PO81 - 25003 - ALGINATE-BASED BEADS AND CORE-SHELL CAPSULES LOADED WITH CORN OIL FOR POTENTIAL DELIVERY OF FUNCTIONAL COMPOUNDS

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Abstract

Alginate-based systems have been used to encapsulate and delivery a wide range of compounds in different applications, such as food and pharmaceutical products. However, their successful application requires a methodology with the capability to produce monodispersed, homogenous-shaped beads or capsules, with a high productivity [1]. In this work, alginate-based beads and core-shell capsules with or without whey protein isolate (WPI) were produced by ionic gelation and used to encapsulate different contents of corn oil. The two systems were evaluated in terms of size, weight, loading capacity, encapsulation efficiency, yield and productivity. Different concentrations of sodium alginate and WPI (Table I) were used to evaluate the capacity to encapsulate different amounts of oil. The encapsulation process was carried out using the Buchi Encapsulator B-395 Pro at flow rates of 8 and 10 mL/min for beads (using single nozzle) and capsules (using concentric nozzle), respectively. The beads and capsules obtained present a spherical and homogeneous form (Figure 1), with a high reproducibility. The sizes obtained for beads and capsules ranged from 3.5 to 5.2 mm and 4.2 to 4.9 mm, respectively. In terms of average weight, the beads and capsules showed values ranging from 23 to 51 mg and 32 to 49 mg, respectively. The results showed that for higher polymer concentrations the beads forming solutions are more difficult to stabilize and the beads obtained are more heterogeneous (formulation E and F) with a teardrop-shaped (formulation F). In contrast, higher polymer concentrations allows to obtain capsules with a higher yield of production (from 4–100%) and encapsulation efficiencies (from 5–100%), and with loading capacity values ranged between 25 and 65%. This work shows that is possible to obtain a high reproducible production of large spherical beads and core-shell capsules with high oil content and high productivities (9,000–16,000 beads/hour and 14,000–20,000 capsules/hour).

Table I. Experimental design

Formulation	[sodium alginate] (%, w/v)	[WPI] (%, w/v)
A	3	0
B	2	1
C	1.5	1.5
D	2	2
E	3	1
F	4	0

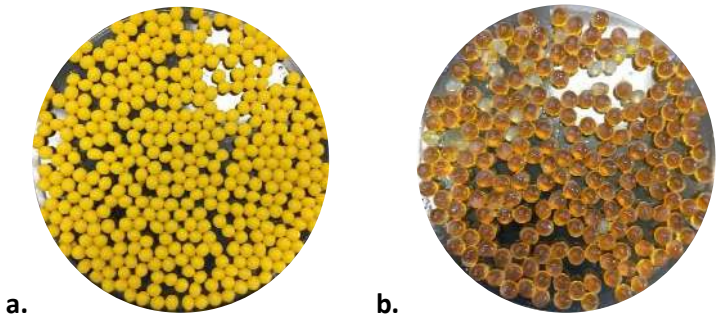

Figure 1. Beads of formulation A (**a**) and core-shell capsules of formulation F (**b**) produced using the Buchi Encapsulator B-395 Pro.

References

1. Nemethova, V. et al., Vibration Technology for Microencapsulation: The Restrictive Role of Viscosity. *Journal of Bioprocessing & Biotechniques*, 2015. 5 (1).

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