

Effects of Additives on Thermal Decompositions of Carbon Black/High Density Polyethylene Compounds

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Abstract : In the present work, the effects of additives, including contents of the added antioxidants and type of the selected metallic stearates (either calcium stearate (CaSt) or zinc stearate (ZnSt)), on the thermal stabilities of carbon black (CB)/high density polyethylene (HDPE) compounds were studied. The results showed that the AO contents played a key role in the thermal stabilities of the CB/HDPE compounds—the higher the AO content, the higher the thermal stabilities. Although the CaSt-containing compounds were slightly superior to those with ZnSt in terms of the thermal stabilities, the remaining solid residue of CaSt after heated to the temperature of 600 °C (mainly calcium carbonate (CaCO₃) as characterized by the X-ray diffraction (XRD) technique) seemed to catalyze the decomposition of CB in the HDPE-based compounds. Hence, the quantification of CB in the CaSt-containing compounds with a muffle furnace gave an inaccurate CB content—much lower than actual value. However, this phenomenon was negligible in the ZnSt-containing system.

Keywords : antioxidant, stearate, carbon black, polyethylene

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