

OCCURRENCE OF BROMINATED FLAME RETARDANTS IN THE LLOBREGAT RIVER BASIN

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Llobregat river belongs to internal basin of Catalonia (Spain). The Llobregat river is 170 km long, with 4 957 km² of basin surface. It comes from the north west of Catalonia and flows into the Mediterranean sea, close to Barcelona. The Llobregat river has been polluted by the effluents from different industries located along the basin. The river can also receive surface run-off from agricultural areas in the last section of its basin, and especially from the rivers Anoia and Cardener, tributaries of Llobregat river. A significant number of wastewater treatment plants have been thus set up along the river during the last decade for improvement of the water quality. Due to the diverse sources of pollution, a broad spectrum of organic chemicals including hydrocarbons, pesticides, surfactants, flame retardants and plasticizers can be found at high levels in the river water.

On the other hand, it is known that the contamination in aquatic environment includes, together with other persistent organic pollutants (POPs), a variety of brominated flame retardants (BFRs), which are dispersed worldwide. Flame retardants are chemicals that are added to polymers which are used in plastics, textiles, electronic circuitry and other materials to prevent fires. However, there are approximately 75 different bromine-based compounds in production and commercial use as additives to polymeric products. The PBDEs have attracted the most attention, due to their persistence and hydrophobicity, two characteristics that make them amenable to bioaccumulation and biomagnification (Eljarrat et al, 2004). Due to their toxicological effect, the use of penta- and octa-BDE has been banned in Europe since 2004. In response to increasing international regulations on BFR formulations, alternative additive flame retardants for achieving commercial product fire safety standards are being developed and used (Verreault et al., 2007). Some of these non-BDE BFRs are pentabromoethylbenzene (PBEB), hexabromobenzene (HBB), 2,2',4,4',5,5'-hexabromobiphenyl (BB-153), 1,2-bis(2,4,6-tribromophenoxy)ethane (BTBPE) and decabromodiphenylethane (DBDPE). PBEB, HBB, BTBPE and DBDPE has been detected in environmental samples of North America and Europe (Pim et al., 2008;

Verreault et al., 2007; Gauthier et al., 2007). In addition, there is little or no toxicological data available for wildlife or humans for these additive BFRs.

The present study investigated the occurrence of 41 mono- to deca-BDE in sediments sampled from four points along Llobregat river and three points from Anoya river, a tributary of Llobregat river. Different sampling campaigns were carried out: June and October 2005 and June 2006. Furthermore, we measured additional set of BFRs including PBEB, HBB, BB-153, BTBPE and DBDPE. The analytical method was based in selective pressurized liquid extraction (SPLE) without further clean up step using aluminium oxide neutral and Hydromatrix. Extraction cell was heated to 100° C and extraction was carried out using a mixture of hexane:CH₂Cl₂ (1:1) at 1500 psi (De la Cal et al., 2003). Analysis by gas chromatography coupled to mass spectrometry (GC-MS) working with negative ion chemical ionization (NICI) was done. The operating conditions were: 250°C of ion source temperature, ammonia as chemical ionization moderating gas at an ion source pressure of 1.9 x 10⁻⁴ Torr. The experiments were carried out monitoring the two most abundant isotope peaks from the mass spectra corresponding to *m/z* 79 and 81 ([Br]). A serie of PBDEs and also some of the non-BDE BFRs were detected in the analysed sediments at levels of ng/g dw.

References

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