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pH-responsive interpenetrating polymeric network based on cellulose/poly(HEMA): elaboration and swelling behavior

pH-sensitive interpenetrating polymer network (IPN) is a class of materials widely used in water purification and drug delivery. This study shows the elaboration of such material based on both crosslinked cellulose and poly-hydroxy-ethyl-methacrylate (poly-HEMA) through the sequenced synthesis method. Cellulose was crosslinked by epichlorohydrin whereas the poly-hydroxy-ethyl-methacrylate is polymerized under UV radiations, with hydroxyl-diol-di-acrylate (HDDA) as crosslinker. The FTIR spectroscopy confirms the formation of the new physically combined material (IPN). The characterization of these IPN by swelling study as a function of two parameters (pH and poly-HEMA rate) was investigated. In the first one, when pH values were varied at room temperature, we obtained a high swelling in basic pH and a slight difference between swelling in neutral and acidic pH medium, as well as a visible morphological change was observed. In the second one, by variation of the HEMA% in the composition of IPN, the experimental results shows that the swelling behavior is inversely proportional to the HEMA rate. The architecture of the IPN depend also to the epichlorhydrine rate within the cellulose gel.

Preferred topic

Polymers and environment

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