

Water sorption and mechanical properties of starch/chitosan nanoparticle films

ABSTRACT

The usage of biopolymer as food packaging material has been limited due to high water sorption and poor mechanical properties of the biopolymer. Thus, this study is aimed at improving the water sorption and mechanical properties of biopolymer particularly starch films by incorporation of a natural filler particularly chitosan nanoparticle (CNP) and investigating the properties of starch/CNP films at different storage conditions (relative humidity: 23, 50, and 75%; temperature: 4, 30, and 40°C). The water sorption behavior and isotherms of the films were investigated by fitting the water sorption data to the Peleg model and Guggenheim, Anderson, and de Boer model. Both the models were well fitted to the experimental data, thus proving the reliability of water sorption behavior prediction. It was found that different storage conditions of the films significantly affected the mechanical properties of the films due to the sensitivity of the films towards moisture. Water sorption and mechanical properties of the films were best improved at relative humidity of 23% and temperature of 30°C. The water sorption and mechanical properties of the films are worth to be investigated because the properties affected the stability, shelf life, and application of the films in the food packaging field.

Keyword: Biopolymer; Food packaging; Chitosan nanoparticle (CNP)