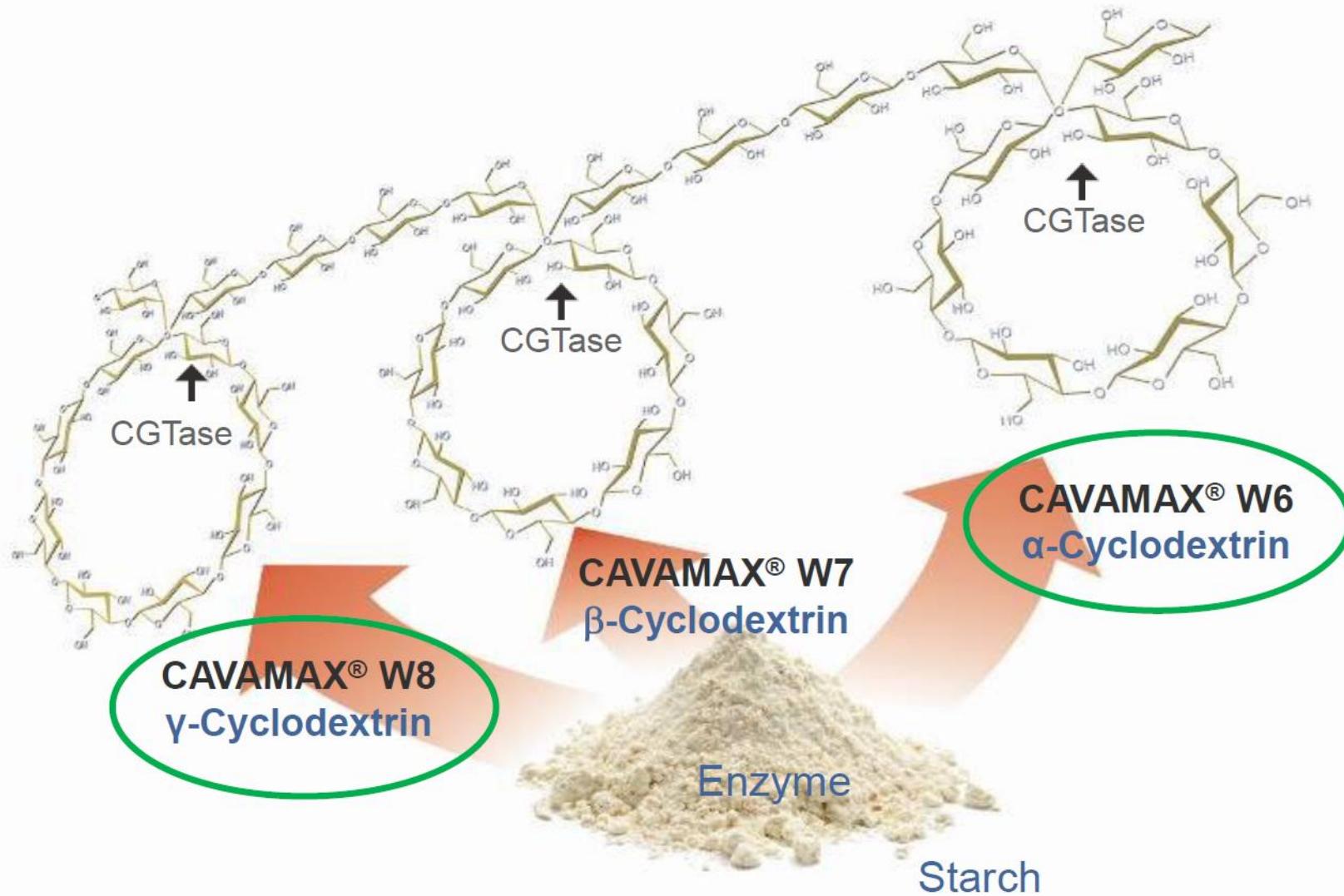
# Cyclodextrins are Naturally Occurring, Non-reducing Oligosaccharides

