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Brominated flame retardants: guardian angels with a bad streak?

A new Federal Environment Agency background paper on the uses, risks, and substitutes

Flame retardants save lives, for they can prevent fires. Many manufacturers therefore make use of these substances in electrical and electronic devices, insulation materials, or textiles. However, some of these would-be lifesavers are not entirely benign. It is brominated flame retardants in particular which can spread into the environment or accumulate in the food chain or in the human being. The commonly used flame retardants Decabromodiphenyl ether (DecaBDE) and Hexabromocyclododecane (HBCD) have been traced in breast milk, fish, birds' eggs, and polar bears. HBCD is highly toxic for aquatic organisms. There is concrete evidence that DecaBDE does long-term neurotoxic damage and degrades slowly into less brominated, more toxic compounds. "I am particularly concerned about the wide-ranging spread of DecaBDE and HBCD. Chemicals that accumulate in the human body or animals' do not belong in the environment", said Prof. Dr. Andreas Troge, President of the Federal Environment Agency (UBA). There are sensible alternatives to many brominated flame retardants, without foregoing safety. They include completely different materials such as textiles made of glass fibres, less harmful flame retardants such as magnesium hydroxide, or certain halogen-free phosphorus-organic flame retardants. Use of these alternatives is both technically and economically feasible. A new background paper published by UBA presents the key facts on brominated flame retardants.

Brominated flame retardants are technologically easy to handle and comparatively cheap. DecaBDE, HBCD and Tetrabromobisphenol A (TBBPA) represent the most commonly used brominated flame retardants worldwide, with respective annual volumes of 56,400 tonnes, 22,000 tonnes, and 145,000 tonnes. Emissions are produced during manufacture as well as product use and disposal. No conclusive findings on how much the various input channels are responsible for exist to date.

The new European chemicals regulation REACH envisions that use of so-called PBTs– substances that are persistent, bioaccumulative, and toxic- be discontinued in future. The

European Chemicals Agency only makes exceptions under the following three conditions: there are no other, less hazardous substitute substances; discharge to the environment can be proven to be reduced to an absolute minimum; the benefits to society outweigh the risks. HBCD is already classified as a PBT whilst a ruling on DecaBDE is still pending. This would make both of these flame retardants among the first key industrial chemicals to be classified as such. "I believe classification as PBTs and a strict limit on the use of these substances is urgent", said UBA President Troge.
DecaBDE, HBCD, and TBBPA are used in the shells of electrical and electronic equipment, and DecaBDE and HBCD can also be found in textiles. The UBA is calling for putting a speedy end to all uses, since less problematic substitutes (e.g. magnesium hydroxide, certain phosphorus-organic or nitrogen-based flame retardants) are available.
There is no known alternative flame retardant to HBCD in insulation materials made of polystyrene. However, other insulation materials (e.g. mineral wool) serve the same purpose in most other uses. UBA believes the continued use of HBCD as a heat insulation material is justifiable for a limited time, on grounds of its positive effects. This is only true, though, if there is stringent monitoring of emissions during manufacture and during use, and if development of suitable alternatives is rapid.

TBBPA is the most common reactive flame retardant used mainly in electronic circuit boards. There are other alternatives on the market, however, which is why UBA advocates its eventual substitution. Possible substitute materials could include certain halogen-free, phosphorus-organic flame retardants or other inherently flame-resistant plastics.

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