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Chemoenzymatic synthesis of iminosugars from monosaccharides

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PURPOSE OF THE ABSTRACT

Iminosugars (1-3), are polyhydroxylated alkaloids and sugar mimics, with a nitrogen in the place of the endocyclic oxygen. These naturally occurring compounds are of pharmaceutical importance because they interact with and inhibit carbohydrate processing enzymes, and because of their beneficial drug-like properties.[1] Conventional synthesis of iminosugars from readily available carbohydrates is challenging mainly due to the presence of multiple hydroxyl groups. A key strategy in carbohydrate synthesis has been complex protecting group manipulations in order to perform regioselective functional group manipulations.[2]

Inspired by the reported biosynthetic gene cluster for transformation of fructose-6-phosphate into an iminosugar scaffold,[3] we present a biomimetic sequential, three step chemo-enzymatic cascade, whereby minimally protected monosaccharides undergo transamination, selective oxidation, and reduction, via transaminase, oxidoreductase, and catalytic hydrogenation steps, respectively.[4-6]

FIGURES

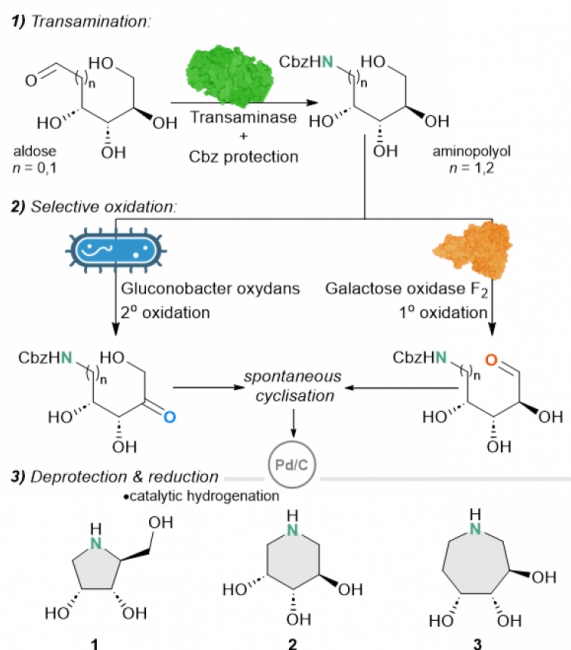


FIGURE 1

Chemoenzymatic synthesis of iminosugars from monosaccharides

Iminosugars of different ring size are accessed from monosaccharides through a four step chemoenzymatic pathway.

FIGURE 2

KEYWORDS

iminosugars | transaminase | galactose oxidase

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