

**CYCLOLAB**



*The Cyclodextrin Company*



# **Reactive cyclodextrins**

**for**

**Click chemistry and single isomer  
cyclodextrin synthesis**



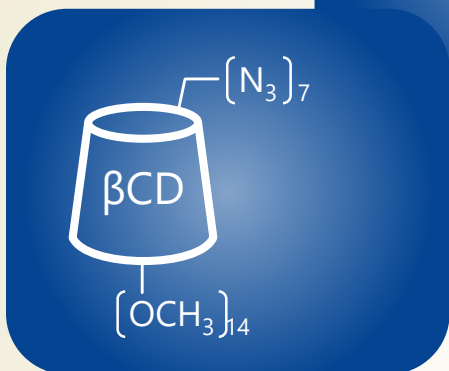
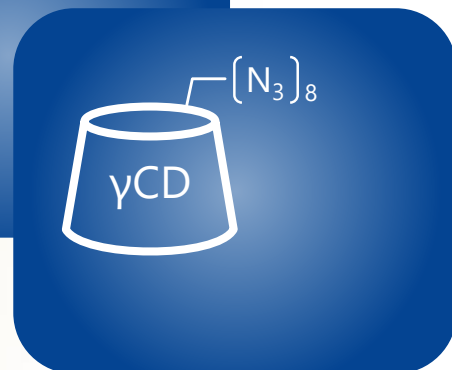
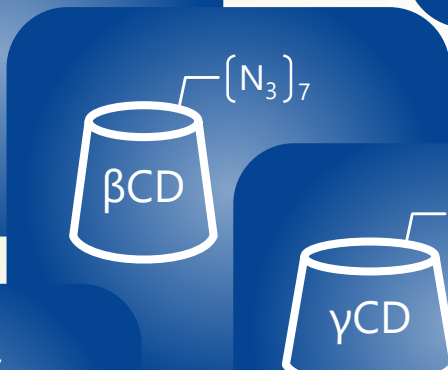
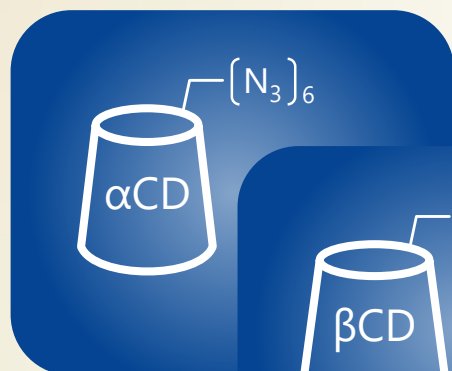
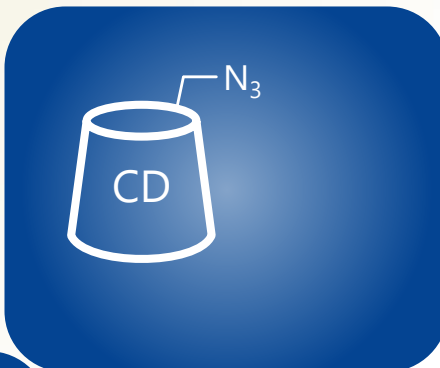
# Reactive cyclodextrins

CycloLab offers a wide variety of cyclodextrins (CDs) which bear functional groups at well-defined positions and these groups participate easily in chemical reactions. These versatile derivatives are milestones for cyclodextrin chemistry:

- Primary-side **halogenated/tosylated** cyclodextrins are ideal substrates for further modification as they can be efficiently substituted by any nucleophile.
- **Azido**-bearing CDs are extremely versatile intermediates. They can be reduced to the corresponding amino CDs or can be promptly used in azide-alkyne cycloaddition.
- CD derivatives modified with **amino** or **thiol** groups are able to react, in suitable conditions, with a large variety of electrophiles.



