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Comparison of different chitin extraction processes from shrimp and crab shells

Ohidul Alam, Xiuchen Qiao and **Yuyan Gu**
East China University of Science and Technology, China

Global consumption of crustaceans, especially shrimps and crabs, has soared in the last decades. Recently, the consumption of peeled shrimps has experienced exceptional growth, generating a large amount of waste, about 50% by weight of whole shrimps. In crustaceans wastes, 20%-30% chitin existing is closely associated with 30%-40% proteins, 30%-50% minerals, 1%-3% lipids, and pigments. Shrimp and crab wastes (i.e. shell, head, leg, tail, and jaw) have been developed as one of the promising options to produce crude chitin. Due to their biocompatibility, non-toxicity, biodegradability, and film forming characteristics, chitin and its deacetylated derivative chitosan, has numerous applications in various fields, e.g. in food, agriculture, cosmetic, biomedicine, textile, water treatment and pharmacy. In order to separate chitin from crustacean shells, chemical processing steps viz. deproteinization and demineralization are applied using strong bases and acids to remove proteins and calcium carbonate, respectively. In this study, NaOH was used for deproteinization and different acids such as HCl, H_2SO_4, and CH_3COOH for demineralization of shrimp and crab shells through the application of orthogonal experimental design. Results showed 15%-43% and 11%-20% mass reduction during deproteinization from shrimp and crab shells, respectively while total 28%-77% and 30%-81% from shrimp and crab shells, respectively after demineralization. Furthermore, it demonstrated 22%-72% chitin extraction from shrimp shells and 20%-70% from crab shells. Finally, it is stark clear that crustacean shells are a good source of commercial chitin extraction.

ohid776@gmail.com