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ORIGINAL RESEARCH

Physicochemical properties of novel pectin/*Aloe* gel membranes

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Abstract

Nowadays, an increased interest on the development of novel biomaterials for different applications has been observed. The biopolymers such as proteins, lipids, polysaccharides or their combinations have been used for the manufacturing of novel membranes. The pectin is a polysaccharide that previously has been used only or combined with polymeric matrices, but the formulation of PEC/AG has not been evaluated yet. The aim of this work was to evaluate the physicochemical properties of a novel PEC/AG membrane. A mixture of pectin citric (PEC)/*Aloe* gel (AG) was prepared to manufacture membranes at 100/0 (control), 90/10, 80/20, 70/30, 60/40 and 50/50 proportions (% v/v) by casting method. Water vapor permeability (WVP), solubility, ATR-FTIR spectroscopy, microstructure, mechanical and optical properties were assessed for the produced membranes. The PEC/AG membranes showed a yellowish color, low UV light transmission at 200 nm and no significant changes in the opacity values. In addition, the microstructure by scanning electron microscopy (SEM) showed changes on the surface appeared as differently sized structures. An analysis of the total area of the 3284 cm^{-1} showed rearrangement of hydrogen bonds of the polysaccharide macromolecules, suggesting an enhanced interaction between the PEC and AG chains. In addition, all the membranes of PEC/AG showed high solubility (100%), low WVP and better toughness, extensibility and plasticity as compared with the control. The assessed physicochemical properties of the produced membranes suggested that they may be used as biomaterial for multiple applications in the medical, pharmaceutical, cosmetic or food industries.

Keyword Pectin · *Aloe* gel · Membrane · Biomaterial · Microstructure

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Introduction

Currently, the fabrication of novel membranes based on natural and biodegradable materials is increasing due to their potential applications as biomaterials in the medical, cosmetic and pharmaceutical industries [1]. For example, some applications of the biodegradable biopolymer membranes have been focused in the development of contact lenses, artificial corneas, dressing, catheters, tissue engineering, and regenerative medicine [2, 3]. The biopolymer based on proteins, lipids, polysaccharides or their combinations has been used for the manufacturing of these membranes [4]. The polysaccharides such as starch, cellulose, alginate, chitosan and citric pectin (PEC) are hydrophilic, exhibit good mechanical properties and permeability to water and gas which are used for the manufacture of reliable membranes [5]. Particularly, PEC is a polysaccharide extracted from the cell walls of citrus peels and structurally contains domains constituted up to 17 different monosaccharides