

TECHNICAL BRIEF

NONHALOGENATED FLAME AND SMOKE SUPPRESSION FOR POLYMERS

In both public and private sectors, there are stringent code requirements which regulate the flammability of polymer materials. Ever increasing use of polymers as substitutes for other more common materials such as wood and metals require polymer substrates to meet acceptable limits of flame spread, smoke development and smoke toxicity. Considering that smoke density and toxicity are responsible for more deaths than fire itself, attention needs to be directed specifically to these areas.

Polymeric materials are usually formed into composite substrates as varied as aircraft interiors, fiberglass gratings in industrial facilities, architectural moldings in modern day buildings or computer circuit boards and housings. Polymers also constitute the insulating jacket on wires and cables, the adhesive and fabric of carpets and wall coverings, ceiling panels and furniture. All are required by various codes, regulatory mandates and legislation to have minimal flame spread, smoke development rates and smoke toxicity qualities.

The conventional practice used to impart these standards in polymers was primarily through the use of brominated compounds or in combination antimony trioxide. Because of the human and environmental toxicity associated with Bromine and antimony and mineral fillers, which compromise the mechanical properties of all composites, industry and government has demanded new chemistries for flame retardancy.

Due to environmental and toxicological concerns of halogenated flame retardants, synergistic systems based on organic phosphates are getting involved in a wider range of applications, especially public transport, aviation, automotive and electronics.

Rather than suppressing flame and smoke tendencies of combusting polymers through “blanketing” effects in the gaseous phase, there is now another means to achieve flame retardancy with much more dramatic efficiency by accelerating char formation. It is possible through the use of materials incorporated into polymer matrices to quickly convert the surface exposed to an ignition source – flame or excessive heat – into an expanding char, i.e. an incombustible layer that does not burn with flame or smoke. The more quickly the char is formed, the more quickly flaming is eliminated and the resultant smoke suppressed to

indistinguishable levels. Continued exposure to excessive heat or flame continues to form char at the polymer surface, which further protects the polymers below the char layer.

These new chemistries offered by Advanced Materials & Composites Research Group minimize flame spread and smoke generation, with smoke toxicity significantly under the newer more stringent limits. As the loading levels in most applications are in the range of 25%-35%, mechanical properties are rarely compromised.

Effective in most thermoplastic and thermoset materials, these non-halogenated, metal-free additives are the most advanced technologies available on the market today.