Załącznik 2.

Studies on the synthesis of graft copolymers containing polyether segments and their application as carriers of active compounds

Abstract

The aim of studies examined in doctoral dissertation was to design the novel, amphiphilic copolymers with nonlinear topologies as potential micellar carriers of selected bioactive drug that is indomethacin (IMC). Macromolecules were synthesized via atom transfer radical polymerization (ATRP) by using hydroxyl-functionalized macromonomers, such as poly(ethylene glycol) methacrylate (PEGMA) and poly(propylene glycol) methacrylate (PPGMA) in the presence of two types of (macro)initiators (low molecular weight and linear high molecular weight). In the case of hydrophobic copolymers, they were converted to multifunctional macroinitiators, which were next used in ATRP of *tert*-buthyl methacrylate and the obtained polymer underwent the acidolysis to remove *tert*-buthyl groups that were protecting carboxyl moiety.

Three series of copolymers differing in topology (grafted copolymers polymethacrylate-*graft*-polyether and polymethacrylate-*graft*-(polyether-*b*-poly(methacrylic acid) as well as semigrafted linear-*b*-graft), molecular weight, composition and physicochemical properties were obtained. Copolymers were tested for their ability to form stable micellar structures and IMC solubilization/encapsulation. Results confirmed the influence of some basic structural factors including composition of copolymers. Subsequently, the drug release rates of IMC from polymeric particles in various buffer solutions (5.0 vs 7.4) were monitored. It was shown that the release rate of IMC depended on the pH of the medium, copolymer topology, degree of grafting and the content of hydrophobic fraction. Fitting the process kinetics to the Higuchi model showed that the diffusion is the most possible mechanism of IMC release.

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