

Abstract

The Title : Controlled-release fertilizer by polymer nanocomposite from cassava starch poly(vinyl alcohol) and montmorillonite

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The aim of this research is to prepare polymer nanocomposites of cassava starch, poly(vinyl alcohol) and montmorillonite(MMT). The films are used for fertilizer coat by solution method. The blend polymer nanocomposites were prepared by mixing of cassava starch and poly(vinyl alcohol) at dry weight ratios of 70:30 , 80:20 and were incorporated with various amount of MMT (2, 4, 6 and 8 parts per hundred of cassava starch and poly(vinyl alcohol)) The obtained homogeneous solution was casted into films using plastic mold and dried at 60°C in a hot air oven. The dry films polymer nanocomposites have been characterized for their structure, water absorption, water permeability, ammonium ion permeability, and biodegradability. The X-ray diffraction patterns (XRD) and transmission electron microscopy (TEM) the results showed that the polymer nanocomposites formed were all exfoliated. The water absorption ,water permeability and ammonium ion permeability of polymer nanocomposites were enhanced with the increasing amount of poly(vinyl alcohol). However, these value were decreased with the addition of MMT. After soil burial for 50 days, percent weight loss and biodegradability of the polymer nanocomposites enhance as the amount of starch increased. Studying on the encapsulation of the commercial granular fertilizer, NPK 16-16-16 and NPK 18-46-0, with polymer nanocomposite in the ratio 80:20:8 as a coating were performed. The granules fertilizer were dipped with polymer nanocomposite solution. Coated fertilizer was put into deionized water and, at a specified period, water solution was analyzed for amount of nitrogen. The results showed that amount of nitrogen released rate from coated fertilizer were less than the uncoated one.