# Reactive cyclodextrins for click chemistry



**Azido-modified CDs are among the most versatile intermediates. They are stable and convenient precursor of the corresponding amino-CD derivatives. They can be efficiently reacted with the alkyne counterpart to generate multifunctional systems able to interact through cooperative forces with the selected biological target.**

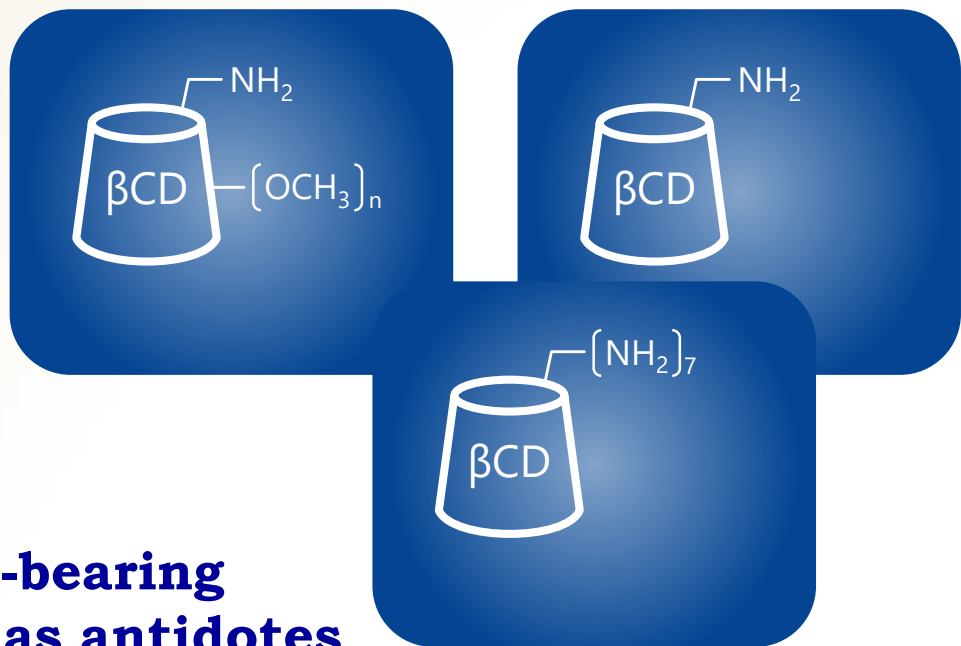
**G. Cravotto:** Alkyne–azide click reaction catalyzed by metallic copper under ultrasound

**A. Vargas-Berenguel:** Ferrocene– $\beta$ -cyclodextrin conjugates: synthesis, supramolecular behavior and use as electrochemical sensors

**H. Ritter:** Pseudopolyanions based on poly(NIPAAM-co- $\beta$ -Cyclodextrin methacrylate) and ionic liquids



# Reactive cyclodextrins bearing -NH<sub>2</sub> functions



**Highly symmetric amino-bearing CDs have been proposed as antidotes for lethal toxins and as effective antibacterial agents. Cationic, amphiphilic CDs can assemble into supramolecular system able to effectively deliver nucleic acids. Amino-CDs can be applied as effective chiral catalyst.**

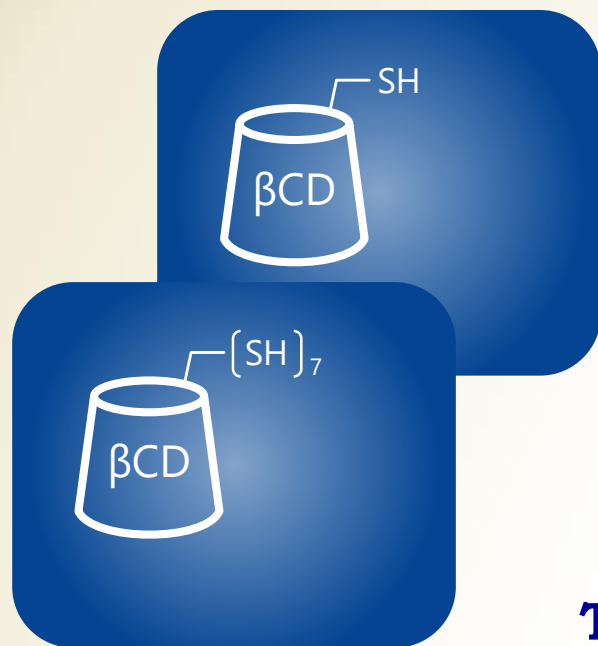
**J.F. Stoddart:** Amino acid derivatives of β-cyclodextrin

