SYNTHESIS AND CHARACTERIZATION OF PH-SENSITIVE SACCHARIDE MODIFIED POLYURETHANE HYDROGELS – EFFECT OF POLYOL, CROSSLINKER AND ACID CHAIN EXTENDER

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Biodegradable polyurethanes can be the basis for drug delivery systems that are sensitive to external changes. pH-sensitive polyurethanes (PUs) have been used successfully as intravaginal rings and specific drug delivery systems for the colon. In this study, a series of pH-sensitive polyurethane hydrogels with a change of the polyol component (poly(ethylene glycol) 400/poly(propylene glycol) 2000/poly(ethylene glycol)-block-poly(propylene glycol)-block-poly(ethylene glycol) 1100), saccharides as crosslinkers (melibiose/raffinose/starch) and α-hydroxy carboxylic acids as chain extenders (dimethylol propionic acid/lactic acid) were synthesized. Structural characterization of the synthesized polyurethane hydrogels was performed using Fourier transform infrared spectroscopy (FTIR), which showed that the polyurethane synthesis reaction was achieved with successful crosslinking with saccharides and, despite the change of starting components, FTIR spectra for all investigated samples are almost identical. The degree of swelling of the hydrogels was monitored at 25 °C in solutions of pH values 4.5 and 7.4. In samples with the polyol component block1100, the degree of swelling at pH 7.4 (16.09%) was up to 9 times higher than at pH 4.5 (1.82%). The effects of variable parameters on the thermal properties and phase transitions of PUs hydrogels were investigated by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). The results showed that by varying the saccharide as a crosslinker, the acid chain extender and the chain length of the polyols, the stated properties of polyurethane hydrogels as potential drug delivery carriers can be influenced.

Keywords: Polyurethane, pH sensitivity saccharide, drug delivery system

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