



CARBOHYDE
REVOLUTION OF
CYCLODEXTRINS

Cyclodextrins

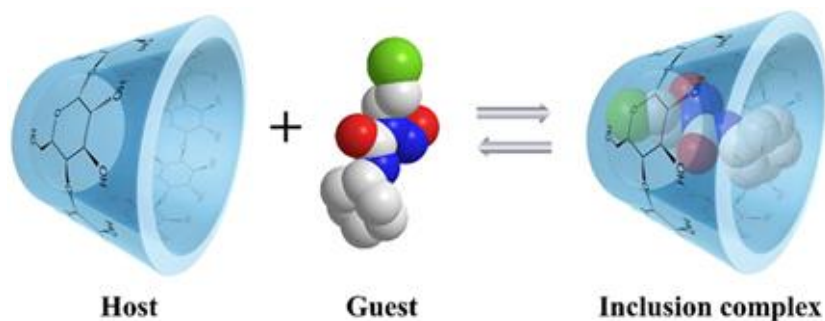
*In drug delivery systems
for small molecules*



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.

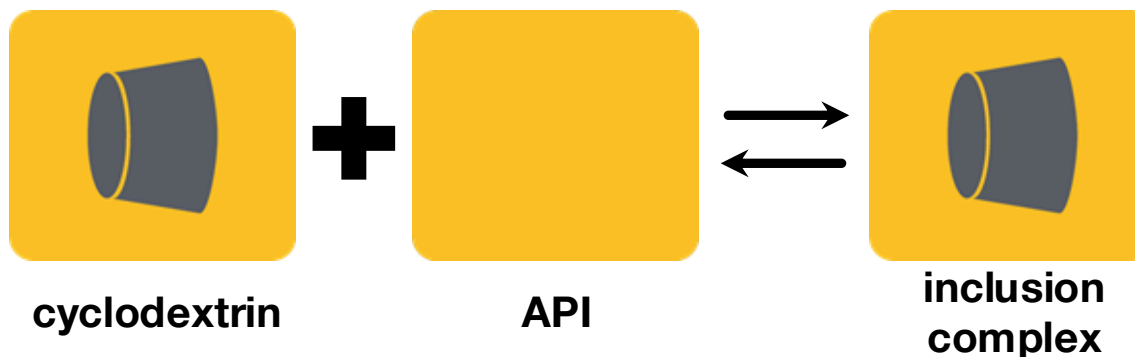
**With cyclodextrins we can
increase your API's**

- 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





Cyclodextrins in Pharmaceutical Products

CDs as multifunctional excipients

- Tool: CDs as drug complexing agents in drug delivery
- Goal: solubilizing, stabilizing, etc.
- Numbers: 130 approved pharmaceutical products in 2023



	α -CD	β -CD	γ -CD	HP- β -CD	SBE- β -CD	RM- β -CD	HP- γ -CD
Oral		X	X	X	X		
Nasal						X	
Rectal		X		X			
Dermal		X	X	X			
Ocular		X		X	X	X	X
Parenteral	X			X	X		X





Solubility increasing effect of CDs



Only distilled water (DW)

2 L

Volumes of solutions needed to
dissolve 10 mg Domperidone



DW with CD

62 mL



DW with hydroxy acid

12 mL



DW with CD and
hydroxy acid

0.3 mL



Cyclodextrins in drug products

Uses beyond solubilization



Taste masking



Ensuring content uniformity



Fast dispersion, dissolution (ODT)

Taste masking



Chemical stabilization



Fast onset

Life-cycle management



- NON-CONFIDENTIAL -

Cyclodextrins in Pharmaceutical Products

Non-conventional dosage forms



Oromucosal spray
Flurbiprofen (Reckitt)
 β -CD, HPBCD



Mouth wash
Chlorohexidine+
citrox (Curaprox)
 β -CD



Vaginal Gel
Metronidazol (Curateki)
 β -CD



Wipes
Miconazole + chlorhexidine (Dechra)
 β -CD



Chewing gum
Nicotine (Nicogum)
 β -CD



Chewing tablet
Cetirizin HCl (Zyrtec)
 β -CD



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



Sample Proposal for Formulation Development Study

Objective

- Improving the properties of your formulation with Cyclodextrins

Phases of the study

- Pre-formulation
- Composition optimization
- Phase-solubility studies
- Stability studies
- Technology transfer

Deliverables

- Results
 - Feasibility study with pharmaceutically approved CDs
 - Comprehensive phase-solubility study with one selected CD
 - Analytical characterisation
- Weekly and final report
- Prepared complex

Commercial terms

- ~10,000-25,000 EUR



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For any questions:

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