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TOPIC(s) : Biomass conversion / Homogenous, heterogenous and biocatalysis

Catalytic depolymerization of cellulose and chitin

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PURPOSE OF THE ABSTRACT

Cello-oligosaccharides are biologically important molecules that can elicit a defensive immune response in plants and improve the health of animals. Cellulose, a polymer of glucose linked by beta-1,4-glycosidic bonds, is an ideal feedstock for synthesis of cello-oligosaccharides. However, cello-oligosaccharides rapidly degrade under the conditions used for cellulose hydrolysis. Here, we report the hydrolysis of cellulose over carbon catalyst [1] in a semi-flow reactor to achieve high yield of cello-oligosaccharides (72%). The excellent activity of oxidized carbon catalyst, adsorption of cellulose on the catalyst and high space velocity of products in the reactor were essential. We also developed a method for quantification of individual cello-oligosaccharides, which suggested a reduction in the rate of hydrolysis with a reduction in chain length.

We also studied depolymerization of chitin to N-acetylglucosamine and its conversion to N-containing compounds [2].

FIGURES

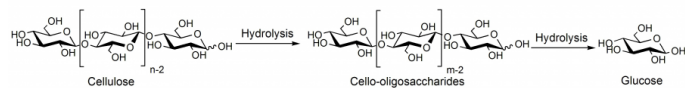


FIGURE 1

Figure 1

Cello-oligosaccharides are formed as intermediates in the cellulose hydrolysis reaction.

FIGURE 2

KEYWORDS

cellulose | chiin | oligosaccharide | N-acetylglucosamine

BIBLIOGRAPHY

[1] A. Shrotri, H. Kobayashi, A. Fukuoka, *Acc. Chem. Res.*, 51, 761-768 (2018).

[2] K. Techikawara, H. Kobayashi, A. Fukuoka, *ACS Sustainable Chem. Eng.*, 6, 12411-12418 (2018).