

A new method for obtaining quaternary salts of chitosan

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The intensive methylation of chitosan generates the N,N,N-trimethyl derivative (TMCh), which is characterized by possessing permanent positive charges into the chains as consequence of the quaternization of the amino groups on C-2 position in the chitosan structure. The TMCh can be synthesized by either covalent addition of a substituent containing a quaternary ammonium group or by quaternization of the amino groups of the parent polymer [1,2]. The TMCh is a water-soluble polyelectrolyte with good intestinal absorption, being suggested as a soluble carrier for drug delivery. Application of TMCh as antibacterial agent is also reported [3], describing good activity as result of the ionic interaction between chitosan positive charges and the negatively charged cell surface of bacteria.

In this work, a novel method for obtaining N,N,N-trimethylchitosan is proposed using dimethylsulfate as methylant agent, resulting in a very efficient, security and cheaper than other common used agents. The resultant derivatives were characterized by FTIR, ^1H NMR, CP-MAS ^{13}C NMR, and specific viscosity. Films were processed by casting and changes on the hydrophilicity were assessed by water contact angle measurements. The higher degree of substitution ($\overline{DQ} = 52.5\%$), was obtained after long-term reaction (6 hours), carried out at room temperature. The use of temperature revealed to provoke polymeric thermal degradation and favor O-methylation reaction instead N-methylation.

Keywords: Chitosan, N,N,N-trimethylchitosan, dimethylsulfate, quaternization degree, hydrophilicity

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