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Formulation, optimization and in vitro characterization of microcapsules of Cymbopogon martini essential oil

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Background: Complex coacervation is one of the microencapsulation techniques by which encapsulated substances release profile improved. This study was conducted by using complex coacervation to formulate and optimize microcapsules of the Cymbopogon martini essential oil. Preliminary study was conducted to define the optimal polymeric ratio for the coating materials (gelatin B and sodium alginate) and optimal pH for coacervate by taking dry coacervate yield and turbidity as response variable. In screening study eight factors, total polymeric concentration, Palmarosa oil concentration, surfactant concentration (Tween 80), reaction time, temperature, stirring speed, crosslinker concentration (Tannic acid) and crosslinking time were screened by Plackett–Burman design generated by Minitab software by using encapsulation efficiency, microcapsules surface property, microcapsules size and distribution as response variable. The three significant factors from screening design, total polymeric concentration, Palmarosa oil concentration, Surfactant concentration was further optimized by taking encapsulation as response variable, which had significant relationship with factors in screening design. Finally, the optimized microcapsules oil releases fitted to zero and first order kinetics model. The optimal polymeric ratio and optimal pH were 0.3:1 and 3.5 respectively and in the optimization study quadratic mathematical model ($p < 0.0001$) was an excellent fit to analyze the relationship between factors and response variable (R^2 , R^2_{adj} and R^2_{pred} were > 0.9). The optimal encapsulation efficiency was 96.7% and zero order kinetics model (where $R^2 = 0.9937$) was defined the oil release from microcapsules..

Keywords: Keywords; Microencapsulation, Complex coacervation, Palmarosa essential oil, Plackett–Burman screening design, Central composite design, Invitro release

Biography

Mr. Christina Haile Shoddo has completed MSc in pharmaceutics and working as assistant researcher at Armauer Hansen Research Institute in the drug development unit.

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