

Depolymerization of chitosan-metal complexes via solution plasma technique

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Abstract

Chitosan-metal complexes were depolymerized under acidic condition by using solution plasma system. Four different types of metal ions which are Ag⁺, Zn²⁺, Cu²⁺, and Fe³⁺ ions were added into chitosan solution at a metal-to-chitosan molar ratio of 1:8. The depolymerization rate was found to be affected by the types of metal ions forming complexes with chitosan. The complexation of chitosan with Cu²⁺ or Fe³⁺ ions strongly promoted the depolymerization rate of chitosan by solution plasma treatment. However, chitosan-Ag⁺ and chitosan-Zn²⁺ complexes exhibited no change in the depolymerization rate in comparison with chitosan. After plasma treatment of chitosan-metal complexes, the depolymerized chitosan products were separated into water-insoluble and water-soluble fractions. The yield of the water-soluble fraction containing low-molecular-weight chitosan as high as nearly 57 % was obtained for the depolymerization of chitosan-Fe³⁺ complex at the plasma treatment time of 180 min.

Keywords: Chitosan; Solution plasma; Metal complexation; Chitosan oligomers