Abstract

Xylanase (1,4-β-xylan xylanohydrolase; EC 3.2.1.8) is industrially important enzyme for the effective production of xylose used for various purpose. Immobilization of enzyme on different medias is an efficacious approach to enhance the stability and recovery to allow their reuse in many cycles of the reaction, decreasing the process costs. This work presents the rational method for covalent immobilization of xylanase with silica coated Fe_3O_4 MNPs exhibited high coercivity, recovery from reaction system, stability, and biocompatibility with improved catalytic activity. Thermal stability and pH stability of Immobilized xylanase showed significant results at 60℃ and pH 6-7 with highest residual activity of 85% ±1 and 90% ±1-92%±1 respectively as compared to free xylanase. Immobilized enzyme showed greater recovery by reusability assay as enzyme could be used for 40 cycles in significant way on xylan and 5 times were reusable on pretreated biomasses i.e. broiler fly and sugarcane bagasse. Pretreated Broiler fly, sugarcane bagasse, sugar distillery sludge and filter cake displayed 72 hours of time of incubation. Immobilization on magnetic nanoparticles is imperative due to their resistance at high pH and temperature. So, substantial reusability and stability of bound enzyme may be advantageous for its industrial application.