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Effect of epoxidized cardanol on poly(vinyl chloride) as a secondary plasticizer

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An epoxidized cardanol plasticizer derived from cardanol was synthesized and characterized by Fourier transform infrared (FTIR), ¹H-nuclear magnetic resonance (¹H-NMR) and ¹³C-nuclear magnetic resonance (¹³C-NMR). Effects of the epoxidized cardanol used as a secondary plasticizer for DOP in PVC blends were studied. Dynamic mechanical analysis (DMA), tensile test and thermogravimetric analysis (TGA) of PVC films plasticized with different content of epoxidized cardanol were investigated. The results indicated that the percent elongation increases with increasing epoxidized cardanol content. The epoxidized cardanol had better thermal stability than cardanol, the 10% weight loss (T_{10}) and 50% weight loss (T_{50}) of which enhanced from 218.73 and 259.53°C to 248.50°C and 312.53°C. And the plasticized films showed the thermal stability increased with increasing the content of epoxidized cardanol. When 8 phr DOP was replaced with epoxidized cardanol, the T_{10} and T_{50} increased by 9.58°C and 5.53°C respectively. The properties of volatility and extraction resistance of plasticizers were tested and showed similar or higher stability in those properties than that of DOP. Surface characterization of films by FTIR was also investigated.

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