## Cyclodextrins



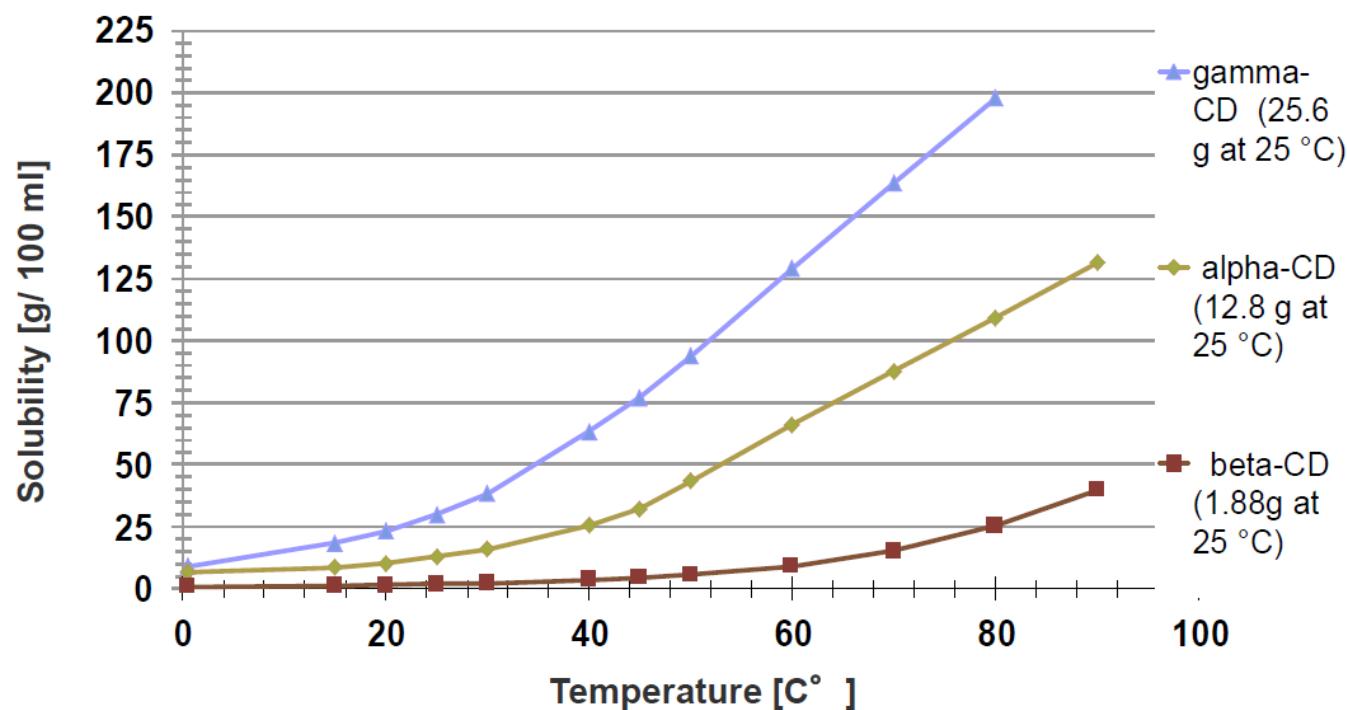
- ▶ Ring shape
- ▶ No free aldehyde or ketone groups
- ▶ Consisting of 6 or more monosaccharide
- ▶ Very stable in alkaline solutions (pH ~14)
- ▶ Hydrolysis in acidic media (pH < 3)
- ▶ Thermally stable ~ 200 °C

# Wacker CAVAMAX® – Three Types for A Perfect Solution



# Main Characteristics of Cyclodextrins

Type	No. of glucose unit	Molecular weight	Cavity diameter [Å]	Solubility in water (25°C) [g/ 100 ml]	Hydrolysis by $\alpha$ - amylase
$\alpha$ -Cyclodextrin	6	973	4.7 - 5.3	12.8	negligible
$\beta$ -Cyclodextrin	7	1135	6.0 - 6.5	1.88	slow
$\gamma$ -Cyclodextrin	8	1297	7.5 - 8.3	25.6	rapid



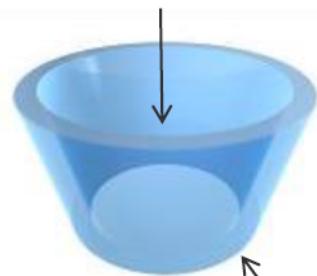
# Agenda

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1. What is CAVAMAX®?
2. What can CAVAMAX® do?

