Flame retardants in the plastics industry

Plastribution have worked with the Kafrit group for many years and stock a wide range of their flame retardant masterbatches and compounds.

**Flame retardant portfolio**

The Kafrit group has further broadened the already extensive flame retardant portfolio to meet the needs of various industries and demanding applications. Flame retardants are used in the plastic industry in order to achieve certain safety standards. These standards are becoming more and more stringent. New parameters such as heat release and smoke density and/or toxicity are now required in new, demanding standards alongside flame retardancy.

In practice, different flame retardants are often combined in the same material to maximize performance and fire safety. In addition to specific fire protection properties the material must have technical characteristics compatible with its end-use.

**Plastics less flammable**

In our modern world, many consumer goods are made from plastics which in fact are very flammable materials. The incorporation of flame retardants makes plastics less flammable by interfering with the chemistry and/or physics of the combustion process, allowing vital time for people to escape and to prevent large-scale damage.

With a global turnover of approximately $3 billion, many industries use flame retardants. Some of those industries are:

- Building: Electrical consults, cables, insulation foams, films, etc.
- Electrical & electronics: Computers, laptops, TV sets, printing circuit boards (PCBs), etc.
- Transportation: Airplanes, maritime applications, trains, buses, etc.
- Textiles: Non-woven, bulked continuous filament (BCF).

**Three main categories**

Flame retardants act through different mechanisms depending on the standard desired, material cost etc. Flame retardants can be divided into three main categories: halogenated, phosphorus and inorganics (metal hydroxides), each of which has a different mode of action.

- **Halogenated** (bromine, chlorine and fluorine) flame retardants act via a chemical mechanism by emitting Hydrogen Halide (HX) gases during their decomposition. These molecules scavenge free radicals from the polymer backbone and less reactive radicals are formed, which in turn inhibit the flame combustion. Antimony is used as a synergist combined with halogen and reduces the amount of halogen needed to impart a given level of flame retardancy. Bromine compounds are more effective than chlorine and are easier to process than fluorine compounds. However, halogen-containing formulations have the disadvantage of emitting more smoke than other flame retardant additives. In addition, some of them act as fillers (especially aromatic halogen compounds) which could make processing more complicated.

- **Phosphorus additives** act in a physical mechanism by promoting carbonisation of the polymer. This forms a solid barrier which separates the source of heat from the flammable gases emitted by decomposition of the polymer. Relatively low quantities are needed and many times these compounds are combined with boron additives by promoting carbonaceous char.

- **Inorganic compounds** such as alumina trihydrate and magnesium hydroxide act in a physical mode by releasing relatively large quantities of water in their degradation which leads to a dilution of the volatile products. These materials are inexpensive and do not result in the emission of any toxic gases. On the other hand, they require high loadings which could be a disadvantage.

**Kafrit - more than 30 years of experience**

Kafrit Industries (1993) Ltd., with more than 30 years of experience in the flame retardant masterbatch & compound market, supplies shelf and tailor-made solutions for all different kinds of demanding standards intended for application in a variety of industries. As the flame retardant market is influenced by new demanding standards, where parameters of heat emission as well as toxicity and smoke density are discussed, there is a need for new halogen-free solutions or combination of several types of flame retardants.

The flame retardants group has invested in recent years in non-halogenated portfolio:

- Product HFFR 00S19 PP - high concentrated halogen-free master-batch, compatible with polylefins, allowing its use for more than one application and standard. Another non-halogenated is propriety copolymer CB 60K98 PP BLUE & FR & UV which provides a unique combination several advantages: a master-batch of colour, flame retardancy and UV required for stadium seats applications. Polytetrafluoroethylene master-batch FR OK350 LL MB a unique solution for PO films and fibres for FMVSS 302, UL94, DIN 4102-1 B2. HFFR 04530 PC - very efficient MB at low concentrations for PC injection moulding applications.

Compounds for building industry

In addition the group has developed some compounds for building industry: HFFR 00519 PP for thin sheet extrusion applications (0.4-0.8 mm): HFFR 00877 PP / HFFR 90A48 HD designed for either high density polyethylene or polypropylene in flame retardant tubes, pipes, telecom cables, conjugated pipes for demanding long-term applications, and HFFR 10A1BC PC WHITE & UV a polycarbonate compound, which provides both FR and UV protection for injection moulding applications and available in variety of colours.

Plastribution are ready to offer any advice and guidance that you may need regarding flame retardant additives. The technical team at Kafrit can also offer bespoke solutions to flame retardancy requirements. Please contact us on 01530 560560 for further information.