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DECOMPOSITION OF POLY(*N*-ISOPROPYLMETHACRYLAMIDE) HOMOPOLYMER NETWORK

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Abstract

Poly(*N*-isopropylmethacrylamide) homopolymer, which belongs to thermosensitive hydrogels, was synthesized by free radical polymerization method with 1.5 mol% of ethylene glycol dimethacrylate as cross-linker. The structure of obtained homopolymer network was confirmed by Fourier transform infrared spectroscopy analysis. The hydrogel in the gelatinous state was subjected to gamma irradiation in order to additionally form a three-dimensional network in a solid state. Suddenly, the synthesized gelatinous homopolymer was transformed into the liquid state after irradiation instead of expected additional crosslinking. Breakdown of poly(*N*-isopropylmethacrylamide) homopolymer was confirmed by using different methods: gel permeation chromatography, the static headspace gas chromatography mass spectrometry and gas chromatography/flame ionization detection methods. New compounds, different from the homopolymer, monomer and crosslinker were detected after irradiation. As result, the gamma irradiation will be applicable for the poly(*N*-isopropylmethacrylamide) homopolymer decomposition and useful to further recyclability analysis.

Keywords: *N*-isopropylmethacrylamide, gamma irradiation, hydrogel, decrosslinking.

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