Occurrence of Brominated Flame Retardants in Wildlife and the Environment

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Brominated flame retardants (BFRs), including polybrominated diphenyl ethers (PBDEs), polybrominated biphenyls (PBB), hexabromocyclododecane (HBCD) and tetrabromobisphenol-A (TBBPA), have been used extensively over the past two decades as flame retardants in many types of products including paints, plastic resins, electronic circuit boards and cases, furniture, building materials, textiles, carpets, and vehicles to reduce flammability. BFRs are incorporated into plastics either through reaction or addition.

Similarly to other persistent organic pollutants (POPs), these BFRs (except TBBPA) appear to be lipophilic and bioaccumulate in biota and humans.

Recent legislation banned certain PBDE congeners. EU directive 2003/11/EC prohibits the use of Penta-BDE and Octa-BDE for the member states of the European community. Therefore, analysis of PBDEs have received increased interest as a result of their known toxicity.

The most efficient trace analysis technique for BFRs proved to be high resolution GC–MS using an isotope dilution technique for quantification.

For this study different environmental samples (surface water, river sediments, sewage sludge) and biota samples (fish) from Germany were investigated for the BFRs as follows:
PBDEs: triBDEs (-17, -28), tetraBDEs (-47, -49), pentaBDEs (-99, -100), hexaBDEs (-138, -153, -154), heptaBDEs (-183, -190), octaBDEs (-196, -197, -201, -203), nonaBDEs (-206, -207, -208) and decaBDE-209; PBBs: (-52, -101, 153); TBBPA; Bromocyclen and HBCD.

All measurements were performed on the DFS high resolution GC–MS coupled to a TRACE GC Ultra gas chromatograph with split/splitless injector (THERMO-FISHER).The results will be presented in detail.