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Production of high added value products from eggshells

Castro, Inês²; Pinto, Daniel²; Maciel, Filipe³; Araújo, Ana³; Vicente, António³; Rocha, Cristina¹

¹REQUIMTE, Department of Chemical Engineering, Faculty of Engineering, University of Porto, Porto, Portugal;

²CPC - Castro Pinto & Costa, Porto, Portugal;

³IBB - Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Braga, Portugal

E-mail: jfilipemaciel@gmail.com

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Abstract

There are an increasing number of food companies addressing sustainable-manufacturing practices as part of social responsibility reporting. The egg processing industry produces several tons of eggshell residues which are a major environmental problem and represent a significant cost for these industries (ca. 0.6 % of sales). The main goal of this work is to produce high added value products, namely collagen and bioactive peptides, using the remnant of collagen extraction from the eggshell membrane. The target market of the products obtained is the biomedical, pharmaceutical, cosmetics and food industry.

The separation of the shell and the membrane was optimized and a chemical-physical process was performed having a yield of 9 % (w membrane/w shell). Times and yields for different separation methods were calculated and the economic viability of the process was studied.

In order to optimize collagen extraction from the eggshell membranes several variables were studied (e.g. temperature, enzyme concentration and time). The collagen obtained was separated using saline precipitation steps and different collagen types were identified. The collagen types were visualized using SDS-electrophoresis and total quantification of collagen was made by hydroxyproline method.

Moreover, the residue after collagen extraction was further digested with different enzymes, namely pancreatin, trypsin and lysin and the peptides profile was determined by HPLC-UV method.

The results showed promising strategies for using this technology at industrial scale as an economic viable technology for producing high added value products from eggshells membranes. This technology will equally contribute to reducing the environmental problem associated with these residues.