NOVEL FLAME RETARDANT POLYMERS & BLENDS

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ABSTRACT

Using unique chlorinated flame retardant additives in combination with Sb_2O_3, we have successfully imparted flame resistance to ABS and HIPS blends that contain more than 75 wt % commercial polymers and still rate as V-0 in the industry-standard UL-94 flame test. While Sb_2O_3/halogen-compound additive systems are currently employed to produce flame-resistant commercial plastics, most utilize brominated compounds as the halogen source. In this study, we have opted for a chlorine-containing halogen source, and we have shown that it is as effective as the brominated compounds. Efforts continue to incorporate these low-cost chlorinated species that will yield a promising new class of flame-retarding materials.

The second goal of this important work is to develop polymers that incorporate flame retardant species, such as chlorine, boron, and phosphorous into the polymer backbone. This requires the synthesis of pure monomers that will polymerize and produce flame retardant polymers. Incorporation of both vapor phase and condensed phase functional groups into the polymer chain will increase the product's flame resistant capabilities. Because flame propagation is a thermodynamically driven process, it has been our intention to design these polymers in their lowest energy states. We have some preliminary results in this on-going work that shows some potential to produce new flame retarding polymers.