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Synthesis and application of oligosaccharide-based cinchona organocatalysts

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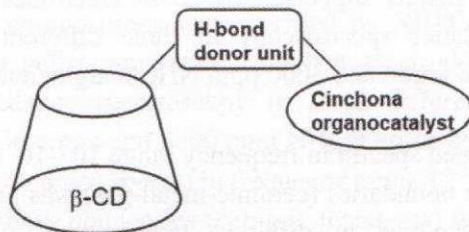
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Organocatalysis has emerged as an efficient solution for the rapid and stereoselective synthesis of enantiomerically enriched molecules. Cinchona alkaloids and their derivatives have proven to be powerful organocatalysts owing to their reactivities, leading to high enantioselectivities.

Organic solvent nanofiltration (OSN) is an emerging technology that allows separation of solutes via pressure gradient in organic media. Attaching cinchona moieties to β -cyclodextrins seems to be an effective way to reach convenient organocatalysts with high molecular weight, leading to easy separation of the catalyst from the reaction mixture.

New β -cyclodextrin-cinchona thiourea and squaramide organocatalysts were prepared starting from commercially available β -cyclodextrin and hydroquinine. These bifunctional organocatalysts were applied successfully (up to 95% yield and 99% e.e.) in asymmetric *Michael* additions between 1,3-dioxo compounds and β -nitrostyrene. After the enantioselective reactions, separation of the products and the cyclodextrin-based catalysts were carried out applying the OSN method with high efficiency, resulting in a green and sustainable organocatalytic method.



General structure of the new cyclodextrin-cinchona organocatalyst family.

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