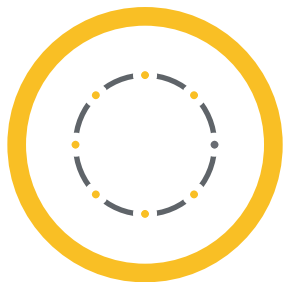




CARBOHYDE  
SUGAR IS LIFE



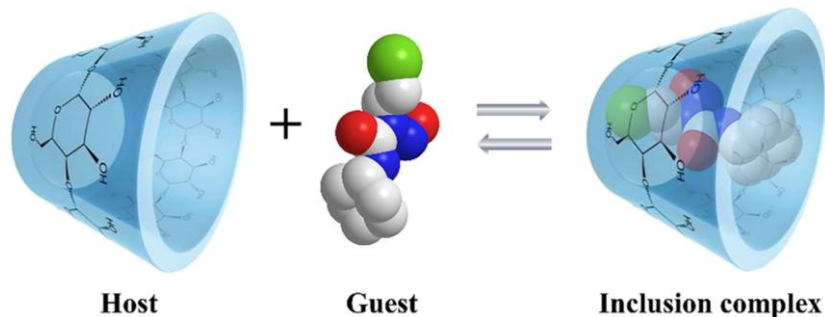
Cyclodextrin complex vs. liposomes



# What are Cyclodextrins (CDs)?

## Properties

- Natural, cyclic molecules, composed of sugars.
- Toroid structure with **interior hydrophobic** cavities and **exterior hydrophilic** rims.
- Hydrophobic molecules can be incorporated.
- Often, the **aim** is to increase the solubility, dissolution rate, and stability of poorly soluble APIs.



Dynamic host-guest interaction



Medicine



Household



Food & Drinks

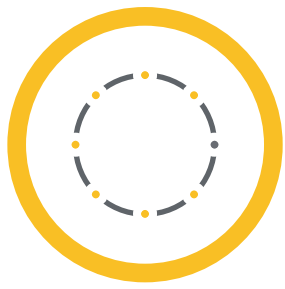


Agriculture



Cosmetics

The structure and application areas of CDs



# A Powerful Tool in Traditional Application

## CDs as multifunctional excipients

CDs as drug complexing agents in drug delivery

Nanosizing, solubilizing, stabilizing, etc.

With cyclodextrins we can **increase** your API's

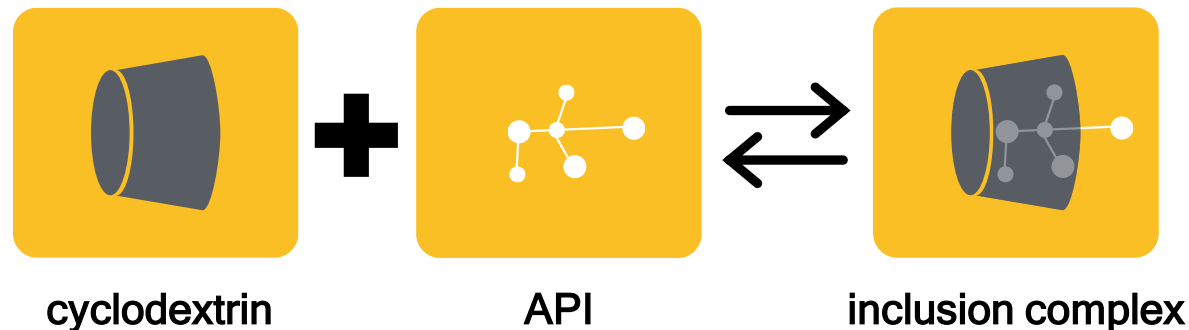


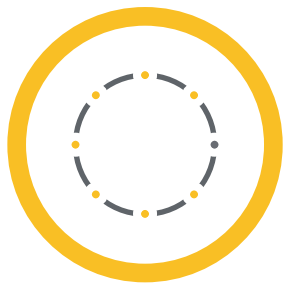
- Solubility, dissolution rate
- Stability
- Wetting
- Absorbed quantity, bioavailability

