ACTIVITY STABILIZATION OF ACID PHYTASES IMMOBILIZED ON ALLOPHANIC SYNTHETIC COMPOUNDS AND MONTMORILLONITE NANOCLAYS

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Enzyme-clay associations have been extensively studied because of their effect on enzyme protection against proteolysis and thermal denaturation. The aim of this work was to study the stabilization of the activity of two commercial microbial phytases (*Aspergillus niger* and *Escherichia coli*) after immobilization on nanoclays and to establish optimal conditions for their immobilization. Synthetic allophane, synthetic iron-coated allophanes and natural montmorillonite were chosen as solid supports for phytase immobilization. Phytase immobilization patterns at different pH values were strongly dependent on both enzyme and support characteristics. After immobilization, the residual activity of both phytases was higher under acidic conditions. Immobilization of phytases increased their thermal stability and improved resistance to proteolysis, particularly on iron-coated allophane (6% iron oxide), which showed activation energy (Ea) and activation enthalpy ($\Delta H^{\#}$) similar to free enzymes. Montmorillonite as well as allophanic synthetic compounds resulted in a good support for immobilization of *E. coli* phytase, but caused a severe reduction of *A. niger* phytase activity.

Keywords: Phytase, enzyme immobilization, nanoclay, phytate, phosphorus.

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