

Forming a lutein nanodispersion via solvent displacement method: the effects of processing parameters and emulsifiers with different stabilizing mechanisms

ABSTRACT

A solvent displacement method was used to prepare lutein nanodispersions. The effects of processing parameters (addition method, addition rate, stirring time and stirring speed) and emulsifiers with different stabilizing mechanisms (steric, electrostatic, electrosteric and combined electrostaticósteric) on the particle size and particle size distribution (PSD) of the nanodispersions were investigated. Among the processing parameters, only the addition method and stirring time had significant effects ($p < 0.05$) on the particle size and PSD. For steric emulsifiers, Tween 20, 40, 60 and 80 were used to produce nanodispersions successfully with particle sizes below 100 nm. Tween 80 (steric) was then chosen for further comparison against sodium dodecyl sulfate (SDS) (electrostatic), sodium caseinate (electrosteric) and SDSóTween 80 (combined electrostaticósteric) emulsifiers. At the lowest emulsifier concentration of 0.1%, all the emulsifiers invariably produced stable nanodispersions with small particle sizes (72.88ó142.85 nm) and narrow PSDs (polydispersity index < 0.40).

Keyword: Nanodispersions; Solvent displacement; Steric stabilization; Electrostatic stabilization; Electrosteric stabilization; Particle size; Particle size distribution; Lutein