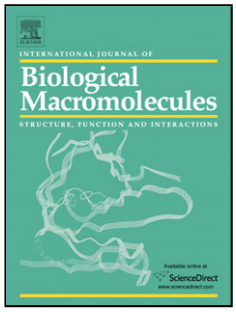

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Pectin-blended anionic polysaccharide films for cationic contaminant sorption from water

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Abstract

Substantial amounts of industrial, agricultural, medical and domestic water worldwide are polluted by different types of contaminants. Removing these contaminants from effluent by adsorbent materials made from abundant, inexpensive polysaccharides is a feasible and promising approach to deal with this problem. In the present study, pectin blended with four other types of anionic polysaccharides, including alginate, carrageenan, xylan and xanthan, were crosslinked with zinc acetate and formed into thin films. In addition, a negatively charged polyelectrolyte, poly(4-styrenesulfonic acid-co-maleic acid) sodium salt (PSSMA) was coated on the film surface with the goal of increasing the capture of cationic contaminants. The average film thickness was measured by a digital micrometer. Surface morphologies and element analysis were obtained by energy dispersive spectroscopy connected with scanning electron microscopy. The swelling ratio and the mechanical properties of the films were investigated in relationship to their composition and PSSMA coating. The sorption of model cationic pollutants clearly improved for coated films and showed to be predominantly based on the interaction of positively and negatively charged groups between film/coating and contaminants.

Keywords: pectin, film, decontamination, antiseptic, sorption, anionic polysaccharide.

1. Introduction

Wastewater discharged from industrial, agricultural, medical and domestic activities is a major contributor to water pollution worldwide. Heavy metals, dyes, pesticides, and fertilizers are among the most persistent hazardous contaminants [1,2]. In recent years, pharmaceuticals and personal care product residues have also been detected in water bodies throughout the world [3]. Chemicals, such as