BASF Aerospace Materials

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Product Information

Melapur®

Halogen free flame retardants

The trend towards more stringent requirements for flame retardancy in aircraft interiors, with concerns about increased regulatory requirements for halogenated flame retardants, is forcing developments in the direction of non-halogenated alternatives.

Regulatory compatibility

- Halogen, antimony and metal free flame retardants
- Allows finished products to conform to eco-labels

Protection throughout product lifecycle

- Lower smoke density
- Less corrosive to processing equipment
- Reduces ancillary damage to equipment and material in case of fire

Offers flexibility in use

- Allows for broader coloration options
- Can be incorporated into a variety of applications
- Can be used alone or synergistically with other materials

All Melapur flame retardants are free of halogens, antimony or any other heavy metals. The Melapur flame retardant product range comprises Melapur MC (melamine cyanurate), Melapur MP (melamine phosphate) and Melapur 200 (melamine polyphosphate).

Flame Retardants	Grades	Product Form	Thermal Gravimetric Analysis (TGA)-Weight Loss[1]	Specific Gravity,[2] g/cm³
Melamine cyanurate	Melapur MC25 Melapur MC50 Melapur MCXL	Powder Powder Granules	1% @ 305 °C 2% @ 320 °C 5% @ 340 °C	1.7
Melamine polyphosphate	Melapur 200 Melapur 200/70 Melapur 200FF	Powder Powder Granules	1% @ 355 °C 2% @ 370 °C 5% @ 385 °C	1.85
Melamine phosphate	Melapur MP	Powder	1% @ 215 °C 2% @ 235 °C 5% @ 260 °C	1.74

[1] TGA heating rate: 20 °C/min in air
[2] @ 20 °C

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Stand alone and synergistic flame retardancy

The table below demonstrates the considerable advantages of Melapur flame retardants compared to other major flame retardant systems. While Melapur flame retardant is often used as a stand alone, it is also used regularly as an effective synergist with other flame retardants to improve the overall performance of the flame retardant system. Please talk to us for further information regarding these applications and the benefits of Melapur flame retardants in them.

Flame Retardant Mechanism	Melapur Flame Retardants	Halogenated Systems	Organo-phosphorous	Metal Hydroxides
Flame poisoning	X	X	X	
Cooling	X			X
Char formation	X		X	
Intumescence	X		X	
Oxygen dilution	X	X		X

Melapur MC flame retardants

Melapur MC flame retardant is a salt of melamine and cyanuric acid. It has a higher thermal stability than pure melamine, remaining stable up to about 320 °C. For this reason, Melapur MC flame retardant is often applied in polymers with higher processing temperatures. Above 320 °C, it undergoes endothermic decomposition to melamine and cyanuric acid, acting as a heat sink in the process. The vaporized melamine acts as an inert gas source diluting the oxygen and the fuel gases present at the point of combustion. Examples of suitable polymers: all nitrogen-based polymers such as polyamide 66, 6, 11, 12, thermoplastic polyurethane and polyurethane.

Melapur MP flame retardants

Melapur MP flame retardant is a salt of melamine and phosphoric acid. Above 200 °C, it reacts to release water, resulting in a heat sink and leaving the phosphorous component available to react synergistically with other flame retardant components. Therefore, Melapur MP flame retardant is often used in blended flame retardant systems for applications, such as coatings and sealants.

Melapur 200 flame retardants

Melapur 200 flame retardant decomposes endothermically above 350 °C, acting as a heat sink to cool the polymer. The released phosphoric acid further reacts with the polymer to form a char and inhibit the release of free radical gasses into the oxygen phase. Simultaneously, nitrogen species released from the degradation of melamine intumesces the char to further protect the polymer.

Melapur 200 flame retardant was originally developed to suit the high processing temperatures associated with the compounding of glass fiber reinforced thermoplastics. Over time, Melapur 200 flame retardants have also evolved into other applications, either replacing existing flame retardant systems, such as ammonium polyphosphate (APP) or permitting development of new formulations such as flame retardant epoxy resins or phenolic resins with improved flame retardancy.

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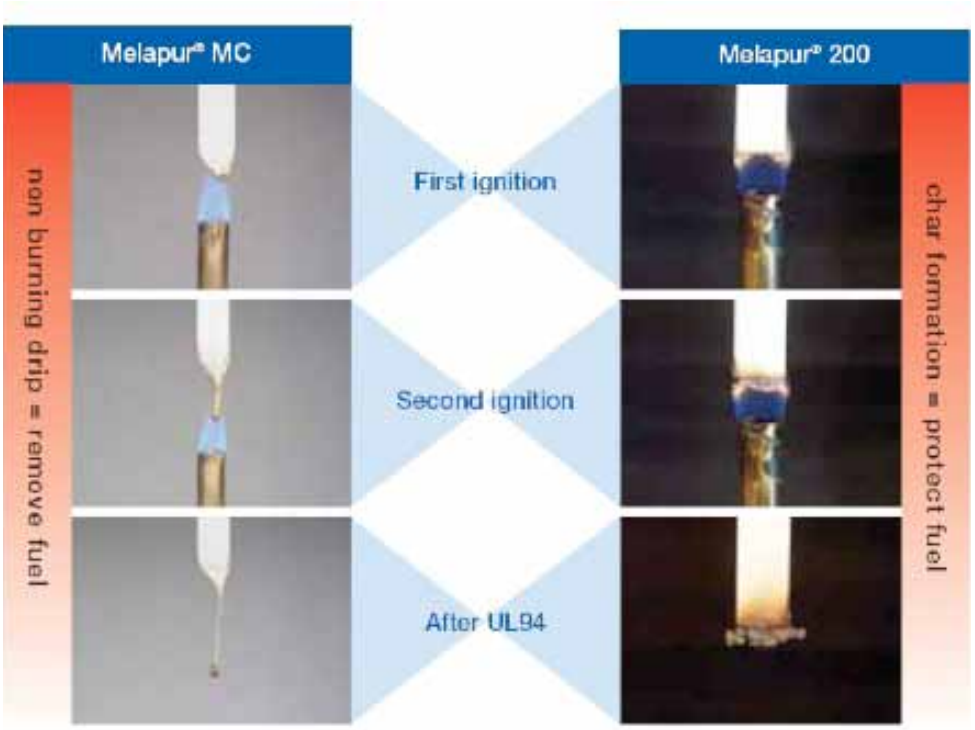
Melapur flame retardants are highly effective due to their different burning behaviors

Endothermic decomposition of melamine and cyanuric acid, resulting in heat sink

Vaporized melamine dilutes oxygen

Polymer degradation caused by cyanuric acid, results in non-burning drip



Endothermic decomposition of melamine and phosphoric acid, resulting in heat sink

Phosphoric acid forms char layer, preventing mixing of oxygen and combustible gases

Melamine acts as blowing agent, increasing thickness of char layer, which insulates polymer from heat

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