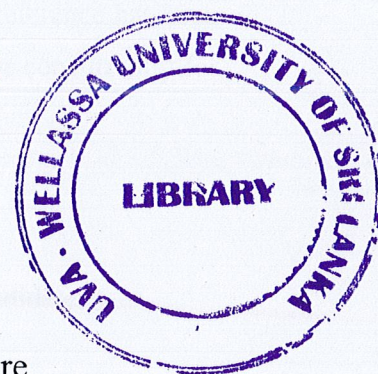


**EXTRACT EXTRACTION AND PURIFICATION  
OF CHITIN AND CHITOSAN FROM *Portunus  
pelagicus* CRAB SHELL WASTE**



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by

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## ABSTRACT

*Portunus pelagicus* shell waste is highly accumulated in Sri Lankan seafood processing factories, but not many efforts have been taken on utilizing this crab shell waste for commercial level chitin and chitosan extraction with a higher percentage purity. The objective of this study was to modify and develop a scale-up, simple, and high-yielding chemical method for extraction and purification of chitin and chitosan from locally underutilized *Portunus pelagicus* crab shell waste. Modified process including pretreatment (hot water), pre-demineralization (acetic acid), demineralization (citric acid), deproteinization (NaOH), decolorization (*n*-butanol) deacetylation (NaOH), and purification (EDTA and SDS) was optimized to obtain a new combination of treatments. Pre-demineralization was introduced as a new step when developing the process. Citric acid was found as the best alternative organic acid to replace HCl in demineralization. The final product was characterized by X-Ray Diffraction Spectroscopy and Fourier Transform Infrared Spectroscopy. The yields of crude chitin, crude chitosan, and purified chitosan were  $32.52 \pm 0.68\%$ ,  $26.28 \pm 0.47\%$ , and  $21.78 \pm 0.34\%$  respectively whereas in the control chitin and chitosan the yields were  $20.34 \pm 0.72\%$  and  $13.79 \pm 0.93\%$  respectively ( $p < 0.05$ ). The percentage purity of the final product on a weight basis was  $82.54 \pm 1.73\%$  with a degree of deacetylation of  $85.84 \pm 2.45\%$ . The XRD data revealed that chitosan extracted from the developed methodology is a semi-crystalline compound with two characteristic crystalline peaks. Chitosan produced from the developed method showed significant results in physicochemical parameters namely moisture ( $5.27 \pm 0.39\%$ ), ash ( $1.95 \pm 0.22\%$ ), whiteness index ( $72.37 \pm 0.66\%$ ), and functional properties namely Water Binding Capacity ( $318.74 \pm 0.48\%$ ), Fat Binding Capacity ( $351.66 \pm 0.69\%$ ) DPPH free radical scavenging activity ( $61.12 \pm 0.59\%$ ) and metal chelating activity ( $40.19 \pm 0.47\%$ ) compared with the control ( $p < 0.05$ ) and showed positive antimicrobial activity against locally isolated *E. coli* at 2.5mg/ml. Thus the methodology developed can be used to obtain high purity and high-quality chitosan with optimum physicochemical and functional properties from crab shell waste.

Keywords: *Portunus pelagicus*, shell waste, Chitosan, Pre-demineralization, XRD, Percentage Purity