

# Abstract

## **Plant proteins in microencapsulation of essential oils using complex coacervation**

The aim of this research was to evaluate the potential application of complex coacervation using plant proteins as a method for encapsulating essential oils and to analyze the physicochemical properties of powders obtained through the lyophilization of the resulting liquid coacervates. Additionally, the study compared complex coacervates made from plant proteins with the traditional model of complex coacervation involving gelatin and gum Arabic to assess their efficiency and practical properties.

The study utilized gelatin, pea protein, fava bean protein, and oat protein, and as polysaccharides, gum Arabic and chia seed polysaccharides were used. Essential oils, such as juniper oil and black pepper oil, were dissolved in vegetable oils (soybean, grapeseed, and rapeseed) to minimize their evaporation during the coacervation process. Additionally, the impact of the emulsifier Tween 80 on the coacervation process and the physicochemical properties of the powders obtained after lyophilization of the coacervates were investigated.

Several analyses were conducted, including measurements of the efficiency of the coacervation process, the lyophilization process, and the microencapsulation efficiency. Furthermore, color, particle size distribution, and microscopic analysis using SEM were evaluated, along with thermal analysis and FT-IR analyses. The water solubility, bulk and tapped density, and powder flowability (using the Carr Index and Hausner Ratio) were also assessed, as well as the initial water content and hygroscopicity of the powders.

Based on the obtained research results, it was concluded that plant proteins can be used in complex coacervation, providing comparable or better results in terms of the efficiency of essential oil microencapsulation and the thermal stability of the resulting microcapsules compared to gelatin.

**Key words:** essential oils, complex coacervation, plant proteins, polysaccharides