# Thanks to their Three-dimensional Structure, Cyclodextrins Can Encapsulate Other Molecules

hydrophobic



hydrophilic

- ▶ Bucket shaped form with a hydrophobic interior and a hydrophilic exterior

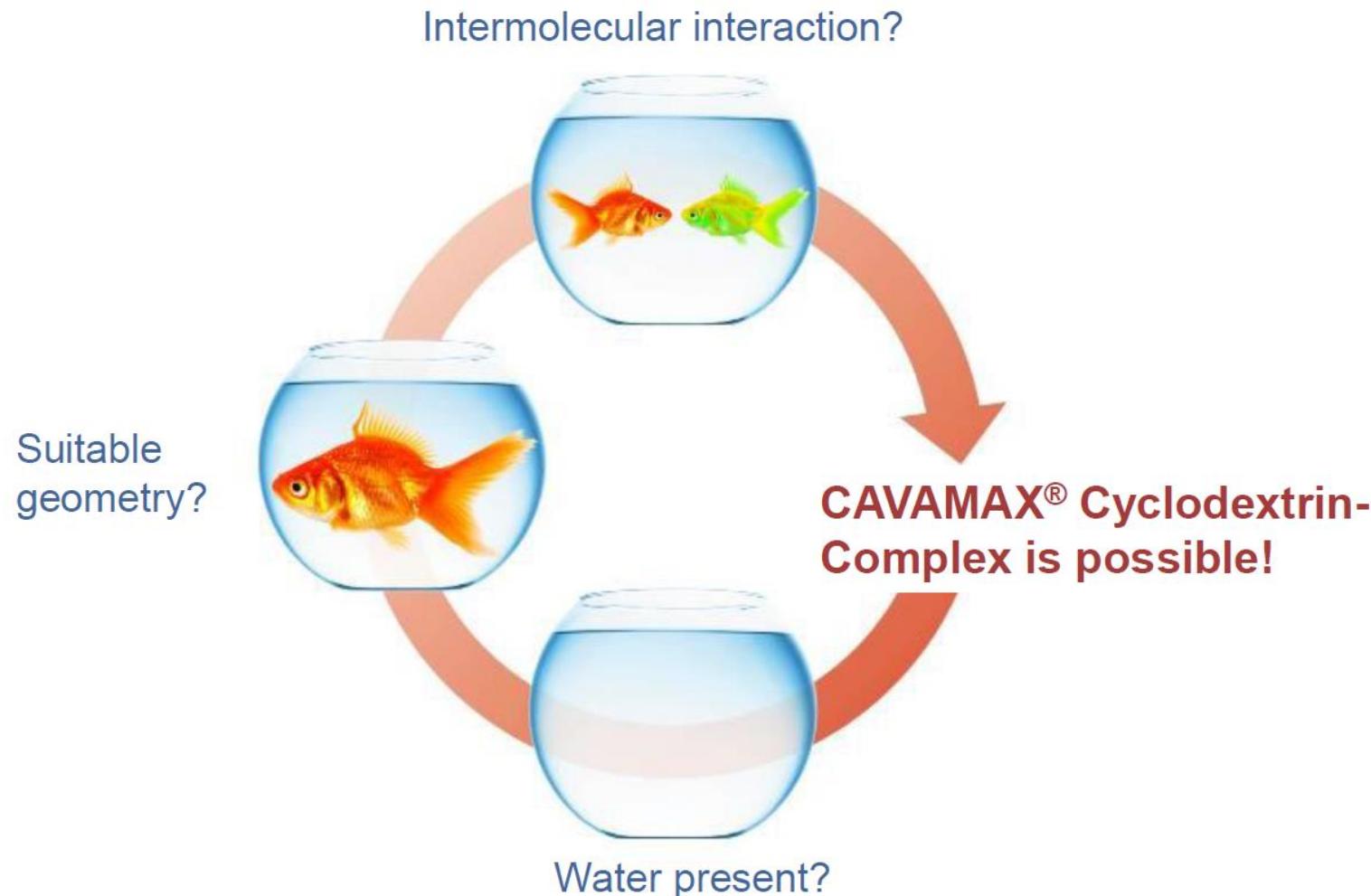
Guest

Host

A 3D rendering of a host-guest complex. A large, light blue, bucket-shaped molecule labeled 'Host' is containing a smaller, brown sphere labeled 'Guest'. The guest molecule is positioned inside the cavity of the host molecule.

