EFFECT OF OXIDATION LEVEL ON THE DUAL MODIFICATION OF BANANA STARCH: THE MECHANICAL AND BARRIER PROPERTIES OF ITS FILMS.

ABSTRACT

Banana starch was oxidized at three different levels and then acetylated. The double-modified starch was used for film preparation. The physical, mechanical, and barrier properties were tested. The oxidation level increased the whiteness of the film, and the second modification (acetylation) did not affect this parameter. The solubility increased with temperature and oxidation level. However, acetylation decreased the solubility value. At the longest storage times, the solubility decreased because of starch reorganization inside the polymeric matrix. In general, oxidation increased the tensile strength of the films, and a slight increase was observed when the oxidized starch was acetylated. This effect was more noticeable at the longest storage time. The oxidation level decreased the percentage elongation at break, and a slight effect due to acetylation was observed. The film of oxidized–acetylated starch showed a higher elastic modulus value than its oxidized counterpart. The water vapor permeability increased with oxidation level, but the acetylation decreased this parameter. The oxidation increased the hydrophilic character of the starch because of the formation of carbonyl and carboxyl groups that showed more affinity for water molecules. When the oxidized banana starch was acetylated, a decrease in the water vapor permeability was found because the acetylation increased the hydrophobic character of the starch due to the ester group. Films prepared with the double-modified banana starch had some improved physical, mechanical, and barrier properties, and they may be used in specific applications. © 2009 Wiley Periodicals, Inc. J Appl Polym Sci, 2009.

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Autores: Paul Baruk Zamudio-Flores, Silvia Bautista-Baños, René Salgado-Delgado, Luis Arturo Bello-Pérez*.

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