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Optimization of microencapsulation parameters of ginger oleoresin

Busra Sahin and **Seda Ozgen**
Cankiri Karatekin University, Turkey

Nowadays, medical plants are increasingly taking the place of synthetic compounds. Medicinal properties include anticancer, antioxidant and antidiabetic activities. In addition to ginger medicinal properties, spices are also widely used in confectionery industry. Microencapsulation is a technique that is utilized to protect the core material from adverse environmental conditions and it is employed to preserve stability, bio-activity and bio-availability of the active component. Selection of encapsulating or coating materials is the foremost step in efficiency of the encapsulation process. Response Surface Methodology (RSM) was used to optimize the encapsulation system and variable parameters (sodium-alginate rate, chitosan rate and flow rate) were optimized. Lyophilized ginger powder was extracted using a solvent extraction by dissolving it in ethanol 40%, ethyl acetate 40% and acetone 20%. Then the extract was separated from the pulp and evaporated using a rotary vacuum evaporator. This oleoresin was then used as an active ingredient in the microencapsulation. Suspension of coating materials was prepared by mixing a solution of sodium-alginate with a ratio of 0.5%, 1% and 1.5% in distilled water. Ginger oleoresin emulsion was prepared by adding the ginger oleoresin into suspension of the coating materials at concentrations of 10% and mixed together using an Ultra-Turrax homogenizer at a 4000 rpm for about 10 minutes. The ginger oleoresin emulsion and coating solution mix was then dropped to the chitosan-calcium chloride solution with injector pump at different flow rates. Capsules of sizes 300-500 microns were obtained at different flow rates. As concentration of the coating material increases, stability of the capsule increased. Capsules with the best size distribution and morphological characteristics were obtained at a flow rate of 1 ml/min. The results were evaluated together with 3D graphics. Therefore, sodium-alginate and chitosan are considered as an effective microencapsulating agent. Microencapsulated ginger oleoresins may be used as a novel food ingredient.

Recent Publications:

1. Regiane Victória de Barros Fernandes, Diego Alvarenga Botrel, Eric Keven Silva, Cristina Guimarães Pereira, Eloá Lourenço do Carmo, Anelise Lima de Abreu Dessimoni and Soraia Vilela Borges (2017) Microencapsulated ginger oil properties: influence of operating parameters. Drying Technology 35(9):1098-1107.
2. Regiane Victória de Barros Fernandes, Eric Keven Silva, Soraia Vilela Borges, Cassiano Rodrigues de Oliveira, Maria Ire ne Yoshida, Yasmim Fernanda da Silva, Eloá Lourenço do Carm o, Viviane Machado Azevedo and Diego Alvarenga Botre (2017) Proposing novel encapsulating matrices for spray-dried ginger essential oil from the whey protein isolate-inulin/maltodextrin blends. Food and Bioprocess Technology 10(1):115-130.
3. Shiva Ganji and Seyyedeh Zahra Sayyed-Alangi (2017) Encapsulation of ginger ethanolic extract in nanoliposome and evaluation of its antioxidant activity on sunflower oil. Chemical Papers 71(9):1781-1789.
4. Jayanudin Jayanudin, Rochmadi Rochmadi, M Kemal Renaldi and Pangihutan Pangihutan (2017) The influence of coating material difference against encapsulation efficiency of red ginger oleoresin. ALCHEMY Jurnal Penelitian Kimia 13(2).

Biography

Busra Sahin had her major in Food Engineering at Konya Selcuk University where she studied the components of mother's milk. After her graduation she attended College of Agriculture and Life Sciences at Cankiri Karatekin University in 2016. In the meantime she worked as a Food Engineer at the local dormitory (hall of residence) dining hall for 2 years. She then moved to London in April 2018 and she is currently working on microencapsulation of ginger and flaxseed as part of her Master's degree studies.

busra1894@hotmail.com