Pectin from *Mangifera indica* L. cv. Haden residues: Kinetic, thermodynamic, physicochemical, and economical characterization

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Research Article

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Abstract

The effect of temperature (60, 70, 80 and 90 °C) and time (30, 45, 60, 75 and 90 min) on citric acid extraction of Haden mango (*Mangifera indica* L . cv. Haden) peel pectin was evaluated in the present study. In order to obtain a better understanding of both the extraction process and the characteristics of the pectin (obtained from an agro-industrial waste) for a future scaling process, the following characterizations were performed: 1) Kinetic, with the maximum extraction times and yields at all evaluated temperatures; 2) thermodynamic, obtaining activation energies, enthalpies, entropies and Gibbs free energies for each stage of the process; 3) physicochemical (chemical analysis, monosaccharide composition, degree of esterification, galacturonic acid content, free acidity, Fourier-transform infrared spectroscopy, thermogravimetric and derivative thermogravimetric analyses) and; 4) economical, of the pectin with the highest yield. The mango Haden peel pectin was found to be characterized by a high-esterified degree (81.81 ± 0.00 %), regular galacturonic acid content (71.57 ± 1.26 %), low protein (0.83 ± 0.05 %) and high ash (3.53 ± 0.02 %) content, low mean viscometric molecular weight (55.91 kDa) and high equivalent weight (3657.55 ± 8.41), which makes it potentially useful for food, pharmaceutical and environmental applications such as delivery system, gelling agent or as an emulsifier.

Statement of Novelty

The novelty of this work lies in the valorization of an agro-industrial waste (Haden mango peel) through the kinetic, thermodynamic, physicochemical, and economic characterization of a product obtained (pectin). This work contributes to laying the groundwork for an industrial scale-up for pectin production in a mango processing industry.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

Figure 3

FT-IR spectrum of Haden mango peel pectin.

Figure 4

TGA and DTG curves of Haden mango peel pectin.

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