Studies on the immobilization of bromelain by using magnetic chitosan/Fe3 O4 micro/nanoparticles as carriers

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ABSTRACT

In this study, magnetic chitosan/iron (II, III) oxide composite suspension was prepared by combining chitosan with iron ions. Suspension was washed with water until it was neutralized and then bromelain was added to the suspension. The chitosan/iron (II, III) oxide/ bromelain micro/nano particles were produced by low-temperature spray-drying. The larger and smaller particles were collected using an electromagnet collector (EMC) and an electrostatic precipitator (ESP) respectively. Scanning electron microscopy micrographs indicate that the diameters of larger particles collected by EMC were in the range of 500 to 2500 nm while the diameters of smaller particles collected by ESP were in the range of 200 to 1000 nm. Both particles exhibited a rough characteristic. Casein hydrolysis tests were used to determinate the enzyme activities of all the particles. The results indicated that all the micro/nano particles had relative activities higher than 80% and could be reused at least ten times. The relative enzyme activities were increased with increasing chitosan content in the particles. The encapsulation of bromelain with magnetic chitosan/iron (II, III) oxide achieved the goals of enzyme quick recovery and reuse.

Keywords : Magnetic chitosan/iron (II、III) oxide/bromelain micro/nanoparticles、Low-temperature spray-drying、Bromelain

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