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Kinetic release studies of nitrogen-containing bisphosphonate fromgum acacia crosslinked hydrogels

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Abstract

Natural polymer hydrogels are useful for controlling release of drugs. In this study, hydrogels containinggum acacia were synthesized by free-radical polymerization of acrylamide with gum acacia. The effect ofgum acacia in the hydrogels on the release mechanism of nitrogen-containing bisphosphonate (BP) wasstudied at pH 1.2 and 7.4. The hydrogels exhibited high swelling ratios at pH 7.4 and low swelling ratiosat pH 1.2. The release study was performed using UV–Visible spectroscopy via complex formation withFe(III) ions. At pH 1.2, the release profile was found to be anomalous while at pH 7.4, the release kineticof BP was a perfect zero-order release mechanism. The hydrogels were found to be pH-sensitive andthe release profiles of the BP were found to be influenced by the degree of crosslinking of the hydrogelnetwork with gum acacia. The preliminary results suggest that these hydrogels are promising devices forcontrolled delivery of bisphosphonate to the gastrointestinal region.