With cyclodextrins we can **decrease** your API's



- Dose for the same efficacy
- Taste and smell
- Drug-drug or drug-excipient interactions
- Toxicity, side effects





# Preparation Methods

## Versatility of product manufacturing

Preparation methods:

Techniques for liquid formulations

- Aqueous solutions
- Suspensions

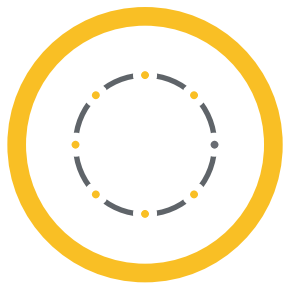
Techniques for solid complexes

- Grinding and kneading methods
- Suspension method
- Co-evaporation
- Co-precipitation

Solid complexes are made from solutions, suspensions, or slurry



Laboratory tools for complex preparation

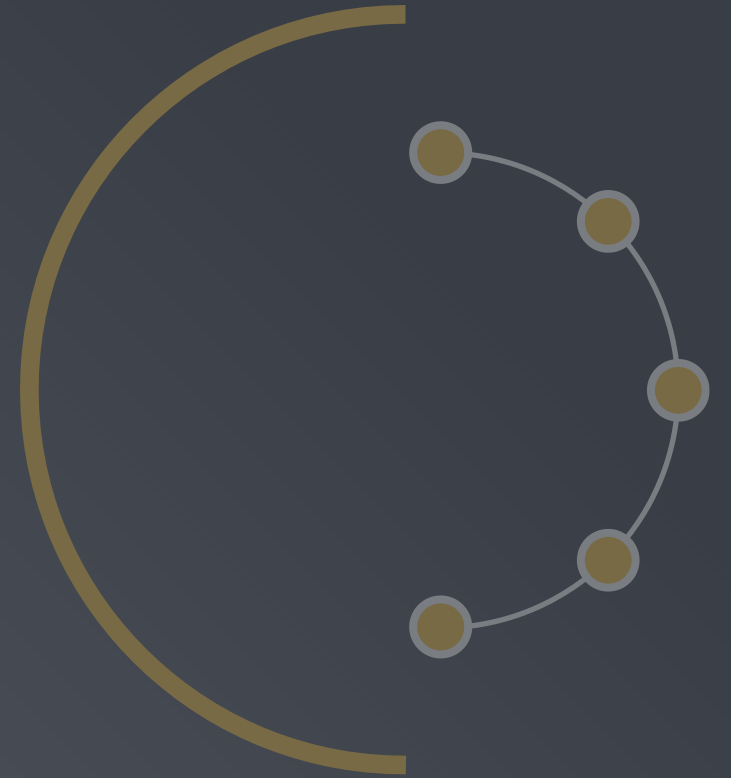


# Comparison of cyclodextrin inclusion complexes and liposomes

Aspect	Cyclodextrin Inclusion Complexes	Liposomes
<b>Preparation Methods</b>	Solid-state or solution-based methods (kneading, co-precipitation, spray-drying, freeze-drying). Generally straightforward but it can be limited by guest molecule properties.	Hydration of lipid films, extrusion, sonication, microfluidics. More technically demanding, but highly tunable to achieve specific release profiles.
<b>Costs</b>	Usually lower material and processing costs; good scalability for solid dosage forms and for aqueous solutions.	More variable: can be higher due to lipid costs, sterile handling, and equipment needs; dry formulations can reduce costs vs. dispersions.
<b>Technological Complexity</b>	Simpler processing; less equipment required. Limited flexibility in achieving targeted or sustained release. Extremely simple for aqueous solutions (simple dissolution process).	Higher complexity; requires specialized technology but allows advanced designs (PEGylation, ligand-targeting, multilamellar systems).
<b>Purpose</b>	Improving solubility, stability, dissolution rate.	Provides controlled and targeted release options.
<b>Encapsulated compound</b>	Mainly suited for small molecules; limited capacity for macromolecules.	Versatile: can encapsulate hydrophilic, lipophilic, and large biomolecules.
<b>Combinability of two technologies</b>	Liposomes can serve as carriers for CD inclusion complexes, combining advantages of both systems.	



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