Functional properties of Tilapia's fish scale gelatin film: effects of different type of plasticizers

ABSTRACT

The aim of this study was to investigate the functional properties of Tilapia's fish scale gelatin films with various type of plasticizers. Gelatin film solutions using solution casting method with different type of plasticizers; glycerol, sorbitol, glycerol: sorbitol (80:20), and diethylene glycol with concentration of 30% were stirred at 60 °C for one hour and dried at room temperature for 2 days. The determination of film characterizations was included thermal (thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC)), mechanical testing using the Texture Analyzer and chemical properties (Fourier transform infrared spectroscopy (FTIR)). Essentially, all plasticizers show an improvement by able to plasticizing with increasing of elongation at break in between 14 and 50% compared to the gelatin film without plasticizer. Meanwhile, the tensile strength of plasticized gelatin films decreased drastically compared to the unplasticized gelatin film. From the result obtained in TGA analysis, film with sorbitol and dietheylene glycol demonstrated low resistance toward high temperature compared to film with glycerol and glycerol:sorbitol gelatin film. In addition, all the gelatin film with different plasticizers show the value of Tg around 60-70.85 °C except for sorbitol with Tg 79.98 °C due to strong intermolecular chain interaction between the sorbitol and gelatin. FTIR spectrum analysis demonstrated that only gelatin film with glycerol does not have any amide group that related to stretching vibration of carbonyl group along the polypeptide backbone of the plasticized film which later give highest tensile strength. Hence, notable differences of functional properties were found with four different type of plasticizers used in the gelatin film, especially in term of temperature resistance and mechanical properties

Keyword: Functional properties; Plasticizer; Tilapia's fish scale gelatin