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## Comparative pharmaceutical – technological evaluation of alginate and gelatin microcapsules containing rosemary essential oil

Marina Tomovic<sup>1</sup>, Marija Popovic Milenkovic<sup>2</sup>, Miljan Adamovic<sup>3,4</sup>, Ana Adamovic<sup>3,4</sup>

<sup>1</sup>Department of Pharmacy, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia

<sup>2</sup>Clinical Data Associate, Worldwide Clinical Trials, Beograd, Serbia

<sup>3</sup>Pharmacy Institution "Zdravlje Lek", Prvomajska 100, 11000 Belgrade, Serbia;

<sup>4</sup>Faculty of Medical Sciences, University of Kragujevac, 34000 Kragujevac, Serbia

Corresponding author e-mail address: [marinapop@gmail.com](mailto:marinapop@gmail.com) (M. Tomovic)

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### ABSTRACT:

Rosemary essential oil is a valuable natural bioactive compound; however, its application is limited by high volatility and sensitivity to environmental factors, particularly humidity. Microencapsulation represents an effective approach to improve the stability of such compounds. In this study, a comparative pharmaceutical-technological evaluation of alginate and gelatin microcapsules containing rosemary (*Rosmarinus officinalis* L.) essential oil was performed. Alginate microcapsules were prepared by ionic gelation using calcium ions, while gelatin microcapsules were obtained by a coacervation-based method. Encapsulation efficiency was determined spectrophotometrically based on total phenolic content, and stability was assessed by monitoring mass changes under controlled humidity conditions ( $a_w = 0.75$ ) over 25 days. Both carrier systems exhibited satisfactory encapsulation efficiency, with values of approximately 70% for alginate and 73.6% for gelatin microcapsules. Stability studies revealed an initial increase in microcapsule mass due to moisture uptake, followed by stabilization and slight mass decrease. Gelatin microcapsules showed greater sensitivity to humidity-induced mass changes, whereas alginate microcapsules demonstrated improved stability under the same conditions. Overall, the results highlight a trade-off between encapsulation efficiency and humidity stability, emphasizing the importance of carrier selection depending on the intended application and storage conditions.

**Keywords:** rosemary essential oil; microencapsulation; alginate; gelatin; stability



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**Herceg Novi 9<sup>th</sup> June – 13<sup>th</sup> June 2026 MONTENEGRO**

**CONFIRMATION OF ACCEPTANCE OF THE ABSTRACT**

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