

Pakawan Pankhoingam 2009: Efficacy of Chitosan Beads from Marine Animal Shells for the Adsorption of Ammonia and Formaldehyde Gas. Master of Science (Marine Science), Major Field: Marine Science, Department of Marine Science. Thesis Advisor: Assistant Professor Jintana Salaenoi, Ph.D. 102 pages.

Properties of chitosan produced from 4 marine animal shells; white leg shrimp shell, mud crab shell, horseshoe crab shell and cuttlefish bone, were investigated. The highest yield (calculated from weight of chitin) was obtained from shrimp shell (73.63%) followed by horseshoe crab shell (70.73%) crab shell (70.64%) and cuttlefish bone (61.23%). The pH values of chitosan products derived from 4 marine shells were in the range of 6.35 – 7.78. Moisture and ash contents of chitosan products were in the range of 1.36 – 4.74 and 0.13 – 0.67 %, respectively. Chitosan from crab, shrimp, cuttlefish and horseshoe crab shell indicated moderate degree of deacetylation, those are, 69.30, 66.74, 64.29 and 60.94 %, respectively. Viscosity and dissolution properties of shrimp chitosan revealed the highest values followed by crab chitosan . Under SEM study, all chitosan products showed small pores with regular distribution pattern, however, crab chitosan exhibited larger surface area and bigger pore volume than shrimp, cuttlefish and horseshoe crab shells chitosan.

Chitosan from the shells were shaped as beads and distinctly examined characters under SEM. The bead structures consisted of large pores, comparing to the original ones, distributed all surface area. The cuttlefish bone and horseshoe crab shell beads showed the large pores with regular performance while those of shrimp and crab were mingled. After testing the efficacy of adsorbing gas within 4 hours, the 4 - chitosan beads exhibited the best adsorption at pH 9 in 18 mg/l ammonia at 2 hours and the highest yield were cuttlefish chitosan bead (59.12%), horseshoe crab (51.45%) crab (45.66%) and shrimp (42.52%), respectively. In addition, the beads from cuttlefish bone, crab and shrimp chitosan had the maximum capacity to adsorb formaldehyde (8 µg/ml) at pH 5 within 30 minutes, but at pH 7 for horseshoe crab chitosan. The adsorption capacity and the amount of beads were found related. The research results showed the relations between pH and the gas concentration affected to the quality of chitosan beads in the adsorption capacity.

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Thesis Advisor's signature