



Water-solubility of chitosan and its antimicrobial activity

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Abstract

Chitosan samples with different molecular weights were prepared by depolymerization with hemicellulase, and water-soluble half *N*-acetylated chitosan samples were obtained by *N*-acetylation with acetic anhydride. The action of chitosans with molecular weights M_w from 1.4×10^3 to 4.0×10^5 on the growth of *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans* was explored by microcalorimetry. The water-soluble half *N*-acetylated chitosans and chitooligomers had no significant antimicrobial activity. Moreover, water-soluble chitosans and chitooligomers promoted the growth of *C. albicans*. In contrast, water-insoluble chitosan in acidic medium exhibited inhibitory effect against these microorganisms. The water-insoluble chitosans with M_w around 5×10^4 were the optimum for antimicrobial action in these tested samples. The antimicrobial mechanism of dissolved water-insoluble chitosan was hypothesized as forming an impervious layer around the cell. The results suggest that optimum chitosan as food preservative should be water-insoluble chitosan from mild depolymerization of native chitosan.

Keywords

Chitosan; Water-solubility; Microorganism; Microcalorimetry

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