News Release

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Smart and sustainable flame retardants for foam in construction applications

- **Oligomeric and reactive phosphorus compounds for polyurethane and polyisocyanurate**
- **Polymeric, bromine-containing flame retardants for expanded and extruded polystyrene**

Cologne – The flame-retardant nature of polyurethane (PUR) and polystyrene (PS) foams for the construction industry will be at the heart of LANXESS's polymer additive presentation at the international trade fair for plastics and rubber (K 2019) in Düsseldorf from October 16 to 23. This focus has been carefully selected by the specialty chemicals company because using foam elements to insulate buildings still offers great potential in terms of energy savings and therefore sustainable climate protection. An efficient flame retardant is indispensable here.

"Organic flame retardants are a key cornerstone of our polymer additive portfolio. We are among the global leaders in this area. Building on our phosphorous compounds that have proven themselves over decades, we have systematically and sustainably consolidated this position in recent years," explained Karsten Job, head of the Polymer Additives business unit at LANXESS.

Tailor-made for substrate and application

"As is so often the case, universal solutions are rarely implemented when it comes to flame retardants," said Dr. Thomas Facklam, head of Global Application Technology in the Polymer Additives business unit at LANXESS. It is rather a matter of developing tailor-made systems that are matched to the specific properties of the polymers, the relevant processing technologies and the particular application profile. There is a wide range of flame-retardant additives available for this at LANXESS. The requirements placed on their environmental

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and toxicological profiles have become increasingly strict, which has resulted in a real generational shift. Due to their undesirable volatility and tendency to migrate, monomer compounds that were previously the favorites for use are currently gradually being replaced by oligomers and polymers. Reactive flame retardants attach themselves to the substrate via a covalent bond and are thereby reliably immobilized. These current developments have made a significant contribution to creating a considerably improved sustainability profile for modern flame retardants.

Efficient protection for polyurethane foam

Organic phosphorous compounds are the means of choice for efficient flame retardants for rigid polyurethane foam in order to meet the diverse fire protection requirements in all parts of the world. The oligomeric alkyl phosphate ester Levagard 2000 and the low-viscous, reactive phosphonate Levagard 2100 are definitely on a par with the conventional TCPP (Levagard PP, tris(2-chlorisopropyl)phosphate) with respect to flame height in PIR (polyisocyanurate) fire tests as per EN ISO 11925-2 (DIN 4102-B2). In addition, the modern alternatives are barely volatile, if at all, and also exhibit only a low plasticizing effect, which is particularly advantageous for rigid PUR foams.

Even PHT4-Diol (tetrabromophthalate diol), an OH-functional, brominated compound, is suitable for use in rigid PUR foams without impairing their mechanical properties. As a reactive molecule, it attaches to the polymer chains via a covalent bond, like Levagard 2100.

Polymeric flame retardant for expanded polystyrene

Following the ban of hexabromocyclododecane (HBCD), which was previously widely used for expanded (EPS) and extruded (XPS) polystyrene, polymeric, bromine-containing flame retardants have been successfully substituted for this in the European Union. “Emerald Innovation 3000 from LANXESS accounts for a significant

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share of these substitutions in Europe," explained Facklam. Not least thanks to the capacity expansion implemented in 2017, 14,000 metric tons of this are currently produced each year. "The product also has significant market potential around the world, which we are just beginning to tap in China, for example," he added.

Based on technology licensed by Dow Global Technologies LLC, the product is manufactured via the bromination of an alternating polystyrene butadiene copolymer and has a molar mass of over 100,000 g/mol. With respect to the oxygen index (limiting oxygen index LOI as per EN ISO 4589) and in accordance with EN ISO 11925-2, its flame-retardant properties are equivalent to those of HBCD with the same bromine content. Adjustments to the formulation and process in the course of substitution owe their success to extensive application technology experience.

Due to the high molar mass, the potential for bioaccumulation is very low, despite the high stabilityof the brominated copolymers. The high molecular weight together with a high chemical stability results in an overall favorable human and ecotoxicological profile, based on current knowledge.

Further innovations in the pipeline

"In the future, innovative phosphorous and organobromine compounds will be the mainstay of sustainable flame retardants, particularly in the construction industry," said Job, outlining his expectations. Bromine-containing systems are characterized by a particularly high level of efficiency. The polymers and reactive flame-retardant additives meet the current requirements of environmental protection and health, without this resulting in compromises in fire protection characteristics. Today, a number of LANXESS flame retardants are already part of these two product groups. The LANXESS technical development centers in Leverkusen and Naugatuck, Connecticut, U.S., are therefore working more intensively

to make such systems available for other polymer classes in the future, too.

You can find more detailed information about products from the Polymer Additives business unit on the website at http://add.lanxess.com.

LANXESS is a leading specialty chemicals company with sales of EUR 7.2 billion in 2018. The company currently has about 15,500 employees in 33 countries and is represented at 60 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of chemical intermediates, additives, specialty chemicals and plastics. LANXESS is listed in the leading sustainability indices Dow Jones Sustainability Index (DJSI World and Europe) and FTSE4Good.

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You can find further information concerning LANXESS chemistry in our WebMagazine at http://webmagazine.lanxess.com.

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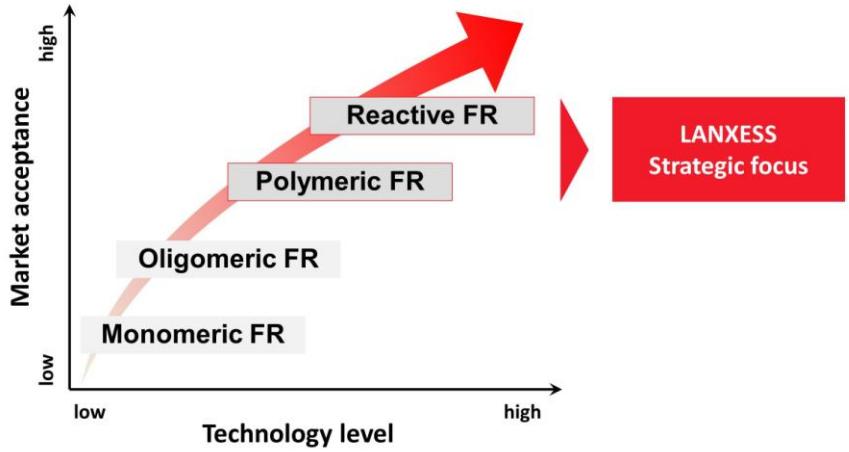
Image



Evolutionary development of flame retardants (FR) – the future belongs to polymeric and reactive systems. Photo: LANXESS AG