- ▶ Attracts and encapsulates selected molecules
- ▶ Forms a Host/Guest complex

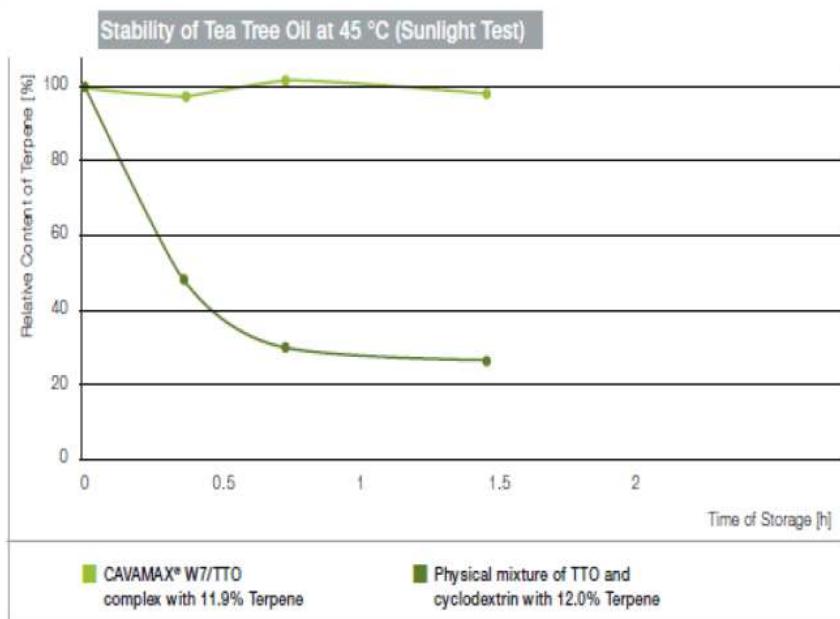
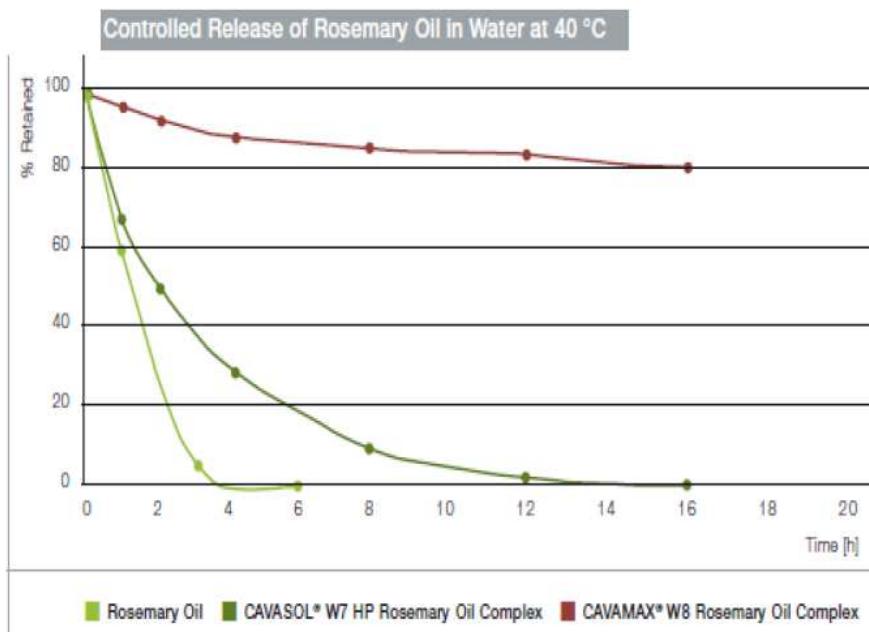
# To Achieve Molecular Encapsulation, A Few Requirements are Necessary



# By Molecular Encapsulation, CAVAMAX® Cyclodextrins Generate A Variety of Effects

## Controlled release

e. g. controlled release of an essential oil in water at 40 ° C



## Stabilization

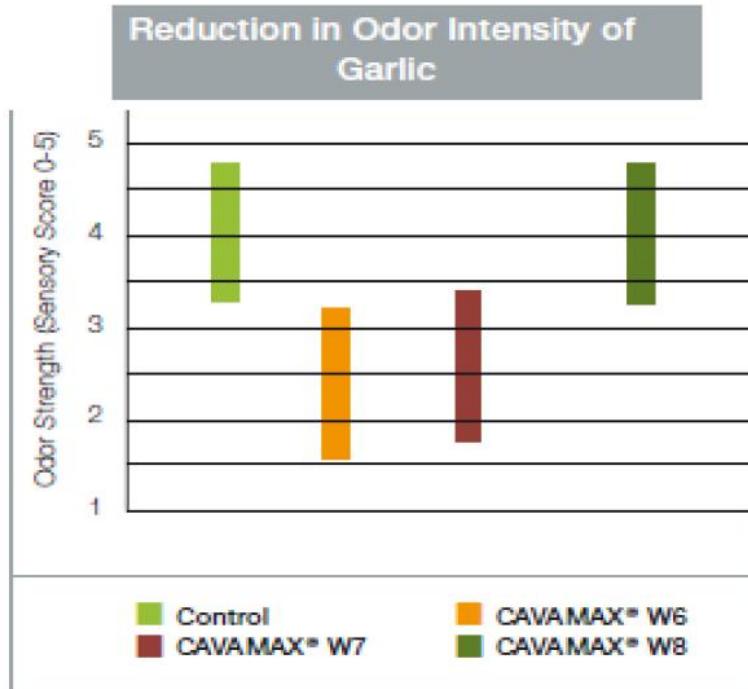
- ▶ Light, UV-radiation
- ▶ Temperature
- ▶ Oxidation
- ▶ Hydrolysis

e. g. Stabilizing Tea Tree Oil at 45 ° C

# By Molecular Encapsulation, CAVAMAX® Cyclodextrins Generate A Variety of Effects

## Masking

- ▶ Unpleasant odor
- ▶ Undesirable taste



## Increase of bioavailability

- e. g. CAVACURMIN®
- e. g. CAVAQ10™
- e. g. Retinol complex

## Solubilization

- ▶ Enhancement of water solubility
- ▶ Avoid organic solvents
- e. g. improved water solubility of hydrocortisone

# Agenda

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1. What is CAVAMAX®?
2. What can CAVAMAX® do?
3. CAVAMAX®'s Application:

## MASKING

# Functional Food Ingredients often Have Undesirable Aspects



Bitter taste



Undesired smell



Unpleasant taste

# To Mask These Undesirable Things, Standard-solutions are Only Second Best

Reduction of active ingredient?



