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

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Abstract: Phthalates can be replaced by other harmless andenvironmentally 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 degradationduring processing. Formulations based on PVC withdifferent amounts of ISB, ESO, and di-(2-ethylhexyl)phthalate (DEHP) from 0 to 60 parts by weight per hundredparts of resin were realized. To make PVC flexiblewith partial amounts of the debated phthalates asplasticizers, we use a combination of DEHP, ISB, andESO. Effects of these two biobased plasticizers, ISBand ESO, and their mixture with DEHP on thermal stabilityby measuring discoloration degrees and thermalgravimetric analysis, on mechanical properties suchtensile strength, elongation at break, and hardness,were characterized. Plasticizer permanence propertiesof PVC compounds were studied. Studies showed thatprocessibility and flexibility were improved by the additionof a plasticizer system (ISB, ESO, and DEHP). Anincrease in the content of ISB and/or ESO increasedthermal and mechanical properties, whereas compositionswith ternary compositions of ISB/ESO/DEHP (15/15/30) exhibited the best performance properties.

Keywords : PVC, Sunflower oil, Leaching, Volatility