

Statistical study of encapsulation of Vitamin A palmitat using mixture design method

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Background and Aims: The purpose of this research is to obtain the relationship between the particle size distribution and the amounts of various components using of “mixture design” method and software called Statistica. Our system, consisting of sunflower oil, surfactant Tween 80, vitamin A Palmitate, sucrose and deionized water.

Methods: A titration technique was employed for the preparation of the samples. Deionized water was added in different volume to the mixture of sunflower oil, surfactant, co surfactant and model drug at room temperature. After phase preparation, the samples of microemulsion area were separated and o/w area of pseudo-ternary phase diagram was plotted for them. Then different samples of this region were selected. The particle size analysis was performed by dynamic light scattering for them. Then the regression models were constructed using of “mixture design” method and Statistica software.

Results: Software eliminated interaction between the particle size with most of material and only the interaction between surfactant / oil and vitamin /oil with particle size were maintained. This means that other materials do not significantly interact with the particle size. The results obtained from surface graphs proposed optimum range for the optimization formulations for encapsulating vitamin A palmitate. When average diameter of particle size is 150 nm , these ranges were obtained from 0.08 to 0.1 g for the surfactant, 0.01 to 0.028 g for oil and 0.004 to 0.006 g for vitamin.

Conclusions: From the mixture design method and regression model, the minimum particle size and an optimal composition of the system consisting of sunflower oil, surfactant Tween 80, vitamin A Palmitate as a model drug, sucrose as a co-surfactant and deionized water was calculated in a statistical way.

Keywords: Mixture design method; Vitamin A palmitat; Microemulsion system; Statistical study