Less effect!

Adding sugar?



Less healthy!

Adding aroma?



Unwanted taste!

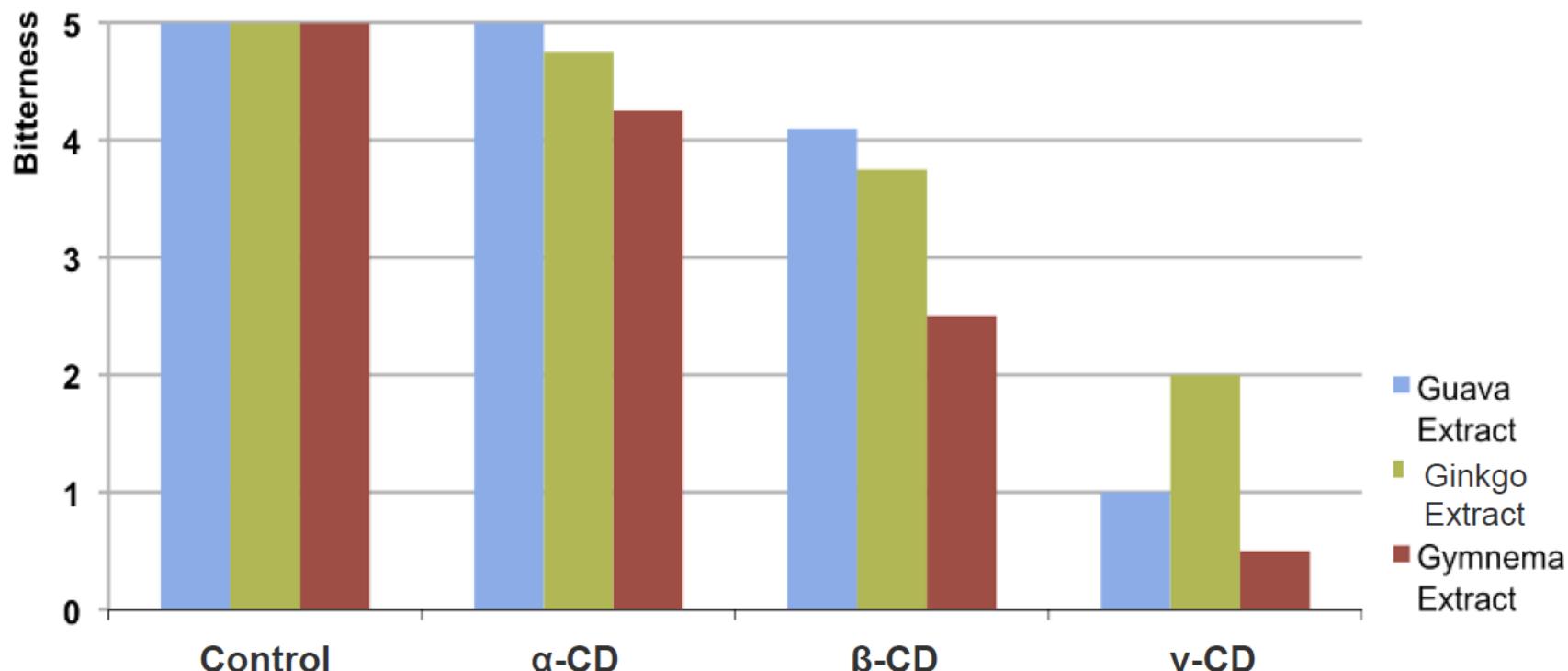
# Our Technology: CAVAMAX® Cyclodextrins – The solution in A Nutshell

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# CAVAMAX® Can Mask the Bitterness Efficiently

