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pH-Responsive Carrier Based on Polymer Particle

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Abstract : pH-responsive drug delivery systems are gaining more importance because these systems deliver the drug at a specific time in regards to pathophysiological necessity, resulting in improved patient therapeutic efficacy and compliance. Polyurethane materials are well-known for industrial applications (elastomers and foams used in different insulations and automotive), but they are versatile biocompatible materials with many applications in medicine, as artificial skin for the premature neonate, membrane in the hybrid artificial pancreas, prosthetic heart valves, etc. This study aimed to obtain the physico-chemical characterization of a drug delivery system based on polyurethane microparticles. The synthesis is based on a polyaddition reaction between an aqueous phase (mixture of polyethylene-glycol M=200, 1,4-butanediol and Tween® 20) and an organic phase (lysin-diisocyanate in acetone) combined with simultaneous emulsification. Different active agents (omeprazole, amoxicillin, metoclopramide) were used to verify the release profile of the macromolecular particles in different pH mediums. Zetasizer measurements were performed using an instrument based on two modules: a Vasco size analyzer and a Wallis Zeta potential analyzer (Cordouan Technol., France) in samples that were kept in various solutions with different pH and the maximum absorbance in UV-Vis spectra were collected on a UVi Line 9,400 Spectrophotometer (SI Analytics, Germany). The results of this investigation have revealed that these particles are proper for a prolonged release in gastric medium where they can assure an almost constant concentration of the active agents for 1-2 weeks, while they can be disassembled faster in a medium with neutral pHs, such as the intestinal fluid.

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