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## Chapter 5 - Synthesis and characterization of biodegradable cellulose-based polymer hydrogel

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### Abstract

In this chapter, cellulose isolated from water hyacinth and hydroxyapatite nanoparticles (nano-HA) were utilized in the synthesis of nanocomposite polymer hydrogel (PHG). Partially neutralized acrylic acid was heterogeneously grafted onto swollen cellulose by radical polymerization reaction. The copolymer was characterized by Fourier transform infrared spectroscopy, X-ray diffraction, transmission electron microscopy, and energy dispersive X-ray spectroscopy. The factors influencing water absorbency including pH and the presence, nature, and concentration of ions, and the swelling in the soil were assessed. Biodegradation of the copolymer was evaluated both in soil and in a microbial culture. The nanocomposite PHG was prepared by grafting acrylic acid onto cellulose in the presence of nano-HA. A mechanism of graft polymerization reaction has therefore been proposed. This polymer nanocomposite could be beneficial in agriculture where biodegradability and effective utilization of water as soil conditioners is