A DUAL PURPOSE IMMOBILIZED BIOCATALYST FOR INULIN AND SUCROSE HYDROLYSIS

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The present work is focused on the characterization of an immobilized biocatalyst produced by a novel, simple method, for the hydrolysis of inulin and sucrose. Immobilization is based in the use of polyvinylalcohol (PVA), a biocompatible synthetic hydrogel, which can be easily produced in large scale, and displays considerable mechanical resistance, even under intense stirring. A relevant approach to produce PVA-based immobilized biocatalysts, currently implemented at commercial scale, relies on the use of the so-called LentiKats® liquid, which ultimately yields lenticular particles[1]. This work addresses a modified procedure for the encapsulation of inulinase in PVA capsules from LentiKat® liquid. In this approach, the PVA based hydrogel is extruded to polyethers (*viz*. PEG, PPG), where gelification occurs almost instantaneously. The feasibility of the method is illustrated by using, as model systems, sucrose and inulin hydrolysis promoted by a commercial inulinase preparation. The most adequate polyether, PEG 600, was reused throughout several immobilization procedures with no apparent lack of efficiency. Upon immobilization, no significant change was observed in the pH/activity profile in either of the systems tested, pH optimum (4.5) remaining unchanged. Temperature runs were limited to an upper limit of 60 ºC, due to melting of the capsules, a phenomenon also observed at 55 ºC in lenticular PVA particles obtained through standard GeniaLab® technology[2,3]. PVA beads displayed long-term operational stability in repeated stirred, 24-hour batch-mode runs for each model system. In each case 20 consecutive runs were performed at 50 ºC, with a final decay of product yield that did not exceed 20% in the worst case scenario. Initial substrate concentration of 5% (w/v) and 10% (w/v) of inulin and sucrose, respectively, were used. Loss of activity during storage, over a 3 month period, did not exceed 10%.

1. www.genialab.com
2. M. Rebros et al. *Enzyme Microb. Technol*. 39 (2006) 800-804
3. M. Rebros et al. *Food Chem.* 102 (2007) 784–787.