

Effect of Biobased Plasticizers on Thermal, Mechanical, and Permanence Properties of Poly(vinyl chloride)

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Abstract: Phthalates can be replaced by other harmless and environmentally friendly plasticizers, such as isosorbidediesters (ISB), and epoxidized sunflower oil (ESO), which has been proved an efficient stabilizer for poly(vinyl chloride) (PVC) in helping to prevent degradation during processing. Formulations based on PVC with different amounts of ISB, ESO, and di-(2-ethylhexyl)phthalate (DEHP) from 0 to 60 parts by weight per hundred parts of resin were realized. To make PVC flexible with partial amounts of the debated phthalates as plasticizers, we use a combination of DEHP, ISB, and ESO. Effects of these two biobased plasticizers, ISB and ESO, and their mixture with DEHP on thermal stability by measuring discoloration degrees and thermal gravimetric analysis, on mechanical properties such as tensile strength, elongation at break, and hardness, were characterized. Plasticizer permanence properties of PVC compounds were studied. Studies showed that processibility and flexibility were improved by the addition of a plasticizer system (ISB, ESO, and DEHP). An increase in the content of ISB and/or ESO increased thermal and mechanical properties, whereas compositions with ternary compositions of ISB/ESO/DEHP (15/15/30) exhibited the best performance properties.

Keywords : PVC, Sunflower oil, Leaching, Volatility