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A novel La-containing additive for the long-term thermal stabilization of poly(vinyl chloride)

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Abstract

A new thermal stabilizer, La-Gly (Gly = *n*-[2-hydroxy-1,1-bis(hydroxymethyl)ethyl]-glycin), was synthesized. Through discoloration and dehydrochlorination tests at 180 °C, La-Gly is found to possess high stabilizing efficiency for poly(vinyl chloride) (PVC): as the mass ratio of La-Gly to PVC resin is increased from 0.3/50.0 to 2.0/50.0, the time to degradation of PVC samples increases from 90 min to 190 min. Studies on combinations of La-Gly and $ZnSt_2$, and of La-Gly and dibenzoyl methane (DBM) show that the initial color of PVC is improved, as the ratio of $ZnSt_2$ to La-Gly or DBM to La-Gly is increased from 0.3/1.2 to 1.2/0.3. One sample (50.0 g PVC, 0.6 g $ZnSt_2$, 0.9 g La-Gly, 3.4 g tributyl citrate) shows the best balance between initial color and long-term thermal stability (140 min). Studies on dynamic thermal stability of the samples（50.0 g PVC, *x* g La-Gly, 3.4 g tributyl citrate, *x* = 0.3, 0.6, 0.9, 1.2, 1.5, 2.0) show that when *x* equals 1.2, the thermal dynamic stability time is 24.5 min, much longer than 6.4 min and 4.8 min, respectively, for two controls (50.0 g PVC , 1.5 g $LaSt_3$, 3.4 g tributyl citrate; 50.0 g PVC, 0.6 g $CaSt_2$, 0.9 g $ZnSt_2$, 3.4 g tributyl citrate).

Keywords: Poly(vinyl chloride), Thermal stabilizer, Lanthium, Zinc, Dibenzoyl methane