

Mechanical and thermal properties of tapioca starch films plasticized with glycerol and sorbitol

ABSTRACT

Recently, the use of natural polymer such as starch to produce packaging film has received much attention as a substitute for conventional petroleum-based packaging film since starch is biodegradable and sustainable. However, the poor characteristic of starch such as high brittleness will limit the application of the film. This problem can be solved by adding plasticizers. In this work, the effects of different types of plasticizers (glycerol, sorbitol and 1:1 mixture of glycerol-sorbitol) on mechanical and thermal properties of tapioca starch films prepared by solvent casting method were investigated. The films were characterized in term of mechanical (tensile strength (TS), elongation at break (EAB), Young Modulus (YM) and thermal properties (thermo-gravimetric analysis (TGA)). Film plasticized with sorbitol exhibited higher TS and YM but lower EAB value which contributed to higher thermal stability than glycerol-plasticized film. This was due to the strong interactions between the polymer chains resulting from the high molecular weight of sorbitol. Hence, films became more rigid and thus promoted to a greater thermal resistance.

Keyword: Film packaging; Biopolymer; Starch; Glycerol; Tensile; Sorbitol