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# Effects of Chemical Extraction Methods on Physicochemical Properties of Shrimp Chitosan

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## Abstract

Chitosan extraction methods have not been applied and optimized in Cambodia where shrimp waste is abundantly found. This study explored the chemical extraction methods for Chitosan from shrimp waste (exoskeleton). Different sodium hydroxide (NaOH) concentrations (at 40%, 50% and 60%) for deacetylation were tested under parameter of yield, moisture content, total ash, lipid, fiber, solubility, nitrogen content, viscosity and degree of deacetylation. NaOH at 50% was found to be the optimum concentration for deacetylation based on increased solubility, reduced ash content, and increased degree of deacetylation as compared to that of 40% NaOH. Though Chitosan yield in the former was lower than that in the latter. Increasing the NaOH concentration to 60% had no significant advantage. The characteristic of Chitosan extracted with 50% NaOH at deacetylation stage were comparable to that of the commercial Chitosan.

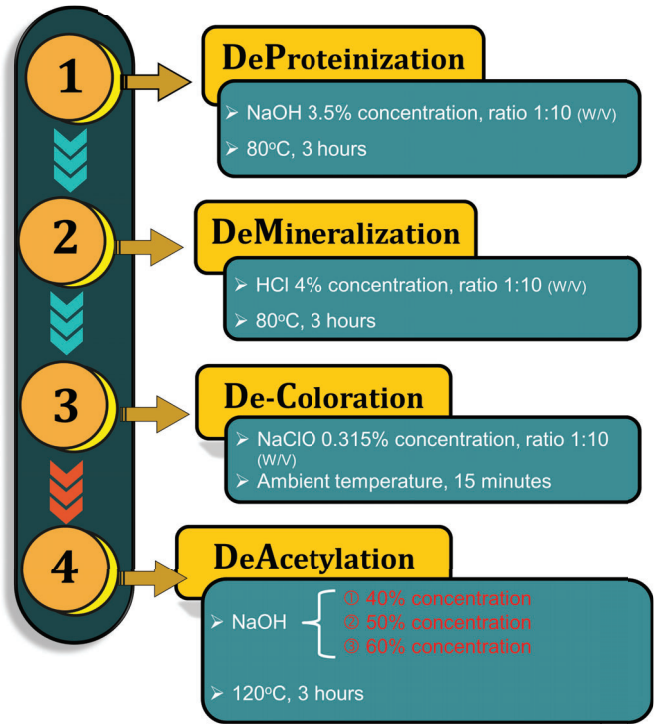
## Introduction

Chitosan is a linear polysaccharide that derived from Chitin. It presents in fungi, yeast, marine invertebrates and arthropods, where it is a principal component in the exoskeleton (El-Nesr, E. M, 2013).

Chitosan is insoluble in most organic solvents but in acidic solutions. Due to this solubility characteristic, Chitosan has been utilized in many fields such as medicine to improve the way certain drugs dissolve, as well as in food processing industry to improve shelve life.

In agricultural prospective, Chitosan has been acting a novel role in environmental-friendly measure for managing crop diseases as alternative to chemical pesticide. Chitosan has been understood to possess antifungal and antibacterial activity. Mechanism in molecular level, Chitosan is an active molecule that possess potential possibilities many applications in agriculture such as plant disease control.

## Material & Methods




## Result

| Concentration of Sodium Hydroxide | Solubility (%) | Nitrogen Content (%) | Viscosity (log mPa/s) | Degree of Deacetylation |
|---|---|---|---|---|
| Commercial Chitosan | 95.65a | 7.12%a | 3.17b | 87.38a |
| 40% NaOH | 93.61b | 6.12b | 2.84c | 74.45b |
| 50% NaOH | 96.27a | 7.29a | 3.20a | 83.23a |
| 60% NaOH | 96.29a | 7.34a | 3.18ab | 83.35a |
| Probability | ** | ** | ** | ** |
| LSD(5%) | 0.287 | 0.287 | 0.022 | 5.342 |
| CV (%) | 2.00 | 0.00 | 0.00 | 3.00 |

*Mean separation within columns by LSD, 5%.*
*Table 1. Major Quality of Chitosan Extracted by Different NaOH Concentration and Commercial Chitosan*

| Concentration of Sodium Hydroxide | Yield of Chitosan (%) | Moisture Content (%) | Total Ash (%) | Lipid (%) | Fiber (%) |
|---|---|---|---|---|---|
| Commercial Chitosan | Non | 10.53ab | 0.59b | 1.12 | 1.33b |
| 40% NaOH | 25.23a | 11.78a | 1.25a | 1.16 | 1.78a |
| 50% NaOH | 20.59b | 11.00b | 0.56b | 1.33 | 1.47ab |
| 60% NaOH | 20.63b | 10.14c | 0.55b | 1.49 | 1.36b |
| Probability | ** | ** | ** | ns | ** |
| LSD(5%) | 0.882 | 0.208 | 0.132 | 0.365 | 1.563 |
| CV (%) | 2.00 | 9.00 | 10.00 | 13.00 | 1.00 |

*Mean separation within columns by LSD, 5%.*
*Table 2. Proximate Quality of Chitosan Extracted by Different NaOH Concentration and Commercial Chitosan*

## Conclusion

Different Sodium Hydroxide Concentration treatments in the production of chitosan result in variation in the characteristics of chitosan. The characteristic of Chitosan extracted with 50% NaOH at deacetylation stage were comparable to that of the commercial Chitosan.

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