**V.A. Karginov:** β-cyclodextrin derivatives that inhibit anthrax lethal toxin

**K. Fujita:** Heptakis(6-deoxy-6-guanidino)-β-cyclodextrin: an artificial model for mitochondrial ADP/ATP carrier



# Reactive cyclodextrins bearing -SH functions



**CDs modified with thiol groups have a large variety of applications. They can be used to coat surfaces, for building-up gene delivery system and for forming hydrogels to carry hydrophobic drugs. They have been used as well as chelating agent and electrochemical sensors.**

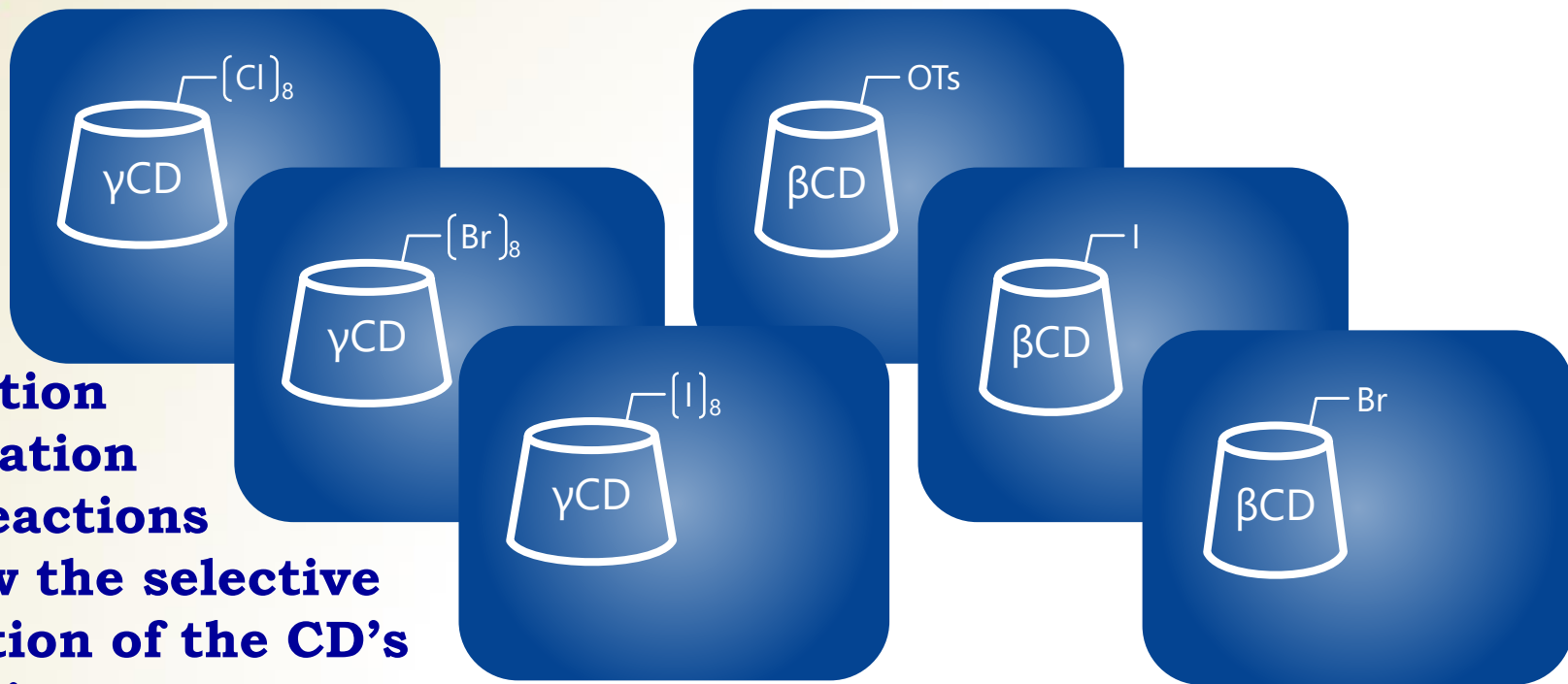
**J.F. Stoddart:** Supported monolayers containing preformed binding sites. Synthesis and interfacial binding properties of a thiolated  $\beta$ -cyclodextrin derivative

**G. Wenz:** Supported monolayers containing preformed binding sites. Synthesis and interfacial binding properties of a thiolated  $\beta$ -cyclodextrin derivative

