

DEVELOPMENT OF MARINE BASED NANOFORMULATIONS USING EFFICIENT EXTRACTION AND ENCAPSULATION TECHNIQUE

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ABSTRACT

Macro and micro algae extracts, protein hydro-lysates, amino acids and plant extracts have gained importance demonstrating versatile applications in various industries, ranging from pharmaceuticals and cosmetics to food and agriculture. For instance *Spirulina platensis* (micro) and *Saccharina Latissima* (macro) extracts, have garnered significant attention in recent years as rich source of bioactive molecules with potential health benefits. However, the challenge lies in preserving and delivering these bioactive compounds effectively. Encapsulation of algae extracts could be a promising procedure of counteracting the obstacles posed by their nature ^[1,2].

In the current work the recovery of *Spirulina platensis* and of brown algae *Saccharina Latissima* extract (SPE & SLE) and their encapsulation in zein biodegradable nanoparticles is presented. The recovery of SPE and CVE was achieved using ultrasound assisted extraction, studying the parameters that affect the extraction process such as solvent used (water, ethanol, ethyl acetate), solid:liquid ratio, extraction time and power. The obtained extracts were evaluated regarding the extraction yield while their chemical analysis was carried out using High-Pressure-Liquid Chromatography (HPLC). The encapsulation of the obtained extracts in zein nanoparticles was performed using emulsification method. Parameters such as the concentration of zein, the %drug loading (%(amount of the extract to be encapsulated/amount of zein)=20%, 30%, 40%) and the time of emulsification through homogenizer mixer were studied. The influence and optimization of the various parameters was evaluated in terms of encapsulation efficiency (%EE) which was calculated using HPLC. The ATR-FTIR technique was used to confirm the interactions between the extract's molecules and the zein carrier. The morphology of the resulting structures was characterized by Scanning Electron Microscope (SEM) and the release kinetics and mechanism of the encapsulated extracts were studied in aqueous solution. According to the results, *Spirulina platensis* ethanolic extract presented high content of chlorophylls after 20 min extraction time. Furthermore, the obtained SPE or SLE-zein nanoparticles presented high encapsulation efficiency ranging from 67%-80% and spherical morphology.

KEYWORDS: algae extracts, extraction, encapsulation

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