

EFFECTS OF CHITOSAN COATING ON KRAFT BARRIER PROPERTIES

A.REIS.^{1,2*}; C.YOSHIDA¹; T. FRANCO¹.

¹School of Chemical Engineering – State University of Campinas ,UNICAMP, – P.O. Box 6066, 13083-970, Campinas – SP, Brazil.

²Federal University of Vale do Jequitinhonha and Mucuri – Institute of Science and technology, Diamantina-MG, Brazil.

e-mail: *arlete.reis@ufvjm.edu.br

The effects on chitosan-lipid coating on Kraft paper were studied. Different chitosan concentrations and lipid additions were evaluated for moisture barrier and structure properties of chitosan Kraft paper systems. The novelty of this paper is the formation of its packaging system, which combines a biodegradable polymer (chitosan) and a hydrophobic compound (pamitic acid and stearic acid) with a widely used packaging paper (Kraft paper). Chitosan is a natural polymer characterized by its biodegradability and capacity to form resistant, elastic, flexible films. Chitosan (Primex ChitoClear®, lot TM 2227, Iceland, DD=82%, Mw=171.492g/mol) solutions (3.0% and 4.0% w/w) were obtained [1] and were applied as a coating on Kraft paper sheets and without lipids (palmitic acid and stearic acid, 0.25, 1.0 and 2.0% w/w) in the filmogenic matrix. Vapor barrier [2], coating evaluation [1] and microstructure were determined. The presence of lipids reduced the water vapor permeability rate by 48% and the water absorption capacity by 40% as compared to those of uncoated Kraft paper.

Table 1: WVPR and water absorption of coated and uncoated Kraft paper packaging systems.

Paper Samples	WVPR (gH ₂ O/m ² day)	Water absorption (g/m ²)
Kraft CF	1074.32 ± 51.09 ^a	38.98 ± 4.06 ^a
Kraft C3	710.14 ± 70.09 ^b	24.67 ± 3.37 ^b
Kraft C4	606.03 ± 31.82 ^c	30.06 ± 5.05 ^c
Kraft C4+SA 0.2	658.91 ± 31.79 ^{bc}	27.07 ± 1.97 ^c
Kraft C4+PA 0.2	527.36 ± 31.15 ^c	26.24 ± 3.45 ^c
Kraft C4+PA 0.9	627.57 ± 32.10 ^{bc}	25.59 ± 1.29 ^c
Kraft C4+PA 1.8	553.18 ± 32.15 ^c	23.01 ± 1.63 ^d

^{a-d} Means in the same column with different superscripts differ significantly (p ≤ 0.05) according to Tukey's test.

SA – Stearic acid, PA – Palmitic acid
Kraft CF – Kraft Chitosan free (uncoated paper)

Kraft C3 – Kraft Chitosan 3.0%

Kraft C4 – Kraft Chitosan 4.0%

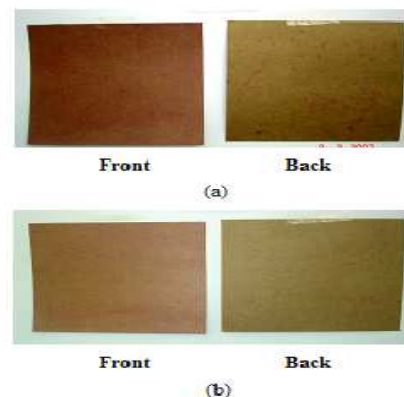


Figure 1: Kraft paper sheets coated with chitosan: (a) Kraft C3, (b) Kraft C4.

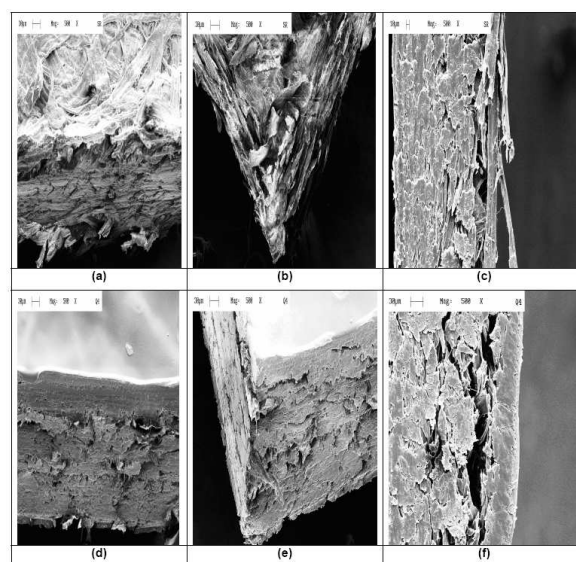


Figure 2

Figure 2 – Micrographic images of Kraft paper packaging systems: series a, b, c – uncoated paper; series d, e, f – coated Kraft C4.

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