

Production and Optimization of Novel Biodegradable Nanoparticles Based α -lactalbumin and Human Serum Albumin (HSA) for Use in Drug Delivery and Food Science

Purpose: In recent years, the concept of controlled release of encapsulated ingredients at the right place and the right time has become of more and more interest to the food and pharmaceutical industry. Whey proteins are valuable by-products from the cheese industry. α -lactalbumin is the major whey protein found in milk and has significant nutritional properties and is associated with some positive health effects upon consumption. Besides, nanoparticle carrier using serum albumins represent an attractive strategy, since they combine a high drug loading capacity with minimal tissue irritation and toxic effects. HSA is a promising material and was used in a multitude of studies for particle preparation. **Method:** α -lactalbumin was used to synthesis nanoparticles by a two-step desolvation process. Different parameters were investigated, including temperature, pH, and type of desolvating agent. HSA was used to synthesis nanoparticles by desolvation method. The process variables were pH, HSA concentration, agitation speed, glutaraldehyde concentration, organic solvent adding rate, the ratio of organic solvent/HSA solution and. Taguchi method with L_{16} orthogonal array robust design was implemented to optimize experimental conditions of the purpose. **Results:** With respect to our study, crosslinker concentration and agitation speed showed that have less effect on produced nanoparticle size so the process variables were pH, HSA concentration, ratio of organic solvent/HSA solution and organic solvent adding rate. Varying this parameter, particle diameters could be adjusted between 69 and 424 nm. The minimum size of nanoparticles (53nm) was obtained with using Taguchi method. **Conclusions:** Nanoparticles analyzed by photon correlation spectroscopy (PCS), scanning electron microscopy (SEM) and atomic force microscopy (AFM). Based on these characteristics, HSA and α -lactalbumin nanoparticles were good enough to be candidate for drug delivery. With respect to our study, production of α -lactalbumin nanoparticles have been carried out in the world for the first time.