

NGUYEN CAO CUONG : PRODUCTION AND PURIFICATION OF
XYLITOL FROM SUGARCANE BAGASSE. THESIS ADVISOR :
ASSOC.PROF. APICHAT BOONTAWAN, Ph.D. 129 PP.

XYLITOL/SUGARCANE HEMICELLULOSIC HYDROLYSATE/MEMBRANE
FILTRATION/ION EXCHANGE RESIN/CRYSTALLIZATION

Xylitol is five-carbon sugar alcohol widely applied in many different fields. In this study, the production using *Candida guilliermondi* TISTR 5068 and purification of xylitol from sugarcane bagasse instead of commercial xylose were investigated. Bagasse was alkaline hydrolyzed to recover the xylose-glucose mixture. Glucose was removed from the xylose-glucose mixture by ethanol fermentation. Batch-batching xylitol fermentation was performed using a 500 L bioreactor. The results showed that xylitol titer of 23.24 g/L with the yield of 0.87 $\text{g}_{\text{xylitol}}/\text{g}_{\text{xylose}}$ and productivity of 0.14 g/L.h were obtained for batch fermentation. Subsequently, the fermentation broth was purified by membranes and ion exchange chromatography techniques. Electrodialysis was initially investigated. However, the color removal capacity was not good. Highly efficient purification results were obtained by conducting a series of microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), ion exchange chromatography, and crystallization steps. MF was used to remove cells and large size insoluble components in the fermentation broth. UF and NF were used to eliminate potential foulants including organic and inorganic substances, proteins, and macromolecules. The ion exchange

chromatography was highly effective in the desalination and decolorization of the clarified fermentation broth. Crystallization was performed as a final step to maximize purity of the final crystal product. The xylitol crystal purity of 99.64% with a recovery efficiency of 85.03% was obtained for a 1% (w/v) seeding crystallization experiment. These results showed that very high-quality xylitol crystal production at a pilot scale could be achieved from sugarcane bagasse using *Candida guilliermondi* TISTR 5068.



School of Biotechnology

Academic Year 2020

Student's Signature _____

Advisor's Signature _____

Co-advisor's Signature _____