Producción de neo-fructooligosacáridos usando ß-fructofuranosidasas de *X. dendrorhous* inmovilizadas por diferentes metodologías (RESUMEN)

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ABSTRACT

The β-fructofuranosidase from the yeast *Xanthophyllomyces dendrorhous* (Xd-INV) is a highly glycosylated enzyme that catalyzes the synthesis of short-chain fructooligosaccharides (FOS). These FOS have several beneficial effects in human health, such as their prebiotic properties, they are non-cariogenic and non-caloric but have a sweet taste, which makes them attractive for food and pharmaceutical industries. Inulin-type FOS are the most widely studied kind of FOS and the only commercialized for human diet supplementation. However, some studies suggest that neo-FOS could display improved prebiotic and physicochemical properties. In particular, this β-fructofuranosidase Xd-INV is unique in its ability to synthesize neo-FOS, neokestose and neonystose mainly. To achieve the industrial scale of the reaction of neo-FOS production, the immobilization of the β-fructofuranosidase Xd-INV is essential. For this reason, several immobilization strategies were evaluated in this work: entrapment in lenses of polyvinyl alcohol (PVA); covalent binding to epoxy-activated polymethacrylate and glyoxyl-agarose carriers; and ionic adsorption using amino-activated resins. Every type of immobilization was evaluated in terms of activity and operational stability. The biocatalyst with the best immobilization yield (85%) was obtained with the lenses of PVA. Due its high encapsulation efficiency and its satisfactory operational stability, the reaction of neo-FOS production was studied with these PVA lenses, and was analysed by HPAEC-PAD. Using sucrose as substrate, the immobilized biocatalyst synthesized 18.9% (w/w) of FOS (59.1 mg/mL of neokestose, 30.2 mg/mL of 1-kestose, 11.6 mg/mL of neonystose and 12.6 mg/mL of blastose). The enzyme preserved most of its initial activity during at least 7 cycles of 26 hours.

Publication: “Immobilization of the β-fructofuranosidase from *Xanthophyllomyces dendrorhous* by entrapment in polyvinyl alcohol and its application to neo-fructooligosaccharides production”. N. Miguez, M. Gimeno-Perez, D. Fernandez-Polo, F.V. Cervantes, A.O. Ballesteros, M. Fernandez-Lobato, M.H. Ribeiro, F.J Plou. Catalysts 8(5), 201 (2018).