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Book of Abstracts of the 1st Congress on Food Structure Design

Fundação Dr. António Cupertino de Miranda, Porto, Portugal

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Synthesis optimization and structural characterization of chitosan-glucose derivative obtained by the Maillard reaction

Montenegro, M. I.[1]; Cardelle-Cobas, A.[1]; Gullón, B.[1]; Ruiz-Matute, A.[2]; Corzo, N.[2]; Pintado, M. M.[1]

[1]CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa/Porto, Rua Dr. António Bernardino Almeida, 4200-072 Porto, Portugal;
[2]Departamento de Bioactividad y Análisis de Alimentos. Instituto de Investigación en Ciencias de la Alimentación. CIAL (CSIC-UAM). Nicolás Cabrera 9, Campus de la Universidad Autónoma de Madrid, 28049 Madrid, Spain

E-mail: mpintado@porto.ucp.pt

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Abstract

Several strategies have been applied in order to expand the functional properties of chitosan and its applicability. One of the most successful is the introduction of hydrophilic residues in the chitosan molecule via formation of covalent bonds with the reactive amino groups that may provide it higher solubility (allowing application in more diverse food matrices) and more functional properties, namely prebiotic activity (allowing the development of new functional foods). The Maillard reaction is one of the most important used reactions. Several authors have carried out this kind of chitosan modification obtaining new derivatives with better functional properties. For that, the aim of this work was to optimize the synthesis of a chitosan (Chit)-glucose (Glc) derivative by the Maillard reaction as well as to carry out a complete structural characterization of the obtained derivative.

Reaction conditions, evaluating the extent of the Maillard reaction, were optimized by varying temperature (40-80 °C), Glc concentration, and reaction time (0-72 h). Assessment of the reaction extent was carried out by measurements of absorbance and fluorescence. Structural characterization of the derivative was performed by different methodologies in order to determine the molecular weight (Mw) of the derivative, the degree of substitution (DS) and, to confirm the structure of the new derivative, a colloid titration method, High-Performance Liquid Chromatography-Size Exclusion Chromatography (HPLC-SEC), Fourier Transform Infrared Spectroscopy (FT-IR) and Proton Nuclear Magnetic Resonance (1H-NMR) were used.

The results obtained, regarding the extent of the reaction, allowed to determine the optimal conditions being: 2% (w/v) of chitosan, 2% (w/v) of Glc, 60 °C and 32 h of reaction time. Structural characterization confirmed the successful introduction of the glucose into the chitosan molecule obtaining a Chit-Glc derivative with a Mw of 76 ±4.25 and a DS of 64.76 ±4.40 %.