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Chitosan-Aluminum Monostearate Dispersion as Fabricating Liquid for Constructing Controlled Drug Release Matrix

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Abstract : Hydrophobic chitosan-based materials have been developed as controlled drug delivery system. This study was aimed to prepare and evaluate chitosan-aluminum monostearate composite dispersion (CLA) as fabricating liquid for construct a hydrophobic, controlled-release solid drug delivery matrix. This work was attempted to blend hydrophobic substance, aluminum monostearate (AMS), with chitosan in acidic aqueous medium without using any surfactants or grafting reaction, and high temperature during mixing that are normally performed when preparing hydrophobic chitosan system. Lactic acid solution (2%w/v) was employed as chitosan solvent. CLA dispersion was prepared by dispersing different amounts of AMS (1-20% w/w) in chitosan solution (4% w/w) with continuous agitation using magnetic stirrer for 24 h. Effect of AMS amount on physicochemical properties of the dispersion such as viscosity, rheology and particle size was evaluated. Morphology of chitosan-AMS complex (dispersant) was observed under inverted microscope and atomic force microscope. Stability of CLA dispersions was evaluated after preparation within 48 h. CLA dispersions containing AMS less than 5 % w/w exhibited rheological behavior as Newtonian while that containing higher AMS amount exhibited as pseudoplastic. Particle size of the dispersant was significantly smaller when AMS amount was increased up to 5% w/w and was not different between the higher AMS amount system. Morphology of the dispersant under inverted microscope displayed irregular shape and their size exhibited the same trend with particle size measurement. Observation of the dispersion stability revealed that phase separation occurred faster in the system containing higher AMS amount which indicated lower stability of the system. However, the dispersions were homogeneous and stable more than 12 hours after preparation that enough for fabrication process. The prepared dispersions had ability to be fabricated as a porous matrix via lyophilization technique.

Keywords : chitosan, aluminum monostearate, dispersion, controlled-release
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