

Preparation and characterization of Persian Gum- Based accompanied with ZnO nanoparticles

Abstract

In this study, films of Persian gum with different amounts of ZnO nanoparticles at three levels (1, 3 and 5 wt) of Persian gum powder production and their properties such as moisture content, solubility, thickness, turbidity, mechanical properties, water vapor permeability, fine structure (SEM imaging), oxygen exchange, color measurement, zinc nanoparticles release, contact angle and antimicrobial properties against the bacteria of *Listeria Innocua* (PTCC 10799), *Pseudomonas Aeruginosa* (PTCC 1712), *Salmonella Enterica* (PTCC 1709), *Escherichia coli* (PTCC 10708) and *Staphylococcus aureus* (PTCC 1189) investigated. The results showed that adding zinc oxide nanoparticles led to the reduction of contact angle and the exchange of oxygen in Persian gum wrapping compared to the control sample. Properties such as the thickness of wrapping and turbidity increased with increasing nanoparticles. The results of antibacterial properties with disc diffusion test showed that the highest inhibition of Persian gum wrapping was against *Listeria Innocua* (PTCC 10799) and *Salmonella Enterica* (PTCC 1709) and the lowest inhibition against *Staphylococcus aureus* (PTCC 1189). The results of water permeability showed that the control sample had the lowest amount of permeability to water vapor and permeability in the wrapping containing 1% significant, which shows that zinc oxide nanoparticles showed more permeability than water vapor, but between different levels of nanoparticles there is no significant difference. The results of the release of nanoparticles in different environments after 7 days showed a significant increase in the release of nanoparticles in all the test environments and the highest level of release in the film containing 3% of the nanoparticles in acidic environment and the lowest release in the control sample were observed.

Key words: Antibacterial, Mechanical properties, Shelf life



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Supervisor

**Dr. M.A. Najafi
Dr. S. Nikniya**

Advisor

**Dr. M.Tavakolli
Dr. B.M. Ahmadi**

By

S. Bameri

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