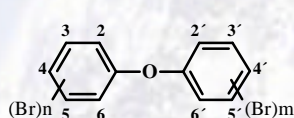


# Biomarker Focus

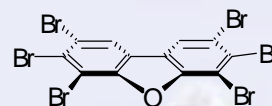
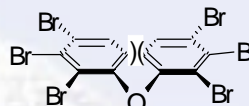
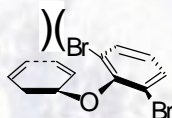
## *F-PBDEs<sup>®</sup> / Internal standards for PBDE analysis*

Polybrominated Diphenyl Ethers (**PBDEs**) have been used as flame retardants over the past two decades and are **globally distributed** in the environment. The PBDEs accumulates in the food chain, and there is a concern about the health effects of PBDE exposure.

As for PCBs, the PBDE congeners can be **grouped according to their presence in technical mixtures**, or more relevant to their **potential toxicity**. Like the PCBs, they can be arranged in **coplanar**, or **almost not twisted mono-ortho-brominated** congeners, resembling the coplanar structure of the dibenzodioxins or the dibenzofurans.



**Fig.:** Chemical structure, and numbering of PBDEs.



**Fig.:** Non-planar twisted and almost coplanar PBDEs, which are similar in their conformation to dibenzofurans or dibenzodioxins.

**Mono- and difluorinated PBDEs (F-PBDEs<sup>®</sup>)** are closely similar to the parent PBDEs in terms of **physico-chemical properties**. This makes them potentially new **internal and surrogate standards** in analytical applications, including **GC-MS and GC-ECD**. The F-substitution pattern has a distinct influence on the chromatographic behaviour. This implicates the option to choose the optimal isomers as sets of standards for the problem at hand, *i.e.* with a **separation from the corresponding parent compounds** in GC-ECD.

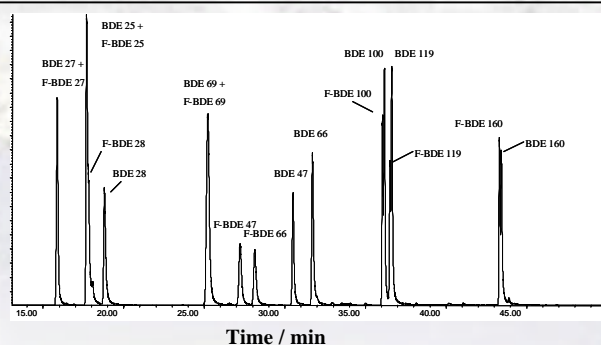
## *Chiron offers*

Chiron now offers F-PBDEs<sup>®</sup> with bromination levels from one to nine, *i.e.* the **complete range of bromination levels**. Both **single and multicomponent standard solutions of F-PBDEs** as 50 µg/mL in iso-octane and toluene are available to assist researchers in their analysis. **Please, inquire for special needs.**

F-PBDE <sup>®</sup> no.	F-PBDE <sup>®</sup> name	Order no.
<b>F-25</b>	<b>4'-Fluoro-2,3',4-tri-BDE</b>	<b>1926,12</b>
<b>F-27</b>	<b>4'-Fluoro-2,3',6-tri-BDE</b>	<b>1927,12</b>
<b>F-28</b>	<b>3'-Fluoro-2,4,4'-tri-BDE</b>	<b>2160,12</b>
<b>F-47</b>	<b>6-Fluoro-2,2',4,4'-tetra-BDE</b>	<b>2161,12</b>
<b>F-66</b>	<b>6-Fluoro-2,3',4,4'-tetra-BDE</b>	<b>2162,12</b>
<b>F-69</b>	<b>4'-Fluoro-2,3',4,6-tetra-BDE</b>	<b>1928,12</b>
<b>F-100</b>	<b>3-Fluoro-2,2',4,4',6-penta-BDE</b>	<b>2163,12</b>
<b>F-119</b>	<b>3-Fluoro-2,3',4,4',6-penta-BDE</b>	<b>2164,12</b>
<b>F-160</b>	<b>4'-Fluoro-2,3,3',4,5,6-hexa-BDE</b>	<b>1929,12</b>
<b>F-201</b>	<b>4',6-Difluoro-2,2',3,3',4,5,5',6'-octa-BDE</b>	<b>2167,12</b>
<b>F-208</b>	<b>4'-Fluoro-2,2',3,3',4,5,5',6,6'-nona-BDE</b>	<b>2168,12</b>

## *Supplementary*

Inquire for  
a free  
catalogue



**Fig.:** GC-MS of nine F-PBDE / PBDE pairs (50 ng/mL each in iso-octane). Conditions: *m/z* 35-400; P., Leonards, P.E.G. and de Boer, J., RIVO, IJmuiden, the Netherlands.

### Recent literature

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- T.M. Kolic, K.A. MacPherson, E.J. Reiner, T. Ho; **Levels of Polychlorinated Dioxins and Furans, Dioxin-like PCBs and Brominated Diphenylethers in Biosolids**; *Organohalogen Compounds*, 61 (2003) 175
- Ontario Ministry of the Environment, Toronto, Canada (2002) Method BDE-E3430.
- Luthe, G., Leonards, Pim E.G., Kolic, T., Reiner, E., Liu, H. and Johansen, Jon E., **Study of the retention behaviour of monofluorinated analogues of PBDEs in gas chromatography**, *BFR conference*, 2004, Toronto, Canada.