

Thermal and mechanical properties of bio-based plasticizers mixtures on poly (vinyl chloride)

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Abstract: The use of mixtures of nontoxic and biodegradable plasticizers coming from natural resources is a good way to replace conventional phthalates plasticizers. In this study, two secondary plasticizers of epoxidized sunflower oil (ESO) and epoxidized sunflower oil methyl ester (ESOME) were synthesized and have been used with two commercially available bio-based plasticizers; isosorbide diesters (ISB) and acetyl tributyl citrate (ATBC) in order to produce flexible PVC. Different mixtures of these plasticizers have been introduced in PVC formulations. Thermal, mechanical and morphological properties have been studied by using discoloration, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), dynamic mechanical thermal analysis (DMTA), tensile - strain and scanning electron microscopy (SEM). Studies have shown that PVC plasticization and stabilization were improved by addition of plasticizers blends containing ISB, ATBC, ESO and ESOME. An increase in the content of ESO or ESOME improved thermal and mechanical properties, whereas ESOME/ATBC formulations exhibited the best properties.

Keywords : PVC, epoxidized sunflower oil, epoxidized sunflower oil methyl ester, isosorbide diesters, acetyl tributyl citrate.