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Thermal and mechanical properties of bio-basedplasticizers 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 replaceconventional 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 commerciallyavailable biobased plasticizers; isosorbide diesters (ISB) and acetyl tributyl citrate (ATBC) in order to produce flexiblePVC. Different mixtures of these plasticizers have been introduced in PVC formulations. Thermal, mechanical andmorphological properties have been studied by using discoloration, thermogravimetric analysis (TGA), differentialscanning calorimetry (DSC), dynamic mechanical thermal analysis (DMTA), tensile - strain and scanning electronmicroscopy (SEM). Studies have shown that PVC plasticization and stabilization were improved by addition ofplasticizers blends containing ISB, ATBC, ESO and ESOME. An increase in the content of ESO or ESOME improvedthermal 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.