Effect of Gamma Polyglutamic Acid(γ -PGA) on the Processing Property of Seafood

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ABSTRACT

γ -polyglutamic acid (γ -PGA) is a water soluble, edible and biodegradable substance and has been proven to be non-toxic to our environment and human body. Examples of food applications of γ -PGA and its derivatives have been very limited. Fresh tilapia has been used as the material in this research, and three pieces of fish meat have been taken from it. Based on the method of three piece filleting, tilapias were dissected into pieces and skinned fish steaks that the size of 3 (length) ×2 (width) × 1 (high). They are soaked in three different kinds of molecular weight γ -PGA solutions which are 0.5% of the Na form with high molecular weight(Na/HM), the Na form with low molecular weight(Na/LM) and the Na form with hydrogel (Na/Hy), and also immersed in sodium tripolyphosphate (P) and RO water (R) with the same concentration for comparison, in order to compare the influence of different types of γ -PGA solutions on the appearance of the fish meat and the change of its freshness during the storage. The results could be obtained as follows: The effect of glazes of various γ -PGA upon the storage stability and the quality of tilapia fillet and its associated storage deterioration are examined. Fresh tilapia fillets were glazed using RO water (R), sodium tripolyphosphate (P) and γ -PGA(Na/HM and Na/Hy). Ice glazing enhanced the storage quality of the tilapia fillet as compared to an untreated sample. Some of the γ -PGA glazing treatments did provide some degree of protection, although some did not. The antioxidant activity of γ -PGA upon tilapia flesh related substantially to the γ -PGA species used for glazing. γ -PGA afforded better protection lipid oxidation, therefore they maintained a better quality of preserved tilipia fillet. The combination of a glazing treatment and the application of γ -PGA at a 0.5% concentration was able to greatly increase the storage quality of the frozen tilipia fillets. In the aspect of the surimi products, different forms of γ -PGA (Na/HM, Ca/HM, Ca/LM and Na/SM) in the sailfish surimi sold to the market have been adopted in the experiment. The result could be seen as the following: comparing different forms of γ -PGA with high molecular weight (above 1,000,000), the added form, Ca/HM γ -PGA, (with gel strength of 835 g×mm) has better gel strength than 0.2% of the form of Na/HM (with gel strength of 680 g×mm). Also, comparing the differences between the same Ca form of γ -PGA products with various molecular content added, the result shows that the form of Ca/HM (with gel strength of 830 g×mm) has better gel strength than that of Ca/LM (with gel strength of 680 g×mm). Observing from the above experiment, the high molecular γ -PGA is more helpful than the lower molecular γ -PGA to enhance the gel strength of surimi; γ -PGA of the Ca form is more helpful than that of the Na form to strengthen the gel strength of fish surimi. To understand the mechanism of surimi gel-forming of γ -PGA, Calium lactate are added to surimi infusion to investigate the effects of gel strength, and water hooding capacity. At the same concentration, Ca/HM γ -PGA produced 7 times gel strength formation as compared to control. Therefore, this result has a remarkable contribution to the promotion of adding γ -PGA to the fish processing products.

Keywords : γ -polyglutamic acid ; glazing ; surimi ; gel strength

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