



INFLUENCE OF THE WASHING PROCESS ON THE PROPERTIES OF CHITOSAN-ALGINATE COMPOSITE FILMS

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Abstract - The combination of chitosan (cationic polysaccharide) with alginate (anionic polysaccharide) leads to the formation of polyelectrolyte complexes (PEC), which have been used mainly for applications as dressings in biomedical areas. The complexation of these macromolecules by strong amino-carboxylic electrostatic interactions and hydrogen bonds results in better final product performance when compared to that obtained with films prepared by only one single polymer. However, the processing conditions can affect the resulting complex structure, influencing the final material properties. In this work, chitosan-alginate films were prepared by casting and a water-washing step was introduced as a post-casting treatment. The preparation of the films was performed according to the following steps: (i) chitosan was solubilized in an acid medium (acetic acid solution, 1% v/v) and alginate in water; (ii) mixing of the chitosan and alginate solutions to obtain the film-forming suspension and correction of its pH to 7, using NaOH 1 M; (iii) casting; and (iv) washing with distilled water followed by a second drying step. Thickness, visual appearance, liquid absorption capacity (LAC), water vapor permeability (WVP), and mechanical properties were evaluated before and after washing. The unwashed composite films showed great heterogeneity in appearance and properties when in contact with air humidity, probably due to excess base. The washing treatment allowed the homogenization of the films and reduced the variability in the evaluated properties. Besides, the washed films showed lower thickness (47% lower), greater stiffness, and greater LAC (87% higher for distilled water) than the unwashed ones. The reduction of variability promoted by the washing treatment was particularly important for WVP data, whose standard deviation for the unwashed films was of the same order as the obtained mean values. Therefore, the additional washing treatment significantly affected the chitosan-alginate PEC films and improved the reproducibility of the evaluated properties.

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