INSTITUTE OF TECHNICAL SCIENCES OF SASA
MATERIALS RESEARCH SOCIETY OF SERBIA

Programme and the Book of Abstracts

TWENTIETH YOUNG RESEARCHERS' CONFERENCE MATERIALS SCIENCE AND ENGINEERING

Belgrade, November 30 – December 2, 2022

2-7

Microencapsulation of Oregano and Thyme essential oils with hydroxypropyl-β-cyclodextrin

Snežana Kuzmanović Nedeljković[1], Nada Ćujić Nikolić[1], Dubravka Bigović[1], Predrag Petrović[2], Dejan Pljevljakušić[1], Katarina Šavikin[1], Brankica Filipić[3]
[1]Institute for Medicinal Plants Research "Dr Josif Pančić", Tadeuša Košćuška 1, 11000 Belgrade, Serbia, [2]University of Belgrade, Faculty of Technology and Metallurgy, Department of Chemical Engineering, Karnegijeva 4, 11000 Belgrade, Serbia, [3]Faculty of Pharmacy, University of Belgrade, Vojvode Stepe 450, 11221 Belgrade, Serbia

Among plant natural products, Oregano and Thyme essential oils (EOs) are well-known for their antimicrobial and antioxidant activity. The biological activities of EOs may be reduced due to oxidation and volatilization. Stability and preservation of EOs can be assured with the microencapsulation method based on complex coacervation technology. Cyclodextrins are suitable as carriers for volatile substances insoluble in water, and hydroxypropyl-β-cyclodextrin (HPCD) leads the group considering the aqueous solubility and safe toxicity profile. The aim of this study was to find conditions for preparing Oregano and Thyme EOs microencapsulates with the best technological properties.Oregano and Thyme EOs were encapsulated by the freeze drying (lyophilization) method. Nine different combinations were prepared, where HPCD content (10, 15 and 20%) and EO:HPCD mass ratio (1:1, 1:5 and 1:10) were varied. After stirring (200 rpm) for 24 h at a room temperature, suspensions were filtered through 0.45 mm PTFE filters. Samples were evaporated under vacuum and frozen (-80 °C for 1 h), then main drying was carried out (-60 °C, pressure of 0.011 mbar for 40 h), and final drying (-65 °C, pressure of 0.054 mbar for 1 h). To ensure the particle purity, lyophilizates were washed with acetonitrile and dried at 25 °C. The content of each EO was determined spectrophotometrically, encapsulation efficiency (EE%) and yield were calculated. Duncan's *post hoc* test was used to evaluate the differences between samples. The best conditions for both EOs were obtained with 15% HPCD and EO:HPCD mass ratio of 1:10. Yields of EOs for chosen Oregano and Thyme EOs complexes were 86.81 ± 2.20% and 89.83 ± 2.80%, respectively, with the following EE% of 49.08 ± 1.80% and 49.29 ± 0.18%. Microencapsulation is a promising method for improving the EOs stability profile, and these results could be very useful in the pharmaceutical and food industry for the implementation of new products.