

Structural transformations during swelling of polycomplex matrices based on countercharged (meth)acrylate copolymers (Eudragit® EPO/Eudragit® L 100-55)

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Abstract

With a view to the application in oral controlled drug delivery systems (DDS), the design of new interpolyelectrolyte complexes (IPECs) between countercharged types of Eudragit® EPO (EPO) and Eudragit® L 100-55 (L100-55) was investigated. The formation and composition of four new IPECs between EPO and L100-55 were established by elementary analysis. The structure of the synthesized IPEC was investigated using FTIR spectroscopy and modulated-temperature differential scanning calorimetry. The binding ratio of a unit molecule of EPO with L100-55 was found to range between 1:2.75 ($Z = 0.36$) and 1:0.55 ($Z = 1.81$) while increasing the pH value from 5.5 to 7.0. As a result of electrostatic interaction between the copolymer chains, the glass transition temperature of the IPEC increased significantly. A large pH-sensitive swelling behavior was observed for different structures of the IPECs. The outcome of swelling and diclofenac sodium release from the polycomplex matrices confirm that they have great potential to be used as a controlled DDS in specified regions of gastrointestinal tract. © 2010 Wiley-Liss, Inc. and the American Pharmacists Association.

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Keywords

Controlled release, Diclofenac sodium, Eudragit® EPO, Eudragit® L 100-55, FTIR; glass transition, Interpolyelectrolyte complexes, Oral drug delivery, PH-dependent swelling behavior, Polymeric drug carrier