Bitter taste masking by the different types of CAVAMAX®



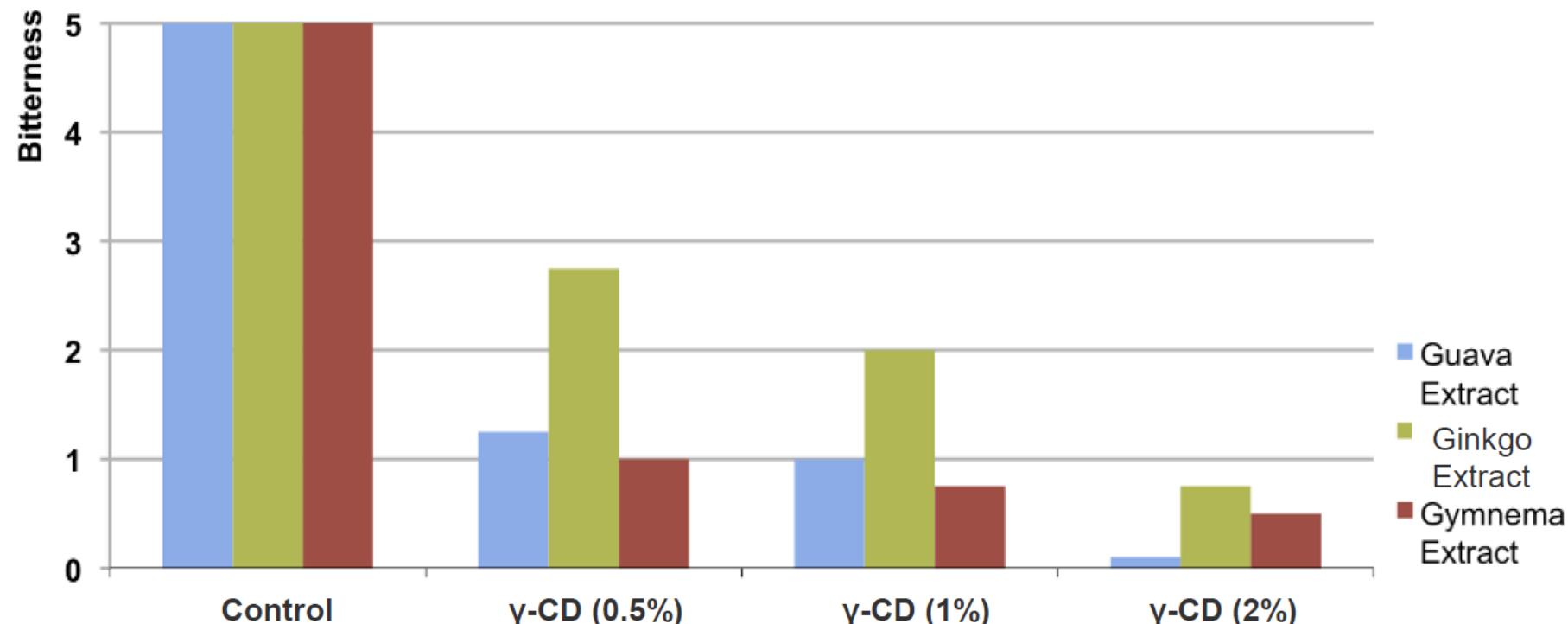
Scale:

01 = not detectable, 02 = faintly detectable, 03 = detectable, 04 = notably, 05 = unpleasant

- All CAVAMAX® are able to reduce the bitter taste of 3 extracts.
- CAVAMAX® W8 is able to mask the bitter taste **most effectively**.

# Bitter Taste Can Be Controlled by CAVAMAX® Content

Bitter taste masking by increasing amounts of CAVAMAX® W8 ( $\gamma$ -CD)



