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Study on the barrier properties of glycerol to chitosan coating layer

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ABSTRACT

Chitosan is a biodegradable natural polymer, coated on the surface of the paper can improve the oxygen barrier properties and resistance to fluid permeability of ordinary packaging paper, but the influence on resisting to water permeation are not enough. In this paper, through the analysis of the infrared spectra, surface properties, elongation, water resistance and water vapor barrier properties of the coated paper, the effects of glycerol plasticizer on the chitosan-coated paper were studied. The results showed that the addition of glycerol could increase the softness of chitosan. When the content of glycerol was 20 wt%, the elongation of the chitosan-glycerol coated paper increased 25.2% to the uncoated paper and 7.4% to the chitosan-coated paper. Meanwhile, those chitosan-glycerol-coated paper had better effect on resisting to water permeation, although the water vapor barrier properties could be improved.

Keywords: Chitosan; Glycerol; Permeability; Barrier properties

Highlights

- The glycerol had significant impact on the chitosan structure and elongation.
- The effect of glycerol on resisting to water permeation were studied upon PDA.
- The water vapor barrier properties of the chitosan-glycerol-coated paper were tested.

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1. Introduction

Chitosan is a kind of non-toxic and non-polluting polysaccharide which has good biodegradability, antibacterial and film-forming properties [1-3]. As a result, chitosan can be applied in a variety of fields, particularly, extensively studied as an edible packaging material [4].

Chitosan coating can improve the barrier properties of paper. Thus through improving the packaging performance to promote packaging paper instead of plastic packaging, finally, reducing environmental pollution [5-8].

Plasticizers are widely used polymer additives, which can affect the flexibility, mechanical properties and permeability of the material [9]. Many scholars [10,11] have studied the effects of different plasticizers such as glycerol, urea, sorbitol and stearic acid on the mechanical properties and permeability of the films. Liu et al. [12] investigated the effect of plasticizer on water vapor barrier properties of composite coating. The glycerol had the greatest effect on the mechanical properties of chitosan films [13,14].

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