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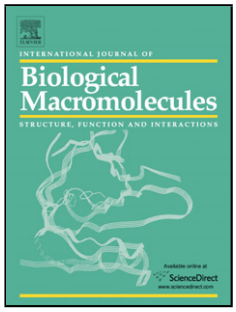

Title: Studies of chitosan/pectin complexes exposed to UV radiation

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PII: S0141-8130(17)30510-X
DOI: http://dx.doi.org/doi:10.1016/j.ijbiomac.2017.05.081
Reference: BIOMAC 7570

To appear in: *International Journal of Biological Macromolecules*

Received date: 9-2-2017
Revised date: 14-4-2017
Accepted date: 15-5-2017

Please cite this article as: Jolanta Kowalonek, Studies of chitosan/pectin complexes exposed to UV radiation, International Journal of Biological Macromoleculeshttp://dx.doi.org/10.1016/j.ijbiomac.2017.05.081

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ACCEPTED MANUSCRIPT

Studies of chitosan/pectin complexes exposed to UV radiation

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Highlights

- Chitosan and pectin formed polyelectrolyte complexes owing to electrostatic attractions between negatively charged carboxyl groups of pectin and positively charged amino groups of chitosan.
- UV rays, used as a sterilizing agent, induced oxidation of the complexes. This process was more efficient for homopolymers than for the complexes.
- UV rays did not cause significant alterations in surface morphology and thermal stability of the complexes, which indicated mutual stabilizing effect of the components.
- The chitosan/pectin complexes were relatively resistant to UV action, which suggests that these materials are suitable for medical and pharmaceutical application.

Abstract

Chitosan and pectin form complexes owing to electrostatic interactions between positively charged amino groups in chitosan and negatively charged carboxylate groups in pectin, which was confirmed by ATR-FTIR spectroscopy and contact angle measurements. Moreover, the formation of these complexes might be associated with the loss of the biopolymers ordering, which resulted in higher surface roughness and lower thermal stability of the complexes in comparison to those of homopolymers.

UV rays, used as a sterilizing agent, caused a moderate increase in the surface polarity of the complexes. Roughness parameters of these samples changed irregularly after irradiation, and their thermal stability was slightly affected by UV rays. The results indicated that the complexes studied appeared to present resistance to UV action higher than homopolymers, which is a desirable property in medical or pharmaceutical applications.

Keywords chitosan, pectin, biopolymer complexes, UV radiation

1. Introduction

Chitosan is a linear polysaccharide composed of (1→4)-linked 2-amino-2-deoxy-β-D-glucopyranose (D-glucosamine) and 2-acetamido-2-deoxy-β-D-glucopyranose (N-acetyl-D-glucosamine) residues. It is a chitin derivative which, after cellulose, is the second most common polysaccharide in nature. Chitin is commercially produced from crustaceans shells that come from food waste [1-5].

Pectins are heteropolysaccharides built of mainly homogalacturonan, a linear chain of (1→4)-linked α-D-galacturonic acid. Part of carboxyl groups in the chain can be esterified with methyl alcohol. Apart from homogalacturonan chain, pectins also encompass rhamnogalacturonan I (RG-I) and ramnogalacturonan II (RG-II) chains. Other saccharides, for example D-galactose and L-arabinose, constitute a part of the pectin structures. Thus, the pectin structure is very complex. This polysaccharide is isolated from the cell wall of plants usually citrus peels, apple pomace, or sugar beet pulp [4-8].

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