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Formation of solid dispersion of PEG-1000 with phenacetin according to differential scanning calorimetry

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Abstract

The formation of solid dispersions is one of the methods for drug hydrophilization. The data obtained by low temperature differential scanning calorimetry (DSC) has shown an opportunity to formation of solid dispersions of a hydrophobic drug - phenacetin with a biocompatible polymer - polyethylene glycol. It was established that in case of polymer:phenacetin 5-10:1 ratios the crystalline phase of the drug is not formed, while in case of 1-4:1 ratios the pharmacological component shows features of a separate phase and does not form a solid dispersion. The observed exo-effects on DSC curves of the mixtures of polymer:phenacetin with ratios of 1-2:1 and 7-10:1 are related to low-temperature crystallization of polymer. Optimal polymer:drug ratio is 5-6:1. At these ratios phenacetin completely dissolved in the polyethylene glycol phase and the quasi-stationary state caused amorphous part in solid dispersion is not observed. This together with absence of polymer plasticization by phenacetin may facilitate the release of the drug from the composite in hydrophilic media. The melting temperature of solid dispersions does not exceed 35.2°C allowing their use as capsular drugs, ointments and suppositories.

Keywords

Differential scanning calorimetry, Phenacetin, Polyethylene glycol, Solid dispersion