

THERMOSENSITIVE CHITOSAN-g-POLY(N-VINYLCAPROLACTAM) CRYOGELS

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Polysaccharide-based smart cryogels represent a promising platform for biotechnological and biomedical applications such as immobilization of bioactive molecules and cells, drug delivery, tissue engineering, among others.¹ Polymeric cryogel is a three-dimensional cross-linked system formed via the cryogenic treatment of solutions or colloidal dispersions of the appropriate precursors.² Recently, dual temperature and pH sensitivity systems based on chitosan derivatives have been studied.^{3,4} In this work, novel thermosensitive chitosan-g-poly(N-vinylcaprolactam) cryogels were prepared from polymeric solutions using glutaraldehyde as a crosslinking agent at -20 °C. The morphology of the cryogel beads was characterized by SEM and confocal microscopy. The resultant materials showed an interconnected regular macroporous structure. The pore size of the cryogels is around 10 µm. The study of equilibrium swelling shows an abrupt decrement in water absorption ability around 34 °C. The reversible thermal responsiveness for cryogel beads was analyzed by variation of swelling in pure water (pH 6) to stepwise periodic changes in temperature between 5 and 45 °C. Below the transition temperature, copolymer chains in the cryogel are hydrated. In contrast, as the temperature increases to 45 °C, the macromolecular chains are slightly contracted, and water is ejected from the cryogel beads. The capacity of the drug delivery carrier of the system was evaluated using citral as a model molecule, varying the pH and temperature of the medium. These chitosan derivatives cryogels exhibited loading ability, and the release of citral was pH- and temperature-dependent.

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