REHYDRATION PROPERTIES OF WALL MATERIALS AS SELECTION CRITERIA FOR MICROENCAPSULATION BY SPRAY DRYING

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Introduction. Spray drying is a common industrial and economic process for the preservation of microorganisms and for the preparation of starter cultures that are used to prepare lactic fermented products. Microencapsulation of microorganism by spray drying is used to protect cells against an adverse environment as well as to control its release. Encapsulation gives a structure and allows creating new function or innovative systems for products (Burgain*et al.,* 2011). By other way, rehydration process is considered to be a critical step in the recovery of microorganisms encapsulated. The conditions used for rehydration may affect the survival rate o dried microbial cultures (Peighambardoust*et al.,* 2011). The aim of this study was to evaluate the rehydration of microparticles obtained by spray drying with mixtures of gum Arabic, maltodextrin and soy protein isolates. From these results the optimal formulation for microencapsulating microorganisms was proposed..

Methods. Blends of gum Arabic, maltodextrin and soy protein isolate (20% (w/w) were prepared. Experimental design was a combined mixing model with response surface methodology. These blends were dried in a spray dryer (Mobile Minor 2000,GEA-Niro, Copenhagen, Denmark) equipped with a pneumatic nozzle, in co-current flow. The operation conditions were: inlet air temperature of 150, 200, and 250°C and outlet air temperature of 70°C. Microparticles obtained were observed by Scanning Electronic Microscopy.The wetting properties were determined by static wetting and solubility was carried out according to the method proposed by Athanasia *et al.* (2005).

Results. Observing the external morphology, microparticles of all powders showed spherical shape, with no apparent cracks or fissures which are important to avoid lost of encapsulated agent. This implies that the wall materials of microparticles may increase the protection and the retention of the active material.

Results of rehydration properties (wetting and solubility) of the blends of wall materials are showed in Fig. 1. All the wall materials and their blends were completely wetted in less than 4235 s and solubilized in less than 6996 s. Powders containing more concentration of maltodextrin presented the shortest wetting and solubility times. The presence of proteins reduces rehydration properties, which is important for a controlled release. An important result was that the inlet temperature of the drying air did not affect the rehydration properties of the wall materials.

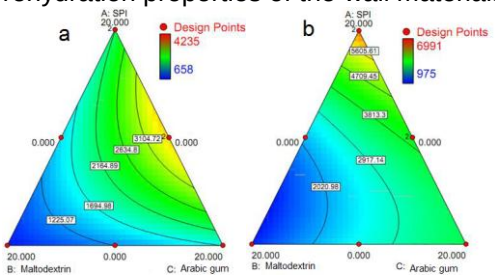

Fig.1 Wetting (a) and solubility (b) properties of wall materials used in microencapsulation

Conclusions. The applied drying air temperatures do not affect the rehydration properties of the wall materials neither provoke fracture on microcapsules. Controlling the wall materials concentration in microcapsules, as well as air drying temperatures and rehydration properties are important in design of controlled release time of biological agents encapsulated.

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