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Glucose production from cellulose by immobilizing cellulase enzyme on chitosan beads

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PURPOSE OF THE ABSTRACT
Recently, interest in an efficient biomass pretreatment and saccharification process is increasing for the production of biofuels and biochemicals from renewable non-edible biomass resources. In this study, we tried to produce glucose from cellulose by immobilizing the cellulase enzyme on chitosan beads, which are reported to have high pH and temperature stability.
Polyvinyl alcohol modified with maleic anhydride was coated on chitosan beads to form an immobilized support and then cellulase enzyme was immobilized thereon. The immobilized amount of the enzyme according to the concentration of the cellulase enzyme solution and the specific activity of the immobilized enzyme at each concentration were investigated. In addition, conversion from cellulose to glucose was performed under conditions that showed the maximum cellulase specific activity.
The domain immobilization method can be completed by a capture method that physically confines the domain and a binding method that adheres to the surface of a support or covalent bond. In this study, since the time division must be paid back when the capture method is implemented, the method of Dincer and Telefonce was used to limit the acceleration in order to contact the Wise mark and immobilize it when applied to the chitosan bead surface to overcome the extreme.
As the concentration of the cellulase solution increased, the amount of cellulase immobilized on the chitosan beads increased linearly. The production of glucose increased to 7.2 g/L from 1% carboxymethyl cellulose (CMC) substrate when immobilized in 20% cellulase solution. The maximum specific activity value of the enzyme was 0.37 unit/mg protein when immobilized in 8% cellulase solution. The optimum reaction composition at pH 7 and 37 °C was 0.5 g beads/L from 1% CMC substrate, and conversion to glucose was completed in about 20 minutes.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Cellulase | Immobilization | Chitosan beads | Cellurose

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