A Biotechnological Approach for Deproteinization of Crustacean Waste for the Production of Chitin

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Each year, seafood processing generates large amounts of solid wastes which have become a major environmental concern to the main producing countries due to the high perishability and the bulky nature of the waste material. Crustacean waste is a rich source of many valuable products with chitin, a versatile environmentally friendly biopolymer, being the most economically valuable component of the waste material. The traditional method of deproteinization involves the use of strong alkali (commonly NaOH) which harms the physiochemical properties of chitin, results in a harmful effluent, wastes the other valuable components present in the waste material, and increases the cost of deproteinization. The present study proposes the use of an environmentally friendly biotechnological method for the deproteinization of shrimp shells. The method involves the use of proteolytic microorganism (*Aspergillus niger*), which secrets extracellular proteases in solid-state fermentation. The ability of *Aspergillus niger* to carry out the deproteinization process has been evaluated. The effects of galactose concentration (as an external carbon source), shrimp shells particle size, initial pH and autoclaving of shrimp shells on the performance characteristics of the deproteinization process have been investigated. The optimum conditions were found to be initial galactose concentration of 20% w/w, ground shells, autoclaved shells and without initial pH adjustment using lactic acid. However the study showed that further enhancement to the deproteinization process is needed and some recommendations were proposed. Deproteinization using proteolytic microorganisms appears to be a good alternative to the harsh chemical treatment since it is considered less expensive, the resulted effluent is less harmful and it preserves the natural state of the biopolymer. In addition, the presence of microorganisms provides a constant and gradual increase of protease throughout the fermentation and microorganisms can grow in the interstices of shell structure thus enhancing the deproteinization process. The resulted protein liquor may be used as an animal feed additive.