**D. Klockow:** Investigation of the adsorption of gaseous aromatic compounds at surfaces coated with heptakis(6-thio-6-deoxy)- $\beta$ -cyclodextrin by surface-enhanced Raman scattering



# Reactive cyclodextrins bearing leaving groups



**Halogenation and tosylation are the reactions that allow the selective modification of the CD's primary rim.**

**The class of per-6-halo-CDs represents the fundamental starting point for any modification based on nucleophilic substitution.**

**6-monotosyl- and 6-monohalogenated CDs are the most widely utilized derivative for single modification of the upper rim.**

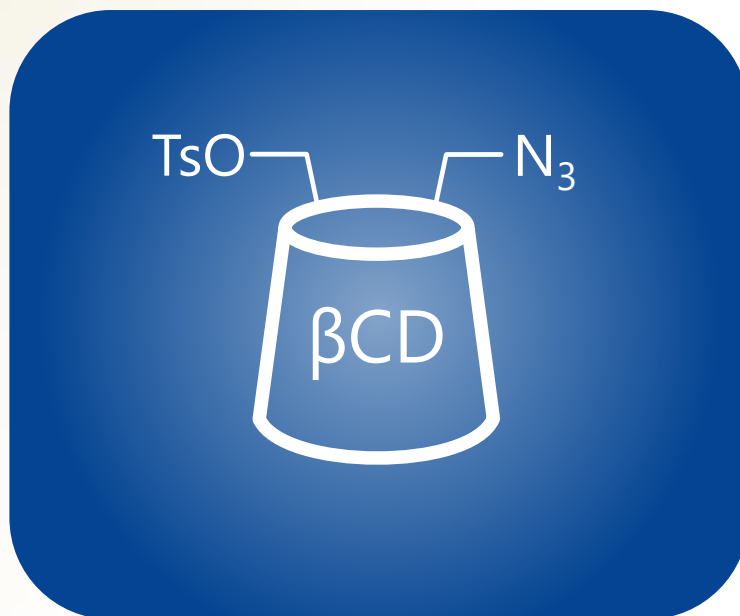
**A. Gadelle:** Selective halogenation at primary positions of cyclomaltooligosaccharides and a synthesis of per-3,6-anhydro cyclomaltooligosaccharides

**R. Darcy:** 6<sup>A</sup>-O-p-Toluenesulfonyl-β-cyclodextrin



# Reactive cyclodextrins for selective bifunctionalization

**This unique derivative was *ad-hoc* developed for hetero-bifunctionalization of the CD on the primary side.**



**This interesting compound is the optimal starting point for the design of sophisticated architectures.**

**Compound available as mixture of three pairs of positional isomer or as single pair of pseudo enantiomer (AB-BA or AC-CA or AD-DA).**





# Reactive cyclodextrins

## List of available Beta-cyclodextrin products at CycloLab

Product code	Product name
CY-2024	6-Monodeoxy-6-monoamino-BCD
CY-2050	6-Monodeoxy-6-monoazido-BCD
CY-2055	6-Monodeoxy-6-monoamino-permethyl-BCD
CY-2056	6-Monodeoxy-6-monoamino-random-methyl-BCD
CY-2059	6-Monodeoxy-6-monothio-BCD
CY-2065	Heptakis(6-deoxy-6-amino)-BCD
CY-2066	Heptakis(2,3-di-O-methyl-6-deoxy-6-amino)-BCD
CY-2075	Heptakis(6-deoxy-6-azido)-BCD
CY-2076	Heptakis(2,3-di-O-methyl-6-deoxy-6-azido)-BCD

Product code	Product name
CY-2021	6-Monosyl-BCD
CY-2051	6-Monodeoxy-6-iodo-BCD
CY-2053	6-Monodeoxy-6-monobromo-BCD
CY-2061	Heptakis(6-deoxy-6-bromo)-BCD
CY-2062	Heptakis(6-deoxy-6-iodo)-BCD
CY-2204	Heptakis(6-deoxy-6-chloro)-BCD
CY-2217	6-Monodeoxy-6-monoazido-6-monosyl-BCD

**Alpha- and gamma-cyclodextrin derivatives are also available of the listed products!**

**For any other specific derivative to be designed, please reach out to us for discussion at [info@cyclolab.hu](mailto:info@cyclolab.hu)**





# Reactive cyclodextrins

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