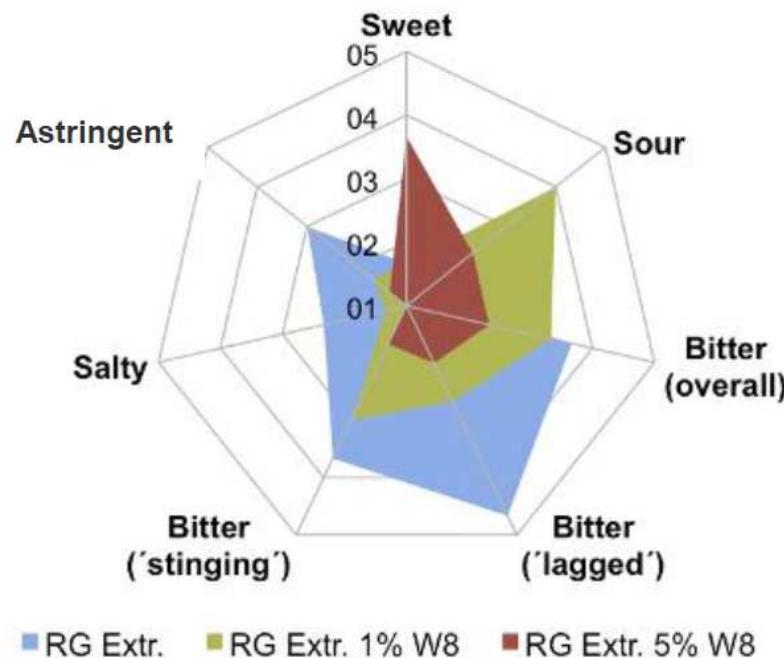
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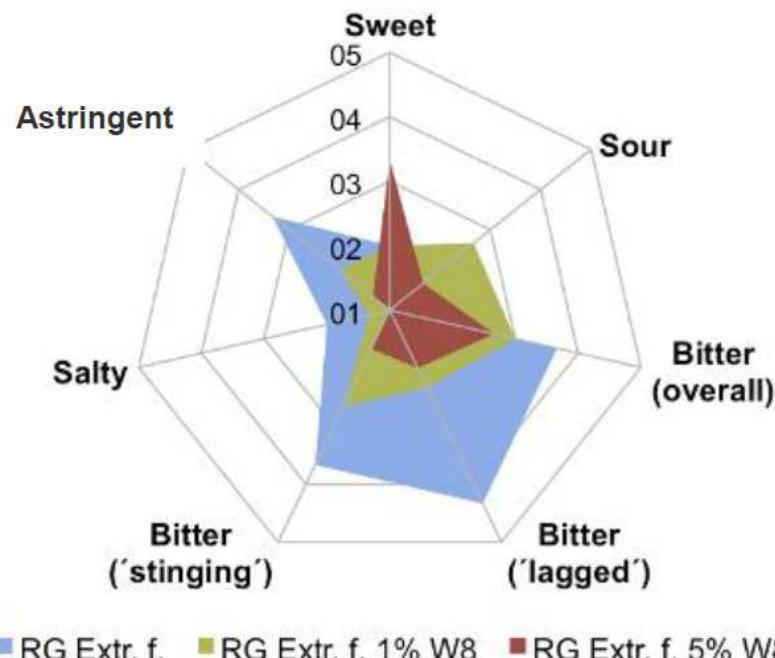
➤ The more CAVAMAX® W8 is used, the more bitter taste is masked.

# CAVAMAX® W8 can Mask Unpleasant Taste of Red Ginseng Effectively

Taste masking Red Ginseng Extract



Taste masking fermented Red Ginseng Extract



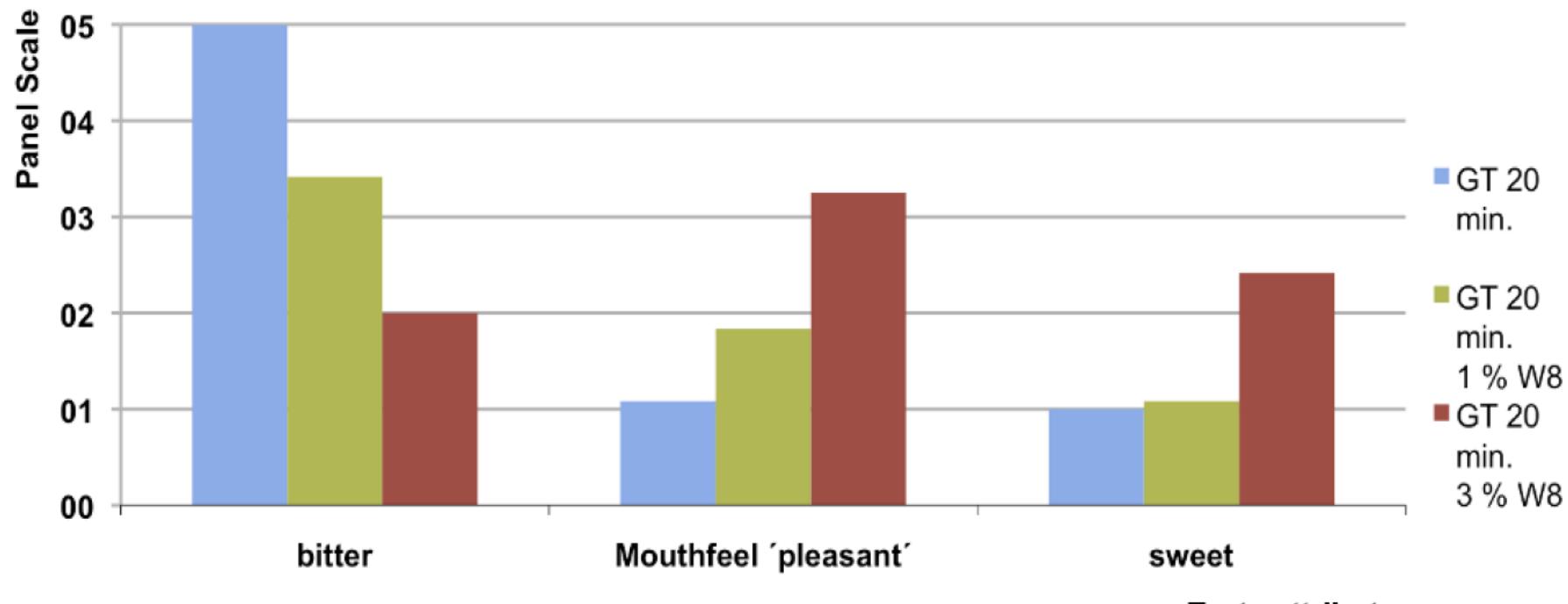
Scale:

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➤ CAVAMAX® W8 is able to reduce bitterness and astringent taste of red Ginseng effectively.

