POSTER

Chitosan films as a carrier of omega-3 loaded nanoemulsions: release behaviour on different food simulants

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Main domain: Food Industry

Keywords: Active packaging, release mechanisms, encapsulation

Bio-based and biodegradable films loaded with active compounds can be used as an alternative to improve the shelf life of food products and add nutritional value to food. Omega-3 polyunsaturated fatty acids (ω-3) are known for their functional properties (e.g. improve cardiovascular health, improve cognitive function and decrease inflammation). However ω-3 is highly susceptible to oxidation which makes their direct application in foods extremely difficult. To improve its application in food products and protect against oxidation, nano-sized emulsions emerge as a viable alternative. Lactoferrin nanoemulsions containing ω-3 were incorporated in chitosan-based films and evaluated in terms of physic-chemical properties (water vapour permeability, solubility, scanning electron microscope, mechanical tests. Moreover, the release behaviour of ω- from chitosan films were studied in a lipophilic and hydrophilic release medium at 25 °C. Nanoemulsions containing ω-3 were produced with a high-pressure homogenization (5 cycles at 20000 psi) using 2% (w/w) of lactoferrin and 5 % (w/w) of ω-3. The average droplet size of nanoemulsions was around 200 nm and with a ζ-potential around 30 mV. Chitosan films with ω-3-loaded nanoemulsions exhibited a higher water vapour resistance, lower solubility and are more flexibility than chitosan films without the addition of nanoemulsions. The release of ω-3 was faster in lipophilic conditions (ethanol 50 % (v/v)) with a coefficient of diffusion (D) of 5.24 x 10^{-16} m^2/s when compared with hydrophilic released (ethanol 10 % (v/v)) with a D of 1.19 x 10^{-18} m^2/s (Fig. 1). Results obtained in the present work evidence the ability of to usechitosan films for the incorporation of ω-3 nanoemulsions foreseeing the application in foods aiming for improved t nutritional value.

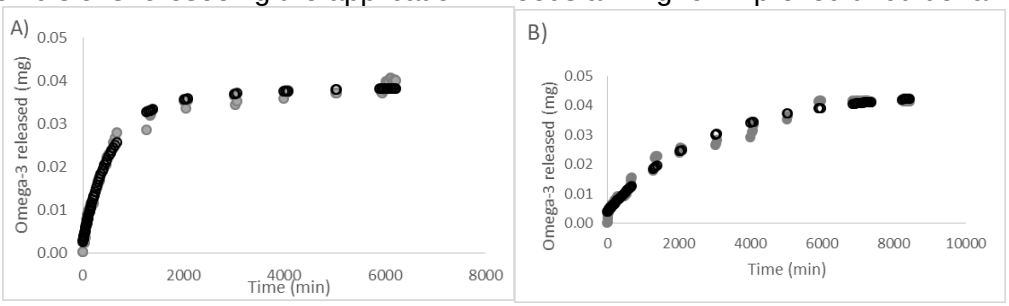

Fig. 1, Release profile of omega-3 through chitosan films at 10 v/v % (A) and 50 v/v % (B) alcohol; experimental data (•); Linear Superposition Model (i = 1) (○).

Acknowledgement

The authors would like to acknowledge the funding from “Ref. 0302_ CVMar+i - Inovação industrial através de colaborações específicas entre empresas e centros de investigação no contexto de valorização biotecnológica marinha” (INTERREG España – Portugal POCTEP).