

Biodegradable Sachets Composed by Starch:Pectin for Controlling/Slow Release of Phosphorus Ions from Hydroxyapatite Nanoparticles

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First of all, the application of materials that can decrease the lost and leaching of active principles employed in the agribusiness is a technic which can save financial investments in this area. So, decrease the process cost and protect the nature from these materials are essential factors for the ground protection and conservation. Thus, the aim of the present work is the evaluation of the hydroxyapatite (HAP) ($\text{Ca}_{10}(\text{PO}_3)_6(\text{OH})_2$) as a source of phosphorus to the soil using sachets based on starch: pectin blends, which are degradable polymers to packaging it. HAP synthesis was performed by wet coprecipitation followed by hydrothermal process. For that, ammonium phosphate dibasic was slowly dropped into calcium nitrate aqueous solution under constant stirring and nitrogen flow, by the way urea was used to raise the pH. In face of that, the white suspension formed was submitted to hydrothermal treatment at 36h for 150°C. The blend was prepared using 75:25 (starch:pectin) ratio, and glycerol, water and stearic were used as plasticizer agents. Then, the mixture was homogenized in a torque rheometer at 130°C for 4 minutes. After that, the thermoplastic polymer was pressed in a way to produce films. In its turn the sachet preparing occurred using the starch:pectin film blend in square form (2x2 cm) that had three sides sealed. Then, the fourth side was used to introduce the hydroxyapatite nanoparticles, so the last one was closed. The materials characterizations were realized by X-Ray Diffraction, Infrared Spectroscopy (FTIR), FT-Raman and Transmission Electron Microscopy (MET) and thermal gravimetric analysis (TGA). It was observed that the produced HAP nanoparticles was pure and monophasic, presenting the whiskers form. Moreover, it was verified that the blend did not degrade at the process temperature. The liberation of HAP nanoparticles varied from 0 to 1 ppm at neutral pH, and from 0 to 26 at pH 1.