# CAVAMAX® W8 Turns Green Tea Drinking into A Pleasant Experience

Bitterness masking of freshly brewed Green Tea (20min) with CAVAMAX® W8 ( $\gamma$ -CD)



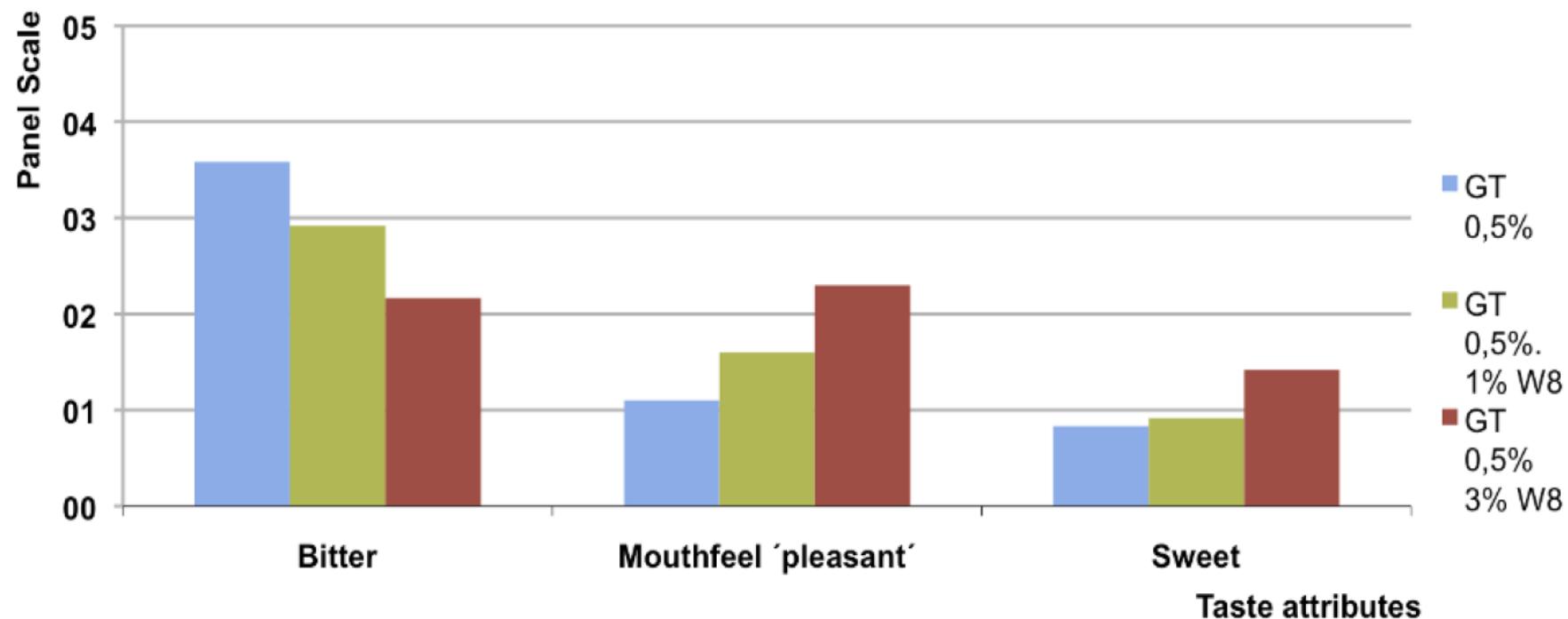
Scale:

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- CAVAMAX® W8 was able to mask bitter taste and increase sweetness of freshly brewed green tea effectively.

# CAVAMAX® W8 Turns Green Tea Drinking into A Pleasant Experience

Bitterness masking of 0.5% **Green Tea extract** with CAVAMAX® W8 ( $\gamma$ -CD)



Scale:

01 = not detectable, 02 = faintly detectable, 03 = detectable, 04 = notably, 05 = unpleasant

- CAVAMAX® W8 was able to mask bitter taste and increase sweetness of green tea extract **effectively**.

**WACKER**



**THANK YOU**