STUDY OF THE EFFECT OF GLYCEROL ON THE THERMAL PROPERTIES OF CELLULOSE ACETATE FILMS

TEIXEIRA; Samiris Côcco 1, ASSIS; Rafael Resende 2, PAUMGARTTN; Mariah Nascimento von 3, RIBEIRO; Alane Rafaela Costa 4, SOARES; Nilda de Fátima Ferreira 5

RESUMO

Biologically based polymeric packaging has been used as an alternative to petroleum-based polymers, as these are harmful to the environment. In this context, the development of cellulose acetate (CA) films deserves to be highlighted because it is a low-cost polymer, non-toxic, and biocompatible with a series of solvents for film formation, is also derived from cellulose, which is the most abundant renewable polymer on Earth. Although promising, the use of CA as packaging material requires the addition of processing aids, such as plasticisers, in order to improve the flexibility, workability, or distensibility of the polymer. In this regard, this work aimed to optimize the effect of glycerol (GLY), added into the polymeric matrix of CA, produced by the casting method, using acetone as a solvent. The study aimed to characterize the properties of the film using results obtained by Thermogravimetric Analysis (TGA). The TGA of the films was made in DTG thermal analyzer (SHIMADZU, model 60H, Japan). Approximately 4 mg of each film packaged in alumina pans were heated in a temperature range from 30 °C to 600 °C at a heating rate of 10 °C.min-1, in a nitrogen atmosphere, with a flow of 50 mL.min-1. Through the TGA technique, it was possible to observe two main events of the thermal decomposition of the control film, in which the initial phase occurred between the temperatures of 25 °C and 120 °C, related to the evaporation of free water. The second event occurred between temperatures of 312.8 °C and 394.1 °C, a mass loss of 74% (m/m) occurred due to the decomposition of the CA polymer. Three events were observed for treatments containing GLY, the first event occurred in the temperature range of 33.1 °C and 100.9 °C, related to the evaporation of free water. The second event occurred at 145.7 °C initial temperature, and corresponds to the evaporation of water delimited in the system, also to be allocated to gli degree, where the piece grows with the growth of gli. The third event occurred in the temperature range of 335 °C to 409.6 °C, in which a mass variation from 55.2% to 61.5% (m/m) was observed, and this behavior can be attributed to the decomposition CA polymer chain. The thermal degradation of films plasticized with GLI occurred at higher temperatures than non-plasticized films and this effect is due to the distancing of the CA chains caused by the insertion of GLY interlaced. In this study GLY was used, to analyze the physicochemical properties for the development of CA packaging, which although already widely used, studies are lacking to understand the influence of these plasticizers in this matrix, which are biodegradable packaging, useful to substitute several pollutant polymers of petrochemical origin. In summary, GLY can be used

1 Universidade Federal de Viçosa, samiris.teixeira@ufv.br
2 Universidade Federal de Viçosa, rafaelmega@yahoo.com.br
3 Universidade Federal de Viçosa, mariahnascimento@hotmail.com
4 Universidade Federal de Viçosa, alane_rafaela@hotmail.com
5 Universidade Federal de Viçosa, nfsoares10@gmail.com
for the development of packaging for the food industry.

**PALAVRAS-CHAVE:** Packaging, Plasticizers, Polymers