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Effect of organic additives on physiochemical properties and anti-oxidant release from chitosan-gelatin composite films to fatty food simulant

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Abstract

Chitosan, gelatin and their blended films prepared and compared in some optical, physical and mechanical properties. The release rate of Gallic acid (GA) from the film to food fatty simulant studied. The chitosan- gelatin based films showed appropriate compatibility and desirable properties in comparison with singular gelatin and chitosan film. GA was added using different methods including simple addition, with two concentration of tween, with ethanol, with β-Cyclodextrin (β-CD) in physical mixture and encapsulated form. Incorporation of GA causes leads to formation of weak and dark samples. Use of β-CD with GA decreased tensile strength (TS) significantly. Film samples with physical mixture of β-CD and GA indicated lower barrier properties against water vapor and release rate in comparison with their inclusion complex. Incorporation of tween 20, at low concentration leads to higher release rate, elongation at break (EB%) and water vapor permeability (WVP). Due to the lowest release rate observed for samples with ethanol as well as almost good (desirable) physical and mechanical properties, it could be appropriate candidate for fatty food packaging in long period. On the other hand, highest rate related to samples contained GA- β-CD inclusion complex, which are suitable to higher anti-oxidant demands and short-term protection.

Key words: Chitosan, Gelatin, Controlled release, Gallic acid, Ethanol, β-Cyclodextrin

1. Introduction

Over the last years, due to the severe environmental problems caused by plastic food packaging, the use of biodegradable films made from natural polymers has attracted considerable attention [1].Bio-based packaging materials are made of naturally renewable resources including polysaccharides, proteins and lipids that offer beneficial effect on the environment in terms of recyclability and reutilization compared with plastic packaging materials **[2].**

According to Bonilla 2016, polysaccharides and proteins are two main macromolecules that used for edible films production. The advantages and/or disadvantages (i.e. mechanical or barrier properties) of each component is the most important reason of regard to the development of composite or blended edible film **[3].** Chitosan is a cationic product of alkaline deacetylation of chitin, which is the most