Environmental Engineering and Management Journal

March 2012, Vol.11, No. 3, Supplement, S94
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

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ENZYMATIC PROCESSING OF CHITINACEOUS WASTES FOR N-ACETYL-D-GLUCOSAMINE PRODUCTION

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Abstract

One of the major structural components of marine invertebrates and fungal biomass is chitin, which is a biopolymer ubiquitous in nature. It is an unbranched polymer of N-acetyl-D-glucosamine (GlcNAc) monomers that are linked by β-1, 4 glycosidic bonds. The annual recovery of chitin has been estimated at about 40 tones from the processing of marine invertebrates. Chitin is conventionally purified from crab or shrimp waste and is further converted into different valuable products. Among those, GlcNAc is one of the important products due to its medical application in the improvement of osteoarthritis. It has been found that sulfate and hydrochloride salts of glucosamine are commercialized for osteoarthritis disease, but these cannot be used for oral administration due to bitter taste. Alternatively, GlcNAc is being used as a supplement as it is sweet in taste. Though GlcNAc is produced by different chemical procedures such as acid hydrolysis of chitin; however, these processes suffer from limitations like production of acidic wastes, high cost and low yield. The GlcNAc could also be produced by N-acetylation of glucosamine, which also has the inherent disadvantages of a chemical process. As the enzymatic conversion of chitinaceous wastes offers an effective and environment friendly alternative to chemical methods, the present study thus involved processing of chitinaceous wastes by the chitinase from *Trichoderma harzianum*. In this study, shrimp wastes and fungal biomass of soil origin were used as chitinaceous wastes. The enzyme loading, amount of wastes and incubation time of enzymatic reaction were standardized for GlcNAc production. The presence of GlcNAc after enzymatic hydrolysis was detected by TLC and HPLC methods. The GlcNAc amount varied from 65% (w/w) to 80% (w/w) from these wastes.